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Proceedings:

**The 4th International Conference on Economics
2023 (ICE2023)**

**Building a Sustainable Future: Navigating the
Economic Realities of Environmental, Social &
Governance Challenges**

November 28-30, 2023

Shangri-La Tanjung Aru, Kota Kinabalu, Sabah, Malaysia

Editors:

Caroline Geetha

Sarma Aralas

Roslinah Mahmud

Beatrice Lim Fui Yee

Khairul Hanim Pazim@Fadzim

Toh Pei Sung @ Sharon

Dayangku Aslinah Abd Rahim

Siti Hajar Samsu

Mohammad I'sa Abd Jalil

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PREFACE

First of all, we pray and give thanks unto our God Allah SWT, who has given us mercies and blessings to complete this publication of Proceedings of International Conference on Economics 2023 (ICE 2023). This conference is organized by the Faculty of Business, Economics and Accountancy, UMS under Centre for Economics Development and Policy (CEDP) in collaboration with the Sabah Institute of Development Studies (IDS), Sabah Development Economics and Investment Authority (SEDIA) and Centre for Future Labour Market Studies (EU-ERA).

The aim of this proceeding is to provide references to ICE2023 participants and readers who were not able to attend this conference in 2023. This conference is held once in every 2 years at Kota Kinabalu, Sabah Malaysia. ICE 2023 is a venue for researchers, academicians, policy makers and individual participants to present and share findings on their research in business, economics, and accountancy.

The theme for ICE 2023 is “Building a Sustainable Future: Navigating the Economic Realities of Environmental, Social & Governance Challenges” encompasses a comprehensive and forward-looking approach to addressing the intricate interplay between economic considerations and the broader issues related to the environment, social dynamics, and governance practices. This aspect underscores a commitment to fostering development and progress that is enduring and capable of meeting the needs of the present without compromising the ability of future generations to meet their own needs. It implies a focus on sustainable practices, whether in business operations, economic policies, or societal initiatives, that aim to balance economic growth with environmental and social responsibility.

Over 100 regional and global participants from members of academia, business and government attended ICE 2023. These proceedings record the refereed papers presented at the conference. All full-length papers and work-in-progress abstracts were submitted to a double-blind peer-review process. All the submitted papers in the proceedings have been peer reviewed by the reviewers. We thank all authors, reviewers, and participants for their contributions. Hopefully, these proceedings provide benefit to all in various ways to enhance their research in the respective fields.

Thank you.

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Will Higher Wages Benefit the Economy? The Effects of Labor Income Share on Macroeconomic Variables in Malaysia

**Nurul Sakinah Ngaini^{a,b,*}, Mohd Yusof Saari^{a,b,c}, Muhammad Daaniyall Abd Rahman^{a,b},
Muzafar Shah Habibullah^{b,d}, Muhamad Zharif Luqman Hashim^{a,b}**

^aSchool of Business and Economics, Universiti Putra Malaysia, Malaysia, 43400 UPM Serdang, Selangor, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Malaysia,

^cMinistry of Human Resources and Emiratization, Dubai, United Arab Emirates (UAE)

^dPutra Business School, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

*Corresponding author email: nnsakinah@gmail.com

Abstract

In Malaysia, household expenditure drives about 60% of the economy. This suggests that increasing aggregate demand is crucial for economic growth. As demand is a function of labor income, raising the latter puts more money into the pockets of consumers, which eventually facilitates feedback effects on the goods and factor markets and potentially triggers macroeconomic structural changes. Having these effects in hand raises a concern on the extent to which the increase in labor income could influence selected macroeconomic variables, such as shadow economy, female labor force participation rate, technology, labor productivity, foreign workers, and skilled-related underemployment. These are some structural issues pointed out in the Twelfth Malaysia Plan (2021-2025). In the pursuit of achieving targets to increase labor income to GDP from 37.1% in 2020 to 40% by 2025, this paper attempts to examine the impact of labor income on the selected macroeconomic variables using annual data from 2005 to 2021 and employing the Ordinary Least Square (OLS) with robust standard error due to Newey-West procedure. Our results indicate that the labor income could boost female labor force participation rate, labor productivity, and technological innovation. Meanwhile, it is also found that increase in the labor income could dampen the prevalence of shadow economy, skilled-related underemployment, and dependency on foreign workers at various skill levels. Therefore, a policy that targets improving labor income could have greater potential to solve various structural issues inflicted on the nation for decades. Whilst the present study provides empirical evidence on the macroeconomic perspective, it is of great importance for the policy makers to gauge a deeper understanding on such effects at the microeconomic side.

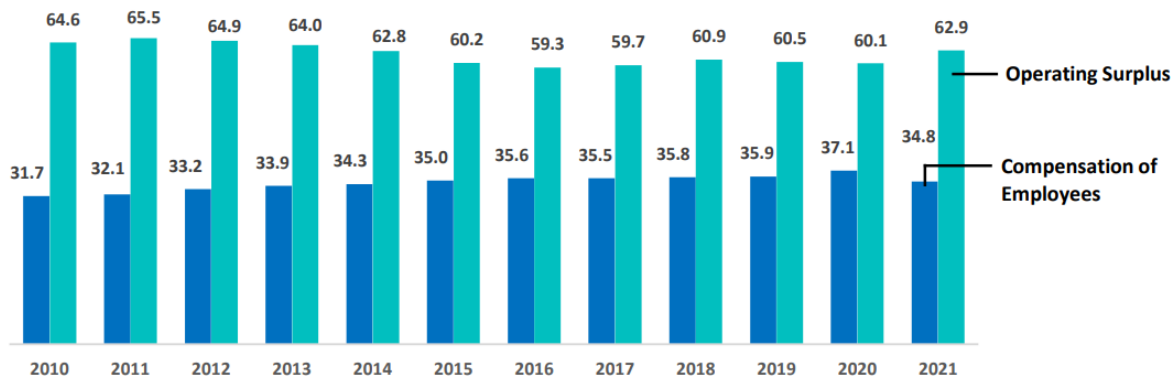
Keywords: labor income, female labor force participation rate, technology adoption, labor productivity, shadow economy, Malaysia

Introduction

The national account identity reveals the equality of national income or Gross Domestic Product (GDP) with respect to production, expenditure, and income approaches. The latter approach is seldom given research attention due to limited information. It is perceived that the total income of the nation is essentially shared by labour and capital owners (employers). Income received by labour is measured by compensation of employees (CE), also known as labour compensation. Whereas, income for capital owners is represented by profits, rents, and other forms of income generated by enterprises, which are also known as operating surplus (OS).

In Malaysia, the share of compensation of employees (CE) to GDP is considerably low, despite an increase from 31.7% in 2010 to 35.9% in 2019, as shown in Figure 1. The federal government aims to increase this share to 40% by 2025, as targeted in the Twelfth Malaysia Plan (12th MP). Though it may seem like a far-reaching goal, when compared to other countries such as Germany (53.4%), the United Kingdom (48.7%), Australia (47.2%), the Republic of Korea (47.5%), and Singapore (39.9%) in 2019, Malaysia's share of labour compensation is relatively low.

Figure 1
Share of compensation of employees and operating surplus to gross domestic product,
2010 - 2021 (%)



Source: Department of Statistic Malaysia (2022)

The low share of compensation of employees (CE) in Malaysia is related to the structural issues faced by the country. As stated in the 12th Malaysian Plan (RMKe-12) document, untapped female participation, a high dependency on low-skilled foreign workers, and skill mismatches are some of the structural issues that can contribute to low wage distribution among local workers in Malaysia. Since 60% of total household incomes come from employee wages, the low share of CE could lead to increased income inequality between workers and employers. This situation is exacerbated when the world is hit by events like COVID-19, leading to more workers becoming unemployed and businesses ceasing operations. Therefore, interventions are needed to ensure that workers receive an equitable share of the distribution based on their productivity, thereby boosting overall company production.

This study attempts to assess the impact of labour income on selected macroeconomic variables, particularly pertaining to the core structural issues in Malaysia. It is important to empirically assess

the impact because understanding the relationship between labour income and these variables can provide further insights into potential policy measures that can address the challenges posed by the aforementioned structural issues and promote economic stability and equity in the country.

Literature Review

Cross-country studies (Lupu et.al, 2022) shows that increment in wage will generate more income to businesses. Study made by Lupu et. al, 2022 shows that there is a positive correlation between GDP growth and wage growth in Eastern European countries. As GDP increases, wages also tend to increase, suggesting that economic growth drives wage share. However, these impacts are mostly short-term and only supported in some European countries to catch up with the Western states. Meanwhile, other studies such as Growiec J., et. al, 2018, Ibarra and Ros 2019, Abreu and Lopes, 2021 had also made a study on the relationship between wages share and economic growth with positive correlation. This is because, the higher the wages obtained by workers, the more they will spend, thus increasing the profit of the firm and its output.

In Malaysia, there are not many studies that have been made on understanding the increment in wage on the economy. The Department of Statistic had published the trend of the Malaysian salary and wage data from 2011 to 2019, which shows that Malaysia compensation of employees (CE) had remained positive but has a very low percentage share to GDP. This is caused by the low value-added and labour-intensive industries in Malaysia. Moreover, a study from Bank Negara Malaysia (BNM) on the outlook and policy in 2021 states that prevalence of the low-cost production model and high dependence on low-skilled foreign workers discourages productivity enhancements, and depresses wages from the observing the trend of wages, productivity through value-added per worker and size of non-citizen by sectors. The discourse on wages has been a persistent subject among private sector employees, featuring prominently in government initiatives such as the 12th Malaysia Plan, as well as in discussions within various ministries.

However, from an empirical analysis point of view there are a limited number of studies made to investigate the relationship between macroeconomic indicators and labour share. A study from Growiec J., 2012 used panel data to identify the determinants of labour share. The empirical findings shows that sector-specific factors, ownership structure, human capital, labour market characteristics, and firm demographics contribute to the growth of labour share. Furthermore, empirical studies on wage share and economic growth had also been made by Karabarbounis and Neiman, 2014, and Charpe, Bridji, and McAdam, 2019 that focuses in developed countries. Hence, this study aims to bridge the empirical analysis gap by evaluating the influence of labour share on macroeconomic indicators in Malaysia, this study will also provide valuable insights for policy development aimed at enhancing wage distribution in Malaysia.

Methodology

In a stochastic econometric model, the macroeconomic variables are determined randomly based on the study of Kindler. A, Golo. N, and Solomon. S on the Stochastic Agent-Based Simulation of the Role of Labor in the Economy, where the macroeconomic variables are chosen based on the discussion from academic and economics practitioners as stated in the RMKe-12. The model is as follow;

$$\text{Macro}_{jt} = \alpha_0 + \alpha_1 \text{CoE}_t + \varepsilon_t$$

where Macro_{jt} is the dependent variable represented by six macroeconomic indicators, which are woman labour force participation rate, labour productivity, technology adoption, shadow economy, skill mismatch and the low-skill foreign workers. COE_t is the compensation of employees. The error term, ε_t , is assumed to have zero mean and constant variance. The parameters are elasticities that suggest the response of Macro_{jt} with changes in COE_t . All variables are transformed into logarithm.

Technology adoption is measured by component of total patent applications by both non-residents and residents (pattot), research and development expenditure to GDP (rndy), number of researchers in R & D (rndpc), number of scientific and technical journal articles (journal), number of technicians in R & D (techy), and total trademark applications by both non-residents and residents (tmtot). Technology Index is computed as $\log((0.145694*\text{pattot}) + (0.172612*\text{rndy}) + (0.175956*\text{rndpc}) + (0.163893*\text{tmtot}) + (0.176246*\text{journal}) + (0.165598*\text{techpc}))$.

Whereas, skill mismatch is computed by calculating the skilled workers working in semi- and low-skilled jobs. The skilled workers are categorized by education level, where workers who have a diploma, degree and above are categorized as skilled workers. While semi and low-skilled jobs are categorized by 1 digit MASCO, where occupations from digit 4 to 8 are categorized as semi-skilled jobs and digit 9-elementary occupations are categorized as low-skill jobs. The presence of skill mismatches indicates instances where skilled workers are not fully utilizing their capabilities, leading to a situation of underemployment.

Data for woman labour force participation rate, labour productivity, low-skilled foreign workers, employed person by education level and occupations by 1 digit MASCO were compiled from the Department of Statistics Malaysia; while data on total patent applications by both non-residents and residents, research and development expenditure to GDP, number of researchers in R & D, number of scientific and technical journal articles, number of technicians in R & D, and total trademark applications by both non-residents and residents were collected from the World Development Indicators available at the World Bank database. Shadow economy measures were estimated using the Modified Currency Demand Deposit Ratio (MCDR) approach and the estimates by World Bank using Computable General Equilibrium (CGE) and Multiple Indicator and Multiple Causes (MIMIC) approaches.

To estimate the above model, we employ the Ordinary Least Square (OLS) with robust standard error. To do this we estimate using the Newey-West approach that is correct for both autocorrelation and heteroscedasticity.

Empirical Results

Study from Growiec J. (2012) stated that labour market condition, market structures and firm demographics plays an important role in determining the labour share, which in other words is the share of compensation of employees to GDP. These factors are similarly observed in this study, where the labour market condition refers to the woman labour force participation, shadow

economy, skilled mismatch and low-skilled foreign workers. While the market structure and firm demographic can be referred to the labour productivity and technology adoption in the firm level of the country. Our study findings are aligned with the findings by Growiec J (2012), corroborating the trends identified in prior research.

From the analysis, it is found that all of the macroeconomic variables significantly correlate with the CoE as seen in Table 1 at 1% level of significance. Women labour force participation rate, labour productivity, and technology are positively correlated with the changes of labour share at 1.1%, 2.2% and 3.7% respectively for every 1% in CoE. Therefore, the higher the share of labour compensation to GDP, the higher the participation of women in the labour force, labour productivity and adoption of technology in the industry. In addition, each of these variables exhibits a robust correlation with the labour share, exceeding 50%.

Whilst, the shadow economy, skill mismatch, and the presence of low-skilled foreign workers exhibit an inverse association with the Compensation of Employees (CoE) with elasticities of -0.5, -2.7, and -2.3, respectively. This implies that a 1% increase in the labour share will decrease the size of the shadow economy at 0.5%, indicating a positive transformation of the industry from non-taxable to taxable. Moreover, increasing in the CoE will also decrease skill mismatch by 2.7% and the use of low-skilled foreign workers by 2.3%, thereby enhancing the overall economic output of the country.

Table 1
Results of impact of COE on Macroeconomic variables

Models	Constant	Macroeconomic indicators	Adjusted R-square
1. Woman labour force participation rate	-0.1082*** (-0.3943)	1.1495*** (14.8215)	0.9075
2. Labour productivity	-3.4973*** (-2.1454)	2.2416*** (4.8638)	0.6716
3. Technology	-13.0702*** (-5.1816)	3.7385*** (5.2423)	0.7331
4. Shadow economy	5.2653*** (14.7515)	-0.5473*** (-5.3375)	0.8091
5. Skill mismatch	23.1186*** (9.8216)	-2.7453*** (-4.3793)	0.4878
6. Low-skilled foreign workers	21.2295*** (7.1548)	-2.3234*** (-2.9404)	0.3091

Notes: Asterisks ***, ** and * denote statistically significant at 1%, 5% and 10% level, respectively. denotes adjusted R-squared. All variables are in logarithm. Dependent variables are women labour force participation rates (lfpr); technology indices (innovation), labour productivity, measures of shadow economy (shadow), skilled mismatch and low-skilled foreign workers. All models have been estimated using OLS with robust standard error due to Newey and West (1987) that correct for both autocorrelation and heteroscedasticity. Variable CoE denotes compensation of employees and woman labour force participation rate denotes female labour participation rate estimated by DOSM. Labour productivity is computed by deflating real GDP with total employment in Malaysia. Technology index is computed as $\log((0.145694 * \text{pattot}))$

$+(0.172612*rndy)+(0.175956*rdpc)+(0.163893*tmtot)+(0.176246*journal)+(0.165598*techpc)$). Shadow economy measures were estimated using Modified Currency Deposit Ratio (MCDR) approach and estimates by World Bank (using Computable General Equilibrium (CGE) and Multiple Indicator and Multiple Causes (MIMIC) approaches. Skilled mismatch is estimated through identifying the skill worker (worker with tertiary education) working in semi- and low skill jobs (based on MASCO classification). Low-skilled foreign workers are obtained from DOSM.

Source: Authors own estimates

Therefore, these findings highlight the need to increase the wage for workers. As higher labour compensation is found to be the answer for some of the structural issues in Malaysia. Among the structural issues are low labour force participation rate (LFPR), inequality in income distribution as well as slow rate of technological innovation and adoption. The implication of this study can be used for some policy intervention. From the data analyzed in Table 1, the conclusion for each variable is explain as follows;

Higher wages attract more woman in the labour force

Firstly, higher wages attract more women in the labour force. When labour shortages arise, offering higher wages tends to attract more women to join the workforce, as indicated by empirical data. These findings emphasize the importance of a wage-focused policy approach in achieving the targeted women's labour force participation rate of 57.0% by 2025 under the Twelfth Malaysia Plan.

Higher wages promote technological adoption

Adopting technology in the production process is a way to increase output by optimizing the use of production inputs such as labour and energy (Maneejuk and Yamaka, 2020). Technological adoption is found to complement the demand for skilled workers that help to increase wages. The empirical assessment as shown in Table 1 indicates that adoption to technology leads to higher labour compensation and higher skilled workers. Thus, firms must be willing to share their wealth by increasing wages that commensurate with higher skills.

Higher wages improve economic efficiency by reducing the size of shadow economy

Shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities to avoid payment of taxes and social security contributions as well as to avoid complying with labour market standards and administrative obligations (Schneider, 2011). The size of the shadow economy in Malaysia for the period of 2010-2019 is estimated at approximately 21.2% of GDP. Shadow economy creates economic inefficiencies as it could potentially reduce government tax revenue, cause a fragmented labour market and lower economic growth. Increasing wages will possibly decrease the size of shadow economy.

Higher wages promote labour productivity growth

Productivity growth is the primary determinant of an economy's long-term growth and higher wages. If an employer is willing to share the wealth by raising wages, employees will consistently exert extra efforts in response to higher wages, in line with the so-called “efficiency wage” theory (Riley and Bondibene, 2017; Georgiadis, 2013). Workers, therefore, may be more motivated to work with higher pay that subsequently contributes to higher productivity. The analysis in Table

1 confirms this expectation, showing that productivity tends to expand by 2.2% for every percentage increase in wage.

Higher wages reduce the dependency on low-skilled foreign labour

According to the Department of Statistic Malaysia (DOSM), low-skilled foreign workers in Malaysia in 2021 made up about 8.0% or 1.2 million persons of the total employments, of which almost 91% of them occupied the low-skilled and semi-skilled employments. The economic costs of extensively relying on low-skilled foreign workers in Malaysia are well documented in the literature, which highlighted the high reliance of low-skilled foreign workers would suppress the domestic wage growth and adversely affect productivity growth (Bank Negara Malaysia, 2018). The empirical analysis as explained in Table 1 indicates that the size of low-skilled foreign workers can be reduced by 2.3% for every percentage increase in labour compensation. The results suggest that wage adjustment is the most effective market-based price mechanism to be used as a policy tool to reduce the dependency on low-skilled foreign workers.

Higher wages reduce the size of skill mismatch

Skills-related underemployment is a condition where workers hold skills or qualifications higher than that required to perform their jobs. Indirectly the skill-related underemployment can be portrayed as the indicator for the skill underutilization which measures those workers with tertiary education and working in the semi- and low-skilled occupations. In 2021, the skill-related underemployment increased by 6.3% to record 1.9 million workers compared to 1.8 million in 2020 (DOSM, 2022b). Persistent instances of skills-related underemployment in Malaysia, akin to unemployment, signify a structural issue (Zakariya, 2014). Addressing this challenge is crucial, as sustained underemployment hinders the full realization of workers' potential, particularly for those with higher skills engaged in lower-skilled jobs, where increased labour compensation, as indicated in Table 1, could potentially reduce skills-related underemployment by 2.7% for every percentage point increase. This finding underscores the potential of wage-focused policy interventions to stimulate automation, technological upgrading, and heightened demand for skilled occupations, ultimately mitigating skills-related underemployment (Lee and Wie, 2015).

Conclusion

In conclusion, there is a need to increase the wages of workers, especially after COVID-19 pandemic as price increases and job loss is higher. From the workers' perspective, an increase in wage is necessary to compensate for the higher prices of goods and services. Generally, employers claimed that wage increases could inflate prices, leading to market distortions that could pose a threat to the economy. Nevertheless, cross-national investigations, exemplified by Lupu et al. (2022), indicate that an increase in wages correlates with a subsequent augmentation in business income—a trend substantiated by our empirical discoveries.

As two-thirds of household income is generated from the labour market, changes in wages can have a positive impact on the economy as well. This is because households provide labour input to the economic sector and receive wages in return. The more wages earned, the higher consumption of goods and services, hence generating additional profits for the business sector.

Therefore, this study has provided some insights to the possible scenario when wages are adjusted higher than the current rate. The empirical analyses clearly show the role of higher wages in addressing pertinent structural issues such as women participation in the labour market, technological adoption, shadow economy and skills-related underemployment. However, it is still crucial to have a thorough comprehension of the various aspects that come with higher income, for example social mobility, income inequality, and sustainable development. Thus, more dedicated studies on the possible impact from the multidimensional aspects of wages are needed, as Malaysia aspires to become a high-income economy.

References

Abreu D. S. and Lopes S. (2021). How to Disappear Completely: Nonlinearity and Endogeneity in the New Keynesian Wage Phillips Curve. *Applied Econometrics Letters* 28 (9): 774-778.

Bank Negara Malaysia. (2021). Outlook and Policy in 2021. Annual Report

Charpe, M., Bridji S., and McAdam P. (2019). Labor Share and Growth in the Long Run. ECB Working Paper No. 2251.

Department of Statistics Malaysia. (2021). Household Income & Basic Amenities Survey Report 2020. Putrajaya: Department of Statistics Malaysia.

Department of Statistics Malaysia. (2022). Wages in Malaysia: The Story Behind the Statistics. Newsletter. Putrajaya: Department of Statistics Malaysia

Department of Statistics Malaysia. (2022a). Gross Domestic Product Income Approach 2021. Putrajaya: Department of Statistics Malaysia.

Department of Statistics Malaysia. (2022b). Labour Force Survey (LFS) Time Series Statistics by State, 1982-2021. Putrajaya: Department of Statistics Malaysia.

Economic Planning Unit. (2020). Twelfth Malaysia Plan 2021-2025. Putrajaya. Economic Planning Unit.

Ibarra, C. A., and Ros J. (2019). The Decline of the Labor Income Share in Mexico, 1990-2015. *World Development* 122: 570–584.

Karabarbounis, L., and Neiman B. (2014). The Global Decline of the Labor Share. *The Quarterly Journal of Economics* 129 (1): 61–103.

Kindler A. Golo N. and Solomon S. (2016). Stochastic Agent-Based Simulation of the Role of Labor in the Economy. *Complex Systems, Sustainability and Innovation*. Chapter 6.

Georgiadis A. (2013). Efficiency Wages and the Economic Effects of the Minimum Wage: Evidence from a Low-Wage Labour Market. *Oxford Bulletin of Economics and Statistics*. 75:6. 962-979.

Growiec J. (2012). Determinants of the Labor Share, *Eastern European Economics*, 50:5, 23-65.

Growiec, J., McAdam P., and Mućk J. (2018). Endogenous Labor Share Cycles: Theory and Evidence. *Journal of Economic Dynamics and Control* 87: 74–93

Lee J. and Wie D. (2015). Technological Change, Skill Demand, and Wage Inequality: Evidence from Indonesia. *World Development*. 67. 238-250.

Lupu D., Cărausu D. and Ifrim M. (2022). Wage share and economic growth: evidence from Eastern Europe, *Applied Economics Letters*, 30:6, 772-779.

Riley, R. and Bondibene, C.R. (2017). Raising the Standard: Minimum Wages and Firm Productivity. *Labor Economics*, 27-50.

Schneider, F. (2011). The Shadow Economy and Shadow Economy Labor Force: What Do We (Not) Know?. Discussion Paper 5769. Institute for the Study of Labor, Bonn.

Zakariya, Z. (2014). Wage Effect of Over-education and Mismatch in Malaysia: A Random Effect Approach. *Jurnal Ekonomi Malaysia*, 48, 3-17.

What are the environmental impacts of economic activity in the future? Environment decoupling effect analysis in Malaysia for 2021 - 2040

Muhamad Zharif Luqman Hashim^{a,b,*}, Muzafar Shah Habibullah^{b,c}, Mohd Yusof Saari^{a,b,d}, Muhammad Daaniyall Abd Rahman^{a,b}, Syamsul Herman Mohammad Afandi^a, Nur Azreen Mokhyi^{a,b}

^a **School of Business and Economics**, Universiti Putra Malaysia, Serdang, Malaysia

^b **Centre for Future Labour Market Studies (EU-ERA)**, Putrajaya, Malaysia

^c **Putra Business School**, Serdang, Malaysia

^d **Ministry of Human Resources and Emiratisation**, Dubai, United Arab Emirates

*Corresponding Author: zharifluqman@gmail.com

Abstract

Progressing towards a green economy implies an absolute reduction in resource consumption and mitigating environmental impacts while simultaneously promoting the growth of economic activities (e.g. gross domestic product) and social well-being (e.g. household income). Descriptively, the links between economic, social and environment can be assessed by using the decoupling factor or index. The presence of decoupling signifies that economic growth occurs with a decreased resource utilization per unit of production, consequently diminishing the environmental footprint associated with economic activities. Hence, the purpose of this paper is to examine the use of resources in economic and social development as well as its impact on the environment covering the periods of 2021 – 2040. To examine this impact, we combine and integrate the augmented input-output (IO) with econometric models that enable us to simulate long-term scenarios. In addition to the ability to provide long-term scenarios, the augmented IO-econometric models allow users and modelers to link between two or more variables in effective ways. Our results show that there is the existence of decoupling among selected economic, social and environment indicators. For example, a decoupling trend is found between gross domestic product (GDP), solid waste and CO2 emission, between 2021 and 2040. Meanwhile, conventional GDP also has a positive decoupling factor when compared with environmentally-adjusted GDP that accounts for four quantifiable environmental costs namely solid waste management, wastewater treatment, flooding and carbon emission. Based on these findings, the paper includes a discussion of potential policy options that government agencies can consider to mitigate the environmental impact of economic activities to promote sustainable economic growth.

Keywords: Green economy, decoupling, augmented IO-econometric models, Malaysia.

1. Introduction

Over the last few years, the world has faced booming economic growth and development because of the expansion and rapid development in the industry area. Due to rapid industrialization, Malaysia has felt historic growth in Gross Domestic Product (GDP) rates (Begum et al., 2015). The Department of Statistics Malaysia data shows that the GDP of Malaysia has increased strongly from RM908.10 billion in 2010 to RM1,390.64 billion in 2021. Wu and Chen (2017) mention that extensive use of natural resources due to greater economic growth increases severe ecological problems.

Gupta (2015) supported that there is a positive correlation between economic growth and environmental degradation. To be precise, one can only be achieved with the other. Several studies agree that environmental degradation increases in conjunction with economic growth but then decreases as the economy continues to prosper (Kuznets, 2019; Sephton & Mann, 2013; He & Richard, 2010). However, the international research body has questioned the country's ability to "grow the economy" away from the environmental problems (Busa, 2013; Caviglia-Harris et al., 2009; Jorgenson & Burns, 2007; Stern, 2004). Correspondingly, the traditional paradigm of economic growth has been challenged by many researchers with this is not only a risk to human beings (Steffen et al., 2011; Rockström et al., 2009) but uncontrollable growth also a major cause of unsustainability and will be contributed to social inequality, poor quality of life and political dissatisfaction (Van den Bergh, 2011; Priesnitz, 2009; Baykan, 2007).

This paper focuses on addressing two main questions: (i) is there any existence of decoupling among selected economic, social and environmental indicators in Malaysia; (ii) to what extent is economic growth impacting the environment. To examine this impact, we combine and integrate the augmented input-output (IO) with econometric models that enable us to simulate long-term scenarios.

2. Literature Review

From the green economy perspective, the choice of quantitative model should be determined based on the following three criteria: (i) economy-wide based model that integrates economic sectors, environmental and social indicators; (ii) consistency framework with the conventional national accounts of GDP; and (iii) availability of data to support the model. In relation to this, input-output (IO), social accounting matrix (SAM), computable general equilibrium (CGE) and system dynamics (SD) are the widely used techniques to assess and monitor green economy performances at the macro-economic level (see PAGE, 2017). Our literature review indicates that input-output is the most popular and widely applied for green economy and sustainability assessment tools (see for example, Bi et al., 2019; Mundaca et al., 2015; Endriana et al., 2015).

Application of the standard IO/SAM model may give biased results in certain circumstances (Szabo, 2022). The standard IO/SAM model is likely to underestimate the short-run effects of demand changes as it does not take into account macroeconomic income multipliers (Berck & Hoffmann, 2002). Given the fact that consumption does not simply follow a Keynesian income mechanism, but also has dynamic (life cycle) properties, these income multipliers should be applied very carefully (Heim, 2007).

It is important to note that the scope of the green macro-economic model is commonly large, involving large structural linkages between economic, social and environment indicators. Therefore, applying a single-static augmented IO model for a green macroeconomic model with large indicators is inadequate. As an alternative, we combine and integrate the augmented input-output with the econometric model (AIOEM) enabling us to integrate more indicators. The approach of linking IO and econometric models has been used extensively in the literature (see for examples, Mundaca et al., 2015; Rey, 2000).

3. Methodology

The integration of economic, social and environmental indicators in the AIOEM is illustrated in Figure 1. It can be seen that the economic, social and environmental indicators are inter-connected through individual models. The AIOEM is a demand-driven model, in which the impacts on economic, social and environmental indicators are steamed from the changes in final demands (domestic demand and exports).

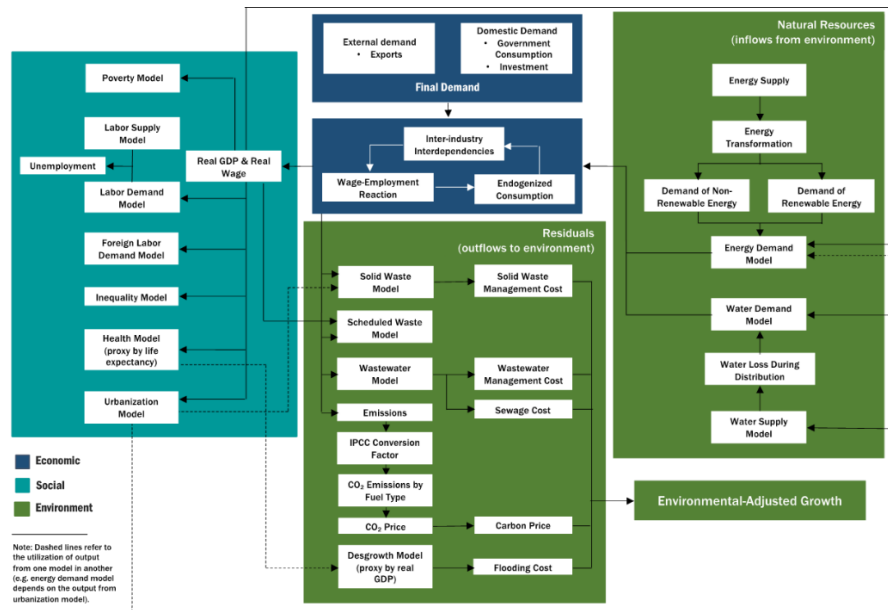


Figure 1
Detailing structure relations in AIOEM
Source: authors' illustration

The economic model in the AIOEM starts with the basic IO relation, in which the total output is determined by the endogenous Leontief inverse matrix and exogenous final demands. The augmented IO extends the standard model by treating private consumption as an endogenous component. In addition to that, the augmented IO also links the labor demand through a wage-employment reaction function. Altogether, the augmented IO includes three linkages in a loop—inter-industry, consumption and labor demand.

Databases that are used in the development of AIOEM are summarized in Figure 2. The database can be grouped into three types. Monetary national accounts data are used to run the augmented

IO model. For this purpose, data are sourced from the IO table and SAM for the latest benchmarking period of 2015. In addition to that, time series and cross-sectional economic data at sectoral levels are also compiled to support econometric models. Socio-economic data are used to model social indicators that connect directly to the economic model. Non-monetary data consist of mainly population, labor force, labor force participation rate (LFPR), employment, income inequality (Gini coefficient), poverty rates and life expectancy at birth. For monetary data, it includes wage and non-wage variables. Non-monetary environmental data include two types: (i) consumption of natural resources and environmental damages measured by the level of emissions/wastes released by the economic sectors and (ii) monetary environmental data involving the valuation of emissions/emissions.

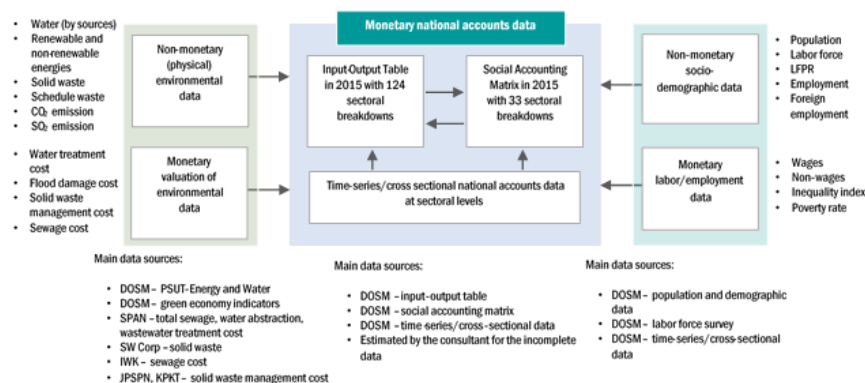


Figure 2
Summary of data used in augmented IO-econometric models
Source: authors' compilation

The AIOEM require estimating coefficients or parameters and growth rate values as input for calibrating and forecasting. Estimating these parameters using the econometric approach requires a sufficient number of time series observations. Unfortunately, we are facing the following constraints: limited number of time series data for reliable estimation, unavailability of some data and incomplete data with missing observations. To circumvent these constraints, missing data are usually interpolated using simple averages or the application of certain econometric approaches.

In this study, we apply both approaches, depending on the situation. For economic variables having one missing observation between two immediate years, we calculate the values of the missing observation using the simple (mean) average approach. However, for missing observations of more than two years, we interpolate the missing observations using a specific econometric approach. The estimated coefficients from the estimated regression equations are used to replace the missing observations. In all cases, all regressions are estimated using real gross domestic product (GDP), total population, time, time-square, and time-cube as potential predictors (regressors), in explaining the variation in the dependent variable. We conjecture that most economic variables are closely related to the movement in real GDP (proxies for level of economic development), total population (proxies for domestic demand), time (proxies for linear relationship), time-square (proxies for nonlinear, quadratic relationship), and time-cube (proxies for nonlinear).

Aside from interpolation, some data needs to be extrapolated to obtain the missing observations. The extrapolation is only conducted for data outside of the data range. For example, the data for

solid waste generated by households is only available for the period 2013-2018. Thus, the data before 2013 are extrapolated to give the predicted data for econometric analysis.

A decoupling analysis is conducted for the selected green economy indicators with the aim to gauge the extent to which the environmental indicators are delinked from economic in short-term and long-term trends, in accordance to the baseline study periods. Before discussing the detailed results, it is important to recall the concept of decoupling in the economy. Figure 3 summarizes the essence of decoupling concept used in the fields of green economy and sustainability.

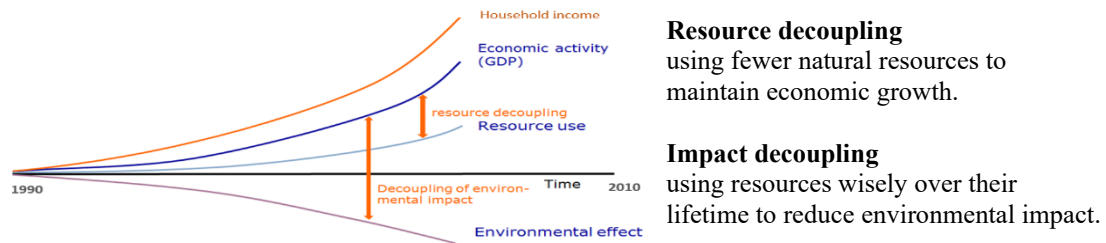


Figure 3
Aspects of decoupling
Source: Adopted from UNEP, 2011

In Figure 3, the presence of decoupling means that the economic grows using fewer resources for every unit of production and reducing the environmental impact of any resources used by economic activities. These are the ideal results that are expected to be shown from any green economic assessment, including this study.

4. Result

The results for the decoupling trends between GDP and environment indicators covering the periods of 2021-2040. Results suggest the presence of decoupling between GDP, solid waste (*impact decoupling*), and water consumption (*resource decoupling*). Results are supported by the CAGR for solid waste and water consumption which are lower than GDP. For CO₂ emission, its CAGR is relatively higher than GDP, implying the absence of impact decoupling (see Figure 4).



Figure 4
Decoupling trends between GDP and environment indicators, 2021=100

Figure 9.6 gives the decoupling trends for wage, employment and environmental indicators for the periods 2021-2040. Wages present decoupling with the environment indicators as the wage growth rate is larger than the growth rate of solid waste and water consumption. CO₂ emission, on the other hand, shows the impact decoupling with wage until 2038 and the absence of impact decoupling from 2039 onwards. For employment, its CAGR is larger than solid waste resulting in the presence of impact decoupling, while resource decoupling with the water consumption. However, the employment does not decouple with CO₂ emission.

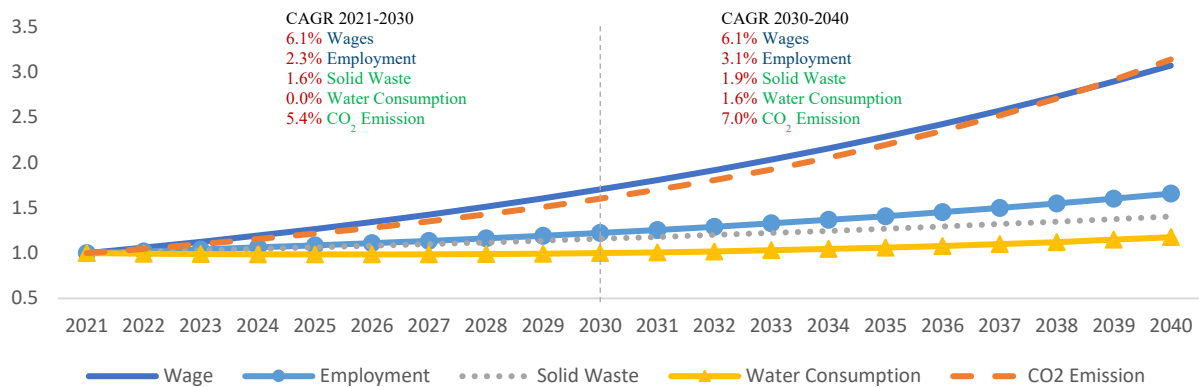


Figure 5

Decoupling trends between wage, total employment and environment indicators, 2021=100

Results for the environmental costs suggest carbon cost, solid waste management cost, wastewater treatment cost, and flood cost are expected to grow over the years due to the growth in the level of CO₂ emission, solid waste, water consumption and flood risk (see Figure 6). Specifically, flood costs and carbon prices are expected to grow at a larger rate compared to water treatment costs. The flood cost is projected to increase from RM1.65 billion in 2021 to RM4.33 billion in 2040.

Similarly, carbon cost is projected to grow from RM37.04 billion to RM116.25 billion between 2021 and 2040. On the other hand, solid waste management cost has shown positive growth rates between 2021 and 2040, with an accelerated growth of 1.6% and 1.9% for years between 2021-2030 and between 2030-2040, respectively.

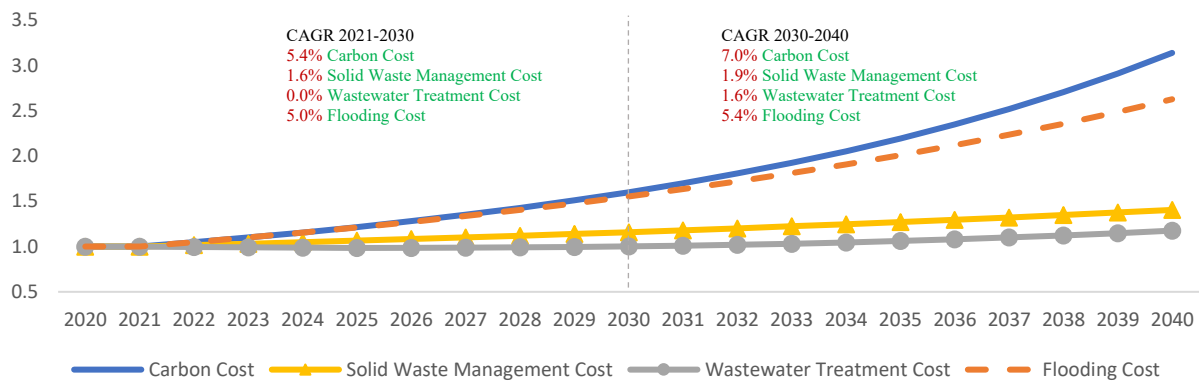


Figure 6

Trends of environmental costs, 2021=100

With the expectation of higher flood risk, CO₂ emission and other environmental degradation factors between 2021 and 2040, a small gap can be seen between GDP growth and environmental-adjusted growth (Figure 7). Specifically, the difference between GDP growth and environmental-adjusted growth is recorded between 0.5 – 1.0% within the simulation period. Interestingly, the environmental-adjusted growth shows a higher growth rate compared to the GDP growth rate between the years 2021-2030 (5.2%) and 2030-2040 (6.7%), respectively.

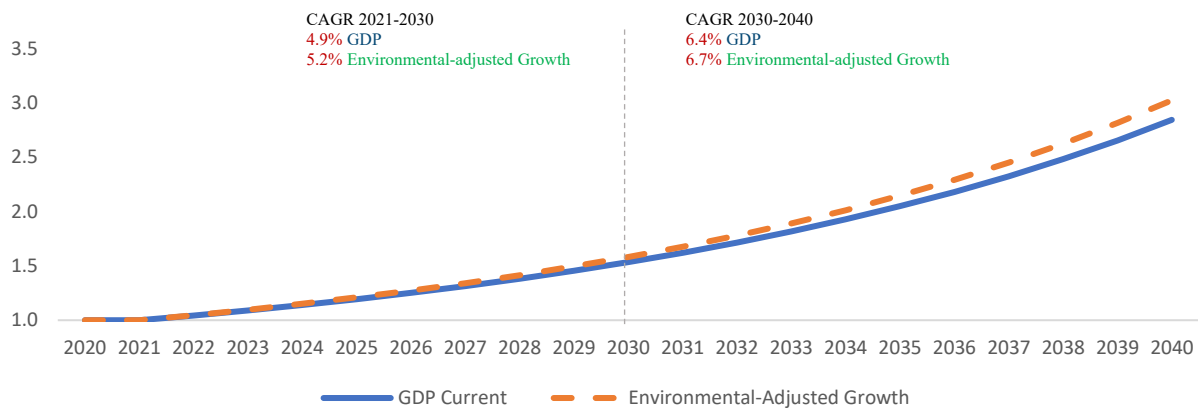


Figure 7
Trends of GDP and environmental-adjusted growth, 2021=100

5. Conclusion

It is generally observed that there is the existence of decoupling among selected economic, social and environment indicators. Impact decoupling indicates the use of resources to reduce environmental impact, while resource decoupling highlights the reduced dependency on resources to maintain economic growth. The impact decoupling is presence between GDP and solid waste, while GDP and CO₂ emission only decouple after the year 2030. This means that with the current economic situation, Malaysia is developed with less harm to the environment and the effect will be seen in the next 10 years. Meanwhile, resource decoupling appears between GDP and water consumption, indicating lesser water consumption is associated with economic growth.

The decoupling analysis on social and environment indicators shows the existence of impact decoupling between employment and solid waste, as well as resource decoupling between the former indicator and water consumption. In addition, the wage is also found to depict the presence of decoupling with all environment indicators. This is because the growth rate of wages is relatively high at 6.1% over the estimated years. The estimated environment costs are associated to carbon price, landfill cost, water treatment cost and flooding cost. The most significant trend in environment cost is led by flooding cost which is projected to grow at a larger rate compared to the carbon price and water treatment cost.

It is found that conventional GDP has a positive decoupling factor when compared with environmentally-adjusted GDP that accounts for environmental costs such as carbon price, landfill cost, water treatment cost and flooding cost. Subtracting these costs from the conventional GDP

calculation forms an alternative in presenting a ‘greener’ GDP growth for Malaysia. However, data limitation has become the main constraint to fully accounting for the environmentally-adjusted GDP as indicated by international organizations. By having more environmental costs with the highest accuracy that transformed into monetary units, then the measurement of environmentally-adjusted GDP can be further improved.

6. References

Baykan, B. G. (2007). From limits to growth to degrowth within French green politics. *Environmental Politics*, 16(3), 513-517.

Begum, R. A., Sohag, K., Abdullah, S. M. S., & Jaafar, M. (2015). CO2 emissions, energy consumption, economic and population growth in Malaysia. *Renewable and Sustainable Energy Reviews*, 41, 594-601.

Berck, P., & Hoffmann, S. (2002). Assessing the employment impacts of environmental and natural resource policy. *Environmental and Resource Economics*, 22, 133-156.

Bi, H., Xiao, H., & Sun, K. (2019). The impact of carbon market and carbon tax on green growth pathway in China: a dynamic CGE model approach. *Emerging Markets Finance and Trade*, 55(6), 1312-1325.

Busa, J. H. M. (2013). Dynamite in the EKC tunnel? Inconsistencies in resource stock analysis under the environmental Kuznets curve hypothesis. *Ecological Economics*, 94, 116-126.

Caviglia-Harris, J. L., Chambers, D., & Kahn, J. R. (2009). Taking the “U” out of Kuznets: A comprehensive analysis of the EKC and environmental degradation. *Ecological Economics*, 68(4), 1149-1159.

Endriana, L., Hartono, D., & Irawan, T. (2016). Green economy priority sectors in Indonesia: a SAM approach. *Environmental Economics and Policy Studies*, 18(1), 115-135.

Gupta, S. (2015). Decoupling: a step toward sustainable development with reference to OECD countries. *International Journal of Sustainable Development & World Ecology*, 22(6), 510-519.

He, J., & Richard, P. (2010). Environmental Kuznets curve for CO2 in Canada. *Ecological economics*, 69(5), 1083-1093.

Heim, J. J. (2007). *Was Keynes Right? Does Current Year Disposable Income Drive Consumption Spending?* (No. 0710). Rensselaer Polytechnic Institute, Department of Economics.

Jorgenson, A. K., & Burns, T. J. (2007). The political-economic causes of change in the ecological footprints of nations, 1991–2001: a quantitative investigation. *Social Science Research*, 36(2), 834-853.

Kuznets, S. (2019). Economic growth and income inequality. In *The gap between rich and poor* (pp. 25-37). Routledge.

- Mundaca, L., Román, R., & Cansino, J. M. (2015). Towards a Green Energy Economy? A macroeconomic-climate evaluation of Sweden's CO2 emissions. *Applied energy*, 148, 196-209.
- PAGE (2017). *The Integrated Green Economy Modelling Framework – Technical Document*. Washington: PAGE.
- Priesnitz, W. (2009). It's not about growth. *Nat. Life*, 126, 62.
- Rey, S. J. (2000). Integrated regional econometric+ input-output modeling: Issues and opportunities. *Papers in Regional science*, 79(3), 271-292.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and society*, 14(2).
- Sephton, P., & Mann, J. (2013). Further evidence of an environmental Kuznets curve in Spain. *Energy Economics*, 36, 177-181.
- Steffen, W. L., Rockström, J., & Costanza, R. (2011). How defining planetary boundaries can transform our approach to growth. *Solutions: For A Sustainable & Desirable Future*.
- Stern, D. I. (2004). The rise and fall of the environmental Kuznets curve. *World development*, 32(8), 1419-1439.
- Szabo, D. A. (2022). Use of digital e-learning technologies through the application of the SAM instructional design model in online medical education. *Geosport for Society*, 16(1), 38-47.
- UNEP. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers*. St-Martin-Bellevue: UNEP.
- Van den Bergh, J. C. (2011). Environment versus growth—A criticism of “degrowth” and a plea for “a-growth”. *Ecological economics*, 70(5), 881-890.
- Wu, X. F., & Chen, G. Q. (2017). Energy use by Chinese economy: A systems cross-scale input-output analysis. *Energy Policy*, 108, 81-90.

Heterogeneous Effects of Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI) on Economic Growth in Malaysia

Muhammad Faris Fikri Che Zakaria^{*a}, Muhammad Daaniyall Abd Rahman^{a,b}, Muhammad Anas Nabil Al-Fattah Mohd Yazid^{a,b}, Muzafar Shah Habibullah^{b,c}

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^cPutra Business School, Serdang, Malaysia

**Corresponding email: faris.czakaria@gmail.com*

Abstract

This research paper delves into the heterogeneous effects of two distinct forms of investment, namely Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI), on the economic growth of Malaysia. Foreign direct investment has played a pivotal role in shaping the economic landscape of Malaysia, while domestic direct investment represents the contribution of local businesses to the nation's growth. The primary challenge tackled in this study revolves around understanding the complex interactions between Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI) and how each of them influences Malaysia's economic growth. This study examines the correlation between FDI and DDI, with a primary focus on discerning the heterogeneous impacts towards economic growth in Malaysia. This analysis comprises two levels: a national-level and a sectoral-level analysis, with a focus on sectors that make the most significant contributions to employment. The econometric estimation which is Ordinary Least-Square (OLS) method with robust standard error has been employed to rectify both autocorrelation and heteroscedasticity. The results of this national-level analysis indicate that the correlation between FDI and economic growth in Malaysia is weaker compared to the correlation between DDI and economic growth. On the other hand, for sectoral level, FDI inflow shows the positive impact towards the service sector and manufacturing sector. As Malaysia expands its global reach, the government has the potential to significantly boost growth in the service and manufacturing sector to overcome the low contribution of FDI towards Malaysia's economic growth.

Keywords: heterogeneous effect; two-level analysis; economic growth

1. Introduction

Economic growth is a commonly used indicator to gauge a country's progress in economic development. When the economy shows higher growth rates, it signifies significant advancements across various sectors. At the same time, investment is crucial for sustaining economic growth because a higher GDP is closely linked to a higher investment. Furthermore, increased economic growth signifies enhanced productivity and holds the potential to drive long-term economic development. In the narrative, investment can play an important and vital role in driving long-term economic growth (Syaparuddin, 2019).

In the first quarter of 2023, Malaysia attracted RM71.4 billion in approved investments across various sectors, boosting its status as a leading investment destination. These investments span manufacturing, services, and primary sectors, set to drive economic growth and create 23,977 jobs nationwide. Notably, Foreign Direct Investment (FDI) outpaces Domestic Direct Investment (DDI), comprising 52.5% of the total approved investments at RM37.5 billion. Knowing the pivotal role of investment for economic growth, the investment heterogeneity has received less attention in the policy arguments.

This study addresses the central challenge of comprehending the intricate dynamics at play within the relationship between Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI), and their respective impacts on the economic growth of Malaysia. This paper aims to examine how FDI and DDI correlated to each other, with a primary focus on discerning the heterogeneous impacts towards economic growth in Malaysia. Secondly, this analytical framework encompasses a dual-tier examination, specifically characterized by a national-level and a sectoral-level analysis, with a particular emphasis on sectors that yield the most substantial employment contributions.

2. Literature Review

There are various time series that show foreign direct investment affects domestic direct investment. The impact relies on the period selected, data processed and the other control variables. The impact of foreign direct investment on domestic investment can be investigated through microeconomic data analysis.

Kosová (2010) conducted a study to explore how foreign direct investment affects domestic investment in the Czech Republic. Her research employed a model that integrates a dominant firm-competitive fringe framework with a model focused on firm and industry dynamics. Mullen (2010) conducted a study to investigate the crowding out and displacement effects of bi-directional foreign direct investment (FDI). He employed detailed industry-level data for U.S. manufacturing sectors spanning the years from 1997 to 2007. Azman-Saini et al. (2010) conducted a study where they investigated the interconnected relationship among economic freedom, foreign direct investment (FDI), and economic growth across a panel of 85 countries. Their empirical findings, derived using a generalized method known as the time-system estimator, indicate that FDI alone does not have a direct positive impact on economic output growth.

Adams (2009) conducted a study that examined the influence of foreign direct investment (FDI) and domestic investment (DI) on economic growth in sub-Saharan Africa during the period from 1990 to 2003. The findings indicate that domestic investment (DI) is positively and significantly associated with economic growth in both ordinary least squares (OLS) and fixed effects estimation. However, foreign direct investment (FDI) shows a positive and significant relationship only in the OLS estimation. Herzer and Schrooten (2008) identified that in the short term, outward foreign direct investment (FDI) had a positive impact on German domestic investment (DI). However, in the long term, there was a negative correlation between DI and FDI outflows. Additionally, broader investment complemented domestic investment only in the short term in Germany.

Recent studies have shown a strong focus on the correlation between foreign direct investment (FDI) and domestic direct investment (DDI), yet they often lack an in-depth exploration of the specific factors that are the primary focus of national and sectoral level analyses. Given these inherent limitations, our research is driven by the aspiration to specifically examine the influence of FDI and DDI on Malaysia's GDP by conducting a detailed analysis at both the national and sectoral levels.

3. Methodology

The fact is that Malaysia's economic development is much dependent on the inflows of foreign capital in the form of foreign direct investment (FDI). Bank Negara Malaysia (2018) reported that the industrialization of the 1970s to 1980s period in Malaysia was due to the significant contribution of FDI by providing the necessary capital inputs in the country. Studies have reported that FDI inflows stimulates economic growth through spillover effects such as technology transfers, capital accumulation, higher income per capita, higher productivity growth, higher exports and human capital development (Opoku et al., 2019; Almasaied et al., 2008).

In 2022, the main recipients of FDI in Malaysia are the services sector (48.8%), followed by manufacturing (43.5%), mining and quarrying (4.7%), construction (1.4%) and agriculture (1.6%). In the services sector, the finance, information and communication, wholesale and retail, and real estate sectors acquire 43%, 16%, 15% and 13%, respectively of the share of FDI investments.

To examine the impact of FDI on Malaysia's economic development or growth, we specify an endogenous growth model of Romer (1986, 1990) and Lucas (1988) as follows (see also the works of Opoku et al. (2019), Almasaied et al. (2008).

$$\mathbf{GDP}_t = \mathbf{f}(\mathbf{EMP}_t, \mathbf{DDI}_t, \mathbf{FDI}_t, \mathbf{control}_t)$$

where GDP_t is measure by real gross domestic product (GDP) per capita, EMP_t is the number of employments, DDI_t is domestic direct investment proxy by using ratio of real net capital stock per capita, FDI_t is foreign direct investment proxy by using ratio of FDI inflows to GDP.

The control variables included in the analysis are globalization proxy by KOF index of globalization, and fertility is total fertility rate measured as the number of births per woman. Data on GDP, EMP, DDI were collected from the Department of Statistics Malaysia. Data on fertility was compiled from World Development Indicators database; while data on globalization and FDI

inflows was taken from KOF index of globalization and UNCTAD databases, respectively. Time series data has been used in the analysis ranges from 1980 to 2022.

4. Empirical Results

This study seeks to assess the impact of Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI) on Malaysia's economic growth, considering both national and sectoral perspectives as proxies. The elasticities of Malaysia's economic growth in response to FDI changes are detailed in Table 1. The model was estimated using Ordinary Least Squares with robust standard errors. Additionally, the analysis delves into the effects of FDI at the sectoral level, specifically within the agriculture, mining and quarrying, manufacturing, construction, and services sectors.

4.1 National level analysis

Table 1: Estimates of Elasticities of Economic Growth to FDI at the national level

Independent Variables	Dependent variable: Real GDP per capita National
Constant	2.2516* (1.9709)
Employment	0.2289 (1.4627)
DDI	0.2019*** (3.0915)
FDI	0.0274*** (5.2783)
Industrialization	0.1231** (2.3270)
Globalization	0.8458*** (4.4130)
Fertility	-0.2387** (-2.1220)
\bar{R}^2	0.9967
SER	0.0272
OLS: LM $\chi^2(1)$	[0.028]**
OLS: ARCH $\chi^2(1)$	[0.596]
No. obs	44

Notes: All models have been estimated using OLS with robust standard error due to Newey and West (1987) that correct for both autocorrelation and heteroscedasticity. Asterisks ***, **, * denote statistically significant at 1%, 5% and 10% level, respectively. LM $\chi^2(1)$ and ARCH $\chi^2(1)$ denote the Lagrange multiplier test for serial correlation of order one and heteroscedasticity or order one in the OLS equations, respectively. Figures in round brackets (...) are *t*-statistics, while figures in square brackets [...] are *p*-values. \bar{R}^2 and SER denote adjusted R-squared and standard error of regression, respectively. All variables are in logarithm.

The results suggest that at the national level, FDI plays an important role in stimulating Malaysia's economic growth. The impact of FDI on Malaysia's economic growth has been positive. The estimated coefficient suggests that a 10% increase in FDI inflows will lead to a 0.3% increase in

Malaysia's economic growth. On the other hand, domestic direct investment also plays a very important role in helping economic growth in Malaysia. Interestingly, the impact of domestic direct investment is greater than the impact of FDI on the Malaysian economy. A 10% increase in domestic direct investment led to a 20% increase in economic growth.

Our results are in agreement with Almasaeid et al. (2008) that both domestic direct investment and foreign direct investment show positive impact on Malaysia's economic growth, and furthermore, the impact of domestic direct investment is much greater than the impact of FDI on the Malaysian economy. Other economic factors that contribute to Malaysia's economic growth include industrialization, globalization and fertility rate. The rapid increase in industrialization and globalization has a positive impact on economic growth. A 10% increase in industrialization and globalization lead to 12% and 85%, respectively, on economic growth. On the other hand, the negative impact of fertility on economic growth would mean that by having a smaller number of children but quality children (increase human capital development) would enhance economic growth in Malaysia. Lastly, employment does not have an impact on economic growth in Malaysia.

4.2 Sectoral level analysis

Table 2: Estimates of Elasticities of Economic Growth to FDI by Sectoral Level

Independent Variables	Dependent variable: Real GDP per capita				
	Agriculture	Mining & Quarrying	Manufacturing	Construction	Services
Constant	4.3438 (1.2532)	5.3128** (2.5723)	-1.9269 (-0.7942)	-5.1389 (-1.2640)	4.2135** (2.3189)
Employment	0.1874 (0.7487)	- 0.1921*** (-5.7114)	0.4070** (2.3167)	0.2838 (1.2623)	0.0621 (0.2415)
DDI	0.2680** (2.6440)	-0.0120 (-0.2774)	0.1127 (1.0494)	0.5047*** (4.5309)	0.2536** (2.2785)
FDI	0.0195 (0.9216)	-0.0414 (-1.1664)	0.0277* (1.7503)	0.0241 (0.6409)	0.0349** (2.3984)
Industrialization	-0.4008*** (-3.4422)	-0.2009* (-1.7607)	0.3016** (2.4701)	0.6282** (2.5474)	0.3063*** (2.7475)
Globalization	0.1559 (0.3374)	0.8451** (2.0299)	1.5205** (2.1018)	1.3258 (1.1250)	0.2794 (1.2601)
Fertility	0.0726 (0.3164)	0.2644 (1.0443)	-0.4198 (-1.6237)	0.6449*** (2.7204)	-0.9629*** (-3.4406)
\bar{R}^2	0.3747	0.8149	0.9947	0.9045	0.9932
SER	0.0638	0.0666	0.0583	0.1204	0.0504
OLS: $LM\chi^2(1)$	[0.000]***	[0.018]**	[0.001]***	[0.000]***	[0.000]***
OLS:	[0.027]**	[0.644]	[0.133]	[0.001]***	[0.000]***
ARCH $\chi^2(1)$					
No. obs	44	44	44	44	44

Notes: All models have been estimated using OLS with robust standard error due to Newey and West (1987) that correct for both autocorrelation and heteroscedasticity. Asterisks ***, **, * denote statistically significant at 1%, 5% and 10% level, respectively. $LM\chi^2(1)$ and $ARCH\chi^2(1)$ denote the Lagrange multiplier test for serial correlation of order one and heteroscedasticity or order one in the OLS equations, respectively. Figures in round brackets (...) are *t*-statistics, while figures in square brackets [...] are *p*-values. \bar{R}^2 and SER denote adjusted R-squared and standard error of regression, respectively. All variables are in logarithm.

Recall back for the results in Table 1 clearly indicate that both domestic direct investment and foreign direct investment play an important role in stimulating Malaysia's economic growth for the period 1980 to 2022. As we can see at the Table 2, FDI inflows show positive impact on the services, as well as the manufacturing sectors. The estimated coefficients suggest that a 10% increase in FDI inflows into these sectors will lead to 0.3% increase in growth in both sectors; which is surprising similar at the national level. On the other hand, domestic direct investment play an important role in stimulating growth in the agriculture, construction and the services sector. A 10% increase in domestic direct investment will lead to 50% increase in growth in the construction sector; 27% increase in growth in the agriculture sector; and 25% increase in growth in the services sector. Employment, on the other hand, show positive impact for the manufacturing sector while a negative impact on the mining and quarrying sector.

In Malaysia, it seems that industrialization has contributed to growth in the construction, manufacturing and the services sectors, but not to the agriculture and mining and quarrying sectors. Increase in industrialization by 10% will lead to growth in the construction, manufacturing and the services sectors by 63%, 30% and 31%, respectively; but while Malaysia's enjoying industrialization for several decades. However, this development is at the expense of the agriculture and the mining and quarrying sectors. The adverse effects of industrialization on the agriculture and mining and quarrying sectors have been at the rate of 40% and 20%, respectively. Globalization, on the other hand, show positive impact on manufacturing and the mining and quarrying sectors. Being going global, the Malaysian government can helps stimulate the growth in the manufacturing sector so much more. Lastly, the positive effects of fertility on the growth of the services sector would suggest that quality children or human capital development is important for the services sector; while the number of workers is more important for the construction sector.

5. Conclusion

In this paper we able to assess the impact between FDI and DDI that gives huge impact towards economic growth using OLS with robust standard error. The findings from the national-level analysis suggest that the relationship between Foreign Direct Investment (FDI) and economic growth in Malaysia is not as strong as the correlation observed between Domestic Direct Investment (DDI) and economic growth. Conversely, at the sectoral level, the influx of FDI exhibits a positive impact specifically on the service and manufacturing sectors.

To strengthen the contribution of FDI to Malaysia's economic growth and enhance the overall correlation between FDI and economic growth, the government should target FDI towards strategic sectors. Focus on attracting FDI into sectors that have the potential for high growth and significant spillover effects, such as high-value services, advanced manufacturing, and research and development (R&D). Other than that, government should invest in human capital by addressing any skill gaps in the workforce to provide targeted training programs and upskilling initiatives. This will ensure that Malaysia has the skilled labour force needed to attract and retain FDI.

Malaysia can strengthen the contribution of FDI to its economic growth and enhance the overall correlation between FDI and economic growth. This will lead to a more diversified and resilient

economy, creating opportunities for job creation, innovation, and improved living standards for Malaysian citizens. as this will have the greatest impact on the country's economic growth.

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References

- Agosin, M.R., & Machado, R. (2005). Foreign investment in developing countries: Does it crowd in domestic investment? *Oxford Development Studies*, 33(2), 149-162.
- Almasaied, S.W., Baharumshah, A.Z., & Rashid, S. (2008). The impact of domestic and foreign direct investments on economic growth: Evidence from ASEAN countries. *Pertanika Journal of Social Sciences & Humanities*, 16(2), 239-255.
- Bank Negara Malaysia. (2018). A critical assessment of direct investments abroad (DIA) and changing nature of foreign direct investments (FDI). Economics and Foreign Exchange Administration Department, Bank Negara Malaysia.
- Barro, R.J., & Lee, J.W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics*, 104, 184–198.
- Lucas, R.E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22, 3-42.
- Misun, J., & Tomsk, V. (2002). Does foreign direct investment crowd in or crowd out domestic investment? *Eastern European Economics*, 40(2), 38-56.
- Newey, W.K., & West, K.D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55, 703-708.
- “NEWSS Portal.” Newss.statistics.gov.my, newss.statistics.gov.my/newss-portalx/ep/epDownloadContentSearch.seam?contentId=179732&actionMethod=ep%2FepDownloadContentSearch.xhtml
- Opoku, E.E.O., Ibrahim, M., & Sare, Y.A. (2019). Foreign direct investment, sectoral effects and economic growth in Africa. *International Economic Journal*, 33(3), 473-492.
- Romer, P.M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002-1037.
- Romer, P.M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5), S71-S102.
- Wang, M. (2010). Foreign direct investment and domestic investment in the host country: Evidence from panel study. *Applied Economics*, 42, 3711-3721.

Using a synthetic inter-regional input output (IRIO) model for estimating economic multiplier between states in Malaysia

Muhammad Daaniyall Abd Rahman^{a,b*}, Nurul Sakinah Ngaini^{a,b}, Muhammad Anas Nabil Al-Fattah Mohd Yazid^{a,b}, Mohd Yusof Saari^{a,b,c}, Muzafar Shah Habibullah^{b,d}

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^cMinistry of Human Resources and Emiratisation, Dubai, United Arab Emirates

^dPutra Business School, Serdang, Malaysia

*Corresponding email: daaniyall@upm.edu.my

Abstract

The absence of an inter-industry regional planning database limits identification of economic strength within and between regional economies. The primary aim of this paper is to account for inter-regional economic transactions across regions of a nation through an inter-regional input-output table (IRIOT) and further examine sectoral multiplier effects using the newly constructed database. Partially-survey technique that integrates *Flegg Location Quotient* (FLQ) approach and superior national account and census data has been employed. Our work involves selecting a case study to develop first ‘synthetic’ Negeri Sembilan IRIOT, where the flow of economic transactions, including intermediate deliveries and final demand, between Negeri Sembilan and the Rest of States (ROS) have been detailed out. There are two main findings obtained in this work. First, high dependency on the imported input has hindered the growth of value-added activities in the state, which eventually reduces the potency of optimizing comparative advantage at the sectoral level. Second, imbalance input-output supply chain networks tend to distort the existence of a high value-added supply chain ecosystem. Policy direction to stimulate these sectors would be highly effective to ensure growth, underscoring their strategic importance. The inherent strength of multiplier effects suggests that fostering growth in these sectors could potentially trigger a cascade of positive economic impacts throughout the broader economy. As such, this approach helps to improve the competitiveness of the state's economic sector as well as reduce the inefficiency of resource allocation.

Keywords: inter-regional input-output tables; location quotient; linkages; Malaysia

1. Introduction

In the regional economic literature, inter-regional input-output tables (IRIOT) or also known as multi-regional input-output tables (MRIOT) are extremely useful for addressing a multitude of research or policy questions (Lenzen et al., 2017). For example, a great deal of studies use IRIOT for impact assessment of employment (Faturay et al., 2017), ecological footprints (Wakiyama et al., 2020) and post-disaster evaluation (Faturay et al., 2020) in an inter-regional settings of a country. These applications give rich information to the users on transboundary economic, environmental and social impacts of regional economies.

It is often argued that one of the major hindrances in the regional economic analysis is the lack of consistent and reliable regional data that integrates inter-regional trade and inter-industry transactions (Canning & Wang, 2004). The main reason of the periphery attention on inter-regional input-output (IRIOT) is due to survey-based data on such transactions are rarely available (Kronenberg, 2009; Sargento et al., 2012; Flegg & Tohmo, 2017; Jahn et al., 2020). To overcome this shortcoming, regional economic literature has emerged on various approaches to estimate the IRIOT (Boomsma and Oosterhaven, 1992; Tobben and Kronenberg, 2015; Jahn, 2017; Fujitomo, 2019; Jahn et al., 2020).

In this paper, we specifically attempt to answer two questions: (i) how to account for inter-regional economic transactions across regions of a nation that include bilateral intermediate deliveries; (ii) What can we know the extent to which sectoral linkages are interconnected beyond national input-output structure. To address these questions we first construct an IRIOT database that captures regional and sectoral contribution and distribution. Then, we use the newly developed IRIOT to analyze sectoral linkages by which these can be estimated using the inter-regional flows of goods and services.

2. Literature Review

The previous works on the construction of IRIOT are well-discussed in various regional studies and input-output literature. Although the need to construct the IRIOT is due to unavailability of regional input-output tables published by the national statistical agencies (Jahn, 2016), there is growing importance to conduct sectoral impact assessment at the regional level. Whilst it is deemed that regional modelers face problems that require regional level data (Kowalewski, 2015), it is found that the main strand of the literature lays on the extent to which available regionalization techniques can represent the actual regional IO tables. Furthermore, in the case of Malaysia, the development of IRIOT remains largely unexplored in the literature to shed lights on the subject matter.

Various regionalization techniques have been suggested and empirically tested in the literature. Location quotient (LQ) technique is the most commonly used non-survey approach (Fujitomo,

2019). The LQ technique has different variations such as simple location quotient (SLQ), Flegg location quotient (FLQ), and augmented Flegg location quotient (AFLQ), and cross-industry location quotient (CILQ, see Miller & Blair, 2009 for detailed discussion on these techniques). Apart from the LQ, there are other techniques used for regionalization, notably the regional purchase coefficients (Lahr, 1993), double-entry method (Boomsma & Oosterhaven, 1992), RAS method (Stone, 1961; Bacharach, 1970), cross-entropy method (Golan et al., 1994; Lamonica et al., 2020), and cross-hauling-adjusted regionalization method or CHARM (Kronenberg, 2009; Többen & Kronenberg, 2015; Fujitomo, 2019).

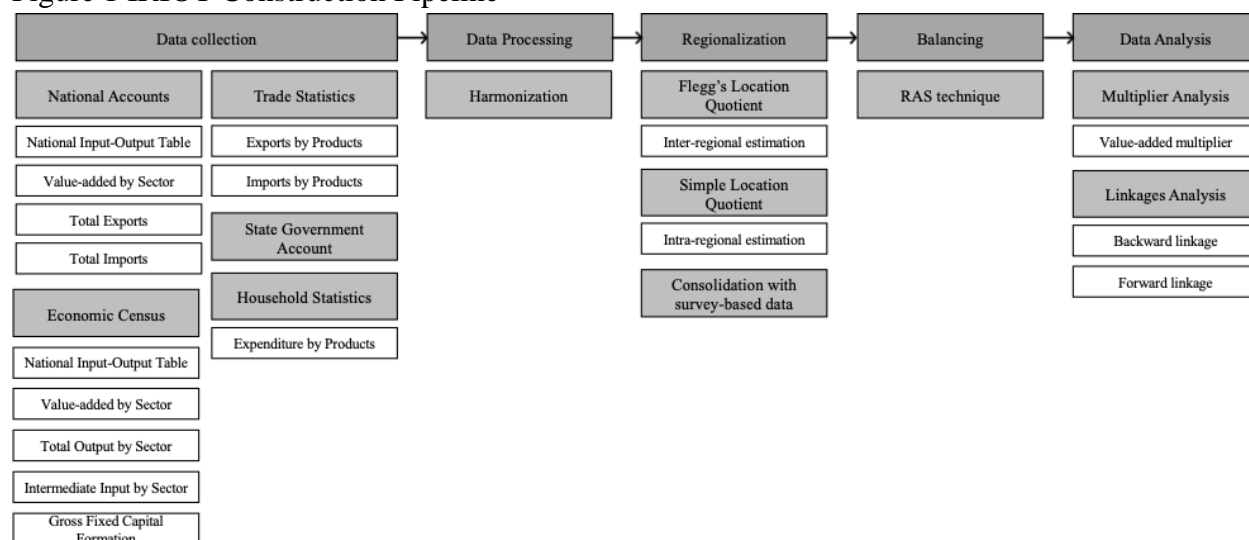
As far as regional studies are concerned within the Malaysia context, there are a number of studies that focus on developing state input-output tables. For example, Saari and Abdul Rashid (2008) estimate and use region-specific data for constructing Selangor input-output tables to identify key economic sectors of the state. However, their work is restricted to account for Selangor state as a single and close economy. Hassan et al. (2017a) and Hassan et al. (2017b) construct regional input-output tables for North Corridor Economic Region (NCER) and East Malaysia region. Whilst their works provide economic impact assessment on output, value-added, import and employment of these economic regions for year 2005, they suffer from providing for more comprehensive analysis due to absence of economic spillover effects of a region to other regional areas. By having these limitations in hand, our work is motivated to construct an interstate input-output model, which is based on the IRIOT construction pipeline, to support comprehensive regional analyses.

3. Methodology

In general, the construction of an IRIOT is starting from the national input-output table initial estimate (Flegg & Tohmo, 2019; Jahn et al., 2020). The national input-output table is compiled by the national statistical agency by collecting industry data through economic census carried out every five year interval. However, the compilation of an input-output table in a smaller spatial unit is not officially done, typically due to cost and time limitations (Jahn et. al, 2020). Thus, the construction of input-output tables at the regional level usually involves an estimation process that is cost- and time-saving (Jahn et. al, 2020). For our study, we use the so-called hybrid technique to construct the IRIOT. In particular, we employ the Flegg Location Quotient (FLQ) method to estimate the inter-regional flows, while using Simple Location Quotient (SLQ) method for the intra-regional flow. Figure 1 summarizes the construction pipeline of estimating the IRIOT.

In terms of data, our work uses the Malaysia input-output table for 2015 published by the Department of Statistics Malaysia (DOSM) as a benchmark table before the estimation of the IRIOT. In addition, to regionalise the national table IRIOT, additional information from the economic census, household income and expenditure survey and trade statistics, each of which contains state level information. Table 1 summarizes the data requirement for our work.

Figure 1 IRIOT Construction Pipeline



Source: Illustrated by the authors

Table 1 Data Requirements for developing Negeri Sembilan IRIOT

Data	Classification	Source of Data
Malaysia Input-Output Tables	MSIC	National Accounts Statistics
Value Added	MSIC	Economic Census 2015 & National Account Statistics
Total Output	MSIC	Economic Census 2015
Intermediate input	MSIC	Economic Census 2015
Household Final Demand	COICOP	Household Income and Expenditure Survey 2016
Gross Fixed Capital Formation	MSIC	Economic Census 2015
Export	SITC	Trade statistics
Import	SITC	Trade statistics

Note: MSIC refers to Malaysian Standard Industry Classification 2008, COICOP refers to Classification of Individual Consumption by Purpose and SITC refers to Standard International Trade Classification.

To achieve the objective of this study, the input-output model is used to identify factors to regional imbalances. The input-output relationship exists in a non-competitive input-output model, with imports separated from the domestic intermediate deliveries (Su and Ang, 2013; Maji et. al, 2017) which is represented in a matrix notation as $\mathbf{x} = \mathbf{Z}\mathbf{i} + \mathbf{f}$ (Eq. 1), where \mathbf{x} ($n \times 1$) is the total output, \mathbf{Z} ($n \times n$) is the intermediate input matrix, \mathbf{i} ($1 \times n$) represents the summation vector, and \mathbf{f} ($n \times 1$) is the total final demand vector, with n refers to number of sector.

A Leontief input-output model can be derived from the Eq. 1 to arrive at $\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f}$ (Eq. 2), where $(\mathbf{I} - \mathbf{A})^{-1}$ ($=\mathbf{L}$, $n \times n$) indicating each element in the Leontief's inverse matrix reflects the direct and indirect input requirements of sector i to meet each unit of final demand from sector j (Lenzen, 2003). Meanwhile, input-output value-added multiplier can be obtained from Eq. 2 via pre-

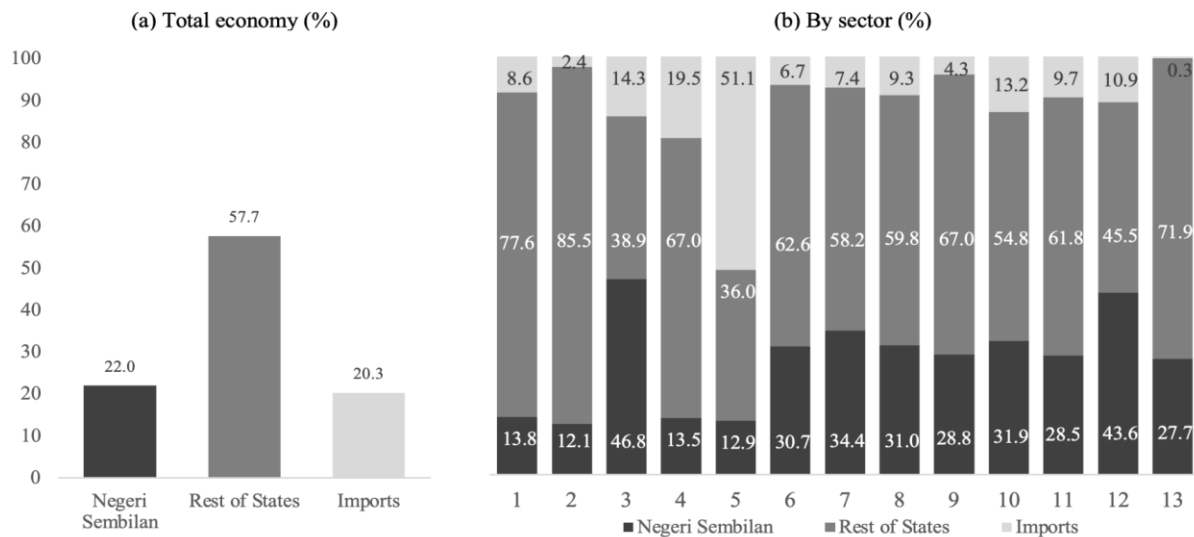
multiplying the equation with the value-added coefficient ($\mathbf{r} = \mathbf{v}\mathbf{x}^{-1}$), as such, $\mathbf{v} = \text{diag}(\mathbf{r})(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f}$, where \mathbf{v} is the value-added multiplier matrix, while “diag” refers to vector diagonalization.

4. Empirical Results

Recall that the main aim of this paper is to construct an IRIOT by taking Negeri Sembilan as a case study. Then, we use the input-output model to analyze sectoral linkages of the newly developed database. The discussion of the results are divided into two sections. First, we provide a brief discussion explaining the structure of the economic sector and the supply chain between Negeri Sembilan and the Rest of States (ROS). Second, sectoral impact analysis is described based on value-added multiplier effects.

A structural analysis has been conducted to gain insights into the sectoral input structure of Negeri Sembilan. Referring to Panel (a) of Figure 2, the findings suggest that economic leakages within the state have been significant. This is primarily due to the fact that only 22% of the inputs used in Negeri Sembilan's sectoral production are sourced domestically. The state relies heavily on the Rest of States for 57.7% of its inputs, while also importing 20.3% of its inputs from external markets. This high dependency on external sources hampers economic opportunities for the domestic industries in Negeri Sembilan to benefit from the state's own production and generate economic rent.

Figure 2 Percentage of domestic, other states and foreign inputs



Note: 1. Agriculture; 2. Mining and Quarrying; 3. Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product; 4. Petroleum Product, Chemical, Rubber & Plastic; 5. Electric Product, Electronic & Optical; 6. Other Manufacturing; 7. Building Construction; 8. Civil Engineering and Special Construction Activities; 9. Utilities, Transportation & Storage and Information & Communication; 10. Wholesale & Retail Trade, Food & Beverage and Accommodation; 11. Finance and Insurance, Real Estate and Business Services; 12. Other Services; 13. Government Services.

Sources: Authors' own calculation

At the sectoral level, a similar pattern has been observed, where a significant amount of inputs are sourced from the Rest of States. This suggests that domestic sectors have lost their comparative advantage to compete with inputs supplied by other states. Additionally, imports have been substantial for certain sectors, particularly high-technology sectors like Electric Product, Electronic & Optical, which requires 51.1% of imported inputs from abroad. Interestingly, Government Services also significantly use inputs from the Rest of States in their production. However, it has been found that the Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product sector shows a higher percentage of domestic inputs at 46.8%. Similarly, the Other Services sector also exhibits a considerable reliance on domestic inputs at 43.6%.

Table 2 summarizes the value-added multipliers by sector derived from the Negeri Sembilan IRIOT. According to Miller and Blair (2009), the interpretation of the multiplier effect in an IRIOT setting can be divided into two categories: (i) national effects, and (ii) sectoral effects. The former effect refers to the combined impact of intra-regional effects (within Negeri Sembilan) and inter-regional effects (across the Rest of States). In other words, exogenous final demand changes in a sector of Negeri Sembilan not only influence the state's economy but also have repercussions on the Rest of States. In addition, these two effects collectively account for the overall sectoral contribution of their respective regions.

The findings reveal that for each unit increase in the final demand from Negeri Sembilan's economic sectors, the total economy generates RM0.85 of value-added, on average. Furthermore, with each additional final demand expansion, the value-added multiplier contributes RM0.57 (Column B) directly and indirectly to the domestic economy (intra-regional effect), while RM0.28 (Column C) is generated in the Rest of States (inter-regional effect).

Table 2 Value Added Multiplier by Sector

Sector	Value Added Multiplier		
	Total (A)	Negeri Sembilan (B)	Rest of States (C)
1 Agriculture	0.94	0.80	0.14
2 Mining and Quarrying	0.94	0.60	0.34
3 Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product	0.81	0.51	0.30
4 Petroleum Product, Chemical, Rubber & Plastic	0.73	0.21	0.52
5 Electric Product, Electronic & Optical	0.51	0.30	0.21
6 Other Manufacturing	0.84	0.47	0.37
7 Building Construction	0.83	0.44	0.39
8 Civil Engineering and Special Construction Activities	0.80	0.39	0.41
9 Utilities, Transportation & Storage and Information & Communication	0.88	0.58	0.29
10 Wholesale & Retail Trade, Food & Beverage and Accommodation	0.91	0.75	0.16
11 Finance and Insurance, Real Estate and Business Services	0.94	0.81	0.13
12 Other Services	0.93	0.78	0.15
13 Government Services	0.96	0.78	0.18
Average	0.85	0.57	0.28

Note: Total value-added multiplier is a summation of the vector for both Negeri Sembilan and Rest of States (A=B+C)

Sources: Authors' own calculation.

At the overall sectoral level, the findings indicate that seven sectors have value-added multipliers higher than the national average, with notable effects in the primary and services sectors. Particularly, Sector 1 (Agriculture) and Sector 2 (Mining and Quarrying) contribute RM0.94 of value-added each to the total economy. However, a closer examination reveals that the Agriculture sector generates even more value-added to the domestic economy, amounting to RM0.80 per final demand increase, as compared to Sector 2, which stands at RM0.60. This difference suggests that Sector 1 holds greater potential for the state to enhance wealth creation through a resource-based strategy.

In the services sector, five sectors stand out for generating value-added multipliers higher than the average of the total economy. Among them, Sector 13 outperforms other service sectors with the highest value-added multiplier of RM0.96. This is followed by Sector 11, with a value-added multiplier of RM0.94. However, when considering the impact on the domestic economy, the latter sector tends to make substantial contributions. It is found that for every unit increase in the final demand for this sector, RM0.81 is generated in the domestic economy, while RM0.13 is generated in the Rest of States.

In addition, it is not surprising to find that manufacturing-based sectors have relatively lower value-added multipliers, given their high import dependency, as indicated in Figure 2. For example, the Sector 5 records the lowest value-added multiplier among all economic sectors in the state. For every unit increase in the final demand within this sector, only RM0.51 of value-added is generated. Out of this value-added multiplier effect, RM0.30 contributes to the domestic economy, while RM0.21 is generated in the Rest of States. The relatively smaller value-added

contribution is evidenced by the sector's significant reliance on imports, with 51% of inputs sourced from abroad.

It is important to note that relying solely on value-added multipliers without considering the economic linkages among sectors is insufficient. Utit et al. (2020) argue that a large value-added multiplier impact does not inform the policy makers whether that sector is passively receiving impulses from other sectors or actively sending impulses to the other sectors. In other words, it does not reveal the direction or nature of these effects. Morrissey and O'Donoghue (2013) argue that economic sectors do not exist in a vacuum; rather they rely on other sectors for inputs (backward linkages) into their production process, while simultaneously selling their output to sectors (forward linkages) to generate profit. Hence, the results shall be deliberated with caution.

5. Conclusion

In this paper, we construct an inter-regional input-output table (IRIOT) that systematically accounts for bilateral intermediate deliveries by using the Flegg's Location Quotient (FLQ) method. Then, a hybrid technique is employed to integrate the estimated data and survey-based data collected by the national statistical agency. With the utilization of publicly available data, we finalize the Negeri Sembilan IRIOT that consists of 13 economic sectors, encompassing primary, secondary and tertiary sectors.

The estimated IRIOT for the Negeri Sembilan, while informative, is not devoid from imperfection. This is due to several limitations. First, the main constraints is that there is no official survey-based IRIOT developed for any Malaysian states, including for the Negeri Sembilan. This limitation could, to some extent, impart a degree of uncertainty to the reliability of the estimated IRIOT presented in this study. Second, aggregated sectors presented in the study may inadvertently hinder a detailed assessment of the economic sector. The sectoral heterogeneity problem, which is not new in the input-output research, potentially underestimates or overestimates the evaluation outcome of a sector.

Moreover, it is worth noting that the scope of the estimated IRIOT could be expanded further to encompass additional input-output interactions spanning across various states within the nation. By incorporating a broader geographical perspective, the resultant analysis could offer more comprehensive insights into the interconnectedness of economic activities across the country. Despite these limitations, the provided IRIOT still holds value as a stepping stone toward elucidating the complex economic relationships characterizing Negeri Sembilan and serves as a foundation for potential future refinements in analytical methodologies.

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References

- Bacharach, M. (1970). *Biproportional Matrices and Input Output Change*. London, U.K.: Cambridge University Press.
- Boomsma, P., and Oosterhaven, J. (1992). A Double-Entry Method for the Construction of Bi-Regional Input-Output Tables. *Journal of Regional Science*, 32(3), 269-284.
- Canning, P., and Wang, Z. (2004). A Flexible Modeling Framework to Estimate Interregional Trade Patterns and Input-Output Accounts. World Bank Policy Research Working Paper 3359.
- DOSM. (2017a). Economic Census 2016. Department of Statistics Malaysia. Putrajaya, Malaysia.
- Faturay, F., Lenzen, M., and Nugraha, K. (2017). A New Sub-National Multi-Region Input–Output Database for Indonesia. *Economic Systems Research*, 29, 234-251.
- Flegg, A. T., & Tohmo, T. (2019). The Regionalization of National Input-Output Tables: A Study of South Korean Regions. *Papers in Regional Science*, 98(2), 601-620.
- Fujimoto, T. (2019). Appropriate Assumption on Cross-Hauling National Input–Output Table Regionalization. *Spatial Economic Analysis*, 14(1), 106-128.
- Golan, A., Judge, G., and Robinson, S. (1994). Recovering Information from Incomplete or Partial Multisectoral Economic Data. *The Review of Economics and Statistics*, 541-549.
- Hassan, M.K.N., Azmi, N.A., Arip, M.A., and Liew, V.K.S. (2017a). Regional Input-Output Table: The Case of North Corridor Economic Region (NCER) in Malaysia. *International Journal of Business and Social Science*, 8, 65-72.
- Hassan, M.K.N., Mohd Noor, Z., Ismail, N.W., Radam, A., and Abdul Rashid, Z. (2017b). The Regional Input-Output Model for East Malaysia Region: Construction and Application. *International Journal of Academic Research in Business and Social Sciences*, 7, 712-731.
- Jahn, M. (2017). Extending the FLQ Formula: A Location Quotient-based Interregional Input–Output Framework. *Regional Studies*, 51(10), 1518–1529.
- Jahn, M., Flegg, A. T., and Tohmo, T. (2020). Testing And Implementing A New Approach to Estimating Interregional Output Multipliers Using Input–Output Data For South Korean Regions. *Spatial Economic Analysis*, 15(2), 165-185.
- Lahr, M. L. (1993). A Review of the Literature Supporting the Hybrid Approach to Constructing Regional Input–Output Models. *Economic Systems Research*, 5(3), 277-293.
- Kronenberg, T. (2009). Construction of Regional Input-Output Tables Using Nonsurvey Methods: The Role of Cross-Hauling. *International Regional Science Review*, 32(1), 40-64.
- Kowalewski, J. (2015). Regionalization of National Input–Output Tables: Empirical Evidence on the Use of the FLQ Formula. *Regional Studies*, 49(2), 240-250.

- Lamonica, G. R., Recchioni, M. C., Chelli, F. M., and Salvati, L. (2020). The Efficiency of the Cross-Entropy Method When Estimating the Technical Coefficients of Input–Output Tables. *Spatial Economic Analysis*, 15(1), 62-91.
- Lenzen, M. (2003). Environmentally Important Paths, Linkages and Key Sectors in the Australian Economy. *Structural Change and Economic Dynamics*, 14(1), 1-34.
- Lenzen, M., Geschke, A., Wiedmann, T., Lane, J., Anderson, N., Baynes, T., Boland, J., Daniels, P., Dey, C., Fry, J., Hadjikakou, M., Kenway, S., Malik, A., Moran, D., Murray, J., Nettleton, S., Poruschi, L., Reynolds, C., Rowley, H., Ugon, J., Webb, D., and West, J. (2014). Compiling and Using Input–Output Frameworks Through Collaborative Virtual Laboratories. *Science of The Total Environment*, 485–486, 241-251.
- Maji, I. K., Saari, M. Y., Habibullah, M. S., & Utit, C. (2017). Measuring the Economic Impacts of Recent Oil Price Shocks on Oil-Dependent Economy: Evidence From Malaysia. *Policy Studies*, 38(4), 375-391.
- Miller, R. E., & Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions*. Cambridge University Press.
- Morrissey, K., & O'Donoghue, C. (2013). The Potential for an Irish Maritime Transportation Cluster: An Input–Output Analysis. *Ocean & Coastal Management*, 71, 305-313.
- Saari, M. Y., and Abdul Rashid, Z. (2008). Kajian Input-Output Wilayah: Aplikasi dan Analisis di Selangor. *Malaysian Journal of Economics*, 42, 23-43.
- Stone, R. (1961). *Input Output and National Accounts*. Paris: OEEC.
- Sargento, A. L. M., Ramos, P. N., and Hewings, G. J. D. (2012). Inter-Regional Trade Flow Estimation through Non-Survey Models: An Empirical Assessment. *Economic Systems Research*, 24, 173-193.
- Su, B., & Ang, B. W. (2013). Input–Output Analysis Of CO2 Emissions Embodied In Trade: Competitive Versus Non-Competitive Imports. *Energy Policy*, 56, 83-87.
- Többen, J., & Kronenberg, T. H. (2015). Construction of Multi-Regional Input–Output Tables Using the CHARM Method. *Economic Systems Research*, 27(4), 487-507.
- Wakiyama, T., Lenzen, M., Geschke, A., Bamba, R., and Nansai, K. (2020). A Flexible Multiregional Input–Output Database for City-level Sustainability Footprint Analysis in Japan. *Resources, Conservation and Recycling*, 154, 104588.
- Utit, C., Saari, M. Y., Abd Rahman, M. D., Habibullah, M. S., & Norazman, U. Z. (2020). Regional Economic Impacts of Natural Resources: The Case of Petroleum, and Forestry and Logging in Sarawak. *International Journal of Business and Society*, 21(2), 898-916.

Decomposing the Sources of Productivity Growth in the States of Malaysia: A Dynamic Shift-Share Analysis Approach

Muhammad Anas Nabil Al-Fattah Muhammad Yazid^{a,b,*}, Mohd Yusof Saari^{a,b,c},
Muzafar Shah Habibullah^{b,d}, Chakrin Utit^a,

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^cMinistry of Human Resources and Emiratisation, Dubai, United Arab Emirates

^dPutra Business School, Serdang, Malaysia

**Corresponding Author: anasyazidanas99@gmail.com*

Abstract

In pursuit of broader economic development and growth targets outlined in the 12th Malaysia Plan, there is a need to address the intricate nature of productivity growth at the national level. The national-level aspirations for productivity growth, while substantial, may unintentionally disregard the critical need to achieve fair and balanced progress at the state levels. It is thus imperative to look at the potential sources of productivity growth within each state, aiming at utilizing each state's unique potential to bolster a more equitable and harmonized productivity growth across all regions. Hence, this paper aims to provide an empirical assessment on the sources of productivity growth across the states of Malaysia. For this purpose, this paper employs a dynamic shift-share analysis (SSA) methodology which is separated into two periods, 2011-2015 (10th Malaysia Plan) and 2016-2020 (11th Malaysia Plan), enabling it to analyze trends in productivity growth sources in a dynamic time-frame. The dynamic SSA decomposes the overall labor productivity growth into the growth of the sectoral labor productivity within the sector and the effects brought by inter-sectoral labor reallocation. The findings reveal two main observations. Firstly, the results show the importance of within effect in driving most of the regions' labor productivity growth. Secondly, surprisingly, it was also revealed that most of the regions rather only relied on either pure productivity gains or labor movements between sectors to increase the overall labor productivity growth. Based on the findings, this paper includes discussion on possible policy options to be considered by the government agencies for economic development policies, particularly those aimed at fostering productivity growth.

Keywords: shift-share; labor productivity; labor reallocation; regional; Malaysia

1. Introduction

Long-run economic growth can be sustained by continuous increases in productivity. As mentioned by Krugman (1997), “*productivity isn’t everything, but, in the long run, it is almost everything*”. Raising productivity therefore has become a mounting challenge for economies seeking to boost economic growth. While productivity improvement is considered to be a good initiative for the overall nation, regional-based productivity should not be ignored to have a more equitable and inclusive growth. For that reason, a more comprehensive assessment to look at the sources of state-level productivity is also crucial to reduce regional disparities by boosting labor productivity, especially in the underperforming regions that would promote faster and more inclusive growth.

To achieve long-term economic growth for middle-income countries, such as Malaysia, the improvement of labor productivity will be a challenge in the context of upgrading the industrial structure (Asada, 2020). As targeted in the Twelfth Malaysia Plan (EPU, 2021), Malaysia is set to have an average annual growth rate of 3.6% from 2021 to 2025. However, state level labor productivity has not been taken into attention, given that each state in the nation has different factors of production and resource endowment. To the best of our knowledge, there is limited literature that looks at the sources of productivity growth at the regional level, particularly for Malaysia.

This paper, specifically, focuses on two main questions: (i) what are the primary drivers of productivity growth for each state of Malaysia; (ii) which area should be focused on for targeted policy interventions. Therefore, this paper employs a dynamic Shift-Share Analysis (SSA) to analyze the source of productivity growth across 15 regions in Malaysia, including federal and state regions. This analysis decomposes the sources of labor productivity into three key components: the within effect, shift effect, and dynamic sectoral effect.

2. Literature Review

Numerous studies, such as those conducted by Ahmed (2011) and Korkmaz (2017), illustrate the positive impact of labor productivity on economic growth. Consequently, there is a wealth of research dedicated to understanding the determinants of increased labor productivity. The existing body of literature extensively explores various methodologies aimed at uncovering the factors behind labor productivity growth. This section provides a concise examination of these approaches, particularly within the Malaysian context, aiming to focus on the methods to decompose sources of labor productivity, and reviewing the productivity assessment that has been done within Malaysia.

One common approach used to pinpoint where productivity growth comes from is through econometric regression. For example, Heshmati & Su (2014) conducted a study in China to connect labor productivity with factors like investment and wages to understand their impact on labor productivity. There are other studies that also employ this method for similar purposes (Elmawazini et al., 2016). Yet, while it helps identify productivity sources linked to other economic factors, this method does not decompose the labor productivity itself. Some literature used dynamic general equilibrium growth models as in Lopez & Torres (2012) for the same purpose. However, this approach, as cautioned by Guerriero (2020), is complex and time-consuming as it requires a lot of datasets. Another method, the input-output model, delves into labor productivity sources in more specific sectors due to its detailed sectoral breakdown. But this model faces limitations, particularly in Malaysia, where the input-output data is solely at the national level, lacking regional specifics and available only periodically every five years.

Within Malaysian literature, macro-level productivity assessments, particularly at the regional level, are notably limited. Discussions on factors influencing productivity cover a range of elements, including the working environment (Razak et al, 2014), the impact of foreign labor (Yean & Siang, 2014), the quality of human capital (Arshad & Malik, 2015), and wage considerations (Senasi, 2020). Additionally, other studies have explored sources of labor productivity at industrial level through capital labor ratio, quantity of labor and total factor productivity (TFP) (Wye & Ismail 2012). Evaluations of labor productivity within specific sectors such as services (Sauian et al, 2013), and construction (Wong et al., 2020) also have been undertaken. Moreover, a study on productivity assessment at regional level (Iskandar Malaysia) has been done as in Yusof et al. (2017) albeit limited to qualitative assessment. Notably, some studies also used shift-share analysis to identify sources of labor productivity in Malaysia (Chuah et al., 2018), yet still limited to the national and sectoral level.

In response to the aforementioned limitations, this paper seeks to bridge the gap by employing the shift-share analysis to evaluate Malaysia's regional labor productivity. This method stands out for its simplicity, speed, and cost-effectiveness in regional assessment, as advocated by Stimson (2006). By only utilizing regional employment and output (GDP) data, this tool could facilitate a comprehensive regional productivity assessment, aiding decision making in pinpointing areas of focus, as highlighted by Stejskal & Matatkova (2012). Likewise, numerous studies also employed this method to assess regional productivity growth (Ferrer, 2019).

3. Methodology

To meet the objectives of this paper, centered on labor productivity growth, it aligns with the concepts proposed by McMillan et al. (2014), which involve decomposing labor productivity growth in two primary methods. First, labor productivity can enhance within economic sectors through capital accumulation, technological advancements, or the mitigation of misallocation

across plants. Second, labor can shift across sectors, moving from low-productivity sectors to high-productivity sectors, thereby elevating overall labor productivity within the economy. These methods are expressed as follows:

When expressed in nominal terms, labor productivity can be written as a weighted sum of the within industry productivity values:

$$LP_t = \sum_i LP_{it} \frac{L_{it}}{L_t}$$

This gives, in difference terms:

$$\Delta LP_t = \sum_i \Delta(LP_{it}) \frac{L_{it-1}}{L_{t-1}} + \sum_i LP_{it-1} \Delta\left(\frac{L_{it}}{L_t}\right) + \sum_i \Delta(LP_{it}) \Delta\left(\frac{L_{it}}{L_t}\right)$$

Dividing by LP_{t-1} to get the growth (percentage change) and rearranging the terms:

$$\frac{\Delta LP_t}{LP_{t-1}} = \sum_i \frac{\Delta LP_{it}}{LP_{it-1}} \frac{Y_{it-1}}{Y_{t-1}} + \sum_i \frac{LP_{it-1}}{LP_{t-1}} \left(\frac{L_{it}}{L_t} - \frac{L_{it-1}}{L_{t-1}}\right) + \sum_i \frac{1}{LP_{t-1}} (\Delta LP_{it}) \Delta\left(\frac{L_{it}}{L_t}\right)$$

The first component, termed the *within effect*, signifies the contribution of each sector's labor productivity growth on the economy-wide labor productivity, by considering a constant employment share for each sector. This component captures the improvement in each sector as a driver of economy-wide labor productivity. If there is improvement in technology, management or production method, this effect will have a positive sign.

The second and third components, commonly referred to as the *structural change effect* by, captures the effect of reallocating factors between sectors. The *shift effect* component reflects the effect of labor's movement across sectors, assuming consistent labor productivity within each sector. Economy-wide labor productivity increment is the result of the transitioning of labor from low productivity to high productivity sectors.

The *dynamic effect* captures the second-order impact of labor mobility, indicating the relationship between changes in labor share and labor productivity growth within each sector. A positive sign implies that the *within effect* and the *shift effect* are complementary, suggesting that sectors with rising (not necessarily high) labor productivity are absorbing more labor and expanding. Conversely, a negative *dynamic effect* signifies the two effects are substitutes, wherein sectors with slow or falling labor productivity growth are receiving more labor.

The data used in this study is sourced from the Department of Statistics Malaysia (DOSM), covering the period from 2011 to 2020. Primarily, two datasets are employed: output data (GDP) from the national accounts and employment figures (employed persons) from the Labour Force Survey (LFS). These datasets offer a breakdown at the regional level, encompassing 15 regions, inclusive of federal and state divisions within Malaysia. Through these datasets, labor productivity is computed by dividing output (GDP) by employment, as previously outlined.

4. Empirical Results

This paper focuses on decomposing the sources of labor productivity at the regional level. To achieve this, a shift-share analysis was conducted, decomposing the data into three distinct components, as previously outlined. **Figure 1** illustrates the shift-share analysis outcomes for all 15 regions in Malaysia. Across the periods of 2011-2015 to 2016-2020, most regions experienced a marginal decline in productivity growth, with the exception of Kedah, Kelantan, Negeri Sembilan, and Selangor. Notably, these four regions observed enhanced productivity growth from 2016-2020, attributable to the increased contributions from both the within and shift effects.

Upon detailed examination of the regions across both periods, it is evident that, in the majority of these regions, the within effect stands as the primary driver of labor productivity growth. Structural change effects predominantly influence only three out of the 15 regions (Kelantan, Perlis, and Sabah). Notably, Sarawak, initially driven by structural change in the 2011-2015 period, shifted to being primarily influenced by the within effect for productivity growth in 2016-2020. Consequently, the main drivers behind regional productivity growth lies in “pure” productivity increase rather than the reallocation of labor between sectors.

During the 2011-2015 period, the within effects were the primary drivers of productivity for most regions, excluding Kelantan, Perlis, Sabah, and Sarawak. However, this effect witnessed a reduction in contribution in the subsequent periods for half of the regions (Johor, Negeri Sembilan, Pulau Pinang, Perak, Terengganu, WP Kuala Lumpur, and WP Labuan). Notably, Johor, Perlis, and Terengganu displayed negative contributions during the 2016-2020 period, indirectly limiting productivity growth in those specific regions. Adding to the concern, despite Sarawak's increased within-effects contributions, it negatively impacted productivity growth in both the 2011-2016 and 2016-2020 periods.

In terms of shift effects, only three of the 15 regions (Johor, Pahang, and Sarawak) consistently contributed positively to overall productivity growth in both the 2011-2016 and 2016-2020 periods. Conversely, Selangor and WP Labuan sustained their negative contribution to overall productivity growth. Furthermore, six regions displayed a positive trend, with their shift effects transitioning from negative to positive contributions to overall productivity. These regions encompass Kedah, Kelantan, Negeri Sembilan, Pulau Pinang, Perak, Perlis, and Terengganu,

signifying their progress in labor relocation towards more productive sectors compared to the preceding period.

In the case of dynamic effect, the outcomes reveal a predominantly negative impact on overall labor productivity in most regions. For 12 out of the 15 regions, the dynamic effects led to a decline in labor productivity over both periods. Notably, Kelantan and Perak exhibited an improvement by contributing positively to labor productivity during the 2016-2020 period, while Pahang consistently maintained a positive contribution across both periods. This suggests that, in the majority of Malaysia's regions, labor productivity growth is not driven by simultaneous increases in both value-added and employment shares. Instead, it involves either enhancing value-added within sectors or reallocating employment to sectors.

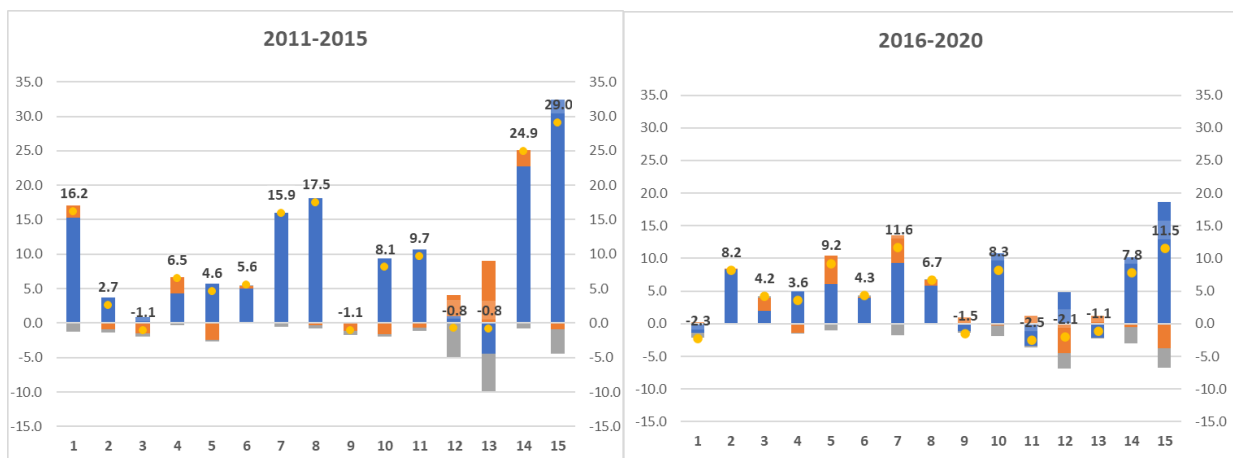


Figure 1

Decomposition of Labor Productivity, 2011-2020

Notes: 1. Johor 2. Kedah 3. Kelantan 4. Melaka 5. Negeri Sembilan 6. Pahang 7. Pulau Pinang 8. Perak 9. Perlis 10. Selangor 11. Terengganu 12. Sabah 13. Sarawak 14. WP Kuala Lumpur 15. WP Labuan.

Sources: Estimated based on data from Department of Statistics Malaysia

The findings underscore the significance of both the within and structural change effects as vital contributors to labor productivity growth. Within effects emerge as the primary drivers of overall labor productivity growth across most regions. Implementing the diffusion of new technologies or the accumulation of physical capital could effectively elevate productivity as within effect significantly influence regional productivity. Furthermore, the prevalence of negative signs in dynamic effects suggests a unidirectional path for improved productivity in most regions. Hence, leveraging both value-added creation and employment reallocation to more productive sectors could unlock the true potential of labor productivity growth in these regions, emphasizing the necessity to tap into multiple sources rather than relying solely on one source of productivity growth.

Specifically, for Sarawak regions, strategic policy interventions are crucial to elevate productivity by emphasizing the creation of value-added. The negative contribution of its within effects to overall productivity growth in both periods calls for a new productivity agenda, which could include initiatives such as facilitating the diffusion of new technologies, human capital development, and infrastructure enhancement through strategic public investments. Similarly, for Selangor and WP Labuan, an emphasis on facilitating labor reallocation to more productive sectors is imperative, given the negative impact of shift effects on labor productivity. Strategies could be involved by identifying productive sectors; providing financial support and incentives for productive sectors to hire and train more workers; and even offering mobility support to aid labor in transitioning work placements. These measures aim to unlock the true productivity growth potential in these regions.

5. Conclusion

This paper introduces a decomposition analysis aimed at understanding the sources of labor productivity across 15 regions in Malaysia over two distinct periods: 2011-2015 and 2016-2020. From the analysis, the results show the importance of within effect in driving most of the regions' labor productivity growth. Other than that, it was also revealed that most of the regions rather only relied on either pure productivity gains or labor movements between sectors. The analysis applied in this paper allows for the identification of specific strengths and weaknesses, in terms of pure productivity and labor reallocation between sectors, signaling areas for targeted interventions and strategies tailored to each region's needs. Moreover, it's important to recognize the potential for an even more comprehensive analysis by broadening the scope of regional labor productivity decomposition. This expansion could encompass further breakdowns into sectoral details and explore aspects like sectoral convergence.

6. References

- Yean, T. S., & Siang, L. C. (2014). The Impact of Foreign Labor on Labor Productivity and Wages in Malaysian Manufacturing, 2000-2006. *Managing International Migration for Development in East Asia*, 136.
- Krugman, P., (1997). *The Age of Diminished Expectations*, 3rd Edition: U.S. Economic Policy in the 1990s. MIT Press.
- Asada, H. (2020). Impacts of Sectoral Labour Productivity Growth of Emerging Countries in East Asia. *Economic Bulletin, AccessEcon*, 40 (2), 906-919.
- Ahmed, E. M. (2011). Measuring the Effects of Labour Productivity on ASEAN Plus 3 Economic Growth. *Journal of Business Management and Economics*, 2(2), 69-74.
- Wu, H. X. (2013). Measuring Industry Level Employment, Output and Labour Productivity in the Chinese Economy, 1987-2008. *Economic Review*, 64(1), 42-61.

- Heshmati, A. & Su, B. (2014). Development and Sources of Labor Productivity in Chinese Provinces. *China Economic Policy Review*, 2(2).
- Guerriero, C. (2020). Chapter 6 - Costing Environmental Health Intervention. Academic Press: Cambridge, 111-127.
- Stimson, J., Stough, R. R. & Roberts, B. H. (2006). Traditional Tools for Measuring and Evaluating Regional Economic Performance I: Economic Base and Shift-Share Analysis. *Regional Economic Development*, 105-155.
- Matatkova, K. & Stejskal, J. (2012). Assessment of Shift-Share Analysis Suitable for Identification of Industrial Cluster Establishing in Regions. *Journal of Economics*, 60(3), 935-948.
- Ferrer, E. M. (2020). Determinants of Labour Productivity Growth in Spanish and Portuguese Regions: A Spatial Shift-Share Approach. *The Annals of Regional Science*, 65(1), 45-65.
- McMillan, M., Rodrik, D. & Gallo, I. V. (2014). Globalization, Structural Change, and Productivity Growth, with an Update on Africa. *World Development*, 63, 11-32.
- Elmawazini, K., Saleeby, E. G., Farouk, A. I. e. & Naser, B. A. (2016). Tripartite Decomposition of Labor Productivity Growth, FDI and Human Development: Evidence from Transition Economies. *Economic Change and Restructuring*, 51, 153-171.
- Lopez, J. R. & Torres, J. L. (2012). Technological Sources of Productivity Growth in Germany, Japan, and the United States. *Macroeconomic Dynamics*, 16(1), 133-150.
- Wye, C. K. & Ismail, R. (2012). Sources of Labour Productivity Growth by Economic Sectors: A Study of Malaysia 1972-2005. *International Journal of Management*, 29(2), 2.
- Razak, M. I. M., Osman, I., Yusof, M. A. M., Naseri, R. N. N., Ali, M. N. (2014). Factors Affecting Labor Productivity in Malaysia: An Overview. *International Journal of Economics, Commerce and Management*, 2(10).
- Arshad, M. N. M. & Malik, Z. A. (2015). Quality of Human Capital and Labor Productivity: A Case of Malaysia. *International Journal of Economics, Management and Accounting*, 23(1), 37-55.
- Senasi, V. (2020). Workers' Perception Towards Minimum Wage Impacts on Labor Productivity in Malaysia. *American Journal of Humanities and Social Sciences Research*, 4(11), 238-248.
- Sauian, M. S., Kamarudin, N. & Rani, R. M. (2013). Labor Productivity of Services Sector in Malaysia: Analysis Using Input-Output Approach. *Procedia Economics and Finance*, 7, 35-41.
- Wong, J. H., Rashidi, A. & Arashpour, M. (2020). Evaluating the Impact of Building Information Modeling on the Labor Productivity of Construction Projects in Malaysia. *Buildings*, 10(4).
- Yusof, Z. M., Mohamed, S. F., Misnan, M. S., Habil, H. & Ohueri, C. C. (2017). Improving Labor Productivity in Iskandar Malaysia: Insights from Site Supervisors. *Journal of Computational and Theoretical Nanoscience*, 24(6), 4162-4165.
- Chuah, L. L., Loayza, N. V. & Nguyen, H. (2018). Resource Misallocation and Productivity Gaps in Malaysia. *Policy Research Working Paper*, 8368.

Assessing the Role of Internships and Skill Utilization on Graduates' Employability

Siti Nor Nadhirah Zainuddin^{a,b*}, Muhammad Daaniyall Abd Rahman^{a,b}, Mohd Yusof Saari^{a,b,c},
Nur Azreen Mokhyi^{a,b}

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^cMinistry of Human Resources and Emiratisation, Dubai, United Arab Emirates

**Corresponding email: ndhrh4@gmail.com*

Abstract

In an ever-evolving job market, the transition from higher education to employment poses a significant challenge for graduates. Beyond academic qualifications, employers increasingly sought after candidates who were equipped with practical skills and real-world experience. To meet this demand, internship programs have emerged as indispensable tools in preparing graduates before entering the job market. Equally important is to understand the extent to which skill utilization at work would improve graduate employability in the presence of internship participation. Hence, this paper aims to assess the impact of internships and skill utilization on graduate employability. To achieve this objective, we conducted a random survey to a target group of employees who have graduated from tertiary education at various higher educational institutions. A multiple regression analysis has been employed to measure the impact of both variables on graduate employability. There are two main findings that can be highlighted. Firstly, it reveals that participation in internship programs substantially enhances graduates' employability in order to secure employment. This finding underscores the role of internships in providing valuable industry experience that graduates require for career advancement and opens doors to new job opportunities. Secondly, the graduates' skill utilization plays a paramount role in their employability, suggesting a link between skill utilization and a greater likelihood of transitioning into full-time jobs roles after graduation. These findings underscore the necessity of establishing a structured internship system within tertiary education to support alignment of skills acquisition with evolving industry demands. At the same time, such an initiative could improve skill utilization by the graduates on the real job they venture in.

Keywords: graduate employability; internship programme; skill utilization

1. Introduction

In the contemporary landscape of higher education and workforce dynamics, the symbiotic relationship between internships, skill utilization, and graduates' employability stands as a focal point of scholarly inquiry. The current state of this discourse reflects a growing recognition of the transformative impact that well-structured internships can have on shaping graduates into competent and job-ready professionals. Maria (2017) argues that graduates who engage in high-quality internships not only gain practical experience but also develop a set of transferable skills that significantly enhance their marketability. This underscores the prevailing consensus that internships play a pivotal role in preparing graduates for the demands of the contemporary job market.

While internships are generally considered beneficial, their effectiveness varies widely for different individuals. The impact of internships is significantly influenced by one's field of study and career aspirations, highlighting a gap in our understanding of how these experiences contribute to skill utilization in real-world job settings. For instance, a study by Anjum (2020) shows that graduates from different fields used their skills in different ways after internships. This shows us that one approach would not work for everyone in understanding how internships really help people get jobs. We need to look more closely at what factors affect how internships, skills, and moving into the workforce all fit together for graduates.

Malaysia produces around 300,000 graduates per year at various tertiary education qualifications (MOHE, 2022). While internship programs (also known as industrial training or on-the-job training) are an essential component of the curriculum structure, the degree to which they enhance graduate employability remains a topic requiring further investigation. This is due to the persistent issue of skill mismatch within the country, particularly affecting young and entry-level workers. Although internships are undertaken with the goal of enhancing graduate employability, the extent to which they maximize skill utilization remains uncertain. Therefore, this paper aims to assess the impact of internships and skill utilization on graduate employability.

2. Literature Review

Internships play a pivotal role in shaping graduates' employability, as evidenced by various studies in the field. According to Bawica (2021), internships provide students with practical, hands-on experience that enhance their skills and knowledge, making them more attractive to potential employers. This sentiment is echoed by a longitudinal study conducted by Baert et al. (2021), which found a positive correlation between the duration and quality of internships and graduates' successful transition into the workforce. These studies highlight the instrumental role internships play in bridging the gap between academic learning and real-world application, thereby contributing significantly to graduates' employability.

However, a critical examination of the existing literature reveals notable gaps that warrant further exploration. One such gap is the lack of emphasis on skill utilization during internships. While the

duration and quality of internship are extensively studied, the specific utilization of acquired skills within these settings remain relatively underexplored. Galbraith et al. (2020) suggest that understanding how interns actively apply and refine their skills during internships can provide valuable insights into the long-term impact on employability.

The missing piece in current research points to the need for more in-depth studies on how skills used during internship. We should dig deeper into how interns apply and improve their skills, understanding the details that shape graduates' abilities and in turn impact their employability.

3. Methodology

Data for this research was gathered from MYFutureJobs, a national job portal managed by the Social Security Organization (SOCSO), which hosted 158,472 job seekers as of August 6, 2021. This diverse platform includes recent graduates, employed individuals, and retrenched workers, aligning with the study's focus on internships and skill utilization in graduate employability. We conducted an online survey via email targeting graduates who completed their tertiary education within the past three years, collecting 506 responses over six weeks. This method was chosen for its cost-efficiency and quick response time.

Moreover, data processing and statistical methods use the software of SPSS as the primary data analysis. This paper utilizes SPSS as a tool for data analysis such as validity, reliability, and hypothesis testing. However, the study uses multiple regression analysis considering that all the assumptions should be fulfilled, including autocorrelation, significance of the parameter (t-test) and goodness of fit (F-test).

In the realm of academic research, regression analysis serves as the methodological approach employed to elucidate the intricate relationships between a designated dependent variable, denoted as "graduate employability" (GE), and an array of independent variables or predictors, symbolized as (x). Within the context of our investigation, our primary focus centers on the dependent variable, graduate employability, ascertained through the employment status of the respondents in our study.

This study examines two significant independent variables. The first variable pertains to whether students engaged in internships prior to entering the workforce. The second variable assesses the degree to which the knowledge and skills acquired during their internship experiences have been implemented and assimilated into their professional endeavors.

The multiple linear regression model is represented by the following equation:

$$GE = \beta_0 + \beta_1 \text{Internship} + \beta_2 \text{Skill Utilization} + \varepsilon$$

Where:

GE	represents the dependent variable, which is measure the graduate employability
β_0	represents the intercept, indicating the expected employability when both internships and skills utilization are absent
β_1 and β_2	are the regression coefficients, signifying the impact of participation in internship and the degree of skill utilization on graduate employability, respectively.
ε	denotes the error term, encompassing unexplained variations in employability that are accounted for the independent variables.

4. Results and Findings

The distribution of the respondents' profile. The sample of respondents is representative of graduates of 2017 to 20202, where 65.3% of graduates are male, and 34,7% are female. Most of the educational attainment of graduates is a bachelor's degree with 73.9% while the rest is diploma with 14.7%, master with 10% and PhD with 1.4%. In terms of employment, among the graduates who participated in this survey, 74.1% of them were employed and the rest of 25.9% are not working (Table 4.1).

Table 4.1: Respondents' Profile

	Category	Frequency	Percentage
Gender	Male	174	34.7%
	Female	328	65.3%
Employment Status	Working	372	74.1%
	Not Working	130	25.9%

Internships play a pivotal role in augmenting the workplace preparedness of recent graduates. A considerable proportion of institutions of higher education, approximately 90.2%, have recognized the importance of internships and have incorporated compulsory internship training into their academic curricula. As indicated in Table 4.2, a statistically significant disparity ($t=3.498$, $p<0.01$) was observed in terms of graduates' employability between male and female individuals. Specifically, males exhibited a higher level of graduates' employability with a mean score of 37.31, compared to females who had a mean score of 35.68. Consequently, the null hypothesis was rejected.

Table 4.2: Graduates' Employability Between Male and Female

Variables	Mean Score	<i>t</i>	<i>p</i>
Gender		3.498	.0002
Male	37.31		
Female	35.68		

Table 4.3 presents an examination of the relationship between internship participation and skill utilization in relation to graduates' employability. The analysis revealed a significant, positive correlation between both internship involvement and skill utilization with graduates' employability. This indicates that a stronger presence of internships among students is associated with increased employment prospects ($r=0.333$, $p<0.042$). Similarly, the findings indicate a substantial, positive correlation for skill utilization, suggesting that the more effectively students employ the skills acquired during their internships, the greater their prospects for future employment ($r=0.961$, $p<0.027$). These results underscore the importance of internships and skill utilization in shaping students' employability outcomes.

Table 4.3: Correlation of Internship and Skill Utilization on Graduates' Employability

Variables	Graduates' Employability	
	Pearson Correlation	<i>p</i>
Internship	0.333	0.042
Skill Utilization	0.961	0.027

5. Conclusion

In conclusion, this research paper highlights the pivotal role of internships and skill utilization in shaping the employability of graduates in today's dynamic job market. The study, conducted through a comprehensive survey of graduates, yielded two critical findings. Firstly, it emphasized that participation in internship programs significantly boosts graduates' employability by providing them with valuable industry experience and opening doors to new job opportunities. Secondly, it underscored the importance of graduates effectively using the skills they acquire during their internships, as this skill utilization correlates with a greater likelihood of transitioning into full-time job roles post-graduation.

These findings stress the importance of a well-structured internship system within tertiary education, aligning skills acquisition with industry demands, and encouraging graduates to effectively apply these skills in their future careers. As the job landscape continues to evolve, it is crucial for educational institutions and policymakers to recognize the significance of internships in equipping graduates with practical experience and skills, as well as promoting their ability to utilize these skills in real-world work settings. Ultimately, this study calls for further research and initiatives to support and enhance the role of internships and skill utilization in improving graduates' employability and facilitating a smoother transition from education to employment.

6. References

- Policy Planning and Research Division, Ministry of Higher Education Malaysia. (2022, April 22). *UNESCO National Commission Country Report Template - WHEC 2022*. World Higher Education Conference (WHEC2022). <https://whec2022.net/resources/Country%20report%20-%20Malaysia.pdf>
- Bawica, I. M., (2021). The Effects of Internship Program on the Employability Readiness. *International Journal of Academe and Industry Research*, Volume 2, Issue 3, pp. 86-101
- Baert, B. S., Neyt, B., Siedler, T., Tobback, I., & Verhaest, D. (2021). Student internship and employment opportunities after graduation: A field experiment. *Economics of Education Review*, 83, 102141
- Galbraith, D., & Mondal, S. (2020) The Potential Power of Internships and The Impact on Career Preparation. *Research in Higher Education Journal*. Volume 38
- Alam, M. J., Ogawa, K., & Islam, S. R. B. (2022). Importance of Skills Development for Ensuring Graduates Employability: The Case of Bangladesh. *Social Sciences*, 11(8), 360. <https://doi.org/10.3390/socsci11080360>

Ministry of Higher Education. (2018). Graduate Tracer Study 2017. Putrajaya: Ministry of Higher Education.

Ministry of Higher Education. (2020). Graduate Tracer Study 2019. Putrajaya: Ministry of Higher Education.

Assessing The Impact of “Older Workers-to-Productivity” Nexus on the Economic Growth in Malaysia

Nur Azreen Mokhyi^{a,b,*}, Muhammad Daaniyall Abd Rahman^{a,b}, Muzafar Shah Habibullah^{b,c},
Siti Nor Nadhirah Zainuddin^{a,b}, Chakrin Utit^a

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^cPutra Business School, Serdang, Malaysia

*Corresponding Author: nurazreen966@gmail.com

Abstract

Malaysia is currently facing demographic changes towards the ageing population. Whilst Malaysia is aiming for a productivity growth target of 3.7% by 2025 in the Twelfth Malaysia Plan, the speed of aging society is somehow rapid in the country, imposing a question on how these older workers can have an impact on economic growth. The purpose of this paper is to examine the extent to which older workers affect economic growth, considering the former relationship to labor productivity growth across economic sectors. To elucidate this objective, we employ a two-stage least square (2SLS) method. In the first stage, we estimate the impact of demographic factors on labour productivity using Ordinary Least Square (OLS) by adopting the Newey-West (Newey & West, 1987) approach that could eliminate both serial correlation and heteroscedasticity (OLS-robust). In the second stage, we predicted the impact of labor productivity on economic growth using OLS-robust. There are two main observations. First, both working age and older workers show variations at sectoral levels. Both working age and older workers show variations of labour productivity and impact on economic growth at sectoral levels. Second, the impacts of combining both workers are positive in promoting economic growth. Drawing from these findings, several implications should be considered to enhance the contribution of older workers to the economy. First, The Government should consider extending the current retirement age to allow more older workers to stay productive and contribute to the economy. Second, upskilling and reskilling programmes should be enhanced to ensure older workers stay relevant in the industry. Third, the role of employment services to address the employability of older workers. In addition, it is important to note that empowering both older and younger workers are needed to cultivate a more balanced and dynamic workforce, and therefore reinforce the foundation for a sustainable demographic dividend.

Keywords: ageing, productivity, demographic shift, Malaysia

1. Introduction

The impact of an aging population on labor productivity is a complex issue that has far-reaching implications for the global economy. As the population ages, the number of people in the workforce decreases or also means an increase in the older workers, leading to overall impact on the labor supply. This can have a significant impact on labor productivity, as fewer people are 'productively' available to produce goods and services. On the other hand, an aging population can also lead to an increase in labor productivity, for example, if there is a shift from physical labor to more cognitive-based jobs.

As far as the aging population is concerned, Malaysia is facing demographic changes with the increase in the size of older workers expanded from 6.6% to 10.3% in 2010 to 2022. Whilst Malaysia is aiming for a productivity growth target of 3.7% by 2025 in the Twelfth Malaysia Plan, the speed of aging society is somehow rapid in the country, imposing a question on how these older workers can have an impact on the economic growth. Inevitably, the increase in the older workers would carry economic burden to the nation, whereby significant economic costs would be imposed on the government (i.e., healthcare and social security).

The demographic dividend is the economic growth potential resulting from a population's age structure shift, particularly when the working-age population (15 to 64) outweighs the non-working-age segment (14 and younger, and 65 and older). It manifests when a higher proportion of the population is of working age, signifying increased productivity and economic contribution potential. Malaysia has experienced a beneficial demographic profile characterized by a rapidly expanding working-age population, creating a "demographic window of opportunity" for sustained economic growth. However, this advantageous period is concluding, highlighting the need for strategic measures to maintain economic momentum as the demographic landscape evolves.

Knowing that the older workers remain resourceful for economic production, leveraging on their availability and readiness would be beneficial for economic and productivity growth. Thus, the purpose of this paper is to examine the extent to which older workers affect economic growth, considering the former relationship to labor productivity growth across economic sectors.

2. Literature Review

2.1 Impact of Demographic Factors on Labour Productivity

The investigation into the impact of demographic factors on labor productivity and the aging workforce on economic growth holds significant importance in understanding the dynamics between demographic shifts and economic outcomes. In Tunisia, Frini and Jedidia (2018) investigated the impact of demographic factors on labour productivity for the period 1965-2014. The results suggest a nonlinear relationship between productivity and demography, thus exhibiting an inverted U-shape curve. Labour productivity edged down for young workers, rose for the prime

age adults, and kept on rising for older people. Poplawski-Ribeiro (2019) reassesses the empirical relationship between ageing and total factor productivity growth for a panel of advanced economies and emerging market economies for the period of between 1985 to 2014. Their findings indicate that ageing has played a significant role in slowing down total factor productivity growth, both for advanced economies and emerging market economies.

Investigating the impact of demographic factors on total factor productivity in Japan prefectural between 1990 and 2007, Liu and Westelius (2016) found that aging of the working-age population has had a significant negative impact on total factor productivity. On the other hand, Calvo-Sotomayor et al. (2019) analyses the influence of workforce ageing on labour productivity in 24 Europe countries for the period 1983-2014. The results obtained show that a 1% increase in the workforce between the ages of 55 and 64 is related to the decrease in productivity between -0.106% and -0.479%. A study by Tang (2006) on 10 Canadian provinces, on the impact of labour force ageing on productivity, and the results indicate that older workers are, on average, less productive than younger workers and that labour force ageing has a modest negative direct impact on productivity growth in Canada.

2.2 Impact of Ageing Workforce on Economic Growth

The impact of an aging on economic growth is rather unambiguous. A study by Phan and Vo (2019) examine the effects of an ageing population on economic growth in a panel of developing countries during the period 1975-2015; and they found that the shares of the elderly population show positive effects on the economic growth in the long-run; while the young population show negative effects on the economic growth in the long-run. Similar findings were found by Munir and Shahid (2020) in which young population has adverse impact on economic growth in the South Asian (Bangladesh, India, Pakistan and Sri Lanka) countries for the period 1980-2018. In Taiwan, the study by Huang et al. (2019) demonstrates that the aging workforce has a significantly positive impact on the rate of economic growth.

In the case of Malaysia, Yusof et al. (2020) use old-dependency ratio to proxy for the old-age population. Their study, which uses time-series data from 1985-2016 suggests a positive relationship between old-age and economic growth. In contrast, a study by Mohd et al. (2021) indicate that the ageing population retards economic growth in Malaysia for the period 1981-2019.

Overall, this collective body of research not only contributes empirical evidence but also offers a comprehensive understanding of the intricate relationship between demographic factors, labor productivity, and economic growth across diverse regions. This nuanced understanding is essential for formulating effective public policies and strategic interventions to navigate the challenges and harness the opportunities presented by demographic changes.

3. Methodology

In this study, in the spirit of Aiyar et al. (2016) and Lee and Shin (2021), we investigate the channel through which demographic factors affect the economic growth through labor productivity. Thus, for this purpose we specify two models, one for labor productivity and the other for economic growth. To determine the effects of demographic factors on labor productivity, we specify the following model (see h & Jedidia, 2019; Cristea et al., 2020; Wong & Wong, 2021),

$$\text{lab_prod}_t = \alpha_0 + \alpha_1 \text{age1554}_t + \alpha_2 \text{age5564}_t + \varepsilon_t \quad (1)$$

where lab_prod_t is labor productivity proxy using real Gross Domestic Product (GDP) divided by the number of employments; while variables and are the number of working populations aged 15-54 years and 55-64 years, respectively. In Equation (1), we did not include other control variables because the main purpose is to investigate the role of demographic factors as the sole variables affecting labor productivity in Malaysia (see Feyrer, 2007).

On the other hand, the economic growth model for Malaysia is specify as follows (see Mahlberg et al., 2013; Huang et al., 2019; Munir & Shahid, 2019; Lee & Shin, 2021),

$$\text{econ_growth}_t = \beta_0 + \beta_1 \text{lab_prod}_t + \theta_i Z_{it} + \varepsilon_t \quad (2)$$

where econ_growth_t is economic growth measures using real GDP; while the regressors are labor productivity (lab_prod_t) and Z_{it} is the control variables which include among others, innovation, life expectancy, globalisation, labor force participation rate, fertility rate, openness, and exchange rate.

Data for labor productivity and working age population 15-54 years and 55-64 years were compiled from the Department of Statistics Malaysia; while data on life expectancy, globalisation, labour force participation rate, fertility rate, openness, and exchange rate were collected from the World Development Indicators, World Bank database. On the other hand, variable Innovation is computed as an Index. The Innovation index was computed as the first principal component of total patent applications by both non-residents and residents (pattot), research and development expenditure to GDP (rndy), number of researchers in R & D (rndpc), number of scientific and technical journal articles (jurnal), number of technicians in R & D (techy), and total trademark applications by both non-residents and residents (tmtot). Innovation Index is computed as $[(0.145694 * \text{pattot}) + (0.172612 * \text{rndy}) + (0.175956 * \text{rndpc}) + (0.163893 * \text{tmtot}) + (0.176246 * \text{jurnal}) + (0.165598 * \text{techpc})]$. The period of the study is from 1982 to 2021. In all estimations, all variables were transformed into logarithm.

Method of estimation

To estimate the impact of demographic factors on labour productivity, and labour productivity on economic growth, we employed the two-stage least square (2SLS). In the first stage, we estimate

Equation (1) using Ordinary Least Square (OLS) using the Newey-West (Newey & West, 1987) approach that could eliminate both serial correlation and heteroscedasticity (OLS-robust). In the second stage, the predict labour productivity, $\widehat{lab_prod}_t$ is included in Equation (2). Equation (2) is then estimated using OLS-robust as above.

4. Empirical Results

Recall that the primary aim of this paper is to examine the extent to which older workers affect economic growth, considering the former relationship to labor productivity growth across economic sectors. A two-stage least square (2SLS) has been employed to estimate the impacts. Table 1 summarizes the results of the 2SLS.

Table 1: Results of Two-Stage Least Squares (2TLS) for labour productivity and economic growth for Malaysia by economic sectors

Independent variables	Malaysia:		Agriculture:		Mining & Quarrying:	
	lab_prod _t	Econ_growth _t	lab_prod _t	Econ_growth _t	lab_prod _t	Econ_growth _t
constant	-6.5695*** (-10.354)	-30.214*** (-4.3597)	4.0273 (1.1115)	8.2041*** (4.8080)	8.9551*** (20.132)	6.8785*** (12.956)
age15 – 54 _t	1.4718*** (10.194)		-1.3374*** (-4.5812)		-0.3100** (-2.5903)	
age55 – 64 _t	-0.4118*** (-3.7872)		1.7255*** (5.1105)		-0.4017*** (-5.3610)	
$\widehat{lab_prod}_t$		0.3159** (2.3165)		0.4875*** (5.2978)		0.2627*** (5.7382)
innovation _t		0.1657** (2.3049)				0.3002*** (10.148)
life_expec _t		8.4566*** (4.8250)				
global _t		1.0662*** (5.7532)				
lab_partrate _t				0.0488*** (3.3904)		
exchangerate _t				-0.4407*** (-3.2684)		
adj R ²	0.970	0.997	0.760	0.867	0.790	0.847
Independent variables	Manufacturing:		Construction:		Services:	
	lab_prod _t	Econ_growth _t	lab_prod _t	Econ_growth _t	lab_prod _t	Econ_growth _t
constant	1.5733 (1.2992)	2.0388 (1.2358)	0.6172 (1.1805)	-0.6188 (-0.5255)	-5.9489*** (-4.8130)	1.2647 (1.3418)
age15 – 54 _t	-0.2442 (-0.7498)		0.5476*** (7.3244)		1.4862*** (6.0858)	
age55 – 64 _t	0.6722*** (2.7695)		0.1124*** (4.1233)		-0.4739*** (-3.1119)	
$\widehat{lab_prod}_t$		1.6367*** (6.2364)		0.8506*** (3.6805)		0.8209*** (2.7899)
innovation _t				0.4115*** (6.2250)		0.4439*** (4.5122)
openness _t		-1.1713*** (-3.6638)				

fertility _t		1.2678*** (7.6769)				
global _t						1.0056** (2.7254)
lab_partrate _t				0.0460*** (3.1383)		
adj R ²	0.598	0.974	0.880	0.945	0.950	0.993

Notes: Asterisks ***, **, * denote statistically significant at the 1%, 5% and 10% level, respectively. Variable $\widehat{lab_prod}_t$ is predicted labour productivity of the first stage by estimating $lab_prod_t = f(age1554_t, age5564_t)$. Innovation is an index, computed as the first principal component of total patent applications by both non-residents and residents (pattot), research and development expenditure to GDP (rndy), number of researchers in R & D (mdpc), number of scientific and technical journal articles (jurnal), number of technicians in R & D (techy), and total trademark applications by both non-residents and residents (tmtot). Innovation Index is computed as $[(0.145694*pattot)+(0.172612*rndy)+(0.175956*mdpc)+(0.163893*tmtot)+(0.176246*jurnal)+(0.165598*techpc)]$.

In the labor productivity equations, working age (15-54 years) shows positive impacts on labor productivity, while older workers (55-64 years) indicate negative impacts on labor productivity at the national average. When combining both workers in the growth equation, labor productivity has a positive impact on Malaysia’s economic growth for the period 1982-2021.

There are two main observations. First, both working age and older workers show variations at sectoral levels. Both working age and older workers show variations of labour productivity and impact on economic growth at sectoral levels. Their contribution to labor productivity is not necessarily positive for both working age and older workers. At the sectoral level, working age (15-54 years) has positive effects in the construction and services sectors while negative effects are observed in the agriculture, mining & quarrying, and manufacturing sectors. On the other hand, older workers show positive impacts in the agriculture, manufacturing and construction sectors.

Based on Department of Statistics Malaysia (DOSM), The employment structure in the agriculture indicates that there are 74% of older workers working as self-employed. This explains the positive contribution of older workers to the productivity. Their vast experiences and skills in the self-employment that relevant to the nature of agriculture sector translate into the productivity.

Second, the impacts of combined of both workers are positive in promoting economic growth. It is important to note that productivity is also contributed by non-labour factors such as technology and capital input. Even though working age and older workers contribute negatively to productivity in the mining & quarrying sector, the contribution labour productivity towards the overall economic growth is positive. This is an example of a sector in which non-labour factors are dominant.

5. Conclusion

This study reveals the positive impacts in the agriculture, manufacturing and construction sectors. Two main findings can be highlighted. First, both younger and older workers show variations at the sectoral levels. Both working age and older workers show variations of labour productivity and

impact on economic growth at sectoral levels. Their contribution to labour productivity is not necessarily positive for both younger and older workers. Second, the impacts of older workers are positive in promoting economic growth.

It is important to note that productivity is also contributed by non-labor factors such as technology and capital input. Drawing from these findings, three policy implications should be considered to enhance the contribution of older workers to the economy, primarily focusing on productivity improvement. First, the Government should consider extending the current retirement age beyond 60 years to allow more older workers to stay productive and contribute to the economy. Such initiatives have been done in the majority of developed countries to prepare for the ageing trend.

Second, upskilling and reskilling programmes for older workers should be enhanced for them to stay relevant in the labour market, particularly when faced with the rise of technology and AI. As example, Japan actively optimizes older workers' contribution, implementing "silver employment," flexible work arrangements, and policies fostering intergenerational collaboration for economic sustainability.

Third, the role of employment services is to address the employability of older workers. Employment services can contribute significantly to providing older workers with suitable employment, through the provision of training and retraining, and by preventing discriminatory age treatment of applicants by employers. With respect to training and retraining the role of employment services can be especially important as employers calculate the amortization costs of training investments, and older workers have fewer years to recoup.

In addition, it is important to note that empowering the older workers may not be enough to address the overall demographic shifts. Fostering an environment that promotes intergenerational collaboration and knowledge transfer can further bridge the gap between different age groups in the workforce. By concurrently empowering both older and younger workers, a more balanced and dynamic workforce can be cultivated, reinforcing the foundation for a sustainable demographic dividend that maximizes economic benefits over the long term.

References

- Aiyar, S., Ebeke, C., & Shao, X. (2016). The impact of workforce aging on European productivity. IMF Working Paper WP/16/238, International Monetary Fund.
- Bawazir, A.A.A., Aslam, M., & Osman, A.F.B. (2019). Demographic change and economic growth: Empirical evidence from the Middle East. *Economic Change and Restructuring*, <https://doi.org/10.1007/s10644-019-09254-8>
- Bloom, D.E., & Finlay, J.E. (2009). Demographic change and economic growth in Asia. *Asian Economic Policy Review*, 4(1), 45-64.

- Bloom, D.E., Boersch-Supan, A., McGee, P., & Seike, A. (2011). Population aging: Facts, challenges, and responses. PGDA Working Papers 7111, Program on the Global Demography of Aging.
- Calvo-Sotomayor, I., Laka, J.P., & Aguada, R. (2019). Workforce ageing and labour productivity in Europe. *Sustainability*, 11, 5851; doi:10.3390/su11205851
- Cristea, M., Noja, G.G., Danacica, D.E., & Stefea, P. (2020). Population ageing, labour productivity and economic welfare in the European Union. *Economic Research-Ekonomska Istrazivanja*, 33(1), 1354-1378, DOI: 10.1080/1331677X.2020.1748507
- Feyrer, J. (2007). Demographics and productivity. *The Review of Economics and Statistics*, 89(1), 100-109.
- Frini, O., & Jedidia, K.B. (2019). Population age structure change and labour productivity: Evidence from Tunisia. *The European Journal of Applied Economics*, 16(1), 1-19. DOI: 10.5917/EJAE15-18209
- Huang, W.H., Lim, Y.J., & Lee, H.F. (2019). Impact of population and workforce aging on economic growth: Case study of Taiwan. *Sustainability*, 11, 6301; doi:10.3390/su11226301
- Lee, H.H., & Shin, K. (2021). Decomposing effects of population aging on economic growth in OECD countries. *Asian Economic Papers*, 20:3, https://doi.org/10.1162/asep_a_00839
- Liu, Y., & Westelius, N. (2016). The impact of demographics on productivity and inflation in Japan. IMF Working Paper WP/16/237, International Monetary Fund.
- Mahlberg, B., Freund, I., Cuaresma, J.C., & Prskawetz, A. (2013). Ageing, productivity and wages in Austria. *Labour Economics*, 22, 5-15.
- Munir, K., & Shahid, F.S.U. (2019). Role of demographic factors in economic growth of South Asian countries. *Journal of Economic Studies*, 48(3), 557-570. <https://doi.org/10.1108/JES-08-2019-0373>
- Newey, W.K., & West, K.D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, 55(3), 703-708.
- Poplawski-Ribeiro, M. (2019). Labour force ageing and productivity growth. *Applied Economics Letters*, DOI: 10.1080/13504851.2019.1637509
- Tang, J. (2006). Labour force ageing and productivity performance in Canada. *The Canadian Journal of Economics*, 39(2), 582-603.
- Wong, L., & Wong, K. (2021). Impact of population ageing on productivity growth in Hong Kong. *Office of the Governor Economist - Economics Letter*, 4, 1-10.
- Yusof, M.M., Mohamed, S., & Basah, M.Y.A. (2020). The impact of ageing population on Malaysia economic growth. *ASM Science Journal*, 13, 1-6.

Nonlinear Relationship Between Shadow Economy and Income Inequality in Malaysia

Adzzahir Ifwad Adzman^{a,c*}, Muzafar Shah Habibullah^{b,c}, Mohd Yusof Saari^{a,c,d},
Badariah Haji Din^e, Muhammad Daaniyall Abd Rahman^{a,c}

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bPutra Business School, Serdang, Malaysia

^cCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

^dMinistry of Human Resources and Emiratization, Dubai, United Arab Emirates

^eCollege of Law, Government and International Studies, Universiti Utara Malaysia, Malaysia

*Corresponding Author: adzzahir@gmail.com

Abstract

The shadow economy, characterized by unreported and informal economic activities, plays a substantial - yet often overlooked - role in shaping income distribution within Malaysia. As Malaysia grapples with persistent income disparities, understanding how the shadow economy influences these inequalities is imperative at large. The novelty of this paper is its contribution to the literature on analyzing the impact of the size of the shadow economy on income inequality in a developing economy, in particular Malaysia, using annual data over the period 1980 to 2018. In this study, we adopt four different measures for computing the size of the shadow economy, as suggested in the literature. To assess the impact of shadow economy on income inequality, we used three estimators, namely; the Ordinary Least Square (OLS), Robust Least Square (RLS) and Fully Modified OLS (FMOLS) regression techniques. In our analyses, we have tested both linear and nonlinear impact of the shadow economy on income inequality. Generally, our results support the nonlinear relationship between shadow economy and income inequality for Malaysia. The nonlinear relationship exhibits an inverted U-shape curve, thus resembling the inequality-shadow economy Kuznets curve. The inverted U-shape curve between the size of the shadow economy and income inequality implies that when the size of the shadow economy is small, income inequality is widening, until to a certain optimal point. Otherwise, the income inequality narrows as the size of the shadow economy becomes larger. Our macroeconomic variables suggest that increase in the level of economic development improves income inequality; while increase in tax burden and urbanization increase income inequality in Malaysia for the period under study.

Keywords: income inequality, shadow economy, robust regression, Malaysia.

1. Introduction

United Nations Development Programme (UNDP, 1994) emphasized the important role of economic security in sustaining human security, leading to sustainable human development and economic growth. Economic security, traditionally associated with assured basic income from productive work, faces challenges in today's economy marked by uncertainty and limited job opportunities, particularly for young individuals. Addressing income inequality is crucial for governments, as it impacts social wellbeing and stability (UNDP, 2013). High income inequality can lead to social dissatisfaction, political instability, and ethnic or regional conflicts (Alesina & Perotti, 1996; Barro, 2000). It also hampers economic growth, limits access to education, and reduces labour productivity. Furthermore, many are compelled to turn to self-employment, which may offer even less security than wage employment, or resort to the shadow economy.

As one of the developing economies, Malaysia's income inequality, as measured by the Gini coefficient, remains a concern despite improvements from 0.513 in 1970 to 0.407 in 2019, however, a coefficient of 0.4 and above is considered alarming (Yau and Tan, 2022). Malaysia's history bears witness to ethnic tensions stemming from income disparities, resulting in the introduction of the New Economic Policy in 1971 to balance income inequality among various ethnic groups (Shari, 2000; Saari et al., 2015). While the policy initially succeeded in reducing income inequality from the mid-1970s to 1990, subsequent trends indicated a resurgence in income disparities (Mahadevan, 2006). However, a more recent study by Goh et al. (2023) suggests that income inequality in Malaysia has generally been on a declining trajectory, over the past four decades, corresponding with a contraction of the shadow economy.

As Malaysia grapples with persistent income disparities, understanding how the shadow economy influences these inequalities is imperative at large. The shadow economy in Malaysia was estimated at approximately 28% of GDP in 2018 (Habibullah et al., 2022), resulting in substantial tax revenue losses. This not only hampers the government's ability to provide quality infrastructure and social services but also fosters criminal and corrupt activities that are hard to detect by the authorities. However, it is worth noting that the current size of the shadow economy is relatively lower than it was from 2000 to 2009 when it constituted 30.2% of the country's GDP (MOF, 2023). In this study, we intend to determine whether the size of the shadow economy has an impact on income inequality in Malaysia, using Gini coefficients as a proxy for income inequality and four measures of the shadow economy's size, spanning from 1980 to 2018.

2. Literature Review

The influence of the shadow economy on income inequality has been extensively discussed in numerous studies and within the realm of economic development literature. However, there are various definitions of the shadow economy (as discussed by Dell'Anno (2022) and the reference therein), and the estimates of the sizes of the shadow economy vary among the countries due to the different time periods, sample of countries, and estimators used in the analysis. Schneider and Dominik (2000) have noted that approximately two-thirds of the income earned in the shadow economy is immediately spent in the formal economy. Additionally, as posited by Smith (2002), the shadow economy can serve as a source of employment and income for individuals. Therefore, it becomes important to explore the precise impact of the shadow economy on income inequality,

especially in Malaysia, considering these intricate dynamics.

The literature has empirically examined a range of impacts of shadow economy on income inequality. According to Gutierrez-Romero (2021), the relationship between the shadow economy and income inequality can either be positive or negative, depending on a country's stages of economic development. Their study on Latin America and Sub-Saharan Africa found that the correlation between the size of the shadow economy and income inequality tends to be positive in developed countries but negative in developing countries. On the other hand, Elgin et al. (2021) discovered that the impact of shadow economy on income inequality is more likely to be negative in developed countries and positive in developing countries by covering a panel of 86 countries for the periods of 1960 to 2016.

Huynh et al. (2019), in their study covering a panel of 19 Asian countries from 1990 to 2015, found that the increase in the size of the shadow economy significantly increases the income share held by the lowest quintile and decreases the income share held by the highest quintile. Moreover, David et al. (2023) also found that the smaller informal sector has marginally contributed to reducing income inequalities in the case of African. Furthermore, they also found that the informal sector has a non-linear relationship with income inequality in Africa, exhibiting an inverted U-shaped curve. However, as was found by Esaku (2021) in Nigeria, a large size of the shadow economy significantly increases income inequality in both the long-run and short-run for the period 1991 to 2015. This positive impact is also supported by Ahmed et al. (2007) who studied the impact of the non-observed economy on income inequality in a sample of 67 cross-country cases.

Additionally, a study by Yap et al. (2018), covering a panel of 154 countries from 2000 to 2017 and employing both nonparametric and semiparametric analyses, found that developed countries exhibit an inverted N-shaped relationship between the shadow economy and income inequality. In contrast, the non-linear impact of the shadow economy on income inequality in developing countries displays an inverted U-shaped curve. Given this diverse array of findings, our study is motivated to investigate the impact of the size of the shadow economy on income inequality in Malaysia, where the shadow economy is estimated to be approximately 28% of GDP in 2018 (Habibullah et al., 2022).

3. Methodology

The Estimating Model

Following the existing empirical literature on income inequality and the shadow economy, the present study adopts the following Equation 1 as the baseline model to explore the impact of shadow economy on income inequality, as used by Huynh and Nguyen (2019), Berdiev and Saunoris (2018) and Esaku (2021).

$$\text{inequality}_t = \alpha_0 + \theta_1 \text{shadow}_{jt} + \gamma_k X_{kt} + \varepsilon_t \quad (1)$$

In this analysis, the dependent variable is income inequality, denoted as inequality_t . Our primary independent variable of interest is shadow_{jt} , which represents the size of the shadow economy measured as a ratio to gross domestic product (GDP). The subscript j corresponds to four distinct

measures of the shadow economy's size in Malaysia. Specifically, these measures are derived from (i) The size of the shadow economy estimated by Medina and Schneider (2019) using the Multiple Indicator-Multiple Cause (MIMIC) approach; (ii) The size of the shadow economy estimated by Elgin et al. (2021) using both the MIMIC and Computable General Equilibrium (CGE) approaches; (iii) The size of the shadow economy estimated by Habibullah et al. (2022) using the Modified-Cash-Deposit-Ratio (MCDR) approach. Additionally, the variable X_{kt} comprises a set of control variables, encompassing selected macroeconomic indicators such as real GDP, tax burden, and the rate of urbanization growth. The parameters α_0 and ϵ_t represent the intercept and error term, respectively. It is assumed that the error term has a zero mean and constant variance. All variables have been log-transformed to ensure that the estimated coefficients are presented as elasticities.

Modelling Nonlinear Impact of Shadow Economy

Equation 1 above demonstrates a linear relationship between income inequality and the shadow economy. To examine potential nonlinear relationship between income inequality and the size of the shadow economy, we specify the following model:

$$\text{inequality}_t = \alpha_0 + \theta_1 \text{shadow}_{jt} + \theta_2 \text{shadow}_{jt}^2 + \gamma_k X_{kt} + \epsilon_t \quad (2)$$

In Equation 2, the size of the shadow economy is introduced in a quadratic form. If $\theta_1 > 0$ and $\theta_2 < 0$, and both are statistically significant, this indicates a nonlinear relationship between the size of the shadow economy and income inequality, resulting in an inverted U-shaped curve. Conversely, if $\theta_1 < 0$ and $\theta_2 > 0$, and both are statistically significant, this also signifies a nonlinear relationship between the size of the shadow economy and income inequality, but it produces a U-shaped curve instead.

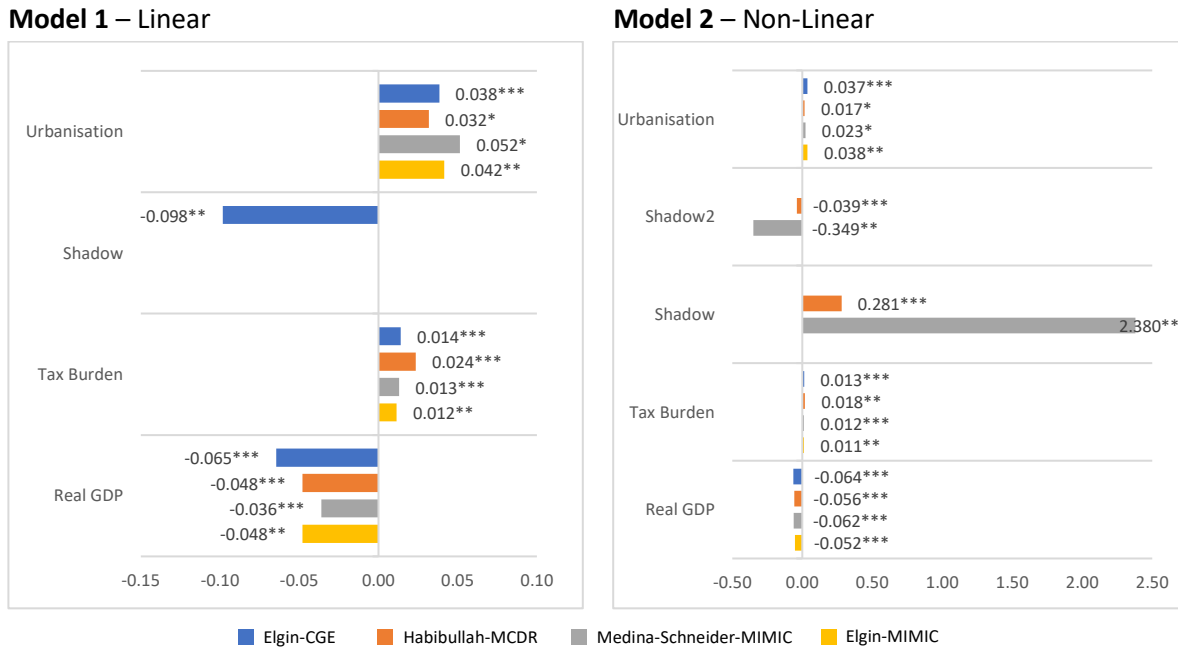
An inverted U-shaped curve implies that when the size of the shadow economy is small, income inequality is widening. However, as it reaches a certain optimal point, income inequality starts to improve (reduced) as the size of the shadow economy becomes larger. On the other hand, a U-shaped relationship suggests that at smaller size of the shadow economy improves income inequality. Yet, once it surpasses a certain minimum threshold, income inequality worsens as the shadow economy continues to expand.

4. Empirical Results

As all variables exhibit the same order of integration, which are all integrated of order $I(1)$, we can proceed with estimating both Equation 1 and Equation 2 and conduct cointegration tests. The presence of cointegration would validate the long-term applicability of Equations 1 and 2. Figure 1 presents the estimation results using the OLS-robust standard error procedure, which corrects for both autocorrelation and heteroscedasticity. Model 1 refers to the linear model, while Model 2 represents the nonlinear model. This figure is organized into four estimations which the results that used the estimates of the size of shadow economy using Elgin-CGE, followed by Habibullah-MCDR, Medina-Schneider-MIMIC and Elgin-MIMIC.

The cointegration test results, as indicated by the significant DF-statistics, can conclude the presence of cointegration among the variables. This implies that there are long-term relationships between income inequality and its regressors. The estimated cointegrated regression equations (Equations 1 and 2) represent the valid long-term models, as supported by the significant DF-statistics in Figure 1 for all four measures of the shadow economy's size.

Nevertheless, there are some interesting results that emerge from Figure 1. In the linear model (Model 1), the shadow economy variable is statistically significant (at the 1% level) but only in the Elgin-CGE model, with a negative sign. This suggests that in Malaysia, an increase in the size of the shadow economy reduces income inequality during the study period.



Source: Authors own estimates

Notes: Asterisk ***, ** and * denote statistically significant at 1%, 5% and 10% level, respectively. All variables are in logarithm. For all countries the proxy for m_{it} is the ratio of military expenditure to GDP except for the Philippines and Thailand using the ratio of military expenditure to general government expenditure. For all countries the proxy for f_{it} is the ratio of broad money to GDP except for the Philippines using the ratio of domestic credit to the private sector to GDP. For all countries proxy for sh_{it} is shadow economy estimates using computable general equilibrium by the World Bank while for Indonesia and Singapore, MIMIC model was used to estimate shadow economy. EG_{t-stat} is the t-statistics for the root test on the residual of the Engle and Granger cointegrating regression.

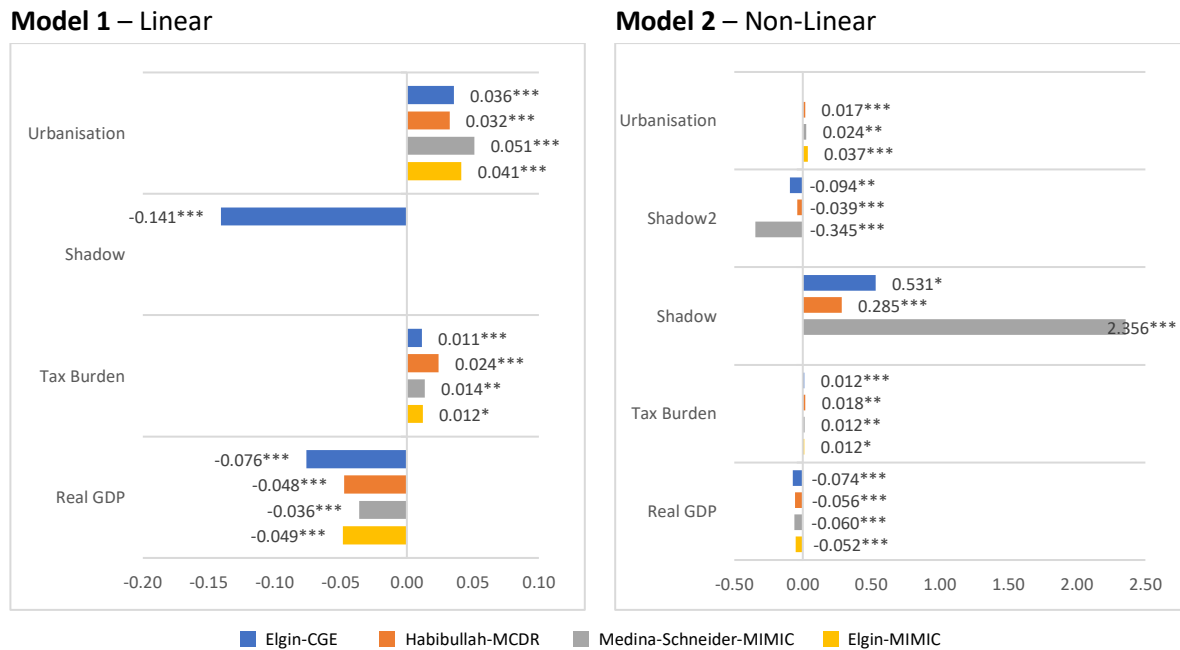
Figure 1. Results using OLS Robust Standard Error

In the case of the nonlinear models (Model 2), both the shadow and shadow-square variables are statistically significant (at least at the 5% level) for the Habibullah-MCDR and Medina-Schneider-MIMIC models, with $\theta_1 > 0$ and $\theta_2 < 0$ which indicates an inverted U-shaped relationship between income inequality and the size of the shadow economy. In other words, when the shadow economy is small, income inequality will increase until it reaches an optimal point, thereafter, further expansion of the shadow economy will decrease income inequality. Furthermore, the optimal size of the shadow economy for Malaysia, estimated by Habibullah-MCDR, is 37.5% of GDP, while Medina-Schneider-MIMIC is 30.2% of GDP.

Lastly, three macroeconomic variables—real GDP, tax burden, and urbanization growth—are all statistically significant, at least at the 10% level. Real GDP has a negative impact on income inequality, while both tax burden and urbanization growth are associated with widening or increasing income inequality.

Figure 2 presents the outcomes of estimating Equations 1 and 2 using Robust regression with M-estimators, a robust method for handling outliers. All the estimated models, whether linear or nonlinear, reveal cointegration among the variables, evident from the significant DF-statistics.

By using Elgin et al.'s (2019) shadow economy estimates, the linear model demonstrates a negative impact of the shadow economy on income inequality. The shadow economy variable is statistically significant at the 1% level, reinforcing the findings in Figure 2. In Malaysia, an increase in the size of the shadow economy reduces income inequality. Conversely, for Habibullah-MCDR, Medina-Schneider-MIMIC and Elgin-MIMIC, Model 1 indicates that the shadow economy has no linear effect on income inequality.



Source: Authors own estimates

Notes: Asterisk ***, ** and * denote statistically significant at 1%, 5% and 10% level, respectively. All variables are in logarithm. For all countries the proxy for $milex_t$ is the ratio of military expenditure to GDP except for the Philippines and Thailand using the ratio of military expenditure to general government expenditure. For all countries the proxy for $finance_t$ is the ratio of broad money to GDP except for the Philippines using the ratio of domestic credit to the private sector to GDP. For all countries proxy for $shadow_t$ is shadow economy estimates using computable general equilibrium by the World Bank while for Indonesia and Singapore, MIMIC model was used to estimate shadow economy. EG_{t-stat} is the t-statistics for the root test on the residual of the Engle and Granger cointegrating regression.

Figure 2. Results using Robust Regression

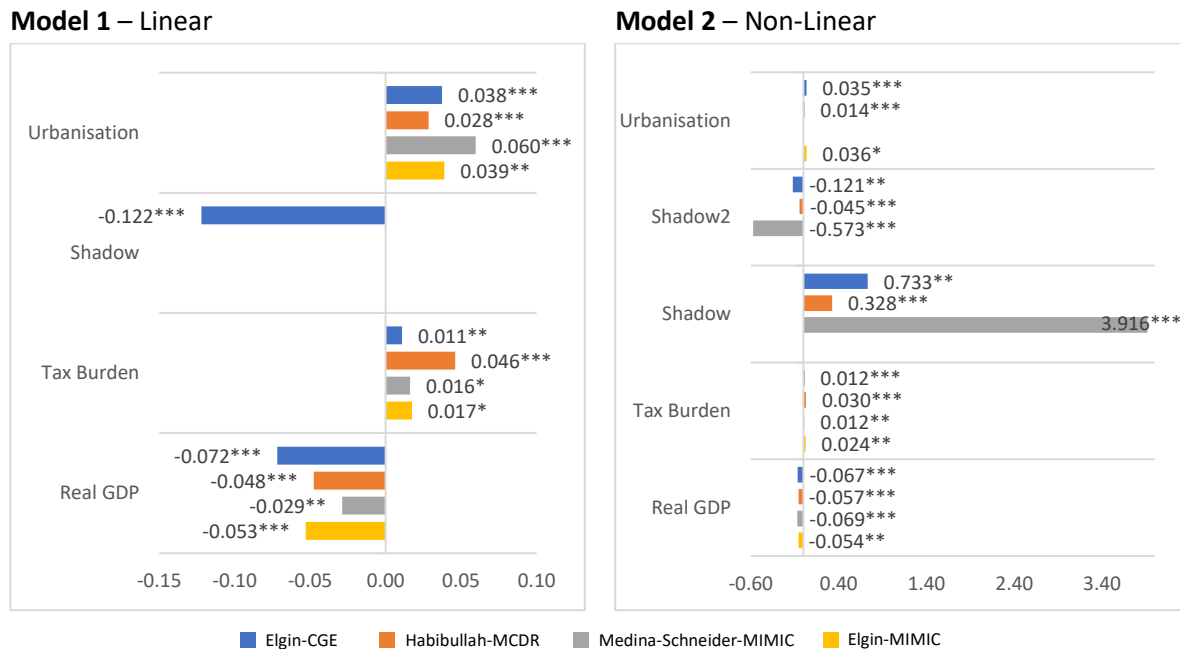
For Model 2, the estimated coefficients for the shadow and shadow-square variables are both statistically significant, with positive and negative values, respectively, at least at the 10% level.

The optimal shadow economy sizes that lead to a reduction in income inequality are as follows: 16.8% of GDP for Elgin-CGE, 37.6% of GDP for Habibullah-MCDR, and 30.3% of GDP for Medina-Schneider-MIMIC methods.

Furthermore, all the macroeconomic variables are statistically significant, at least at the 10% level. Real GDP has a negative impact on income inequality, while tax burden and urbanization growth have a positive impact on income inequality.

For robustness results, we employed the FMOLS procedure, which mitigates small sample bias and endogeneity issues, to estimate the cointegrated long-run models (Equations 1 and 2). The outcomes are detailed in Figure 3.

Consistent with prior findings (as observed in the OLS-robust results in Figure 1 and the Robust regression results in Figure 2), the linear impact of the shadow economy on income inequality is evident in Model 1 in Part A when employing the shadow economy estimates from Elgin et al. (2019).



Source: Authors own estimates

Notes: Asterisk ***, ** and * denote statistically significant at 1%, 5% and 10% level, respectively. Figures in the brackets are t-statistics. All variables are in logarithm. The optimal point for the shadow economy is calculated as . The prewhitening lag length=1.

Figure 3. Results using FMOLS for the long-run model

Regarding the non-linear Model 2, the estimated regressions in Elgin-CGE, Habibullah-MCDR and Medina-Schneider-MIMIC reveal that the quadratic terms are statistically significant, at least

at the 5% level. The shadow variable displays a positive sign, while the shadow-square variable exhibits a negative sign. This indicates an inverted U-shaped curve, signifying a non-linear relationship between income inequality and the size of the shadow economy. These results further reinforce and confirm our earlier findings regarding the non-linear relationship between income inequality and the size of the shadow economy in Malaysia.

5. Conclusion

This study reveals a nonlinear relationship between the shadow economy and income inequality in Malaysia, characterized by an inverted U-shaped curve, thus, supporting the inequality-shadow economy Kuznets curve. Initially, as the shadow economy grows, income inequality widens. However, once it reaches a certain optimal point, income inequality begins to decrease as the shadow economy expands further. Additionally, macroeconomic factors play a role in this equation, with higher economic development levels reducing income inequality, while an increase in the tax burden and urbanization tends to raise it. Both tax burden and urbanization exhibit nonlinear effects on income inequality, with tax burden following a U-shaped curve and urbanization displaying an inverted U-shaped curve.

The practical implication of our findings is that addressing income inequality in Malaysia should involve regulating the size of the shadow economy. It's essential to recognize that the shadow economy has some positive impacts on the economy by providing employment and business opportunities that can narrow the income gap between the rich and the poor. However, it's important to manage the shadow economy's size in the long run, as an excessively large shadow economy can worsen income inequality and be associated with harmful activities such as corruption, tax evasion, and illegal trades, which can disrupt a country's stability.

References

- Ahmed, E., Rosser, J.B., & Rosser, M.V. (2007). Income inequality, corruption and the non-observed economy: A global perspective. In: M. Salzano and D. Colander (eds). *Complexity Hints for Economic Policy*. Milano: Springer. pp. 233-252.
- David, A., Diallo, Y., & Nilsson, B. (2023). Informality and inequality: The African case. *Journal of African Economies*, 32, ii273-ii295. <https://doi.org/10.1093/jaec052>
- Dell'Anno, R. (2022). Theories and definitions of the informal economy: A survey. *Journal of Economic Survey*, 36(5), 1610-1643. <https://doi.org/10.1111/joes.12487>
- Elgin, C., Kose, M.A., Ohnsorge, F., & Yu, S. (2021). Understanding informality. Working Paper No: 2114, Koc University-Tusiad Economic Research Forum, Istanbul, Turkiye.
- Esaku, S. (2021). Does shadow economy increase income inequality in the short- and long-run? Empirical evidence from Uganda. *Cogent Economics & Finance*, 9, 1, 1912896,
- Goh, S.K., Wong, K.N., Ayupo, K., & Lai, Y.W. (2023). Income inequality, income growth and government redistribution in Malaysia: What do we know in the long-run? *Malaysian Journal of Economic Studies*, 60(1), 69-87.
- Gutierrez-Romero, R. (2021). Inequality, persistence of the informal economy, and club convergence. *World Development*, 139, 105211.
- Habibullah, M.S., Saari, M.Y., Eng, Y.K., Tan, Y.L., & Din, B.H. (2022). *Modelling Shadow Economies: Sizes, Causes and Consequences*. Balakong, Selangor: MPH Group Publishing Sdn Bhd.

- Huynh, C.M., & Nguyen, T.L. (2019). Shadow economy and income inequality: New empirical evidence from Asian developing countries. *Journal of the Asia Pacific economy*, 25(1), 175-192. <https://doi.org/10.1080/13547860.2019.1643196>
- Mahadevan, R. (2006). Growth with equity: The Malaysian case. *Asia-Pacific Development Journal*, 13(1), 27-52. DOI: 10.18356/b3751b80-en
- Medina, L., & Schneider, F. (2019). Shedding Light on the shadow economy: A global database and the interaction with the official one. CESifo Working Papers 7981, Munich Society for the Promotion of Economic Research, Munich, Germany.
- Pickhardt, C., & Sarda, J. (2015). Size and causes of the shadow economy in Spain: A correction of the record and new evidence from the MCDR approach. *European Journal of Law and Economics*, 39, 403-429. <https://doi.org/10.1007/s10657-013-9431-y>
- Saari, M.Y., Dietzenbacher, E., & Los, B. (2015). Sources of income and inequality across ethnic groups in Malaysia, 1970-2000. *World Development*, 76, 311-328.
- Schneider, F., & Dominik, H.E. (2000). Shadow economies: Size, causes and consequences. *Journal of Economic Literature*, 38(1), 77-114. DOI:10.1257/jel.38.1.77
- Shari, I. (2000). Economic growth and income inequality in Malaysia, 1971-95. *Journal of the Asia Pacific Economy*, 5(1-2), 112-124.
- UNDP (United Nations Development Programme). (2013). *Humanity Divided: Confronting Inequality in Developing Countries*. New York: United Nations Development Programme Bureau for Development Policy.
- Yap, W.W., Sarmidi, T., Shaari, A.H. and Said, F.F. (2018). Income inequality and shadow economy: a nonparametric and semiparametric analysis. *Journal of Economic Studies*, 45(1), 2-13. <https://doi.org/10.1108/JES-07-2016-0137>
- Yau, J.J.G., & Tan, S.H. (2022). The Kuznets curve, information and communication technology and income inequality in Malaysia. *International Journal of Economics and Management*, 16(2), 163-177. <http://doi.org/10.47836/ijeam.16.2.0>

Working Here or There? Assessing the Impact of Job Location on Job Mismatch Among Young Entry-Level Workers

Muhammad Adib Jamal^{a,b*}, Muhammad Daaniyall Abd Rahman^{a,b},
Chakrin Utit^a, Nur Azreen Mokhyi^{a,b}

^aSchool of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia

^bCentre for Future Labour Market Studies (EU-ERA), Putrajaya, Malaysia

**Corresponding Author: adibjamal99@gmail.com*

Abstract

The mismatch between the skills acquired by graduates from learning at higher learning institutions and the areas of employment involved is an important issue and should be a concern for policymakers. This situation actually reflects inefficiency in the labor market. This condition can be caused by various factors. Among them may be due to the oversupply of graduates in the job market in a particular field, or the expertise obtained is not in line with the needs of the industry. This situation can create the issue of skilled workers who are not properly used in the labor market. The main objective of this study is to identify factors that influence job mismatch among graduates from higher education institutions in Penang. These factors include income, job location, job sectors, age, and gender. This study adopted a survey approach with 185 university graduates from two public universities in Penang. Descriptive analysis and a logistic regression method have been used to examine the relationship between the income, job location, job sectors, age and gender to the job mismatch of these young workers. Results from descriptive analysis indicate that graduates from programs that are more specific such as in Science, Mathematics and Computer Sciences, and Engineering are quite able to find regular jobs that match their field of study. Graduates working in the sector of skilled worker's category received higher salaries (income) compared to graduates working in semi-skilled and low-skilled categories. Lastly, this study also found that graduates who work in sectors that can offered higher income, and working in Penang are more likely to get job relevant to their qualifications. In summary, this study points to the broader issue of jobs-employment mismatch, discusses factors contributing to this mismatch, and highlights specific findings related to program specificity, job categories, income, and the influence of location on job opportunities for graduates in Penang.

Keywords: Graduates, higher education institutions, human capital, mismatch, Penang

1. Introduction

As per the theory of endogenous growth, economic growth is significantly influenced by the knowledge, skills, and technological innovation of the population (Romer, 1990). Furthermore, Naess (2020) acknowledged the pivotal role of human capital in development, stating that it serves as the 'engine of growth'. This effect is particularly associated with skilled labor in the output-production process. Research has shown that skilled human capital usually acquires their knowledge and skills from higher education institutions (HEIs).

According to the UNESCO National Commission Country Report Template - WHEC 2022, there were 1,207,131 students enrolled in higher education institutions (HEIs) across Malaysia in 2021. Out of that number, 590,254 students were enrolled in public universities; 517,580 in private HEIs; 84,566 in polytechnics, and 14,741 in community colleges. The increasing supply of educated and skilled workers is due undoubtedly to the fact that education has been playing a pivotal role in enhancing individuals' productivity and standard of living (Sun et al., 2020).

The role of HEIs is pivotal in providing adequate high-skilled labor supply. At the same time, the employment demand from the industry needs to be fulfilled by channeling the right workforce needed by industry skill requirements. Having a precise match between the workforce and industry prerequisites indicates an efficient labor market interaction. However, the reality manifests that friction in the labor market is somehow inevitable, particularly for the entry-level workforce, which mostly suffers from job mismatches. This situation creates the issue of over-education, whereas having a higher level of education than a job requires. Here, we focus on over-education and this term can be defined as the extent to which an individual possesses an education level that exceeds the requirements of a particular job (Zakariya, 2013; Zakariya & Md. Noor, 2014). This often results in differences in the cost and benefit for university graduates when choosing their first job. It is therefore essential to explore the underlying motivations and factors that lead to job mismatch among graduates in Malaysia. However, research on job mismatch in Malaysia is scarce, with most studies in Malaysia focusing on university graduates' employability (Paramjit Singh et al., 2014; Samuel & Ramayah, 2016) and soft-skills requirement (Ali et al., 2014).

Conducting a comprehensive investigation into the issue of job mismatch among young entry-level workers in Penang is essential for several reasons. Firstly, as one of Malaysia's primary economic centres, Penang's economy plays a significant role in Malaysia's overall economic growth. In 2021, Penang recorded the highest Gross Domestic Product (GDP) growth among all states in Malaysia, indicating a remarkable recovery of economic sectors in Penang after the pandemic crisis. Secondly, despite operating under a "full-employment" condition with unemployment rates below three percent, Penang's labor market faces a persistent shortage of skilled workers (Department of Statistics, 2022). Given importance of Penang economy to the performance of national economy, any ongoing job mismatch among young entry-level workers could affected growth and economic performance.

2. Literature Review

Studies on mismatch incidence in Malaysia have focused on graduates and the main finding is that around 31-35% of graduates were employed in jobs that do not correspond to their field of study

(Lim, 2011). Lim (2011) said that a large portion of mismatched graduates were from social sciences backgrounds.

Within the realm of demographic factors, gender has emerged as a salient determinant of job mismatch. Gender factor has also emerged as a pivotal factor in job mismatch. Robst (2007) adopted an innovative approach by scrutinizing why men and women accept mismatched jobs in the United States. His study found that men were observed to be more inclined to accept mismatched jobs due to considerations such as remuneration, promotional opportunities, or shifts in career interests.

The literature on over-education shows that having qualifications more than is actually required in a job implies a lower wage than working in an occupation that fits the educational level (Lim, 2011). Over-educated workers also have a lower wage growth rate than adequately educated workers (Verhaest and van der Velden 2013; Naess, 2020). Job mismatches are due to the fact that employers do not have much information about the productivity level of applicants whereas job seekers may misinterpret job requirements and lack knowledge about job characteristics (Zakariya, 2014). A penalty for job mismatch is also given in the case of non-monetary outcomes such as occupational status, such as permanent versus contract employment (Urbanski, 2022).

According to human capital theory (Becker, 2009) an employee's productivity level is directly determined by his or her individual skills. In order to increase their labour productivity people can invest in human capital such as general education or vocational training. As employers pay their workers according to individual productivity, people's wages will rise depending on their productivity. While productivity is influenced by the level of education and skills.

3. Methodology

The study aims to identify factors that influence job mismatch among graduates from higher education institutions in Penang. These factors include income, job location, job sectors, age, and gender. To achieve this goal, a comprehensive survey with graduates from two public universities in Penang was conducted from December 10th to December 16th, 2022. The main purpose of the survey was to determine factors that influence job mismatch with actual jobs offered among graduates from higher education institutions (HEIs) in Penang. Out of 385 responses collected, 185 respondents were used for this study. Descriptive analysis and model testing were used to study the behaviors of graduates and the prevailing job market conditions in Penang. The study focused on graduates who have first-degree and master's degree qualifications. To design the research questionnaire, this study followed questionnaires that have been used by previous researchers such as Ma et al. (2016), and Sun et al. (2020).

The sample was further restricted due to theoretical reasoning. Graduates who became self-employed in their first significant job or started a second non-constitutive course of studies are excluded from the analyses. Job mismatch is also based on a subjective measurement for the same reasons as indicated above. An objective assessment of a job mismatch seems to be quite arbitrary, as fields may apply to several different occupations, and one has to decide whether the field of study and a job are related or unrelated.

Based on the ISCED-97 classification (UNESCO, 1997) the field of study as a central independent variable is coded into ten categories: education, arts, humanities, social/behavioral sciences, business/economics, law, science/mathematics, engineering, agriculture, and health/welfare.

4. Empirical Results

Hypothesis 1: The more specific the study programme (field of study), the smoother graduates' transition from higher education to work.

This study uses the assumption of graduates who work permanently as graduates who work based on their graduation qualifications, while those who work on a 'contract, temporary and part-time' basis are considered graduates who work mismatch with their qualifications. It happens because the employers are assumed to be unsure of the suitability of the job with the qualifications of the graduates. Table 1 shows the field-specific risks of having a job mismatch in the first significant job. Graduates from the field of study "Arts and Humanities" by far have the highest share of employees that work in an occupation that does not fit the field of study: 48% of them are mismatched in their first significant job. Verhaest and van der Velden (2013) and Naess (2020) also found that credential mismatch (mismatch between formal education requirements and job requirements) was most common in the arts and humanities.

Graduates with the qualification of "Education" have strong difficulties in finding an adequate occupation according to their acquired degree as well. Almost 80% of them cannot use their field-related skills. This factor may be due to the placement factor of graduate teachers who take more than a year after their graduation.

Interestingly, graduates from Science, Mathematics, and Computer Sciences (72% have permanent jobs), Services (71% have permanent jobs), and Engineering, Architecture, and Construction (68% have permanent jobs) are quite able to find regular jobs that match their field of study. Graduates from programs that are more specific, such as in Science, Mathematics, Computer Sciences, and Engineering, appear to have a higher likelihood of finding permanent jobs that match their field of study. The more specific the preparation or the more narrow the occupational profile of a study programme, the less additional training employers have to invest in graduates' job-specific skills. Thus, a high occupational specificity should improve the match between employer and employee. Instead, students graduating in more general study programmes, normally lack specific occupational skills and require more cost-intensive on-the-job training. Thus, they are ranked into lower positions in the labor queue than their peers with specific occupational skills and have more difficulties in finding a (matching) job.

Table 1
Field of study and status of employment

Field of Study		Status of Employment				Total
		Permanent	Contract	Temporary	Part-time	
Arts and Humanities	Count	12	7	3	1	23
	% within Field of Study	52.2%	30.4%	13.0%	4.3%	100.0%
Social Sciences and Business	Count	28	9	3	6	46
	% within Field of Study	60.9%	19.6%	6.5%	13.0%	100.0%
Science, Mathematics and Computer Sciences	Count	21	7	0	1	29
	% within Field of Study	72.4% (1)	24.1%	0.0%	3.4%	100.0%
Education	Count	4	8	4	2	18
	% within Field of Study	22.2%	44.4%	22.2%	11.1%	100.0%
Engineering, Architecture and Construction	Count	28	6	4	3	41
	% within Field of Study	68.3% (3)	14.6%	9.8%	7.3%	100.0%
Services	Count	12	5	0	0	17
	% within Field of Study	70.6% (2)	29.4%	0.0%	0.0%	100.0%
Healthcare	Count	5	3	0	0	8
	% within Field of Study	62.5%	37.5%	0.0%	0.0%	100.0%
Total	Count	110	45	14	13	182
	% within Field of Study	60.4%	24.7%	7.7%	7.1%	100.0%

Hypothesis 2: Workers with skilled expertise will receive a higher income in comparison to those categorized as semi-skilled and low-skilled.

Skill categorization is made based on a MASCO classification, whereas Managers, Professionals, and Technicians are categorized as skilled workers. Clerical, Service, and Sales workers, Skilled agricultural and fishery, Plant and machine operators and assemblers, Craft and trade-related workers as Semi-Skilled. While Elementary occupation as Low Skilled workers. Table 2 shows a significant portion of graduates (more than three-quarters of graduates) from universities in Penang successfully secure jobs under the Skilled Workers category. These graduates tend to receive higher salaries compared to those working in semi-skilled and low-skilled categories.

Graduates working in the sector in the skilled worker's category receive higher salary remuneration than graduates working in semi-skilled and low-skilled categories. Table 3 shows the average salary rate of graduates working in the skilled workers category earning an average monthly salary of RM2,946, followed by semi-workers RM2,029, and low-workers RM1,730.

Table 2
Type of jobs with skill categorization based on MASCO classification

	Frequency	Percent	Valid Percent	Cumulative Percent
Managers	10	5.4	5.4	5.4
Professionals	75	40.5	40.5	45.9
Technicians	54	29.2	29.2	75.1
Clerical	9	4.9	4.9	80.0
Services (salesman)	27	14.6	14.6	94.6
Traders	1	.5	.5	95.1
Machine operators	2	1.1	1.1	96.2
Elementary occupations	7	3.8	3.8	100.0
Total	185	100.0	100.0	

Table 3
Mean salary by type of occupations (RM/month)

	N	Mean monthly salary	Std. Deviation	Mean monthly salary	Minimum	Maximum
Managers	10	2,900.00	1241.86	2,946.00	1100.00	5000.00
Professionals	75	3,063.40	1495.19		1000.00	10000.00
Technicians	54	2,790.92	861.79		1500.00	5500.00
Clerical	9	1,944.00	615.56	2,029.00	1500.00	3296.00
Services (salesman)	27	2,119.25	745.14		1000.00	3500.00
Traders	1	1,730.00	.		1730.00	1730.00
Machine operators	2	1,350.00	212.13		1200.00	1500.00
Elementary occupations	7	1,730.00	278.62	1,730.00	1500.00	2200.00
Total	185	2,706.60	1217.67		1000.00	10000.00

Hypothesis 3: Influential factors contributing to job mismatch among graduates in Penang.

To determine factors that influence job mismatches, this study does the Logistic Regression Analysis of Job Mismatch Among graduates. As shown in the Logistic regression (Table 4), the impacts of INCOME are significant ($p = 0.001 < 0.05$). Graduates who work in sectors that can be offered higher income are less likely to be job mismatches (negative sign). Also, the effect of JOB LOCATION is significant ($p = 0.072 < 0.10$). This study found that graduates working in Penang are more likely to find jobs relevant to their qualifications. The presence of various industries and tourist attractions in Penang is highlighted as a factor that enables graduates to access job opportunities according to their qualifications.

Table 4
Logistic Regression Analysis of Job Mismatch Among Young Entry-Level Workers (graduates)

	B	S.E.	Wald	df	Sig.	Exp(B)
Income	-3.439	0.673	26.075	1	0.001	0.032
Job Location (1-Penang, 0-Outside Penang)	-0.749	0.416	3.236	1	0.072	0.473
Job Sector (1-Service Sector, 0-Other Sectors)	0.459	0.426	1.163	1	0.281	1.582
Age (1 - 21 to 29 years old, 0 - Others)	-0.893	0.893	1.000	1	0.317	0.409
Gender (1 - Male, 0 - Female)	-0.514	0.434	1.402	1	0.236	0.598
Constant	26.577	5.461	23.688	1	0.001	3.487E+1 1

5. Conclusions

The study reveal that graduates from ‘soft fields’ such as Arts and Humanities are predominantly disadvantaged at labor market entry. They are not easily able to find jobs that are relevant to their qualifications. In comparison, graduates from programs that are more specific such as in Science, Mathematics, and Computer Science, and Engineering are quite able to find regular jobs that match their field of study. The study also found that the state's economic position can influence the chances of getting a good job to graduates.

References

- Ali, J., Lim, H., Ismail, R., Abdul Rahim, F., & Md. Isa, F. (2014). The effectiveness of finishing school from the perspective of graduate, employers and graduate marketability outcomes. *Malaysian Journal of Learning and Instruction*, 11, 147-170.
- Becker, G. S. (2009). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago: University of Chicago Press.
- Lim, H. (2011). The determinants of individual unemployment duration: the case of Malaysian graduates. *Journal of Global Management*. 2(1): 184–203.
- Ma, K.-R., Kang, E.-T., & Kwon, O.-K. (2016). Migration behavior of students and graduates under prevailing regional dualism: The case of South Korea. *The Annals of Regional Science*, 58(1), 209-233. <https://doi.org/10.1007/s00168-016-0799-9>.
- Naess, T. (2020). “Master’s degree graduates in Norway: field of study and labour market outcomes”. *Journal of Education and Work*. 33 (1): 1-18.

Parmjit Singh, Xaviour Thambusamy, R., & Ramly, A. (2014). Assessing graduates generic skills: an indicator of employability. *Pertanika Journal of Social Sciences & Humanities*, 22 (3), : 845-860

Robst, J. (2007). Education and job match: The relatedness of college major and work. *Economics of Education Review*, 26(4): 397–407

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98, S71–S102. <https://doi.org/10.1086/261725>

Samuel, R. & Ramayah, T. (2016). Employability, mobility and work-life balance: how do they relate for MBA holders in Malaysia? *Pertanika Journal of Social Sciences & Humanities*, Volume 24 (1): 359-374.

Sun, Y.-F., Pan, K.-F., & He, Z.-L. (2020). Intercity migration behavior of Chinese graduates: From home region to work destination. *The Annals of Regional Science*, 64(1), 111-132. <https://doi.org/10.1007/s00168-019-00958-3>.

Terje Næss & Jannecke Wiers-Jenssen (29 Jul 2022): Labour market mismatch among master's graduates in the humanities from 1995 to 2015 in Norway. *European Journal of Higher Education*, DOI: 10.1080/21568235.2022.2105369

Urbanski, Mariusz. (2022). Comparing Push and Pull Factors Affecting Migration. *Economies*. 10(1), 21. <https://doi.org/10.3390/economies10010021>

UNESCO, International Standard Classification of Education". *UNESCO*. 16 March 2017. Archived from the original on 5 June 2022. Retrieved 1 February 2020.

Varheest, D. & R. van der Velden (2013). “Cross-country differences in graduate overeducation”. *European Sociological Review*. 29 (3): 642-653.

Zakariya, Z. (2014). The effects of over, required and under education on earnings in manufacturing sector in Malaysia. *International Journal of Management Studies*. 21(1): 83–109.

Zakariya, Z. (2014). Wage Effect of Over-Education and Mismatch in Malaysia: A Random Effect Approach. *Jurnal Ekonomi Malaysia*. 48(2): 3 - 17.

Zakariya, Z., & Mohd. Noor, M. A. (2014). Workplace characteristics and determinants of over-education in the manufacturing sector in Malaysia. *Jurnal Pengurusan* 40: 125–136. <http://ejournals.ukm.my/pengurusan/article/view/7124>.

Assessment of Sustainable Economic Development: Where We Are Today

Sarma Binti Aralas^{a,*}

^aCentre for Economic Development and Policy, Universiti Malaysia Sabah,
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia
miasarma@ums.edu.my

*Sarma Binti Aralas: miasarma@ums.edu.my

Abstract

The three pillars of sustainability address the social, economic, and environmental aspects of development. This paper discusses sustainable economic development assessment of countries using data by country and region, with an emphasis on the Asian and Southeast Asian areas. Sustainable economic development assessment may provide a measure of a country's sustainable economic growth as well as its citizen's well-being based on three development categories, namely, economics, investments and sustainability. The three categories are comprised of ten dimensions which include income, economic stability, education, infrastructure, and equity. The objective of this paper is to attempt to identify priority areas for sustainable development that align with economic and social goals, in particular for Malaysia. Through the processes of benchmarking and identification of sustainable development aspects, a ranking of sustainable economic development assessments may shed light on how countries may move towards the achievement of sustainable development goals.

Keywords: Sustainable economic development, Southeast Asia, Assessment of Sustainable Economic Development.

1. Introduction

The United Nation's 2030 Agenda for Sustainable Development was adopted in 2015 by all United Nations Member States. It refers to 17 Sustainable Development Goals (SDGs) that include zero hunger, quality education, clean water and sanitation, economic growth, and climate action (United Nations, 2023). Today, as countries strive to achieve the sustainable development goals, many countries are yet to attain basic and fundamental states of well-being especially for the disadvantaged segments of their population. Developed countries are better able to provide a quality of life that aligns more closely with the for Sustainable Development 2030 Agenda, compared to developing countries which are still lagging behind in terms of economic development. According to the Boston Consulting Group (2023), the top thirty countries assessed with high sustainable economic development and well-being are in the category of developed countries with per capita income that exceeds USD15,000 per year.

The sustainable economic development assessment (SEDA) is based on ten dimensions which are grouped into three categories namely, economics, investments, and sustainability. The economics category comprises of the dimensions of income, economic stability, and employment; the investments category comprises of the dimensions of education, health, and infrastructure; and the sustainability category comprises of the dimensions of the environment, equality, a strong civil society, and sound governance. SEDA provides an indicator on how far each country has achieved the goal of economic sustainability development, as thus is a useful measure of the economic status and well-being of the people in the country.

This paper discusses the ranking of countries on the SEDA scale which is based on a score ranging from zero to 100. In 2020, Switzerland achieved the highest score of 87.0 while Chad achieved the lowest score of 16.9 (Boston Consulting Group, 2023). Notably, Asian, and Southeast Asian countries generally fare better than African dan Middle Eastern countries through efforts can be increased to improve the ranking of the developing countries in Asia. The ten dimensions of SEDA can be analysed to show specific areas where improvements can be made and for the benefit of future policy actions to remedy or improve the performance of the country in these areas.

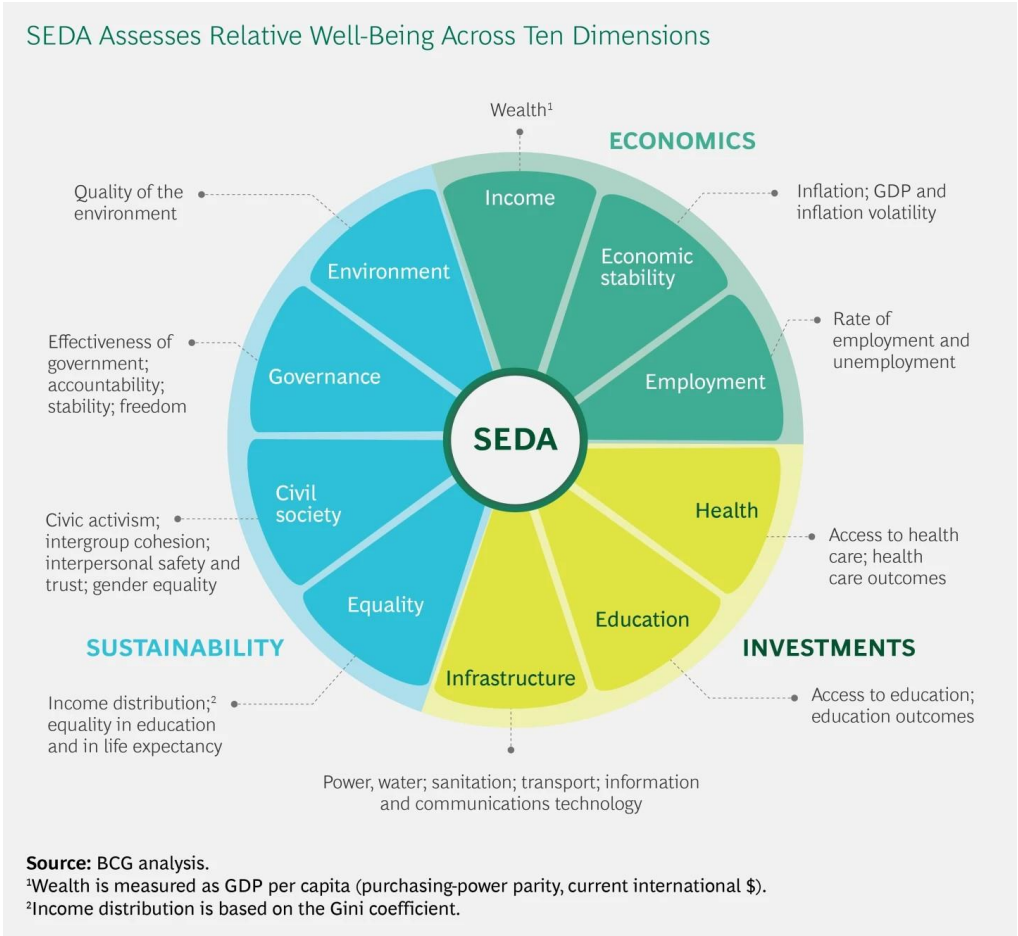


Figure 1
 The Ten Dimensions of Sustainable Economic Development Assessment (SEDA)

Source: Boston Consulting Group, 2023

Figure 1 shows the sub-categories of the dimensions of economics, investments and sustainability of sustainable economic development. It can be seen that for the three dimension of economics comprising of income, economic stability and employment, these can be segregated further into the sub-dimensions of wealth; inflation; GDP and inflation volatility; and the rates of employment and unemployment. Meanwhile, the three dimensions of investments which are health, education and infrastructure, encompass the sub-dimensions of access to healthcare, and healthcare outcomes; access and outcomes of education; power, water, sanitation, transport, information and communication technology. Finally, the four dimensions of sustainability which include the environment, governance, civil society and equality, they encompass the aspects of quality of the environment; effectiveness of government accountability, stability and freedom; civic activism, intergroup cohesion, interpersonal safety and trust, and gender equality; income distribution, equality in education and in life expectancy.

The dimensions and sub-dimensions of sustainable economic development are assessed for each country in the measurement of SEDA. SEDA is based on 40 indicators obtained from publicly available sources to assess each country's performance on each of the dimensions; each measure is normalized on a scale of zero (the lowest) to 100 (the highest). The score calculated using the normalized indicators provides insight into the well-being of each country.

2. Sustainable Economic Development Assessment by Country and Region

This paper discusses the SEDA scores for countries that were included in the list of SEDA by the Boston Consulting Group (BSG, 2023).¹ Asian countries are examined more closely in terms of their SEDA performance, and in particular, for Malaysia.

Table 1 provides the ranking from highest to lowest of SEDA scores for 141 countries. It indicates that high scores on the SEDA are dominated by high-income countries for the year 2020. Switzerland achieves a score of 87.0 on SEDA which is the highest amongst 141 that were assessed. The gross national income (GNI) per capita of Switzerland in 2020 is \$85,500. This also turns out to be the highest GNI per capita of all 141 countries in 2020. High income countries² with GNI in excess of \$11,200 in 2020 (BCG, 2023) achieved SEDA scores of a maximum of 87.0 for Switzerland and a minimum of 56.9 for Argentina.

The lowest SEDA score of 16.9 was for Chad, whose GNI per capita was USD700 in the year 2020. Chad is considered as one of 21 low income countries³ (BCG 2023). The highest score for countries in the low income category in 2020 is for Nepal with a SEDA score of 39.1 and the lowest SEDA score of 16.9 for Chad.

¹ <https://www.bcg.com/industries/public-sector/sustainable-economic-development-assessment>

² Switzerland, Norway, Finland, Iceland, Austria, Denmark, Netherlands, Sweden, Singapore, Luxembourg, Germany, Ireland, Australia, New Zealand, Belgium, United States, Japan, Canada, United Kingdom, France, South Korea, Slovenia, Estonia, Czechia, Spain, Portugal, Lithuania, Poland, Italy, Malta, Israel, United Arab Emirates, Slovakia, Qatar, Latvia, Cyprus, Hungary, Greece, Croatia Uruguay, Kuwait, Chile, Bahrain, Oman, Saudi Arabia, Argentina, Trinidad and Tobago, Panama.

³ Nepal, Tajikistan, Rwanda, Senegal, Tanzania, Benin, Togo, Burkina Faso, Malawi, Ethiopia, Uganda, Niger, Madagascar, Zimbabwe, Mozambique, Guinea, Mali, Burundi, Democratic Republic of the Congo, Yemen, Chad

Table 2 shows the SEDA for Asian countries in 2020. There are 21 countries in the Asian region that are included in the 2020 SEDA (BCG, 2023), of which three are considered as high income countries, namely Singapore, Japan and South Korea which achieved scores of 82.3, 76.7, and 74.1 respectively. Malaysia scored the fourth highest score of 60.0 in the SEDA. Similar to the world rankings, Asian countries with higher GNI per capita generally have higher SEDA scores compared to countries with lower GNI per capita. Pakistan has the lowest SEDA score of 25.6 amongst all the Asian countries. Interestingly, countries that score higher on the ten dimensions of the economics, investments and sustainability aspects of SEDA are also more likely to score higher on SEDA.

Table 1
Sustainable Economic Development Assessment Ranking, 2020

No	COUNTRY	GNI Per Capita	SEDA	No	COUNTRY	GNI Per Capita	SEDA	No	COUNTRY	GNI Per Capita	SEDA
1	Switzerland	85,500	87.0	48	Costa Rica	11,700	57.8	95	Nepal	1,090	39.1
2	Norway	82,500	86.5	49	Oman	15,330	56.9	96	Egypt	2,690	38.3
3	Finland	49,580	84.2	50	Mauritius	12,740	56.8	97	Nicaragua	1,910	37.6
4	Iceland	72,850	84.2	51	Georgia	4,740	56.6	98	Tajikistan	1,030	37.5
5	Austria	51,300	83.9	52	Saudi Arabia	22,850	56.4	99	Guatemala	4,610	37.5
6	Denmark	63,240	83.7	53	Russia	11,260	56.4	100	Venezuela	13,080	37.0
7	Netherlands	53,200	83.5	54	Kazakhstan	8,810	56.1	101	India	2,310	36.9
8	Sweden	55,840	83.0	55	Argentina	11,200	55.2	102	Cambodia	1,480	36.2
9	Singapore	59,590	82.3	56	Trinidad & Tobago	16,890	54.9	103	Rwanda	820	36.2
10	Luxembourg	73,910	81.4	57	Montenegro	9,010	52.9	104	Gabon	7,210	36.0
11	Germany	48,520	81.2	58	China	10,410	52.7	105	Ghana	2,220	35.9
12	Ireland	62,210	81.0	59	Armenia	4,680	52.6	106	Honduras	2,390	35.8
13	Australia	54,910	80.6	60	Serbia	7,020	52.4	107	Bangladesh	1,940	35.7
14	New Zealand	42,670	79.4	61	Albania	5,240	52.4	108	Lao PDR	2,570	35.0
15	Belgium	47,350	79.0	62	Thailand	7,260	52.1	109	Namibia	5,060	34.9
16	United States	65,760	76.9	63	Panama	14,950	52.1	110	Kenya	1,750	34.5
17	Japan	41,690	76.7	64	Turkey	9,610	52.0	111	South Africa	6,040	34.1
18	Canada	46,370	76.3	65	Moldova	3,930	50.4	112	Senegal	1,450	34.0
19	United Kingdom	42,370	75.7	66	Peru	6,740	49.9	113	Myanmar	1,390	33.9
20	France	42,400	75.2	67	North Macedonia	5,910	49.5	114	Tanzania	1,080	32.6
21	South Korea	33,720	74.1	68	Ukraine	3,370	49.1	115	Benin	1,250	30.0
22	Slovenia	25,750	73.8	69	Mexico	9,430	49.0	116	Zambia	1,450	29.4
23	Estonia	23,220	73.2	70	Suriname	5,540	49.0	117	Togo	690	29.1
24	Czechia	22,00	72.1	71	Vietnam	2,540	48.6	118	Burkina Faso	790	28.9
25	Spain	30,390	71.7	72	Brazil	9,130	48.4	119	Malawi	380	28.7
26	Portugal	23,080	71.4	73	Mongolia	3,780	48.4	120	Cote d'Ivoire	2,290	27.8
27	Lithuania	18,990	69.6	74	Sri Lanka	4,020	47.9	121	Ethiopia	850	27.8
28	Poland	15,200	69.5	75	Azerbaijan	4,480	47.4	122	Uganda	780	27.2
29	Italy	34,460	69.2	76	Colombia	6,510	47.1	123	Eswatini	3,590	27.1
30	Malta	27,290	68.1	77	Ecuador	6,080	46.4	124	Cameroon	1,500	26.4
31	Israel	43,290	67.9	78	Dominica Rep	8,090	46.2	125	Niger	560	26.3
32	United Arab Emirates	43,470	67.5	79	Indonesia	4,050	45.9	126	Republic of the Congo	1,750	25.9
33	Slovakia	19,320	67.4	80	Bosnia Herzegovina	6,150	45.8	127	Madagascar	520	25.6
34	Qatar	63,410	67.1	81	Jamaica	5,250	45.6	128	Pakistan	1,530	25.6
35	Latvia	17,730	66.9	82	Tunisia	3,360	44.8	129	Zimbabwe	1,390	25.2
36	Cyprus	27,710	66.0	83	Paraguay	5,510	44.2	130	Mauritania	1,660	24.4
37	Hungary	16,140	65.3	84	Jordan	4,300	44.2	131	Mozambique	480	23.8
38	Greece	20,320	64.6	85	Kyrgyzstan	1,240	42.5	132	Lesotho	1,360	23.7
39	Croatia	14,910	64.5	86	Lebanon	7,600	41.9	133	Guinea	950	23.5
40	Uruguay	16,230	63.7	87	Algeria	3,970	41.8	134	Mali	880	23.1

41	Kuwait	34,290	61.8
42	Chile	15,010	61.3
43	Bahrain	22,110	60.4
44	Malaysia	11,200	60.0
45	Bulgaria	9,410	59.2
46	Romania	12,630	58.4
47	Belarus	6,280	58.4
88	Bolivia	3,530	41.4
89	Iran	5,420	41.2
90	Morocco	3,190	41.1
91	El Salvador	4,000	40.8
92	Botswana	7,660	40.0
93	Philippines	3,850	39.7
94	Uzbekistan	1,800	39.3
135	Burundi	280	22.8
136	Nigeria	2,030	22.2
137	Sudan	590	21.3
138	Angola	3,050	20.9
139	Democratic Republic of the Congo	520	18.1
140	Yemen	940	17.3
141	Chad	700	16.9

Source: Boston Consulting Group, 2023

The majority of Asian countries achieve high scores on the dimension of economic stability, ranging from a maximum score of 96.5 for Cambodia to a minimum score of 61.6 for Mongolia. In addition, except for Tajikistan and India, Asian countries are assessed positively in the dimension of employment, with the highest score of 99.5 for Cambodia and the lowest score of 23.5 for Tajikistan. The rest of the Asian countries excluding India, achieve scores of more than 50.0. In contrast, all of the Asian countries score very low on the dimension of environment, with the highest score of only 45.5 for Japan, and the lowest score of 21.7 for Pakistan. It is also interesting to note that with the exclusion of high-income states of Singapore, Japan and South Korea, Asian countries perform poorly in the dimension of income with the rest of the remaining 18 Asian countries having scores of below 50.0. Similarly, in the dimension of governance, with the exception of Singapore, Japan, South Korea and Malaysia, the remaining 17 Asian countries achieve scores of less than 50.0.

Table 2
Sustainable Economic Development Assessment Ranking for Asian Countries, 2020

Country	GNI Per Capita	Income	Economic Stability	Employment	Health	Education	Infra-structure	Equality	Civil Society	Governance	Environment	SEDA
Singapore	59,590	100.0	77.2	74.9	81.1	80.5	95.9	78.1	76.5	87.2	45.1	82.3
Japan	41,690	53.5	93.2	71.4	94.1	70.5	95.3	87.1	76.0	87.4	45.5	76.7
S. Korea	33,720	53.3	92.9	66.6	92.4	80.6	94.4	79.8	63.7	76.1	41.7	74.1
Malaysia	11,200	36.0	95.4	70.8	74.4	56.8	87.0	64.7	52.1	65.6	27.6	60.0
Kazakhstan	8,810	33.4	80.9	71.4	81.3	54.3	77.6	91.9	57.3	39.5	9.9	56.1
China	10,410	19.8	90.9	71.4	80.9	62.4	72.6	67.9	57.1	33.6	13.6	52.7
Thailand	7,260	22.9	86.0	82.6	72.0	52.5	77.4	67.8	46.8	35.4	36.0	52.1
Vietnam	2,540	9.0	86.6	89.5	67.0	54.7	71.0	65.6	53.0	36.9	19.6	48.6
Mongolia	3,780	14.7	61.6	57.0	67.9	50.9	55.4	73.9	57.1	52.8	10.4	48.4
Sri Lanka	4,020	15.7	82.0	56.7	79.3	32.6	67.3	68.8	41.9	43.9	32.7	47.9
Indonesia	4,050	14.0	95.3	69.7	54.7	39.9	65.6	58.8	53.9	44.6	30.1	45.9
Kyrgyzstan	1,240	5.3	73.4	56.2	70.4	27.8	58.3	87.8	49.8	34.4	15.9	42.5
Philippines	3,850	10.2	92.8	69.5	45.9	27.6	62.0	52.9	56.3	36.3	24.8	39.7
Uzbekistan	1,800	7.5	80.2	63.0	71.4	18.7	66.5	73.3	39.3	26.1	12.9	39.3
Nepal	1,090	2.9	81.8	98.2	59.7	22.0	44.5	53.9	38.2	34.5	44.7	39.1
Tajikistan	1,030	2.8	90.0	23.5	67.3	22.8	61.5	72.2	40.7	19.7	31.7	37.5
India	2,130	7.3	86.5	48.2	55.3	19.6	57.7	60.0	27.2	46.4	10.4	36.9
Cambodia	1,480	4.2	96.5	99.5	53.7	9.6	46.3	49.6	44.3	26.2	45.2	36.2
Bangladesh	1,940	4.7	90.4	62.2	61.0	18.0	46.7	56.5	49.2	24.4	20.0	35.7
Lao PDR	2,570	8.7	89.4	95.3	46.2	16.5	37.8	49.2	50.6	27.8	27.8	35.0
Myanmar	1,390	5.2	81.2	73.6	50.1	16.6	36.9	61.4	45.4	20.4	35.6	33.9
Pakistan	1,530	4.6	80.8	54.5	39.2	3.5	45.8	41.7	24.2	18.6	21.7	25.6

Source: Boston Consulting Group, 2023

In Table 2, SEDA scores for ASEAN countries are highlighted in brown colour. It is noted that in SEDA, the 2 ASEAN countries namely Brunei and Timor-Leste are not included in any assessment, and thus are omitted from any table provided by the Boston Consulting Group (2023).

For the 9 Southeast Asian countries included in Table 2, Singapore receives the highest SEDA score at 82.3, followed by Malaysia (60.0), Thailand (52.1), Vietnam (48.6), Indonesia (45.9), Philippines (39.7), Cambodia (36.2), Lao PDR (35.0), and Myanmar (33.9).

Figure 2 shows the SEDA scores by dimension for Malaysia for 2020 (BCG, 2023). The pie graph indicates that out of the ten dimensions of SEDA, Malaysia achieves the highest score in economic stability (95.4), followed by infrastructure (87.0), health (74.4), employment (70.8), governance (65.6), equality (64.7), education (56.8), civil society (52.1), income (36.0), and environment (27.6). Notably, the weakest assessment for Malaysia are in the dimensions of income and the environment. Although Malaysia has improved its overall SEDA scores within the decade from the years 2011 to 2020 (see Figure 3), improvements need to be made in the dimensions of economics and environment. Additionally, in the dimension of education, Malaysia is assessed with a rather weak score of 56.8.

Figure 2
Sustainable Economic Development Assessment By Score Malaysia 2020

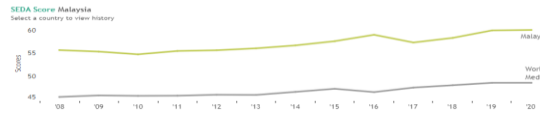


Source: Boston Consulting Group, 2023

As Malaysia intends to become a high income nation by the year 2030, it is noted that improvements in terms of its performances in the aspects of income, education and environmental concerns would be needed to achieve its goal, aligned with the United Nation’s 2030 Agenda for Sustainable Development Goals.

Figure 3
Change in SEDA Scores, 10 years 2011-2020 Malaysia

2020 Rank	Country	First year in period	SEDA score, 2008	SEDA score, 2020	Change in SEDA over period
44	Malaysia		55.47	59.39	4.92



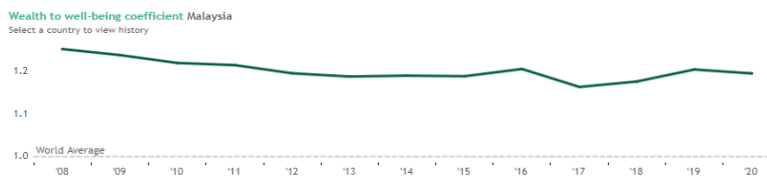
Source: Boston Consulting Group, 2023

The well-being coefficient calculated under SEDA (BCG, 2023) examines how well countries can convert their wealth as reflected by income per capita into well-being. It provides an indicator that is measured on a scale above or below 1.0, with a coefficient of 1.0 indicating that a country is generating well-being in line with expectations given income levels of the population. A coefficient greater than 1.0 implies that well-being is generated at higher levels than expected given the GNI level, and a coefficient below 1.0 implies that a country delivers lower levels of well-being than expected given its GNI level.

Figure 4 shows that the wealth to well-being coefficient for Malaysia from the years 2008 to 2020 (BCG, 2023). Although the well-being coefficient is 1.19 which means that the country is generating well-being at a higher level than expected given its GNI, there is a downward trend of the value of the coefficient from 1.25 in 2008 to 1.19 in 2013, then an increase to 1.20 in 2016 falling to 1.16 in 2017, improving slightly to 1.20 in 2019 but falling again to 1.19 in 2020. Compared to the beginning year of 2008 to the end year of 2020 as shown in the graph, Malaysia's well-being coefficient fell from 1.25 to 1.19 in 2020. Thus, Malaysia's performance as measured in converting income to well-being has been in a declining trend over the years up to 2020.

Figure 4
Wealth to Well-being Coefficient, 2008-2020 Malaysia

Sustainable Economic Development Assessment Rankings			
Sorted by 2020 wealth to well-being coefficient			
Rank by coefficient	Country	SEDA score	GNI per capita
1	Malaysia	60.0	11,200



Source: Boston Consulting Group, 2023

3. Conclusion

The Sustainable Economic Development Assessment (SEDA) provides a useful indicator to a country's performance in achieving a sustainable economic development as measured by the three main categories of Economic, Investments and Sustainability of SEDA. SEDA provides insights into a country's overall social and economic conditions, in contrast to indicators such as a Gross Domestic Product (GDP) would be able to provide. On the SEDA scores, high income countries tend to achieve relatively higher scores than low income countries. Although Asian countries generally do not achieve high scores, they score highly on the dimensions of economic stability, employment, health and equality (BCG, 2023), they score poorly in important dimensions of income, education, governance and the environment. Malaysia's ability to generate well-being higher than expected given its gross national income as indicated by its well-being coefficient has been trending downward since 2008 with the exceptions on three years up to 2020. The fall in Malaysia's ability to convert income to well-being may be indicative of the weak assessments in the dimensions that would matter, namely, in its income, the environment, and education aspects.

4. Future Research

This paper discusses elements of Sustainable Economic Development Assessment of countries. Aside from the wealth to well-being coefficient, future research can be undertaken to analyse more closely the relationships between the SEDA of countries and indicators that contribute to the country's sustainable economic development to provide greater insights into the economic and social conditions of the country. Such research could be used to recommend policies that can overcome the poor performance of the country's economic and social dimensions and to increase the well-being of its citizens.

5. References

1. Sustainable Economic Development Assessment and Citizen Well-being [online], Available at <https://www.bcg.com/industries/public-sector/sustainable-economic-development-assessment> (2023)
2. United Nation's The 17 Goals [online], Available at <https://sdgs.un.org/goals> (2023)
3. Boston Consulting Group [online], Available at

Strengthening the institutional support for single mothers in Sabah: Opportunities and challenges

**Salmah Topimin^{1*}, Beatrice Lim Fui Yee¹, Noor Fzlinda Fabeil¹
Haslinda Hasan¹**

¹**Faculty of Business, Economics and Accountancy,
Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia**

*Corresponding Author: salmah@ums.edu.my

Abstract

Single mothers are perceived as one of society's most vulnerable social groups. Faced with both financial and non-financial challenges, achieving the well-being of their family is never easy. Therefore, it is believed that an inclusive support mechanism for single mothers can help them to build a better life, thus improving their well-being. This paper explores the extent to which the current support mechanisms for single mothers are in accordance with their needs and expectations. This paper is prepared based on a qualitative study that was conducted on a group of single mothers in Sabah. However, this paper only presents partial findings from this study. Views and opinions gathered from the interviews conducted with the single mothers are presented as a proposed framework in strengthening the implementation of support mechanisms for single mothers. The views of the single mothers indicate the needs for supports that reflect on the different stages of their motherhood lives. This finding suggests the significance to acknowledge single mothers as a heterogeneous group and this understanding can help to ensure the effectiveness of support mechanisms for them.

Keywords: institutional support, single mothers, Sabah.

1. Introduction

Single mothers are perceived as one of society's most vulnerable social groups (Van Lancker, Ghysels & Cantillon, 2015). Although having the status of a single mother does not necessarily put someone in a vulnerable state, it does increase the likelihood of putting women at poverty and social exclusion (Kotwal & Prabhakar, 2009) particularly when they are characterised as having low educational attainment, lacking skills, having limited social networks and struggling to cope between work and family responsibilities (Rembiasz, 2016). Not only that these characteristics could limit the ability of single mothers to compete for employment opportunities (Topimin et al., 2019), the characteristics are also crucial in influencing single mothers to work in the informal sector which only provides them with insufficient and irregular income to support their families (Nor, 2022). In addition, it has long been debated that women have limited access to productive resources and this issue becomes even more crucial for women headed households (Moser, 1993).

Therefore, it comes to a no surprise that single mothers are more likely to live in poverty than other groups of women in the society (i.e married and single).

Recognising that single mothers are faced with distinctive challenges in ensuring the well-being of their families (Addelyan Rasi et al., 2013; Li, 2020), governments in many countries have introduced various institutional support for single mothers. However, the provision of a formal institutional support for single mothers has received criticisms regarding its effectiveness (e.g. Mahat et al., 2019; Topimin et al., 2021). The ineffectiveness of institutional support for single mothers can be seen from the design and implementation of such support. While the provision of institutional support is argued as lacking gender sensitivity (Li, 2020), the support also fails to acknowledge the heterogeneity of single mothers who have distinctive needs at the different stages of their motherhood lives (Topimin et al., 2021). Generally, institutional support refers to either formal (e.g. policy, programmes) or informal elements (e.g. culture, family). This study focuses on formal institutional support by exploring the extent to which support programmes for single mothers meet their expectations, thus facilitating the achievement of their family's well-being. While there are a number of institutional support programmes available to support single mothers in Sabah, little research has been done on how these programmes affect their well-being. Therefore, this paper addresses the following research question:

- How does the existing formal institutional support for single mothers provide opportunities and challenges for their well-being?

This study may potentially contribute to the existing literature on women, by highlighting the importance of incorporating an institutional perspective in explaining women's experiences in live. This may encourage policymakers to improvise the strategies targeted to single mothers, including better provision of support programmes and policies for women. The findings of this study may also provide single mothers the confidence to actively engage in productive activities, which would improve their financial empowerment and the state's economic development of where they live. This study is contextualised based on the life experience of single mothers in Sabah. Several interesting points about single mothers in Sabah can be highlighted. First, the number of single mothers in Sabah has increased between the period of 2000, 2010 and 2020. It was reported that the number of single mothers in Sabah in 2000 was 46, 859, and the number has increased to 61,717 in 2010 and 73,589 in 2020 (Malaysia, 2000; Malaysia 2010; Malaysia, 2022). In addition, single mothers in Sabah are represented by women in all ethnic groups whose male-partners are permanently absent due to death or divorce (Topimin, 2021). In this respect, juggling between work and domestic responsibilities provides women with a great challenge in sustaining their well-being. Finally, despite the availability of support programmes for single mothers in Sabah, they are still living in poverty, particularly in the rural areas (Mulia, 2017; Topimin et al., 2019). Therefore, the phenomenon of single motherhood in Sabah is related to negative characteristics which justifies the necessity to investigate their life experiences and how the formal institutional support affects them.

This study draws on qualitative data that focuses on constructivist inquiry and capitalises on in-depth interviews (Patton, 2015). Seven leaders of single mother associations from various districts in Sabah who accepted the researchers' invitation to take part in the study were interviewed. Since it is not uncommon that any institutional support for single mothers is channelled through these

associations, obtaining the views of the leaders of this association about the support is seen as appropriate. By referring to the experience of these leaders in handling the institutional support for single mothers who are the members of their respective associations, the richness of the qualitative explanations as highlighted by Huq and Moyeen (2008) was ensured. As such, we use this data source to illustrate our investigation on the interaction of institutional support and the well-being of single mothers.

This paper only represents a part of a larger qualitative research, focusing on the financial well-being of single mothers in Sabah, Malaysia. The main objective of this paper is to highlight the findings obtained from the views shared by the single mothers on the implementation of institutional support designed for them. We start this paper with a general introduction on issues that surround single mothers and the significance of institutional support in minimising the negative impact of such issues. The subsequent section provides an overview of the institutional landscape for single mothers in Malaysia. We then continue by describing the present state of the institutional support for single mothers and their involvement in it. This paper concludes with possible future directions for institutional support programmes aimed at Sabah's single mothers.

2. Institutional support for single mothers in Malaysia

Institutional support for single mothers in Malaysia can be seen as part of a larger national effort to include women into the country's development process. After the Declaration of the Women's Decade [1975–1985], the institutional frameworks to encourage women's involvement in economic activities were established (Ahmad, 1998). The first initiative was the establishment of the National Advisory Council on the Integration of Women in Development (NACIWID) in 1976. In 1983, the Women Affairs Secretariat (HAWA) was established, and later it was restructured and named as the Department of Women Development (DWD). The institutional framework for women in Malaysia was further strengthened by the establishment of the Ministry of Women and Development in 2001 and it was renamed the Ministry of Women, Family and Community Development in 2004, which still remains till this day. The ministry is the leading entity in the development and well-being of women, families, and society. Six departments with distinctive functions and roles were positioned under the ministry. One of the departments is the Social Welfare and the initial findings of this study shows that most single mothers rely on this department in obtaining institutional support.

Another significant initiative for women by the Malaysian government was the formulation of the National Policy for Women (NPW) in 1989. The formulation of the policy is to ensure equitable sharing in the acquisition of resources and information and access to opportunities and benefits of development, and to integrate women into all sectors of the country's development process. The major impact of the policy was the inclusion of women's issues in a separate chapter of the Sixth Malaysia Plan, which ran between 1991 and 1995. In the plan, women were recognised as an important resource for economic development. The past achievement and current issues of women that are restricted from participating in the development process were also highlighted. This understanding led to the formulation of the National Action Plan for the development of women in 1992, which was incorporated in the Seventh Malaysia Plan [1996–2000]. Five areas of interests that relate to women were included in the plan. One of the areas was to encourage positive action for the advancement of women in various fields which include women and the economy (Ahmad, 1998). The National Policy for Women was improved in 2009. The revised policy has also included

an action plan for the development of women in 13 sectors: economics; poverty; law; violence against women; health; education and training; science and technology; decision making; mechanisms, and institutions of women's development; media; environment; sports; and culture, arts and heritage (Malaysia, 2023). Within these sectors, institutional support for single mothers was highlighted under poverty, demonstrating the crucial connection between single mothers and issue of poverty. As such, it can be seen that the main objective of the institutional support for single mothers is to encourage them to have a sustainable income that can lead them to a better living condition. In the Sabah context, it is apparent that the support for single mothers is commonly handled by the Sabah Women's Affair Department - a department that is placed under the Ministry of Community Development and People's Well-being. In general, this department is responsible for the advancement and development of women in Sabah and single mothers are one of the targeted groups. Among all the services offered by this department, single mothers are usually involved in training programmes that provide them with skills for generating income purposes.

3. The current institutional support for single mothers in Sabah

Analysis of the interviews with the leaders of single mother associations revealed themes underlying the role of institutional support in influencing the life of single mothers in Sabah. Although they agree that such support is useful, they see that the current institutional support suffer from various weaknesses that have given little impact on improving their well-being.

3.1 Perceived strengths of institutional support for single mothers

Pertaining to the strengths of institutional support for single mothers, participants in this study perceived the availability of support programmes that is accessible to various districts in Sabah as the main strength. A stated by one participant:

“...if there are any training programmes for single mothers, this association will be notified ... so we can extend the information to our members. The same goes to other districts. That's why I always remind them to register with single mother association at their locality ... perhaps the association cannot help them much in terms of materials, but this association provides emotional support and show them that they are not alone.”

Additionally, all participants felt that institutional support for single mothers had improved over the years, especially in terms of encouraging them to engage in income-generating activities by providing specific equipment. They also commented that the establishment of an institution for women in general, has made the institutional support for single mothers is now more apparent than it was in the past. As stated by one participant:

“... challenges of being single mothers will always remain... but, now we can see some success stories of single mothers ... single mothers are invited to attend specific training programmes ... they had been given some equipment for income generating activities ... at least now, single mothers have an idea when I mention about Organisation A [an organisation that offers support for single mothers] ... but the current support system for single mothers definitely still needs to be improved in many ways.”

3.3 Perceived weaknesses of institutional support for single mothers

All participants in this study had similar perceptions regarding the weaknesses of institutional support that was received by single mothers who members in their respective associations. They concur that institutional support for single mothers does not take into consideration various challenges faced by single mother at the different stages of their single motherhood lives. For example, one of the participants who has been the leader of single mother association since 1999 in different areas stated:

“... being a single mother is an experience that is difficult to describe. The challenge is too big at the beginning ... accepting the new title and how to live with the status is not easy. At this early stage, single mothers struggle to accept the fact that they are single mothers ... their mental health is challenged. At this stage, they are very fragile, and no one can understand them except for those who have gone through the same experience. For me... it is very important to incorporate this issue when providing support for single mothers. For more than 20 years of experience in managing single mother associations ... this issue is still relevant and significant. Their physical, emotion and mind must be ready to take the new challenge in life and they need support in this aspect”.

With regards to the support programmes that were received by the single mothers, all participants in this study highlighted several negative elements. First, they perceive that the focus of support programmes does not take into consideration the skills and interests that single mothers have in creating their income generating activities. It becomes apparent that the most common support given is in terms of providing specific equipment to allow single mothers to start entrepreneurial activities. For example, the equipment includes sewing machines, baking equipment or any equipment that relates to their income generating activities. However, this practice restricts the diversity of interests among single mothers. Providing support by giving equipment for cooking and baking may be suitable for older single mothers but less attractive to the younger ones. Therefore, this practice affects the effectiveness of the program when it is attended by single mothers who are not interested, and their participation is only to meet the quota set by the training providers. Theoretically, this practice strengthened the concept of gendered segregation duties among women. The concept limits the involvement of single mothers in generating income to only women-related activities such as cooking and sewing. Second, as a consequence of receiving equipment (e.g. sewing machines) that is not matched with their interests, there is a situation in which the equipment was sold to other party for cash. In this respect, it should be acknowledged that unlike other women's group (e.g. single and married), single mothers in general have a critical financial constraint. So, by providing certain equipment is not necessarily the best option if the financial capital to start the business activities is beyond their capability. Naturally, an individual will try to utilise the best way to earn money, such as selling unused equipment. In this respect, any institutions that are responsible in providing support for single mothers must be able to identify the basic needs of single mothers, and these needs are supposed to reflect on the different stages of a single motherhood's life. Third, all participants in this study highlighted that there is a lack of effort in trying to match the suitability of training programmes according to the areas or districts of where they live. For example, one participant asserts:

“...there were training programmes conducted by government organisations here ... how to sew... cooking class ... how to start a spa business ... baking class. These programmes might be suitable for single mothers in the city area ... but many of our members are involved in farming activities ... growing ginger, chillies, vegetables and so on. So, if the support programmes for single mothers can consider the core activities in a particular area, it would be perfect. Luckily, these women always have food on their tables ... but we are talking about having adequate saving and assets for their long-term survival ... for their well-being.”

Beyond the lack of focus of support programmes, another weakness highlighted is related to the individual approach taken by support providers in encouraging single mothers to be involved in income generating activities. This approach is viewed by the participants of this study as being unable to help single mothers to maximise their income. As stated by one participant:

“... let’s say... a single mother attends a training on sewing ... she is given a sewing machine, and she is expected to generate income by using the machine. The same practice for other types of training such as baking ... cooking. What I can see is that ... single mothers if they work individually, they cannot get much income. They are taught about specific skills The skills they possess help them to produce but they lack other capabilities ... for example ... how to do marketing ... how to look for opportunities and so on. So, I believe ... there is a need to use a different approach. They must be guided to work as a team with other single mothers. There must be some initiatives from government organisations to encourage or to introduce a hand-in-hand approach. Perhaps ... there is a need to appoint someone or some organisations to market the products produced by single mothers... at least for those who just started ... as time goes by, they are more confident and know how to tackle the market and have developed some networking.”

Finally, lacking sustainable financial resources was highlighted as a common weakness in the current institutional support for single mothers. As the leader of single mother associations, participants in this study encounter financial management issue in managing their respective associations. Interestingly, single mother associations became the most well-known institution among single mothers to turn to when they face problems. So far, the main financial source of these associations is from the fees paid by their members. The fees vary but it is very minimal. Additionally, these associations also get funds from government organisations. However, these funds are activity-based which means single mother associations would have to prepare a proposal, suggesting activities that they want to carry out and financial requirements. Although useful, the amount is limited, and it is given based on the proposed activities. What has become a constraint for these associations is that there are no funds for the management of the associations. In most situations, the management and operation of the association is on voluntary basis of members. More often than not, the leader of the association has to use their own personal money. Interestingly, many leaders of the associations also actively engage with the local politicians, and they have utilised this engagement to obtain additional funds. As stated by one leader:

“Luckily, I have many contacts that I developed when I was working. So, for this association, I would say ... there are always financial support from my contacts list.

However, it is not the same for associations in other districts especially in rural areas. If we really want to empower single mothers ... we need to have adequate funding ... sustainable financial resources ... not the one that is based on one-off approach. Whoever decide or making strategies should be able to oversee the whole picture of how single mothers survive and face their life. What is the best way for ensuring the long-term survival of these women? How do we empower single mothers if there is inadequate financial support? Again ... one should look at the needs of single mothers in their different stages of motherhood life, identify the challenges and come out with an action plan.”

The views of the leaders of single mother associations signify different aspects that need to be improved in the current institutional support for single mothers.

4. Moving forward

This study was conducted as a respond to the increased number of single mothers in the research context, Sabah, and the issue of poverty that surrounds their life. We aimed to highlight issues pertaining to the well-being of single mothers in light of the government’s support programmes received. While the institutional efforts to support the well-being of single mothers is evident in this study, its effectiveness is questioned. Our findings highlight a number of issues that demonstrate the strengths and weaknesses of the current institutional support for single mothers, though the latter is more prevalent than the former. On a positive note, the fact that Sabah is a geographically diverse state has been acknowledged by the institutional support providers. In this respect, collaborating closely with single mother associations in different districts of Sabah have strengthened the institutional structure supporting single mothers and made it possible for single mothers to access such support. As revealed through our findings, it becomes apparent that the approach of ‘one size fits all’ is applied in providing support for single mothers. Considering the complexity of the single motherhood life, and the geographical diversity of single mothers in Sabah, using a single approach can be regarded as inappropriate. Specifically, this study highlights that the income generating activities of single mothers vary according to their locality. For instance, in some districts, farming is the most common activity and if the support programmes provided are not tailored to this aspect, single mothers cannot see any value of such programmes. Our findings also demonstrate that the efforts to empower and provide better living conditions for single mothers through income generating activities should go beyond an individual approach. Focus should be placed on maximising their potential by working collectively with other single mothers. Ideally, the social enterprise concept for single mothers can be utilised as a strategic approach to help them generate a sustainable income. By encouraging single mothers to work collectively under initiatives such as social entrepreneurship, the heterogeneity of single mothers in terms of their skills, knowledge, and readiness to face challenges at a different stage of their single motherhood life is captured, thus ensuring the effectiveness of institutional support provided. However, the availability of sufficient financial resources determines whether institutional support can enhance the well-being of single mothers or not.

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6. References

Addelyan Rasi, H., Moula, A., Puddephatt, A. J. & Timpka, T. (2013). Empowering single mothers in Iran: Applying a problem-solving model in learning groups to develop participants' capacity to improve their lives, *British Journal of Social Work*, 43(5), 833-852.

Ahmad, A., 1998. *Country briefing paper: Women in Malaysia*. Kuala Lumpur: UNDP.

Huq, A. & Moyeen, A. F. M. (2008). Addressing gender in enterprise development programs: Current practices and a proposed approach. Paper presented at the ICSB World Conference.

Kotwal, N. & Prabhakar, B. (2009). Problems faced by single mothers. *Journal of Social Sciences*, 21(3), 197-204. <https://doi.org/10.1080/09718923.2009.11892771>

Li, Q. (2020). Mothers left without a man: Poverty and single parenthood in China. *Social Inclusion*, 8(2), 114-122.

Mahat, I. R., Mahat, N., Ahmad Mustafa, M. S. & Wan Ismail, W. M. (2019). Empowering single mothers through implementation and recognition of Law in Malaysia.

Malaysia (2022). *Buku Perangkaan 2020-2021: Perangkaan Wanita, Keluarga dan Masyarakat*, Kementerian Pembangunan Wanita, Keluarga dan Masyarakat, Malaysia.

Malaysia (2022). *Dasar Wanita Negara 2009*, Kementerian Pembangunan Wanita, Keluarga dan Masyarakat, Malaysia.

Malaysia (2010). *Population Distribution and Basic Demographic characteristics 2010*, Department of Statistics, Malaysia.

Malaysia (2000). *Population Distribution and Basic Demographic characteristics 2000*, Department of Statistics, Malaysia

Moser, C. O. N. (1993). *Gender planning and development: Theory practice and training*. London: Routledge

Mulia, D. S. (2017). Survival strategies of single mothers among indigenous ethnics in rural areas: Case study in Kota Belud, Sabah. *Jurnal Kinabalu*, 23. 43-63.

Nor, Z. M. (2022). Precarious employment amongst lowincome single mothers in Malaysia: The implications on family wellbeing. E3S Web of Conferences. Paper presented at 10th International Conference on Multidisciplinary (ICMR)- 2nd International and National Symposium on Aquatic Environment and Fisheries (INSAEF). <https://doi.org/10.1051/e3sconf/202233906009>

Patton, M. Q. (2015). *Qualitative Research and Evaluation Methods: Integrating theory and practice*, 4th edn. Sage.

Rembiasz, M. (2016). Entrepreneurship of single mothers: Selected economic and social aspects. *Zeszyty Naukowe Politechniki Poznańskiej Organizacja I Zarządzanie*, 68, 167-179.

Topimin, S. (2021). Women, family, and gender issues. In N. P. Tey, S. L. Lai, J. K. L. Chan (Eds.), *Demographics and socioeconomics changes in Sabah* (pp. 259 – 281). Penerbit UMS.

Topimin, S., Hasan, H., Fabeil, N. F. & Lim, B. F. Y. (2021). Empowering single mothers through institutional support: Lessons from single mothers in Sabah. *International Journal for Studies on Children, Women, Elderly and Disabled*, 14(Dec), 48-56.

Topimin, S., Fabeil, N. F. & Abdullah, A. S. (2019). Women's business survival: Challenges and strategies for single mother entrepreneurs. *Academic Journal of Business and Social Sciences*, 3(Special Edition), 1-10.

Van Lancker, W., Ghysels, J. & Cantillon, B. (2015). The impact of child benefits on single mother poverty: Exploring the role of targeting in 15 European countries. *International Journal of Social Welfare*, 24(3), 210-222. <https://doi.org/10.1111/ijsw.12140>

Analysing the Global Economic Impact of the Fisheries Industry in Southeast Asia: A Multi-Regional Input-Output Perspective

Muhammad Khalid Ahmad Kamal^{a,c,*}

Syuhaida Ismail^b

- a. Maritime Institute of Malaysia, 50450 Kuala Lumpur Malaysia. Email: khalid.ahmad@mima.gov.my
- b. Maritime Institute of Malaysia, 50450 Kuala Lumpur Malaysia. Email: syuhaida@mima.gov.my
- c. School of Business and Economics, Universiti Putra Malaysia, 43400 Serdang, Malaysia

Corresponding author: khalid.ahmad@mima.gov.my

Abstract

The contemporary landscape of international trade is characterised by an increasingly fragmented production process, with firms relying heavily on foreign inputs. This study challenges the conventional evaluation of industry contributions using single-country Input-Output models and highlights the outdated assumption that all production activities occur domestically using locally sourced inputs. This study aims to examine the magnitude of output multiplier and economic contribution of the fish producing industry in Southeast Asia. Drawing from prior research, the study employs a Multi-Regional Input-Output (MRIO) approach to decompose total exports and final demand into various value-added components, based on their global origins. This methodology is applied to the fisheries industry in Southeast Asia, a sector that significantly depends on foreign inputs, and its outcomes offer valuable insights into the distribution of global value added. The findings reveal significant variations in the economic strategies of Southeast Asian nations. The study underscores the dynamic and nuanced nature of these nations' approaches in response to evolving global economic conditions.

Keywords: Fisheries Industry, Southeast Asia, Global Value Chain (GVC), Multi-Regional Input-Output, Output Multiplier

1. Introduction

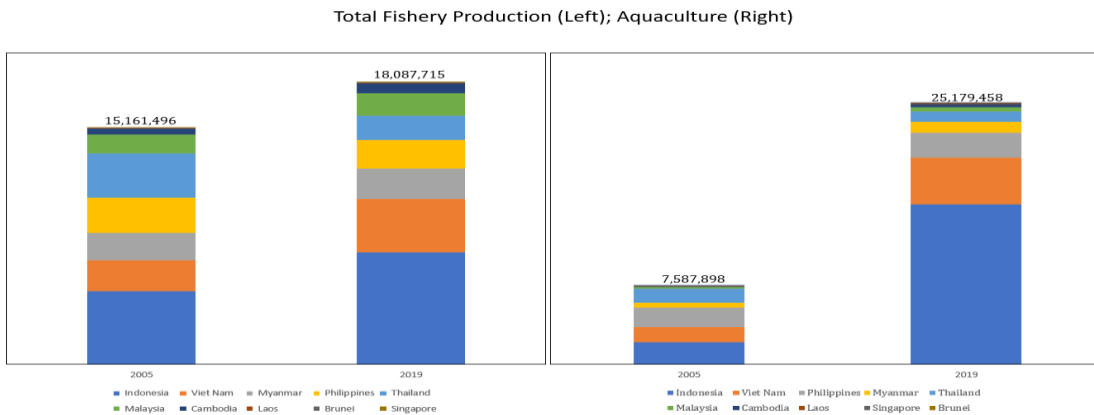
The global fisheries sector plays a crucial role in meeting the world's demand for seafood and supporting the livelihoods of millions of people. To gain a comprehensive understanding of this complex industry, it is essential to conduct a global value chain analysis. This analysis examines the various players and processes involved in the fisheries sector, providing insights into its functioning and dynamics. Additionally, it helps to comprehend the economic impact of global value chains in fisheries, including the creation of employment opportunities and the generation of revenue. Furthermore, analysing the environmental sustainability of these value chains is crucial in ensuring the long-term viability of the sector and the conservation of marine resources. By exploring these three supporting points, a deeper understanding of the global fisheries sector and its significance in the world economy can be gained.

The fisheries sector in Southeast Asia stands as a vital cornerstone of the region's economic development, food security, and cultural heritage. Stretching across a diverse archipelago, Southeast Asia's fisheries Global Value Chain (GVC) encompasses a complex network of actors, activities, and challenges. It is estimated that the region accounted for close to 17% of global fisheries production with 19% for capture fisheries and 14% for aquaculture (OECD-FAO, 2017).

In both capture fisheries and aquaculture, four of the world's top ten producing nations are located in Southeast Asia, with Indonesia ranking as the second-largest global producer, following China. On a global scale, Indonesia maintains its lead in total fishery and aquaculture production in the region, contributing to 38% of the total production in 2015 (see Figure 1). This dominance has grown over time, thanks to a robust

increase in production. Concurrently, fishery and aquaculture production has witnessed substantial growth in Vietnam, nearly tripling between 2005 and 2019, while Myanmar has reported a similar level of production growth, elevating its status from the sixth to the third-largest regional producer.

Figure 1: Contribution to fishery production by country



Source: FAO (2017b), Global Production Fisheries (database), www.fao.org/fishery/statistics/global-production/en.

There is a limited study that examined the fisheries industry in Southeast Asia. Examining the fisheries industry global value chain in Southeast Asia is unique due to several factors that distinguish the region from other parts of the world. These factors contribute to the significance and relevance of studying the fisheries industry in Southeast Asia. Southeast Asia is known for its high dependence on fisheries as a source of livelihood and food security. Fishing communities in the region have deep cultural and historical connections to fishing practices. Therefore, understanding the dynamics of the fisheries industry is crucial for sustainable development and the well-being of these communities. The region is also recognised as a global biodiversity hotspot, hosting a wide range of marine species and ecosystems. Its diverse marine habitats, including coral reefs, mangroves, and seagrass beds, contribute to the abundance and variety of fish species. Examining the fisheries industry in this context allows for insights into the conservation and management of these unique ecosystems.

The fisheries managers in a country prioritise the economic well-being of fishing-dependent communities. They have a keen interest in understanding the extent to which fish-producing activities contribute to job creation and income generation in the economy. Additionally, they want to assess the competitiveness of the fish-producing industry compared to other countries. The economic contribution of fish production is often measured using output multipliers derived from a single-region input-output model or the indices constructed based on these multipliers (Seung, 2022). Some studies that utilise multipliers evaluate the economic impact of fish production at a sub-national level (Seung & Waters, 2006; Garza-Gil et al., 2017).

The fisheries industry plays a vital role in the context of the United Nations Sustainable Development Goal (UN SDG) 14, "Life Below Water." As one of the most significant contributors to global food security, fisheries provide a crucial source of nutrition and livelihoods for millions of people worldwide. However, the sustainability of this industry is inextricably linked to the health and well-being of our oceans. The UN SDG 14 seeks to conserve and sustainably use marine resources, highlighting the importance of maintaining the health and productivity of aquatic ecosystems. It encourages responsible management practices in the fisheries sector, such as combating overfishing, protecting marine habitats, and reducing pollution, to ensure the long-term viability of this industry while safeguarding the diverse life below water, including marine species, coral reefs, and the overall ecological balance of our oceans. Therefore, the fisheries industry's sustainability is not only essential for economic and social reasons but also for preserving the delicate marine ecosystems in alignment with the UN SDG 14.

The aim of this study is to examine the contribution of the Southeast Asia Fisheries industry GVC based on the changes in (i) the output multipliers for fish producing industry and (ii) the economic contribution of the industry, which occurs during the period 2005-2019. The ten countries include Malaysia, Brunei, Myanmar, Cambodia, Indonesia, Laos, Philippines, Singapore, Thailand, and Vietnam.

The outline of this study is organised as follows. The next section (Section 2) briefly outlines the previous study of the fishing industry. Section 3 briefly outlines the methods that this study uses, including the MCIO model. Section 4 presents and discusses the results. The final section concludes.

2. Literature Review

The global fish industry represents a vital component of the world's food supply, contributing significantly to global nutrition, economic growth, and employment. As the demand for seafood continues to rise due to population growth, changing dietary preferences, and increased awareness of the health benefits associated with fish consumption, the intricacies of the industry's global value chain have garnered increasing attention from researchers, policymakers, and industry stakeholders. This literature review aims to provide an overview of the key themes, findings, and emerging trends within the global value chain of the fish industry.

In the study conducted by Rosales et al. (2017), the authors provide a comprehensive analysis of the various stages and actors involved in the global fisheries sector. The study highlights the complexity of the value chain, which encompasses activities such as fishing, processing, distribution, and consumption. It also emphasises the interconnectedness of actors, including fishers, fish traders, processors, retailers, and consumers. The authors argue that understanding the dynamics and interactions within this value chain is crucial for effective fisheries management and sustainable development. By mapping the global value chain, policymakers and stakeholders can identify critical points where interventions can be made to improve sustainability, reduce waste, and enhance the economic and social benefits derived from fisheries. This study serves as an important resource for researchers, policymakers, and practitioners seeking to gain insights into the complexities of the fisheries sector and develop strategies for its sustainable management.

A study by Stringer et al. (2016) explores the economic implications of Global Value Chains (GVCs) in the fisheries sector, providing valuable insights into this complex phenomenon. The authors argue that GVCs have transformed the way fisheries operate, enabling the integration of different stages of production and distribution across multiple countries. This integration has resulted in increased efficiency and productivity, as well as expanded market opportunities for seafood products. Furthermore, GVCs have facilitated technology transfer, knowledge exchange, and skill development, contributing to the overall growth and competitiveness of the fisheries sector. However, the study also highlights the challenges associated with GVCs participation, such as the potential for inequalities in the distribution of benefits and the vulnerability of small-scale fishers to market fluctuations. Overall, this research underscores the need for policies that promote inclusive and sustainable GVCs in the fisheries sector, taking into account the diverse interests and needs of different stakeholders.

Economic well-being of the fishing-dependent communities is a main concern of fisheries managers in a country. They are naturally interested in how much contribution its fish-producing activities make to the economy and how competitive its fish-producing industries are compared to other countries. Economic contribution of fish production is usually measured by the output multipliers from a single (country) region input-output model or the indices constructed based on the. Some of the multiplier-based studies assess the economic contribution of fish production at sub-national level (Seung, 2022). For instance, Seung and Walters (2006) examines the role of the seafood industry in Alaska, United States by using the social accounting matrix (SAM) model. In Spain, Garza-Gil et al. (2017) examine the economic contribution of fishing and aquaculture using the IO multiplier.

Other studies that focus on the national-level contribution of fish production. For example, Dyck and Sumaila (2010) measures the contributions of capture fisheries in many different countries to their economies using output multipliers computed from national input-output (IO) models. Sigfusson et al. (2013) examines the importance of the fishing industry and the associated industries to the Icelandic economy. Recently, Cai et al. (2019) develop methods to measure the national-level economic contribution of fisheries and aquaculture to Gross Domestic Product (GDP) based on the IO models. The study presents a conceptual framework, and suggests internationally established methodology, standards and guidelines to gauge aquaculture and fisheries' economic contribution. However, none of the previous studies assessing the economic contribution of a fish producing industry use a Multi-country Input-output (MCIO) framework. Therefore, the measures of the economic contribution from these previous studies fail to capture the effects from the inter-country trade flows (spillover effects and feedback effects).

This study overcomes the disadvantage of the previous studies by adopting the GVCs. This study aims to examine the magnitude of output multiplier and economic contribution of the fish producing industry in Southeast Asia. Thus, this study uses a MCIO model using data from Inter-Country Input Output (ICIO) Organisation for Economic Co-operation and Development (OECD) data.

3. Methodology

3.1 Multi-country Input-output (MCIO) model

Assume that there are F countries and N industries, and that each of the N industries produces one homogenous product, the Multi-country Input-output (MCIO) model that this study uses can be represented as follow:

$$Y = (I - A)^{-1}F \quad (1)$$

Where Y is a $(GN \times 1)$ vector of industry outputs for all G countries and N industries, A is a $(GN \times GN)$ matrix of MCIO input coefficients, F is a $(GN \times 1)$ vector of final demand for all G regions, and $(I - A)^{-1}$ is the MCIO inverse (multiplier matrix).

According to Seung (2022), it is important to use a multi-country input-output model when a large volume of commodities are traded among countries. He explained that an expanded economic activity in a country produced two different types of inter-country effects, namely spillover effect and feedback effect. Spillover effect explained that the effects occur in the other countries due to the first country's expanded economic activity. The first country enlarges its production of a commodity, it will import more intermediates from the other countries, resulting in an increased production in these other countries. However, feedback effects arise due to the first country spillover effects. When the other countries increase production to meet the higher demand by the first country, they will, in turn, import more intermediates from the first country. As a result, the first country will need to produce additional output to meet this demand by these other countries. The limitation of a single-country IO model is that the model underestimates the global value-added generated from an industry because the model fails to account for the additional value-added produced due to these spillover and feedback effects.

Managers in fishery in a county believe that all the production fishery production and its supporting industries (e.g. producing fuel, vessel repair services, transport) value added income generated remains in the country. In the country, Seung (2022) argues that some portion of the value-added income is generated in foreign countries (spillover effects) due to the fishing industry's purchase of the foreign-sourced inputs. Assume that a county implements a policy that reduces the harvest of a fish species via lowering the total allowable catch (TAC). This causes lower inputs for fishing industries which originate from domestic and foreign countries. He explained that there are two routes through which the spillover effects of this policy

are generated. First, the lowered use of the domestic-sourced inputs will lead to a decrease in production of the supporting industries. This will cause lower input for the supporting industries imports of intermediates from the foreign countries. Thus, this will prompt the industries producing the intermediates in the foreign countries to reduce their production. Second, spillover effects can also occur from the lowered use of the foreign-sourced inputs by the fishing industry because it will result in the foreign countries reducing their production of the intermediates. The foreign countries, which experience the spillover effects generated via the two routes, will in turn import smaller amounts of inputs from the first country. Thus, the production and value-added income in the first country will decrease further resulting in feedback effects.

This study's utilisation of an MCIO model has been instrumental in overcoming the limitations of single-country input-output (IO) models and accurately assessing a country's economic contribution. By considering these spillover and feedback effects, policymakers and researchers can gain a more comprehensive understanding of the interconnectedness and complexity of the global economy. This knowledge can inform more effective strategies for economic growth and development in an increasingly interconnected world.

3.2 Decomposing global value added multiplier

Figure 2 illustrates the mechanism by which a final demand for a product, manufactured within a specific country, triggers the generation of value added across various industries and countries. In this diagram, the broad arrows depict the flow of intermediate goods, while the narrower arrows represent the creation of value added. Here, 'VA' signifies value added, with labels like 'VA2.1' denoting the value added generated in the first (indicated as '1') industry or group of industries in country 2 (referred to as '2'). The industry responsible for producing the final product is denoted as 'E,' while the industries producing intermediate goods are designated as 'A,' 'B,' 'C,' and 'D.'

For instance, when an industry (E in Figure 2) in a specific country (Country 3) manufactures a final product using both domestically produced (D) and imported inputs from Country 2 (C), it generates value added (VA3.1) within the country. The industry providing intermediate inputs within the same country (D) to the final goods-producing industry (E) also contributes to value added (VA3.2). Consequently, the overall value added income generated in Country 3 equals $VA3.1 + VA3.2$.

Subsequently, an industry in Country 2 (C) produces and exports these inputs to Country 3, thereby creating value added (VA2.2). Industry C uses a combination of domestically produced inputs (B) and foreign inputs (A). During the production process of B, which generates inputs supplied to C, industry B also generates value added (VA2.1). Therefore, the total value added income produced in Country 2 is the sum of VA2.1 and VA2.2.

Lastly, an industry in Country 1 (A) manufactures inputs that are subsequently sold to C in Country 2, leading to the generation of value added (VA1).

Hence, during the process of manufacturing the final product in Country 3, value added income is produced in these three countries. The total of these value added incomes constitutes the income within the Global Value Chain (GVC). It's worth noting that, for the sake of simplicity in this example, it is assumed that no trade flows among industries. Additionally, in real-world scenarios, industries A and B may directly supply inputs to industry E, and industry D may provide some inputs to industry C.

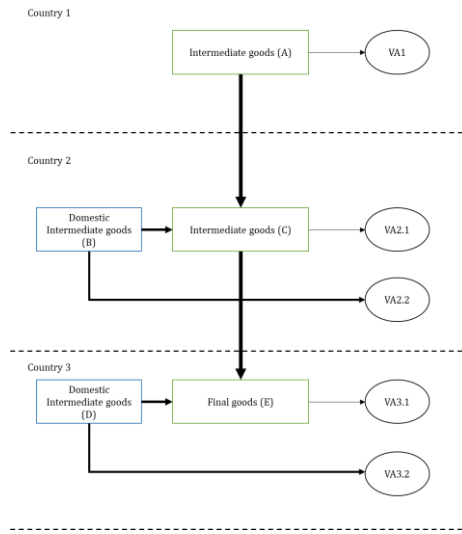
With this, let g to be a $GN \times 1$ column vector of value added coefficients. The element, $g_r(i)$, measures the value added generated per unit of output in industry i in country r . Let \hat{g} be the diagonal matrix of dimension $GN \times GN$ whose elements on the main diagonal are the elements of g . then

$$v = \hat{g}(I - A)^{-1}F \quad (2)$$

Where v is a $GN \times 1$ vector of value added for N industries and G countries. Given certain final demand levels in F , the element of v , $v_s(j)$, measures the contribution of the final demand levels to the value added in industry j of country s or how much of the value added engendered in the industry (j) is attributable to the final demand levels.

Note that GVC income is the sum of the stream of the value added incomes earned by all factors in all countries that participate directly and indirectly in the production of a final product, and is equal to the output value of the product.

Figure 2: A simplified diagram illustrating the creation of value-added within the Global Value Chains (GVC)



Source: (Los et al., 2015)

3.3 Global Value Chains (GVCs) table

Timmer et al. (2014) has introduced the Global Value Chains (GVCs) table and its definition with methodology. This measure provides an explanation on the usage of domestic value added (DVA) and foreign value added (FVA) to produce a final product of a sector in a country. This includes the value added of all activities that are directly and indirectly needed to produce the final product. The mathematical representation of the GVCs model is similar to equation (2), with slight modification as follows:

$$v^{GVC} = \hat{v}L\hat{y} \quad (3)$$

A hat represents a diagonalised matrix with non-zero values in the diagonal cells and zero otherwise. This GVCs indicator is defined by the combination of a specific country and sector, hereafter referred to as a 'country-sector,' representing the location where the final stage of production occurs before the delivery of goods to end consumers.

3.4 Data

This study uses a Inter-country input-output (ICIO) table from Organisation for Economic Co-operation and Development (OECD) released in 2022. The database consists of 14 years of ICIO data (2005-2019) and covers 76 countries plus one aggregated region and 45 industries for each country. ICIO database also

includes information on value added income and final demand including exports for each industry in each country. For further details, <https://www.oecd.org/industry/ind/measuring-trade-in-value-added.htm>.

4. Result

This study estimated the total output multipliers in Southeast Asian countries (Table 1). For each country, this study computes two different types of output multipliers for each country – a domestic output multiplier and a global output multiplier. Assumes that there is one unit increase in the final demand for the raw fish produced in a country. The effect of the domestic multiplier gauges the increase in the total industry output produced in the country, whereas the global multiplier measures the increase in global total industry output. It should be noted that there are two different multipliers that represent the impact caused by the foreign-sourced inputs used in the country’s raw fish production. Therefore, the larger the difference, the stronger the country’s dependence on foreign inputs.

In 2005, Vietnam’s fish producing industry had the largest output multipliers (both domestic and global, 1.85 and 2.66, columns 2 and 3, Table 1). This means that fish production in the country has the largest effects (per unit of final demand) on both total domestic output and the total global output. The country’s domestic multiplier is consistently larger than those of other countries in 2019. Malaysia and Singapore are the two countries that have the next largest multipliers (both domestic and global multipliers) in 2000. The smallest domestic multipliers are obtained for Laos and Cambodia. This is due to the fact that the share of revenue from fish production spent on intermediate inputs is very small. Instead, they may depend strongly on primary factors of production especially labour (Seung, 2022).

Malaysia experienced a decrease in both domestic and global multipliers between 2005 and 2019. The change in the difference between global and domestic multipliers was negative (-14.31%), indicating a decline in the country's ability to generate domestic value compared to global value. This trend is also reflected in the change in the difference between global and domestic multipliers, where Malaysia had a decrease of -49.58%. Brunei, on the other hand, witnessed an increase in both domestic and global multipliers during the same period. The change in the difference between global and domestic multipliers was positive (9.16%), suggesting that the country's domestic value creation exceeded the global value. Furthermore, the change in the difference between global and domestic multipliers showed a significant increase of 103.19%, indicating Brunei's enhanced ability to generate domestic value compared to global value.

Looking at Myanmar, it experienced a slight increase in both domestic and global multipliers. However, the change in the difference between global and domestic multipliers was positive (41.07%), indicating a significant improvement in the country's ability to generate domestic value compared to global value. This trend is further reflected in the change in the difference between global and domestic multipliers, where Myanmar had an increase of 54.16%. These findings provide insights into the changes in domestic and global multipliers for different countries over the specified period. The data highlights variations in the ability to generate domestic value compared to global value, with some countries experiencing improvements while others witnessing declines. Further analysis can be conducted to explore the factors influencing these changes and their implications for each country's economy.

Table 1: Output Multiplier for Southeast Asia Country, 2005-2019

(1)	2005			2019			Change (%) (2005–2019)		
	Domestic (2)	Global (3)	Foreign (4) = (3)-(2)	Domestic (5)	Global (6)	Foreign (7) = (6)-(5)	Domestic (8)	Global (9)	Foreign (10)
Malaysia	1.9266	2.5234	0.5968	1.6510	1.9519	0.3009	-14.3050	-22.6480	-49.5811
Brunei	1.3242	1.569	0.2448	1.4455	1.9429	0.4974	9.1602	23.8305	103.1863
Myanmar	1.4644	1.5257	0.0613	2.0659	2.1604	0.0945	41.0748	41.6006	54.1599

Cambodia	1.1993	1.6215	0.4222	1.1091	1.1268	0.0177	-7.5211	-30.5088	-95.8077
Indonesia	1.2842	1.3892	0.105	1.1407	1.1741	0.0334	-11.1743	-15.4837	-68.1905
Laos	1.0868	1.1258	0.039	1.1201	1.1545	0.0344	3.0640	2.5493	-11.7949
Philippine	1.3346	1.5075	0.1729	1.7148	1.9469	0.2321	28.4879	29.1476	34.2394
Singapore	1.6668	2.3206	0.6538	1.5983	2.24	0.6417	-4.1097	-3.4732	-1.8507
Thailand	1.5475	2.1143	0.5668	1.5338	1.9914	0.4576	-0.8853	-5.8128	-19.2661
Vietnam	1.8473	2.6559	0.8086	2.4109	3.364	0.9531	30.5094	26.6614	17.8704

Source: Authors own estimates

In Table 2, the data provided offers a comprehensive snapshot of the economic dynamics in various Asian nations, comparing domestic, global, and foreign influences on their economies over a 14-year period, from 2005 to 2019. This analysis reveals intriguing insights into the interplay between these economic factors and the distinct paths taken by each country. Malaysia exhibited a clear balance between domestic and foreign economic forces, with a relatively small difference between domestic and foreign multipliers. In 2019, its domestic multiplier stood at 0.8627, while the foreign multiplier was 0.9910, resulting in a difference of 0.1283. This indicates that Malaysia's economy was largely influenced by both domestic and foreign factors. Similarly, Brunei also maintained a balanced approach, with a slightly higher foreign multiplier but still maintaining a significant domestic influence. These countries seemed to have struck a balance between reliance on their domestic economies and foreign markets.

In contrast, Cambodia and Vietnam demonstrated a higher dependence on foreign economic factors. In 2019, Cambodia's domestic multiplier was 0.9912, while its foreign multiplier was 0.9971, resulting in a small difference of 0.0059. This indicates that Cambodia's economy was heavily influenced by foreign factors. Vietnam showed even greater foreign influence, with a significant difference between its domestic and foreign multipliers. This suggests that these two countries were more open to foreign investments and trade, possibly making them attractive destinations for international businesses.

Singapore's economic story is unique. While it displayed a significant foreign influence with a high foreign multiplier, it also had a considerable domestic multiplier. In 2019, the difference between these multipliers was 0.2844. Singapore's approach to balancing domestic and foreign factors is indicative of its role as a global financial hub and trading centre, where foreign investments play a crucial role. Thailand and the Philippines experienced notable shifts in their economic dynamics. Both countries showed an increase in foreign influence over the years, with larger differences between domestic and foreign multipliers in 2019 compared to 2005. This suggests a trend toward greater reliance on international markets and investments, possibly as a response to global economic changes. Myanmar, Indonesia, and Laos maintained relatively stable and domestically focused economic policies. They displayed only modest differences between their domestic and foreign multipliers in 2019. These countries seemed to prioritise domestic economic stability and resilience over heavy foreign influence.

In terms of growth, Malaysia experienced an increase in all three indicators between 2005 and 2019. The change in the difference between global and domestic multipliers was positive (19.99%), indicating an improvement in the country's ability to generate domestic value compared to global value. However, the change in the difference between global and foreign multipliers was minimal (1.28%), suggesting that the country's ability to generate foreign value remained relatively stable. Overall, Malaysia's domestic multiplier increased significantly while its global and foreign multipliers showed moderate improvements. Brunei witnessed an increase in all three multipliers during the same period. The change in the difference between global and domestic multipliers was positive (1.70%), indicating an enhancement in the country's ability to generate domestic value compared to global value. Moreover, the change in the difference between global and foreign multipliers showed a substantial increase of 15.16%, suggesting that Brunei's ability to generate foreign value experienced significant growth. These findings indicate Brunei's improved capacity to create domestic and foreign value, with its global multiplier also showing a positive trend. Looking at Myanmar, it experienced a slight increase in all three multipliers. The change in the difference

between global and domestic multipliers was negative (-0.75%), suggesting a slight decline in the country's ability to generate domestic value compared to global value. However, the change in the difference between global and foreign multipliers was positive (0.40%), indicating a slight improvement in Myanmar's ability to generate foreign value.

These findings provide insights into the changes in domestic, global, and foreign multipliers for different countries between 2005 and 2019. The data highlights variations in the ability to generate domestic and foreign value compared to global value, with some countries experiencing improvements while others witnessing slight fluctuations. In summary, this data discussion highlights the diverse economic strategies and priorities of various Asian nations. While some countries, like Malaysia and Brunei, struck a balance between domestic and foreign influences, others, such as Cambodia and Vietnam, leaned more towards foreign dependence. Singapore showcased a unique dual focus, emphasising its role as a global financial centre. Thailand and the Philippines appeared to have shifted towards greater foreign influence, while Myanmar, Indonesia, and Laos emphasised domestic stability. These findings underline the importance of understanding the nuanced economic approaches of each nation in the broader context of the global economy.

Table 2: VA Multiplier for Southeast Asia Country, 2005-2019

(1)	2005			2019			Change (%) (2005–2019)		
	Domestic (2)	Global (3)	Foreign (4) = (3)-(2)	Domestic (5)	Global (6)	Foreign (7) = (6)-(5)	Domestic (8)	Global (9)	Foreign (10)
Malaysia	0.7190	0.9785	0.2595	0.8627	0.9910	0.1283	19.9861	1.2775	-50.5588
Brunei	0.6722	0.7578	0.0856	0.6836	0.8727	0.1891	1.6959	15.1623	120.9112
Myanmar	0.9635	0.9872	0.0237	0.9563	0.9911	0.0348	-0.7473	0.3951	46.8354
Cambodia	0.8128	0.9733	0.1605	0.9912	0.9971	0.0059	21.9488	2.4453	-96.3240
Indonesia	0.9481	0.9917	0.0436	0.9841	0.9974	0.0133	3.7971	0.5748	-69.4954
Laos	0.9621	0.9775	0.0154	0.9823	0.9949	0.0126	2.0996	1.7801	-18.1818
Philippine	0.9070	0.9818	0.0748	0.8760	0.9677	0.0917	-3.4179	-1.4361	22.5936
Singapore	0.6350	0.9196	0.2846	0.6598	0.9442	0.2844	3.9055	2.6751	-0.0703
Thailand	0.6698	0.9418	0.2720	0.7489	0.9420	0.1931	11.8095	0.0212	-29.0074
Vietnam	0.6296	0.9450	0.3154	0.5699	0.9350	0.3651	-9.4822	-1.0582	15.7578

Source: Authors own estimates

The data provided in Table 3 offers a detailed and comprehensive snapshot of the economic dynamics in various Asian nations, particularly focusing on the shares of domestic and foreign influences on their total final output over a 14-year period, spanning from 2005 to 2019. This in-depth analysis provides valuable insights into the complex interplay of economic factors that have shaped the trajectories of these nations.

Malaysia, for instance, demonstrated a clear balance between domestic and foreign economic forces. In 2005, its domestic share in total final output was 73.48%, with the foreign share at 26.52%. However, by 2019, there was a significant shift towards a higher domestic influence, with a domestic share of 87.06% and a reduced foreign share of 12.94%. This shift of 18.47% towards domestic influence suggests a strengthening of Malaysia's domestic economic factors.

Conversely, countries like Cambodia and Vietnam showed a higher dependence on foreign economic factors. Cambodia's domestic share in 2005 was 83.52%, while the foreign share was 16.48%. By 2019, the domestic share had surged to 99.41%, with a minimal foreign share of 0.59%, indicating a significant 19.04% shift towards domestic dominance. In Vietnam, the shift was even more pronounced, with a substantial difference between domestic and foreign multipliers, showcasing a clear preference for foreign economic influences.

Singapore, a unique economic case, maintained both significant domestic and foreign influences. In 2005, Singapore's domestic share was 69.05%, while the foreign share was 30.95%. By 2019, the domestic share increased slightly to 69.87%, while the foreign share decreased to 30.13%. This balanced approach reflected

Singapore's role as a global financial hub where foreign investments played a crucial role in conjunction with a robust domestic economy.

In contrast, Thailand and the Philippines experienced notable shifts towards greater foreign influence over the years. This trend was evident in the larger differences between domestic and foreign multipliers in 2019 compared to 2005, signifying a response to global economic changes and a growing reliance on international markets and investments.

The data also highlighted that Myanmar, Indonesia, and Laos maintained relatively stable and domestically focused economic policies. They displayed only modest differences between their domestic and foreign multipliers in 2019, indicating a consistent emphasis on domestic economic stability and resilience over heavy foreign influence.

Table 3. GVC income for Southeast Asia Country, 2005-2019

	2005		2019		Change (%) (2005–2019)	
	Domestic (Share to total final output (%))	Foreign (Share to total final output (%))	Domestic (Share to total final output (%))	Foreign (Share to total final output (%))	Domestic	Foreign
Malaysia	73.48	26.52	87.06	12.94	18.47	-51.18
Brunei	88.24	11.76	78.69	21.31	-10.82	81.15
Myanmar	97.60	2.40	96.50	3.50	-1.13	45.79
Cambodia	83.52	16.48	99.41	0.59	19.04	-96.44
Indonesia	95.60	4.40	98.67	1.33	3.21	-69.76
Laos	98.42	1.58	98.73	1.27	0.32	-19.82
Philippine	92.39	7.61	90.52	9.48	-2.02	24.48
Singapore	69.05	30.95	69.87	30.13	1.20	-2.68
Thailand	71.12	28.88	79.50	20.50	11.78	-29.02
Vietnam	66.63	33.37	60.95	39.05	-8.53	17.02

Source: Authors own estimates

5. Conclusion

International trade nowadays is characterised by a strong fragmentation of production. Further, firms in a country use an increasingly larger share of foreign-sourced inputs in their production. Yet, economic contributions of an industry are often evaluated using output multipliers from single-country input-output (IO) models. Moreover, conventional methods quantify the competitiveness of an industry based on the assumption that all the activities for production of a final product occurs within a country using only the inputs produced within the country. This is not a valid assumption. Previous studies (e.g. Johson & Noguera, 2012; Koopman et al., 2014; Timmer et al., 2013, Wang et al., 2013) address this issue by decomposing the total value of exports or final demand into different value added components depending on where (in which industry and in which country) the global value added is generated.

The fisheries industry in Southeast Asia has been a subject of relatively limited research and analysis. To address this gap in our understanding of the sector, this study underscores the significance of employing a Multi-Regional Input-Output (MRIO) approach. By adopting an MRIO framework, the GVCs income related to fish production within the context of Southeast Asia can be effectively investigated. Such an approach is instrumental in providing a more comprehensive and nuanced examination of the economic dynamics, both domestic and international, that shape the fisheries industry in this region. In essence, this research contributes to an improved comprehension of the complex interplay of factors that influence the income generation within the fish production sector in Southeast Asia.

In the provided data, several key findings regarding the economic dynamics of Southeast Asian countries between 2005 and 2019 come to light. These findings are based on indicators such as output multipliers, value-added multipliers, and GVCs.

Firstly, the output multipliers for these countries reveal how the fish production industry impacts both domestic and global output. Vietnam stood out with the highest multipliers in 2005, demonstrating its significant influence on both domestic and global output. The Philippines showed steady growth in value-added indicators, signifying a stable economy. Malaysia and Singapore maintained a balance between domestic and foreign influences, while Cambodia and Vietnam displayed a higher dependence on foreign economic factors. These findings provide insights into the economic strategies of these nations over the specified period.

Secondly, the value-added multipliers highlight the interplay between domestic and foreign economic forces. Malaysia and Brunei demonstrated a balanced approach, maintaining both domestic and foreign influences. In contrast, Cambodia and Vietnam leaned more towards foreign dependence, making them attractive to international businesses. Singapore's unique role as a global financial hub allowed it to balance domestic and foreign factors effectively. Thailand and the Philippines shifted towards greater foreign influence, possibly in response to global economic changes, while Myanmar, Indonesia, and Laos focused on domestic economic stability.

Lastly, GVC provides a comprehensive overview of the economic dynamics in several Asian nations, particularly examining the interplay of domestic and foreign influences on their total final output during the period from 2005 to 2019. Malaysia shifted towards a stronger domestic influence over this period, while Cambodia and Vietnam moved towards domestic dominance. Singapore maintained a balanced approach with significant domestic and foreign influences, while Thailand and the Philippines saw an increase in foreign influence, possibly in response to global economic changes. Myanmar, Indonesia, and Laos prioritised domestic stability with consistent domestic and foreign multipliers in 2019. These findings reveal the varied economic strategies of these nations in adapting to evolving global economic conditions.

References

- Cai, J., Huang, H., & Leung, P. (2019). Understanding and measuring the contribution of aquaculture and fisheries to gross domestic product (GDP). *FAO Fisheries and Aquaculture Technical Paper No. 606*. Rome, FAO. 80 pp.
- Dyck, A., & Sumaila, U. (2010). Economic impact of ocean fish populations in the global fishery. *Journal of Bioeconomics*, 12, 227–243.
- Garza-Gil, M. D., Surís-Regueiro, J. C., & Varela-Lafuente, M. M. (2017). Using input–output methods to assess the effects of fishing and aquaculture on a regional economy: The case of Galicia, Spain. *Marine Policy*, 85, 48-53.
- Johson, R. C., & Noguera, G. (2012). Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics*, 86, 224-236.
- Koopman, R., Wang, Z., & Wei, S.-J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-494.
- Lang, J., Ponte, S., & Vilakazi, T. (2022). Linking power and inequality in global value chains. *Global Networks*, 23(4), 755-771.
- Los, B., Timmer, M. P., & Vries, G. J. (2015). How global are global value chains? A new approach to measure international fragmentation. *Journal of Regional Science*, 55(1), 66-92.
- OECD-FAO. (2017). *OECD-FAO Agricultural Outlook 2017-2026*. Paris: OECD Publishing.
- Rosales, R. M., Pomeroy, R., Calabio, I. J., Batong, M., Cedo, K., Escara, N., . . . Sobrevega, M. A. (2017). Value chain analysis and small-scale fisheries management. *Marine Policy*, 83, 11-21.
- Seung, C. K. (2022). Decomposing global value chain (GVC) income for world fisheries. *Marine Policy*, 137, 104950.

- Seung, C., & Waters, E. (2006). The role of the Alaska seafood industry: A social accounting matrix (SAM) model approach to economic base analysis. *The Annals of Regional Science*, 40, 335-350.
- Sigfusson, T., Arnason, R., & Morrissey, K. (2013). The economic importance of the Icelandic fisheries cluster—Understanding the role of fisheries in a small economy. *Marine Policy*, 39, 154-161.
- Stringer, C., Hughes, S., Whittaker, D., Haworth, N., & Simmons, G. (2016). Labour standards and regulation in global value chains: The case of the New Zealand Fishing Industry. *Environment and Planning A*, 1-18.
- Timmer, M. P., Los, B., Stehrer, R., & Vries, G. J. (2013). Fragmentation, incomes and jobs: An analysis of European competitiveness. *Economic Policy*, 28(76), 613-661.
- Wang, Z., Wei, S.-J., & Zhu, K. (2013). Quantifying international production sharing at the bilateral and sector level. *NBER working paper series*.

Investigating the Co-movements between Energy Price Volatility, Equity and Debt Markets Performance: Deciphering the Insights through Morlet Wavelet Analysis

Ummara Razi ^{a*}, Calvin W. H. Cheong^b, Arshian Sharif^c, and Sahar Afshan^d

*Department of Economic and Finance
Sunway Business School, Sunway University, Bandar Sunway,
47500 Selangor Darul Ehsan Malaysia*

^aEmail: 22122469@imail.sunway.edu.my, (*Corresponding Author),

^bEmail: calvinc@sunway.edu.my

^cEmail: arshian.aslam@gmail.com, ^d Email: sahar.afshan15@gmail.com

Abstract

Due to the financialisation of the energy sectors, analysing the intricate relationship between financial markets and oil price volatility is imperative for informed decision-making, risk management, and economic stability. Therefore, this research investigates the dynamic interplay between energy prices in Malaysia's equity and bond markets, focusing on the mediating role of interest rates. The study examines these relationships across two distinct time intervals by employing Wavelet Analysis, offering insights into their time-varying and intricate associations. The findings reveal that, in the initial interval (2011-2015), higher energy prices positively impacted the Malaysian equity market, driven by increased corporate earnings, stock market valuations, and inflation hedging. However, the coherence weakens in the subsequent interval (2016-2020), implying a nuanced and evolving relationship. Energy price volatility demonstrates a short-term positive influence on the bond market in the first interval but turns negative in the medium term. It suggests the importance of energy price management and diversification strategies. Additionally, interest rates exhibit a consistently negative relationship with the equity and bond markets during both intervals. The equity market negatively impacts the bond market during periods of economic uncertainty. These findings highlight the need for risk mitigation strategies and prudent interest rate management. Eventually, this study provides valuable insights for policymakers, investors, and financial practitioners seeking to navigate Malaysia's ever-evolving financial landscape.

Keywords: Stock market, bond market, energy prices volatility, wavelet analysis, and Malaysia.

1. Introduction

The rapid advancement of options, futures, and other derivative instruments has led to the increased financialisation and integration of the oil market within the global financial system (Kilian & Park, 2009). Therefore, institutional investors have progressively expanded their energy investments, specifically in oil-related commodities (Mensi et al., 2022). It implies that changes in oil prices not only act as external disruptions to macroeconomic indicators but also face exposure to systemic financial hazards stemming from other financial markets (Krishnakumar et al., 2022). The association between speculative endeavours and capital flows has strengthened the correlation between the oil market and the financial sector. The evidence of the global financial crisis (2008) demonstrates that the stock and oil markets underwent significant tumult simultaneously, influenced by the worldwide economic downturn (Tian et al., 2022). The complex association between energy price fluctuations and their consequential impact on financial stability has garnered significant attention (Hayo & Kutan, 2005; Sujit & Ray, 2023; Tule et al., 2017; Wang et

al., 2023). However, it is imperative to recognise that energy price volatility has a ripple effect across diverse sectors, influencing consumer expenditure patterns, production costs, and investment decisions (Mensi et al., 2023).

In the existing literature, the emphasis on stock market performance as an indicator of financial stability is well-founded, given the factors of market capitalisation, risk indicators, policy impact, investor sentiment, liquidity, and data availability. In contrast, the bond markets have been relatively understudied besides their vast scale. According to Bloomberg's estimation, the size of the US equity market was approximately 21.4 trillion dollars, while the bond market reached nearly 37 trillion dollars recently (Gan et al., 2023). However, in other developed and emerging economies, the proportion of the debt market compared to equities is even more substantial. Therefore, analysis of the association of equity and debt markets with oil price volatility is crucial for measuring overall financial stability due to their interconnectedness and sensitivity to energy price fluctuations. Oil price volatility affects financial stability in various ways. For instance, energy price fluctuations significantly impact the financial performance of the energy sector, thereby changing the perceptions and expectations of investments, reflecting the financial health and stability of energy-related firms with the stock price movements (Hayo & Kutan, 2005).

Moreover, energy prices also affect the creditworthiness and risk profile of energy companies, thereby influencing their ability to access debt markets for funding by downgrading their credit rating and posing systemic risks to the stability of the debt market (Pavlova et al., 2018). Likewise, energy price fluctuations can spillover effects on related sectors, including financial institutions exposed to energy-related assets or investments. Besides this, energy price volatility affects market sentiment and investor confidence, hence leads to market disruptions (Demirer et al., 2020). These fluctuations are intertwined with macroeconomic factors, such as interest rates and inflation, which influence equity and debt markets. Monitoring these markets serves as vital indicators of financial health and interconnectedness across sectors. Debt markets provide funding insights, while equity markets reflect investor confidence (Gan et al., 2023; Kilian & Murphy, 2014; Kilian & Park, 2009).

A fluctuation in oil prices plays an essential role in shaping various aspects of the financial landscape. For instance, as oil is a critical input in various industries and has a significant influence on production costs, an increase in prices engender inflation expectations in term of increased credit risk, consequently driving nominal bond yields upward and price downward, which influence bond returns (Pavlova et al., 2018). This phenomenon is notably pronounced in the context of oil-importing economies. Moreover, the increased oil prices can trigger inflationary concerns, promoting central banks to implement contractionary monetary policies characterised by interest rate hikes. Such actions aimed at curbing inflation can unfavourably affect the attraction of fixed-income securities, leading to decreased bond prices (Nazlioglu et al., 2020). The commodity sector financialisation has made the oil market a more lucrative alternate investment, which led to portfolio decisions that factor in the potential for profit from oil prices. It creates a feedback loop between the bond and oil markets, as changes in one market can lead to changes in the other and affect the price movements and risk spillovers (Tule et al., 2017). According to Kang et al. (2014), the fluctuations in oil market-specific demand exert a substantial influence, elucidating the variance in real 30-day Treasury bill returns. These demand-related shocks also explain variations in the real returns across various government bonds of 1-year, 5-year, and 10-year.

On the other hand, for oil-exporting nations, elevated oil prices translate into improved domestic income, fostering increased demand for investments in financial assets, including bonds. This increased demand propels asset prices and returns on an upward trajectory. However, the bond market remains susceptible to the sway of oil price fluctuations (Nazlioglu et al., 2020). A sudden surge in oil prices can activate market uncertainty and volatility, driving investors to invest in safer assets like government bonds and increasing bond prices (Das et al., 2022). Additionally, nations reliant on oil exports for revenue are particularly vulnerable in meeting debt obligations. A substantial decline increases the risk of default, raising concerns regarding sovereign bond defaults. Such apprehensions can trigger a bond market sell-off, decreasing prices (Demirer et al., 2020). Therefore, the bi-directional relationship between bond and oil markets exhibits complex interdependencies in their most basic and advanced statistical properties, requiring in-depth examination in Malaysia's context.

Interest rates play a crucial role in shaping bond yields and stock returns, as they directly affect the cost of borrowing and the expected returns on fixed-income investments (Ioannidis & Ka, 2018). By including interest rates as a variable, the model can capture the influence of monetary policy decisions on bond yields and oil price volatility. Changes in interest rates can impact investor sentiment and risk appetite, which in turn can affect the demand for and pricing of oil. For example, higher interest rates may increase oil companies' borrowing costs, potentially impacting their investment decisions and production levels (Mensi et al., 2023). Additionally, changes in interest rates can influence currency exchange rates, which can indirectly affect oil prices. Therefore, incorporating interest rates in the study provides a more comprehensive understanding of the relationship between stock returns, bond yields, and oil price volatility.

The interplay between energy price volatility and Malaysia's equity and debt markets is a crucial but underexplored aspect of the country's economy. As a major oil and gas producer and exporter, Malaysia's economic stability is closely linked to energy price fluctuations, making a deep understanding of this relationship vital. However, a noticeable lack of scholarly research on this topic, particularly in the Malaysian context, leaves a gap in our understanding of these complex interdependencies. The academic significance of this study is underscored by the fact that, as of 2021, Malaysia ranks among the world's top 25 oil and gas producers. According to the Suruhanjaya Tenaga (2022), Malaysia's crude oil production averaged approximately 614,000 daily barrels in 2020. It places Malaysia in a unique position where energy market dynamics substantially impact its economy.

Additionally, Malaysia boasts a burgeoning financial sector with a well-established stock exchange (Bursa Malaysia) and a significant bond market. As of 2020, the total market capitalisation of Bursa Malaysia was valued at over USD 400 billion (Andaiyani et al., 2022). The interconnectedness between energy and financial markets is important in the region and underscores the empirical significance of studying these co-movements. Moreover, Malaysia's ambition to diversify its economy away from oil and gas dependency, as outlined in its "12th Malaysia Plan 2021-2025," adds a forward-looking dimension to the study (Ekonomi, 2021). Focusing on Malaysia as a case study in this research offers a unique opportunity to explore the connections between energy prices, financial markets, and interest rates. Investigating the historical co-movements can provide valuable insights into how an oil-dependent economy manages a changing global energy landscape and how these dynamics affect financial stability. Malaysia's experience can be a blueprint for other nations facing similar energy-related economic

challenges. The study applied the Morlet wavelet analysis on data from two five-year intervals (2011-2015 and 2016-2020).

The remaining part of the study is structured into several key sections. In Section 2, an extensive review of theoretical and empirical literature is conducted to identify gaps in existing research. Section 3 concisely summarises the data and outlines the empirical methodology, emphasising wavelet analysis. Section 4 presents the study's findings and engages in a comprehensive discussion, aligning them with the research objectives. In the last, Section 5 concludes the study by summarising the key findings and offers policy recommendations

2. Literature review

2.1 Theoretical background

The existing literature has a well-established economic rationale for understanding the impact of oil price volatility on the stock market dynamics. Crude oil, the most strategically vital energy source, influences macroeconomic trends, consumer sentiment, geopolitical risks, and corporate profitability (Mensi et al., 2022). It is widely acknowledged that oil market developments can substantially influence both the global economy and financial markets (Fu et al., 2022). However, from a theoretical standpoint, oil price volatility can affect stock valuations through two primary channels. Such as these fluctuations exert pressure on production costs, potentially driving undesirable variations in consumer demand for products. These cost pressures, in turn, affect companies' expected future cash flows, thereby influencing stock prices (Tian et al., 2022). In addition, the energy price hikes often coincide with inflationary pressures. As the risk premium theory posits, investors are willing to obtain higher returns to compensate for the increased uncertainty associated with rising inflation. These inflationary pressures lead to higher discount rates, ultimately depressing the stock investment and boosting investment in the bond market (Demirer et al., 2020). Moreover, according to the portfolio theory, investors also seek diversification in their portfolio to minimise the risk; therefore, they often hold portfolios of assets, including the energy companies' stocks. The intensity of energy price volatility influences these portfolios' risk and return profiles (Wen et al., 2019).

The theoretical background for the interrelationship between oil price volatility and the bond market hinges on numerous financial theories, elucidating their mutual impact. Such as the portfolio theory, championed by Harry Markowitz, posits that diversification can mitigate risk in investment portfolios that typically comprise both stocks and bonds. As a source of market uncertainty, oil price volatility can disrupt the expected correlations between these asset classes, thus influencing portfolio diversification strategies (Tule et al., 2017). Furthermore, fluctuations in oil prices can strike the landing policies, contributing to inflationary uncertainty and causing shifts in bond market dynamics (Lee et al., 2021). Additionally, in an era of global economic interdependence, the ramifications of oil price volatility extend across borders as oil-importing nations grapple with economic challenges arising from oil price surges, influencing their fiscal and monetary policies and impacting their respective bond markets (Pavlova et al., 2018). Therefore, comprehending the complex interplay between oil price volatility and the bond market necessitates a holistic exploration of these theoretical foundations, considering their reciprocal impacts on each other's dynamics.

2.2. Empirical background

2.2.1 Stock market and energy prices volatility

The extensive empirical literature concerning the correlation between oil price shocks and financial markets, primarily concentrating on stock markets, has yielded substantial insights. The existing literature in a seminal contribution mainly refers to Kilian (2008) framework, which introduced a “structural Vector autoregressive (SVAR)” model to investigate the impacts of oil price volatility on countries’ stock returns. Moreover, Kilian and Park (2009) employed the same framework, highlighting the prevalence of oil demand shocks exerting a pronounced influence on the US stock. Furthermore, they underscore that oil price increases are attributed to precautionary factors or aggregate demand shocks. In addition to the tangible economic impacts of energy price volatility, numerous studies have highlighted the strong connections between these fluctuations and stock markets. Various studies have also delved into sector-specific effects, including research by Chatrath et al. (2014), which explored the intricate relationship between crude oil and the petroleum and natural gas sector stock returns. The outcomes reveal noteworthy intersections in the relationships between returns and the higher moments of the S&P 500 index and crude oil and identify a significant negative correlation between PNG stocks and crude oil volatility.

Huang et al. (2018) explored the intricate relationship between oil prices and the stock market using a multivariate approach that combines wavelet coherence and complex network analysis. They combined oil price indices (Brent, Dubai, Minas, OPEC) to examine their impact on the Shanghai Composite index. The finding revealed that the short-term coherence between oil prices and the stock market varies significantly. Additionally, the coherence between the stock market Brent and OPEC shows diverse movements during most of the sample period, indicating opportunities for improved diversification with these assets. Wei et al. (2019) employed a non-linear threshold cointegration method within a multivariate framework to investigate the enduring connections between the Chinese stock market and oil futures prices during the high uncertainty and financial crisis. The study has incorporated three crucial macroeconomic factors: domestic economic development, the foreign exchange market, and China’s total foreign trade volume as transmission channels between these markets. In contrast to prior research, their findings reveal significant impacts of the oil futures market on the Chinese stock market through these macroeconomic channels. Moreover, the study highlights the significant long-term cointegration relationships. However, structural breaks in March 2008 and December 2012 developed due to adjustments in China’s refined oil pricing mechanism and exchange rate regime.

Ji et al. (2020) assessed the dynamic interdependence and risk transmission mechanisms between BRICS stock returns and various oil price fluctuations for the panel data study. The study employed a combined approach, utilising the Structural VAR model alongside the time-varying copula-GARCH-based CoVaR framework. The study’s findings suggested that the dependence between BRICS stock returns and oil shocks undergoes time-varying patterns, with distinct behaviours contingent upon the nature of the oil market fluctuations. Notably, the configuration of CoVaRs in each BRICS country varies significantly, reflecting the unique market conditions and domestic policies reflected through the significant variations of the CoVaRs configurations. Chang (2020) evaluated the short-run and long-run asymmetric influence of oil prices on stock prices; existing research has predominantly employed the standard non-linear autoregressive distributed lag (ARDL) model. However, the ARDL model restricts its analysis to decomposing oil price series into partial sums of positive and negative changes, thereby overlooking the influence of their

extensive violation on stock prices. This study extends the existing literature by focusing on seven emerging countries: Brazil, India, Russia, China, Mexico, Indonesia, and Turkey. It adopts a multiple threshold non-linear ARDL model, enabling a comprehensive examination of the asymmetric effects of minor and substantial fluctuations in oil price series on stock prices. Findings from the standard non-linear ARDL model indicate significant and asymmetric short-run effects of oil prices on stock prices in Russia, Indonesia, and India, with negligible long-run effects observed across all sample countries. In contrast, persistent asymmetric effects in both the short and long run are achieved through the multiple threshold nonlinear ARDL model.

Alexandri and Supriyanto (2022) highlight the increased global monetary integration resulting from the escalation of volatility spillovers of oil prices. They employed the EGARCH model to investigate the dynamics of volatility spillovers within the oil sector across five ASEAN nations during the COVID-19 pandemic. The data has been gathered from five prominent international markets known for their substantial volatility spillovers: Indonesia, Malaysia, Singapore, Thailand, and Vietnam, to assess the interconnections of these countries' stock indices and the trajectory of volatility. The findings bear significant relevance for ASEAN investors and the Filipino market.

2.2.2 Oil prices volatility and bond market

The existing research has abundant empirical evidence examining the repercussions of oil price volatility on stock markets; however, the corresponding literature about bond markets remains notably scarce. It is evident that unanticipated shifts in oil prices, primarily attributed to supply-side factors within energy markets, have the potential to induce fluctuations in inflation expectations of the country. These fluctuations, in turn, manifest in the form of adjustments in bond market yields. Within the realm of research exploring the nexus between bond and oil markets, it is essential to place our study within the broader context of existing literature. One of the pioneering investigations in this domain was conducted by Kilian and Murphy (2014); utilising a structural vector autoregressive (SVAR) model, researchers have undertaken a comprehensive examination of the impact of fluctuations due to demand and supply gap within the global crude oil market on real bond returns in the United States. Their empirical results explain that positive oil market-specific fluctuation leads to reductions in the real returns of a composite bond index.

Examining the US bond market from a different angle, the recent study by Tule et al. (2017) evaluated the volatility spillover in the Nigerian sovereign bond market arising from oil price shocks; the study employed “Vector Autoregressive Moving Average - Asymmetric Generalized Autoregressive Conditional Heteroscedasticity (VARMA-AGARCH)” model. The daily data of Nigerian Sovereign Bonds, Brent oil and West Texas Intermediate (WTI) covers the period from 2011 to 2016. The outcomes demonstrate a significant cross-market volatility transmission between oil and sovereign bond markets with ample sensitivity to structural breaks.

Balcilar et al. (2020) focused towards the influence of uncertainty within the oil market, as opposed to mere fluctuations in oil prices, on the primary and secondary statistical moments portraying the bond premia associated with US Treasury bonds. Therefore, a nonparametric causality-in-quantiles framework has been adopted to mitigate the potential misspecification of models arising from unexplored nonlinearities and structural discontinuities. The analysis explores a compelling relationship wherein increased oil market uncertainty indicates greater bond premia across various maturity periods, as per the intensity of volatility. Wang et al. (2023) examine the association between crude oil prices and green bonds using a rolling-window Granger-causality test. It reveals both positive and negative impacts of oil prices on the green bond index (GBI) within the same

dataset. Elevated COP levels positively influence the GBI, indicating the resilience of green bonds to COP shocks. Conversely, the GBI negatively affects COP, but only during certain conditions. The asymmetric characteristic is attributed to escalating production costs and mounting environmental preservation imperatives.

Lee et al. (2021) delve into the causal connections between oil prices, geopolitical risks, and the green bond index within the United States, spanning from December 2013 to January 2019. The investigation assesses causal relationships through Granger-causality within the framework of quantile analysis. The empirical findings extract a unidirectional Granger causality from geopolitical risk to oil prices, particularly evident in the extreme quantiles. Moreover, a bi-directional causality emerges from oil prices to the green bond index, predominantly influencing the lower quantiles. Interestingly, the outcomes also exert causality from geopolitical risk to the green bond index, particularly pronounced within the lower quantiles of the distribution. Gan et al. (2023) examine the influence of oil price volatility on China's debt cost. The study employed bond data spanning from 2008 to 2019 and discovered that fluctuations in oil prices lead to an increase in bond offering spreads, signifying that oil price volatility elevates the debt cost attributed to enhanced default risks. Furthermore, energy sector firms are more susceptible to the impacts of oil price volatility. The study outcomes reveal an asymmetric effect of oil price volatility on the debt market.

2.3 Research Gap

Based on the literature review, the research gap in this study lies in the need to explore the relationship between oil price shocks and stock market returns in a time-varying and non-linear context, moving beyond the static linear frameworks that have dominated previous research. Additionally, there is an opportunity to investigate market dynamics, particularly in resource-dependent developed countries systematically. In the context of oil prices' impact on the bond market, the gap exists in understanding the second-moment effects and spillovers of prices and volatility between these markets, particularly for government bonds considered safe havens, which has been less explored in the existing literature. Therefore, addressing these gaps contributes to a more comprehensive understanding of the complex dynamics between energy prices and financial markets.

3. Methodology

3.1 Sample and data specifications

The study evaluates the time-varying linkage between energy prices, equity market and bond market performance and interest rates. The motivation to select Malaysia as the sample is based on numerous facts, such as Malaysia compels significance in the global energy landscape. Even though Malaysia is a notable oil-producing country, it exhibits a substantial reliance on oil and gas, making it a compelling subject of investigation (Talha et al., 2021). Conventional energy resources, particularly crude oil, contribute to its economic structure (Jiang et al., 2022). Due to its heavy dependence on oil revenues, the country has faced considerable fluctuations and uncertainties. Predominantly, Malaysia's equity and debt markets exert a substantial ramification by energy price volatility in terms of capital flows, dynamics of financial markets and investor sentiments (Krishnakumar et al., 2022). To measure this, the study uses benchmark financial indices like FTSE Malaysia KLCI for equity market performance and benchmark bond indices such as Malaysia's 10-Year Bond Yield to measure the bond market performance.

Energy price volatility can also engender adjustments in interest rates set by Malaysia’s central bank, Bank Negara Malaysia (BNM). The interest rate changes impact borrowing costs, investment decisions, and overall market sentiment (Naeem et al., 2022); therefore, the study incorporates the interest rate as a mediator to delve into the complex interaction between energy prices and the financial markets. Malaysia adheres to the systematic approach for its economic planning framework known as “The XXth Malaysia Plan,” which typically spans five years and allows for continuous assessment and adjustment of policies to meet emerging challenges and varying economic conditions (Mustaffa & Kudus, 2022). Taking into account the 10th and 11th Malaysian Plans, the study has split the weekly data into two five-year intervals (2011-2015 and 2016-2020) to gain insights into the economic dynamics and the impact of policies during these specific time frames. The fluctuations in the crude oil price have significantly ripple effects on other energy sources’ prices (Statistics et al., 2016) . Considering the most widely used energy source globally, the study has specifically focused on crude oil prices following the West Texas Intermediate (WTI) benchmark as the proxy of energy prices. Table 1 illustrates the proxies and data sources of the study variables.

Table 1: Data summary

Variables	Abbreviation	Proxies’ details	Sources
Energy prices	ENP	The price of crude oil following the West Texas Intermediate (WTI) benchmark, measured in Dollars per Barrel	FRED
Equity market returns	EMP	Benchmark financial market indices FTSE Malaysia KLCI weekly price data converted into returns	investing.com
bond market returns	BMY	Benchmark bond market indices: Malaysia 10-Year Bond Yield	investing.com
Interest rate	INR	Weekly interest rate	BNM

Note FRED: Federal Reserve Economic Data and BNM: Bank Negara Malaysia.

3.2. Wavelet Approach

The study employed wavelet analysis to explore the relationships between energy prices, equity market and bond market performance and interest rates. Wavelet transformation was first adopted by Fan and Gençay (2010), which has numerous advantages as a mathematical instrument for signal analysis. In contrast to conventional Fourier analysis, wavelet transformation can decompose signals into various frequency components, exposing hidden information that might not be easily discerned within the wide spectrum frequencies. Moreover, this empirical approach assists in determining the duration and the frequency of variable fluctuations, such as for the non-stationary signals that demonstrate complex behaviours, analysed by its ability to capture the multiscale features of a signal (Tiwari et al., 2015).

Likewise, the coherence or co-moments, along with lead-lag positions between the variables within the time-frequency domain, support understanding and managing the impact of volatility on the variables (Yu et al., 2022). The study employed different wavelet analysis techniques, such as continuous wavelet transform, wavelet transformation coherence, partial wavelet coherence,

and multiple wavelet coherence, to comprehensively investigate the intricate association and dynamics among the examined variables. A wavelet transformation is a powerful tool for uncovering critical patterns in economic and financial data due to its ability to adapt to time-varying qualities in real-time series (Afshan et al., 2023).

3.2.1. The Continuous Wavelet Transform (CWT)

The continuous wavelet transform is a prevailing approach to determining a signal's frequency characteristics across different scales, enabling a detailed analysis of how the signal's properties evolve. In this research, the Morlet wavelet is employed to investigate the signal's time-frequency components and use the Gaussian window to manipulate the parameters “m” and “n” within the complex exponential function. This approach provides valuable insights into the signal's temporal and spectral attributes. In this context, the continuous wavelet transform is denoted by the expression. $W_a(m, n)$ in this context.

$$W_a(m, n) = \int_{-\infty}^{\infty} a(t) \frac{1}{\sqrt{n}} \overline{\psi\left(\frac{t-m}{N}\right)} dt \quad (i)$$

The transformation is calculated by measuring the scaled and translated version of a mother wavelet function denoted as $\psi\left(\frac{t-m}{N}\right)$. The term $1/\sqrt{n}$ ensures that the amplitude of the wavelet function is appropriately adjusted as it is scaled. The negative infinity to positive infinity (from-to ∞) demonstrated that the integral is taken over the entire real line, which means the wavelet transform is computed for the entire time domain of the signal $a(t)$. The continuous wavelet transforms indispensable characteristic is its ability to decompose and reconstruct a time series represented as under.

$$a(t) = \frac{1}{c_\psi} \int_0^{\infty} \left[\int_{-\infty}^{\infty} W_a(m, n) \psi_{m,n}(t) du \right] \frac{dn}{N^2}, N > 0 \quad (ii)$$

This process involves breaking down the signal into components represented by the continuous wavelet coefficient. $W_a(m, n) \psi_{m,n}(t)$, and then smoothly reconstructing it. The above integral equation describes the reconstruction process, where $a(t)$ is expressed as a combination of these wavelet coefficients over a range of scales “n,” using the mother wavelet function $\psi\left(\frac{t-m}{N}\right)$. The constant “ c_ψ ” ensures proper normalisation and the scale factor denoted by parameter “N”. To analyse and understand the time-frequency characteristics of the signal constantly, the reconstruction capability is pivotal.

Besides this, the CWT also maintains the fidelity of the observed time series.

$$\|a\|^2 = \frac{1}{c_\psi} \int_0^{\infty} \left[\int_{-\infty}^{\infty} |w_a(m, n)|^2 dm \right] \frac{dn}{N^2} \quad (iii)$$

The study leverages this feature to expound upon wavelet coherence, quantifying the inherent relationship between two-time series.

3.2.2. Wavelet Transform Coherence (WTC)

WTC is a bivariate analysis structure that simultaneously investigates the relationship between two variables or signals in time and frequency domains based on the same wavelet transformation concept with cross-wavelet transformation, coherence calculation, and significance testing. It specifically measures the similarity or degree of coherence between two signals at various scales

and reveals the directions and strength of the association across different frequencies. The cross-wavelet transform is described by two-time sequences $a(t)$ and $b(t)$ under

$$W_{ab}(m, n) = W_a(m, n)W_b^*(m, n) \quad (\text{iv})$$

In the above equation, two continuous wavelet transforms of $a(t)$ and $b(t)$ are $W_a(m, n)$ and $W_b(m, n)$ respectively. The wavelet power is W_{ab} , the 'm' and * sign demonstrates the location index, time, and composite link. The WTC determine the locally phase-locked behaviour and significance level of association with Monte Carlo methods. A squared wavelet coherence coefficient is calculated as follows.

$$R^2(m, n) = \frac{|N(N^{-1}W_{ab}(m, n))|^2}{N(N^{-1}|W_a(m, n)|^2) N(N^{-1}|W_b(m, n)|^2)}, \quad (\text{v})$$

Wavelet coherence coefficient (R^2) is a scale-invariant measure that ranges from 0 to 1, where values closer to 0 represent little or no coherence, and values closer to 1 signify a strong coherence between the two signals being compared.

3.2.3. Partial and Multiple Wavelet Coherence

After obtaining the results of WTC analysis to gain a comprehensive grasp of the relationships and dynamics among multiple time series, the subsequent examination of Partial Wavelet Coherence (PWC) and Multiple Wavelet Coherence (MWC) is crucial. PWC is instrumental in determining scale-specific and localised bivariate relationships between variables. It quantifies the linear relationship between two time series and removes the confounding variables' influence through a partial correlation approach. In contrast, the MWC expands upon the coherence function to assess the correlation of the dependent variable with two or more time series. The analysis of MWC considers all the cross-spectra of the dependent variable with each related time series and then computes the overall coherence. In this study, both PWC and MWC shed light on the interconnections between energy prices and equity and debt market performance in the presence of interest rates. Hence, PWC and MWC analyses complement the WTC results by delving into the intricacies of the association of the variables for multiple time series. This empirical strategy helps get a further nuanced perspective, suggesting the researcher focus on controlling confounding variables.

4. Findings and Discussions

4.1 Descriptive Statistics

The findings and discussion section delves into the dynamic linkage between energy prices, equity and debt market performance and interest rates in Malaysia. For this, the energy prices, equity market and debt market prices data were converted into return series, making it more standardised performance measures for the meaningful comparison across different variables (Fu et al., 2022). Besides this, the returns eliminate the effects of long-term trends and reflect the net value changes (gains or losses) over specific periods. Moreover, returns standardised the risk assessment as a key indicator of investment profitability (Ramzan et al., 2023). Also, due to the returns' stationarity properties, constant variance is widely used in statistical analysis and financial modelling (Tiwari et al., 2015). Figure 1 compares energy, equity, and bond market prices and returns.

Table 1: Results of Descriptive Statistics

	ENP	EMP	BMV	INT
Mean	0.004	0.003	-0.004	0.433
Median	0.001	0.000	-0.001	0.476
Std. Dev.	0.144	0.014	0.047	0.102
Skewness	340.589	9.568	14.685	-0.402
Kurtosis	16.319	-0.944	1.564	-1.153
Jarque-Bera	22.828	25.200	282.001	132.507
Probability	0.000	0.000	0.000	0.000
Observations	517	517	517	517

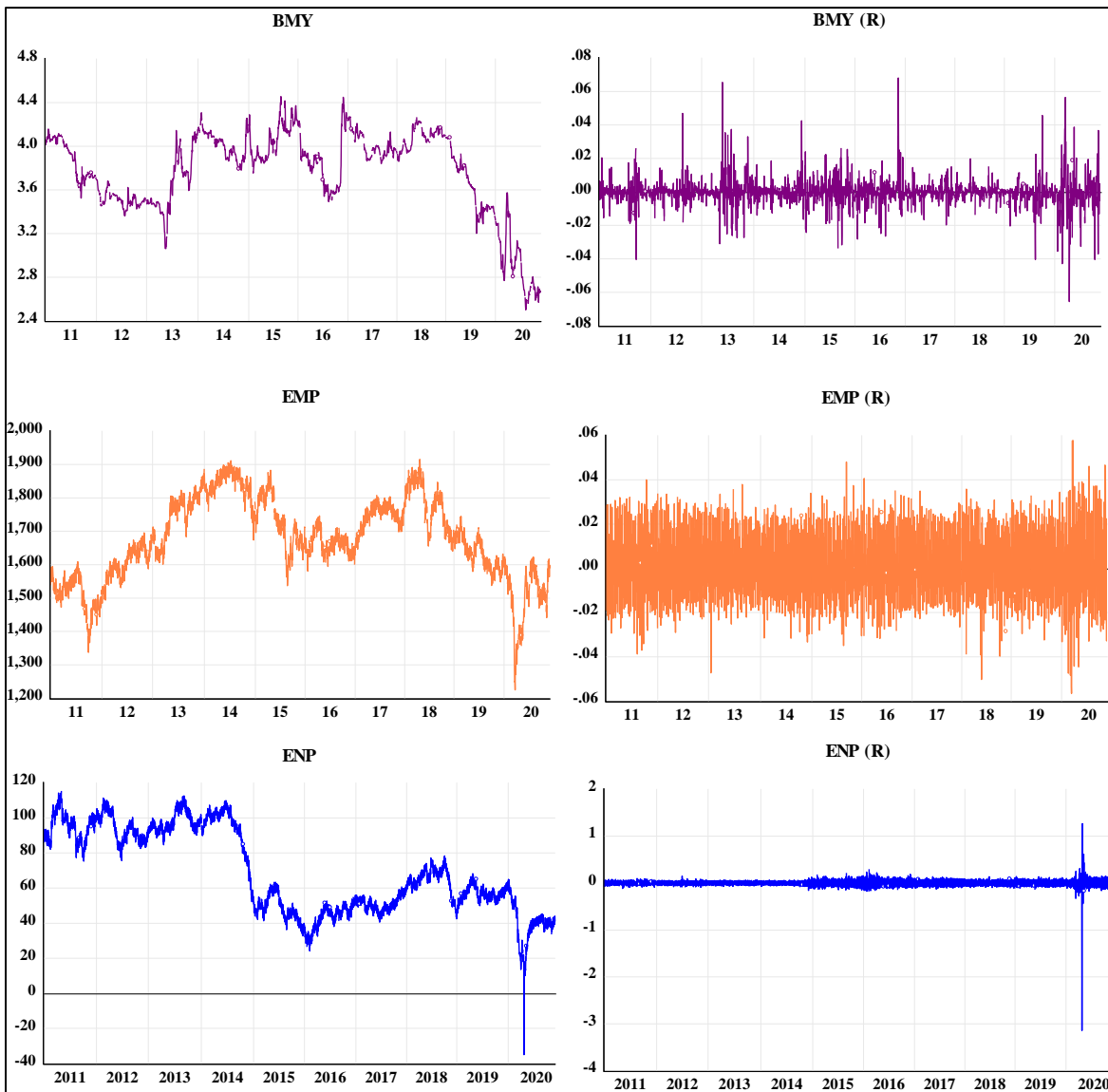


Figure 1: Prices vs. return of ENP, EMP, BMV

The descriptive statistics of energy prices, equity market, bond market and interest rate are presented in Table 2. The table reports the central tendency in terms of mean and median, which shows the highest mean value held by interest rate. For the dispersion around the means, energy prices have the highest standard deviation, showing the highly volatile nature of oil prices for Malaysia, while the equity market shows the least value. Table 2 also provides details related to data distributions such as skewness, kurtosis and the Jarque-Bera test. The probability of Jarque-Bera for all variables is highly significant, indicating that all data series in the sample significantly deviate from a normal distribution. Therefore, as proposed by prior studies to determine non-linear relationships, the most appropriate analysis method is a time-frequency approach.

The study has also applied correlation analysis to assess the strength and direction of the linear association between two data series. Figure 2 demonstrates the Pearson correlation matrix and shows that all the data series positively associate with each other; however, the coefficient values vary, showing strong and weak relationships.



Figure 2: Correlations between ENP, EMP, BMY, and INT

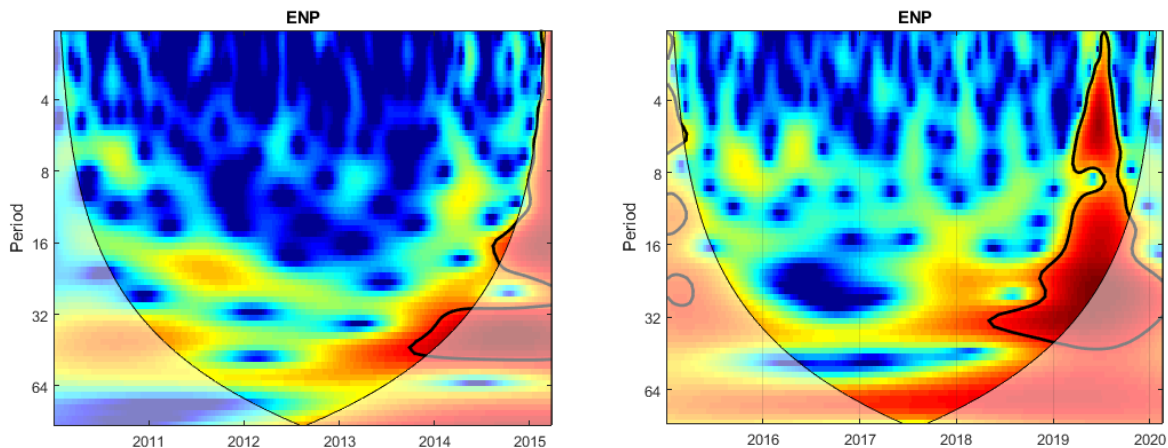
4.2 Continuous Wavelet Transform

The Continuous Wavelet Transform (CWT) expands time series into time-frequency space and demonstrates instinctive fluctuations. Its graphical frequency depiction provides an edge for richer information to understand the insights easily. Figure 3 displays the continuous wavelet power spectrum results for ENP, EMP, BMY, and INT in Malaysia for two different time intervals for 2011-2015 and 2016-2020. The vertical axis of the spectrogram displays frequencies representing short-term (0-4), short to medium (4-8), medium-term (8-16), medium to long (16-32), and long-term (32-64) oscillations, while the horizontal axis spans from 2011 to 2015 and 2016 to 2020 respectively. The correlation coefficient values are represented by black lines on the plot, enabling the identification of dependencies between two variables within the time-frequency domain. In Figure 3, in the left panel, CWT graphs cover the interval from 2011 to 2015, while on the right panel, CWT results are exhibited for the interval from 2016 to 2020. According to Figure 3(a), the

oil prices remain stable throughout the study and display no significant volatility except conspicuous variability on small scales in the medium (2015) and medium to long run (2014). In Figure 3b, for the other interval (2016-2020), the oil prices have significant variation with intense volatility in short, medium and medium to long scale (2019-2020). It indicates that the different economic and geopolitical dynamics impact Malaysia's oil price trajectory in distinct phases. In the initial five years, the prices were relatively stable due to the steady global economic recovery of the post-financial crisis of 2008. In the later years, the high variation pronounced the heightened uncertainty and market turbulence due to the unprecedented impact of the COVID-19 pandemic, trade tensions, and overall global economic slowdown (AMRO, 2022).

The outcomes of CWT for Malaysia's equity market (EMP) over two distinct intervals. As depicted in Figure 3c, the spectrogram illustrates a relatively stable market environment through periodic fluctuations in the equity market during this period. These fluctuations are attributed to economic events or policy changes that temporarily influence the market. Figure 3d exhibits the significant and extended island of activity that emerged, starting in 2017 and persisting until 2019. This island spans various frequency ranges, from short to medium to high (0-32), indicating substantial market volatility and oscillations over this timeframe. The presence of such a large and persistent island implies that the equity market in Malaysia experienced significant turbulence due to external shocks, domestic policy changes, and global economic uncertainties.

The CWT analysis for the bond market (BMY) observed in Figure 3e, a relatively tranquil market environment. The presence of light orange islands, primarily in the short to medium frequency range (0-16), suggests occasional fluctuations in the bond market. Notably, a small red island was in the medium to long frequency range (16-32) in 2013, indicating a brief period of increased intensity of variation in the market during that year. The sporadic nature of these islands suggests that such events were relatively infrequent and did not significantly disrupt the market's stability. Figure 3f illustrates that a substantial red island appeared in 2020, primarily in the short to medium run (0-16), suggesting a change in market dynamics and increased synchronisation among bond instruments during this period. Figures 3g and 3h demonstrate the CWT outcomes for INR. In the early period (3g), a red island indicated a period of high variation in the short term during 2012. It suggests that the interest rates in Malaysia experienced significant fluctuations and variability during that particular year, primarily in the short run. In the later interval in 2018, Malaysia's interest rates displayed a relatively stable but moderately fluctuating behaviour across both short and medium-term.



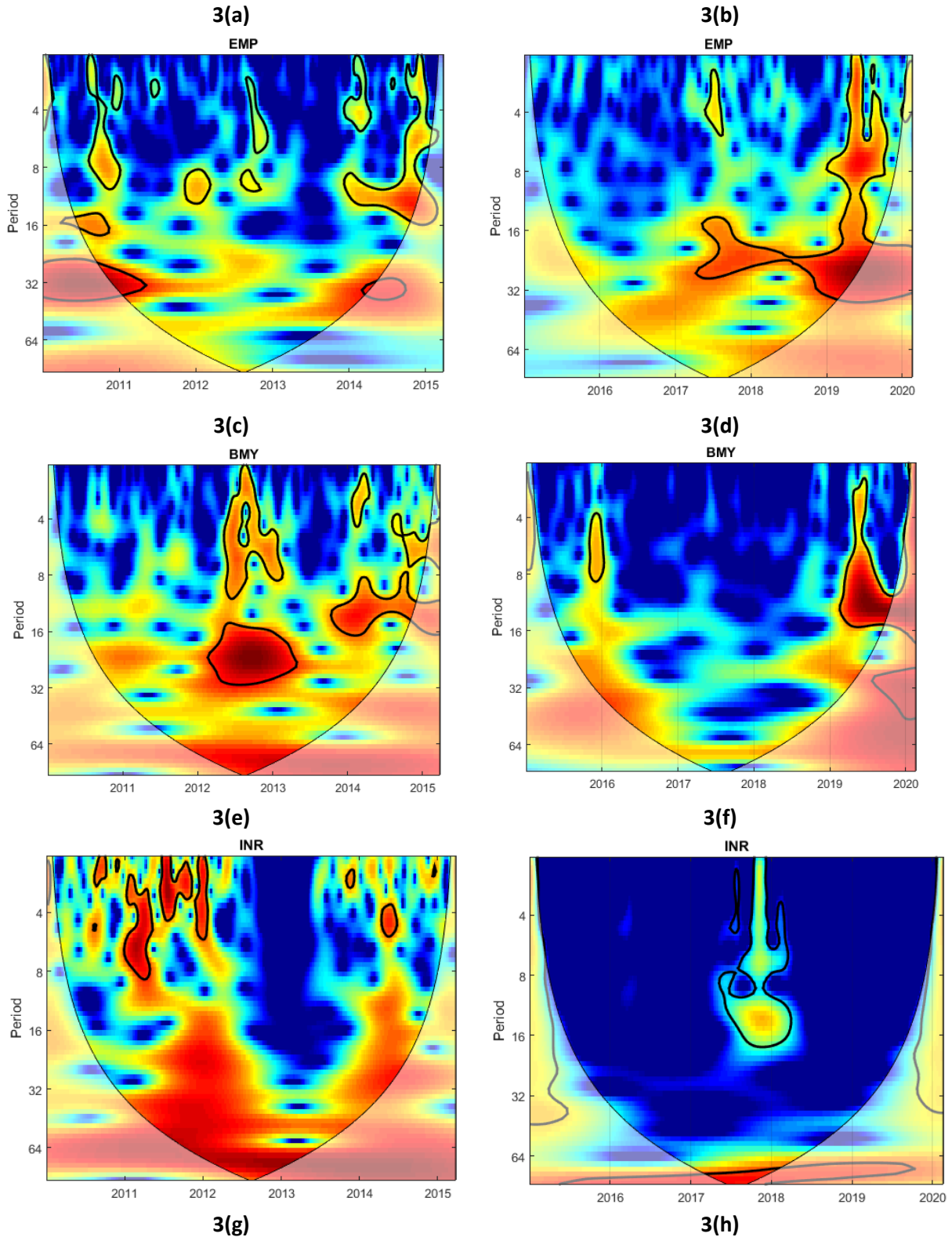


Figure 3: Continuous Wavelet Transform (CWT) of ENP, EMP, BMY, INT from 3/01/2011 to 28/12/2015 (left panel) and from 4/01/2016 to 23/11/2020 (right panel). Note: “The thick black contour represents the 5% significance level against the red noise. The color code for power ranges from blue (low power) to red (high power)”.

4.3 Wavelet transformed coherence

Wavelet Transformed Coherence (WTC), a statistical metric measuring the degree of coherence between two signals at varying frequencies, assesses the relationship between time series signals operating within distinct frequency bands (Jin et al., 2022). Figure 4 presents the results of WTC for ENP, EMP, BMY, and INT. The spectrogram's vertical axis delineates frequencies characterised into different periods, spanning from short-term (0-4), short to medium (4-8), medium-term (8-16), medium to long (16-32), and long-term (32-64), whereas the horizontal axis spans from 2011 to 2015 (left panel) and 2016 to 2020 (right panel) respectively. Black lines signify the correlation coefficient, aiding in identifying the co-movements between variables across time and frequency. The chromatic spectrum, ranging from blue to red, visualises the coherence magnitude between the variables (Si et al., 2020). Furthermore, the orientation of the arrows indicates the phase difference between the two series, with rightward arrows denoting in-phase association with cyclical effects and leftward arrows representing out-of-phase coherence with anti-cyclical effects (Rua & Nunes, 2009).

Figure 4a and 4b presents the results of WTC analysis to explore the intricate link between ENP and the EMP in Malaysia across two intervals. The results revealed that in the initial interval, strong co-movement is evident, with high variation intensity represented by small red islands spanning various frequencies. The in-phase coherence led by ENP implies that the Malaysian equity market is positively affected by energy price fluctuations due to the country's interdependent economic sectors. Energy price increases lead to higher corporate earnings, stock market valuations, and inflation hedging. Higher energy prices allow companies to pass on elevated costs, bolstering investor sentiment. In the second interval, lower variation intensity and a smaller island are observed. In the short run, in-phase coherence suggests immediate responses, but in the long run, an in-phase pattern emerges, indicating complex, no specific lead-lag interactions in 2019 and 2020. The positive nexuses between ENP and EMP have been endorsed by Demirer et al. (2020).

The wavelet coherence analysis between ENP and BMY in Figures 4c and 4d reveals a small island in the short run, indicating concurrent fluctuations between these variables during brief timeframes. While in the medium to long term, this relationship turns negative, reflecting the temporal complexity of their dynamics for the first interval. On the other hand, during the second interval, the variables have opposite oscillation patterns. The pointer direction indicates that in the medium run, the energy price fluctuations have a moderate adverse impact on the bond market performance. It is attributed to the market's sensitivity to economic conditions and investor confidence, as moderate energy price fluctuations may signal economic uncertainty. Additionally, concerns related to potential inflationary pressures and their effect on real bond returns play a role. Foreign investment dynamics, influenced by currency movements, also contribute to the observed adverse impact. The outcomes are consistent with the findings supported by Demirer et al. (2020)

Figures 4e and 4f show the bivariate wavelet coherence results for the relationship between energy prices and interest rates in Malaysia. The result reveals intriguing insights. In Figure 4e, a small island in red during the medium run signifies an out-of-phase coherence, indicating opposing movements between energy prices and the equity market without a clear lead-lag relationship. In contrast, in the medium-to-long run, a relatively substantial dark orange island, prevalent in 2014-2015, indicates strong in-phase coherence with interest rates leading to energy prices. In the second interval, a small island is evident in the short run, suggesting a brief, localised coherence. However,

in the medium run, a conspicuous, elongated red island for 2012-2013 dominates the spectrogram, signifying a significant and sustained in-phase coherence without a distinct lead-lag orientation. The positive association is attributed to the inflationary pressure. Energy price rises trigger inflation; therefore, to stabilise the prices, the rise of interest rates is crucial. (Ioannidis & Ka, 2018).

Further, WTC examines the nexus between the equity market and interest rates during two distinct intervals. The results illustrate in Figure 4g that a small island signifies a strong out-of-phase coherence during the medium run, indicating opposing movements between the equity market and interest rates, where interest rates lead this relationship. Moreover, in the medium-to-long run, two relatively large dark red islands spanning from 2012 to 2015 become evident, implying a significant and sustained in-phase coherence, with interest rates leading position. Shifting to Figure 4h, a small island is observed in the short run, suggesting a brief, localised coherence. However, in the medium-to-long run, a notable elongated red island in 2018 indicated a substantial, sustained out-of-phase coherence between EMP and INR without a distinct lead-lag orientation. These findings underscore the evolving and nuanced dynamics between the equity market and interest rates during these specified intervals.

For the nexus between the equity market and the bond market, WTC yield compelling insights; as for the first interval, Figure 4i exhibited a small island in red during the short run in 2013, indicative of a brief and limited coherence between the equity market and the bond market for 2014 and 2015. A high-intensity red island emerges, signifying a substantial and synchronised relationship. As we delve into the medium-to-long run for 2013-2014, we observe that an out-of-phase coherence implies a negative impact of the equity market on the bond market, primarily driven by shifts in investor sentiment, risk aversion, and interest rate expectations. During periods of economic uncertainty or market turmoil, investors tend to favour the safety of bonds (flight to quality), causing increased demand and higher bond prices. For the second interval, Figure 4j shows a small island in both the short and medium runs, suggesting relatively transient coherences between the two markets. However, a notable red island surfaces in 2019 during the medium run, signifying a sustained out-of-phase coherence where the bond market leads. The negative coherence of EMP and BMY is consistent with the findings of Papadamou et al.(2021), who supported the flight-to-quality approach for these market relationships.

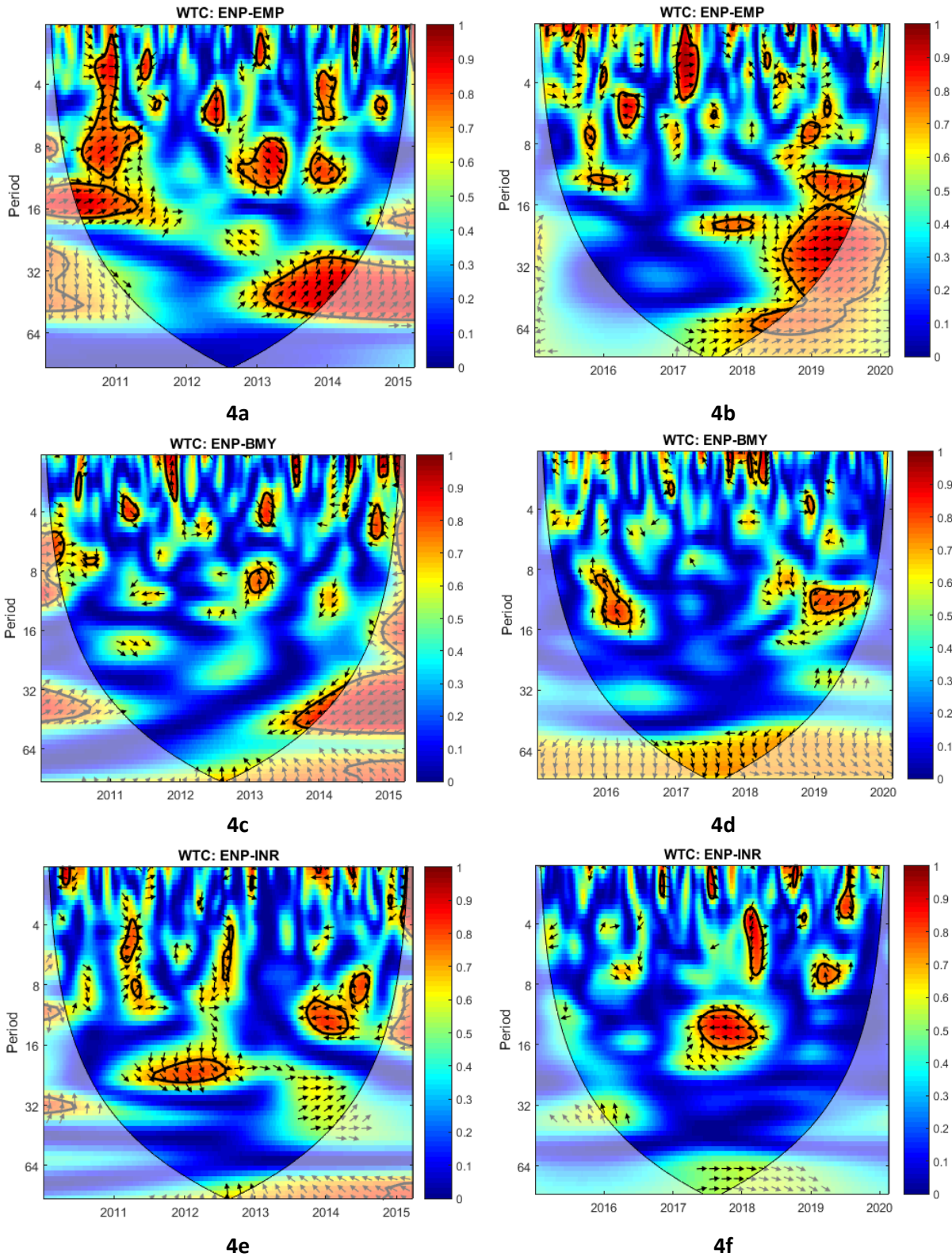


Figure 4: Wavelet Transform Coherence (WTC) of ENP, EMP, BMY, INR from 3/01/2011 to 28/12/2015 (left panel) and from 4/01/2016 to 23/11/2020 (right panel)

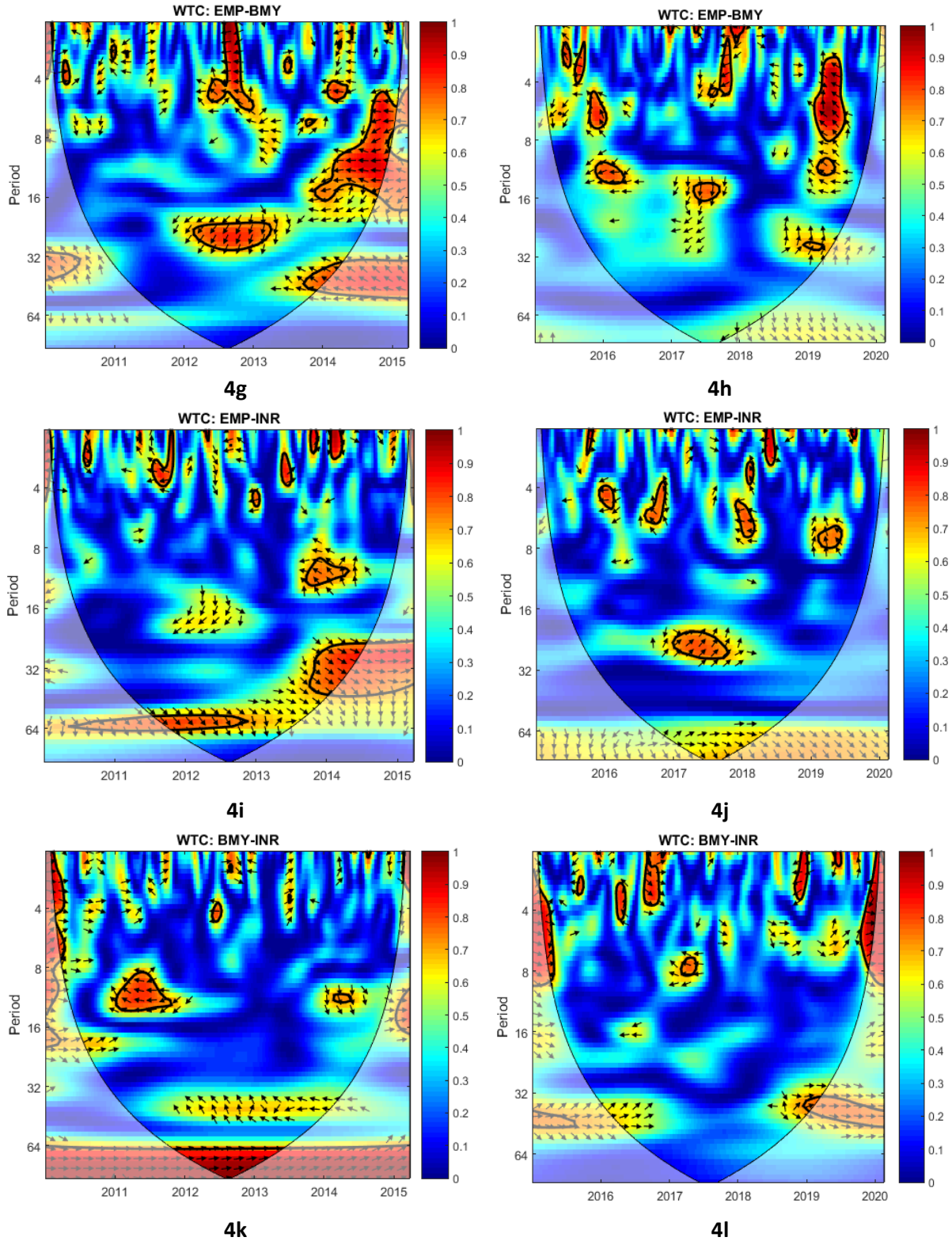


Figure 4: Continue.

In Malaysia's financial landscape, WTC results for the bond market's interaction with interest rates for two discrete intervals are exhibited in Figures 4k and 4l. Figure 4k exhibits a high-intensity

red island in the medium run (2012). This observation underscores a substantial out-of-phase coherence between the bond market and interest rates during that specific temporal window. However, it is essential to note that within this coherence, there is an absence of a clear lead-lag relationship, which suggests that the relationship between these variables is complex and less directional. In contrast, Figure 4l encounters a different dynamic. Comparatively diminutive islands in the short run, with a singular occurrence in the medium run, notably in 2018, are observed. These islands signify out-of-phase coherence between the bond market and interest rates. Interestingly, a distinctive lead-lag orientation remains elusive. The negative coherence is due to the inverse relationship between BMV and INR. When INR rise, the fixed interest payments provided by existing bonds become less attractive to investors, as they can obtain higher yields from new bonds issued at higher rates; therefore, they sell existing bonds, which causes a fall in prices.

4.4 Partial and Multiple Wavelet Coherence

Following the initial wavelet coherence analysis, the study employs two additional analytical techniques: partial wavelet coherence (PWC) and multiple wavelet coherence (MWC) analyses. PWC enables the exploration of coherence between two time series while controlling for the potential influence of one or more additional time series. In contrast, MWC allows concurrently examining correlations among three or more time series simultaneously. Figure 5 presents the results of PWC in the left panel and MWC in the right panel, utilising various graphical representations. These analyses aim to elucidate the interactions among oil price volatility, bond market, equity market and interest rate. The vertical axis of the spectrogram signifies oscillation frequencies categorised into distinct periods, ranging from short-term (0-4), short to medium (4-8), medium-term (8-16), medium to long (16-32), to long-term (32-64). The horizontal axis corresponds to the time scale from 2011 to 2015 (as the first interval left panel 1st column and right panel 3rd column) and 2016 to 2020 (as the second interval left panel 2nd column and right panel 4th Column), respectively.

Figures 5a and 5b exhibit the PWC between ENP and EMP after controlling the BMV. In the first interval, the impact of EMP on ENP is significantly strong in the medium run (2012); in the later interval, the string association is pronounced in the medium to long run (2020). In contrast, Figure 5c and 5d reveals the combined influence of ENP and EMP on BMV, which is strongly evident in the short, medium (2012), and long run (2014), indicating a robust co-movement of these variables in the first interval while in the later the extensive correlation has observed from medium to long (2017-2020). Overall, our PWC and MWC analyses emphasise the significant influence of EMP on ENP in Malaysia. Turning our attention to Figures 5e and 5f, we present the PWC between ENP and BMV with the influence of EMP excluded. The results show no significant correlation in both intervals. In contrast, Figures 5g and 5h demonstrate a robust correlation between the nexus of ENP, BMV and EMP for MWC. The intensified correlations in both intervals underscore the significance of the equity market for the relationship between EMP and BMV in Malaysia.

Figures 5i and 5j display the PWC between ENP and BMV after excluding the influence of interest rate. This analysis reveals a brief or localised correlation between the variables under consideration, characterised by a few tiny islands in the short run in the first interval while in a medium run in the second interval. Conversely, MWC Figures 5k and 5l exhibited a moderate association between ENP BMV and INR encompassing both intervals, suggesting that both ENP and INF significantly influence the ecological footprint in Malaysia. Further, When the study

examines the relationship between ENP and EMP while excluding the impact of INR (Figures 5m and 5n), a strong but brief correlation in the short, medium and long run is identified under PWC results. The MWC analysis demonstrated through Figures 5o and 5p reveals a robust correlation between ENP, EMP and INR across all horizons in both intervals, while in the first interval, the association is more intense and expended. This highlights that the co-movement between energy price and the equity market is more pronounced in the presence of interest rates, especially in the medium and long run. The same findings have been retrieved for PWC (Figures 5q and 5r) and MWC (Figures 5s and 5t) for EMP, ENP and BMY, wherein the first interval, the association is more robust among these variables.

Further exploring the nexus of EMP and BMY, excluding ENP Figures 5u and 5v, exhibited the PWC analysis and revealed a brief period of coherence in the short and short to medium run. Conversely, the MWC analysis illustrates many large islands in Figure 5w and 5x during multiple years, specifying a significant correlation between EMP and BMY due to ENP. Likewise, Figures 5y and 5z address the nexus between BMY, EMP, and ENP. When the ENP was controlled, the brief correlation between EMP and BMY was observed for the PWC analysis. However, the MWC analysis Figures 5aa and 5ab illustrate a robust correlation (0.9-1.0) between these three variables across short and medium time horizons. Notably, in the first interval, the coherences also cover the long run. The nexus of BMY, EMP and INR also exhibited the same correlations for PWC (Figures 5ag and 5ah) and MWC (5aj and 5ak) for both intervals.

In comparison, the nexus of BMY, ENP, and EMP demonstrates the unusual outcomes. The PWC analysis Figures 5ac and 5ad barely show any coherence between BMY and EMP, keeping INR constant. However, with INR's inclusion, the relationship between these variables is highly pronounced in all the time horizons. Again, INR, as a mediator, plays a significant role in the financial landscape of Malaysia.

5. Conclusion

This study aims to investigate the dynamic connections between energy prices, the equity market, and the debt market to enhance the stability of Malaysia's financial landscape. Additionally, it investigates the interplay of these variables while considering interest rates as a mediator. By utilising wavelet Analysis, the study investigates these relationships over two distinct time intervals, comprehensively examining their complex and time-evolving associations. This analytical approach is chosen for its capability to uncover short-term and long-term linkages, enabling a deeper understanding of the evolving financial dynamics within the Malaysian context and shedding light on potential drivers for these changes. Analysing the variable's behaviour in five-year intervals offers insights into how they respond to changing economic conditions and policy measures. According to the analysis outcomes in the initial interval from 2011 to 2015, higher energy prices positively influence the Malaysian equity market, driven by increased corporate earnings, stock market valuations, and inflation hedging. In the second interval from 2016 to 2020, the coherence weakens, with no specific lead lag indicating a nuanced and evolving relationship between energy prices and the equity market.

The association of energy prices and the bond market for the first interval shows that energy price volatility positively impacts in the short run and negatively impacts in the medium run. The variables exhibit opposing oscillation patterns for the second interval, suggesting that energy price fluctuations adversely affect the bond market, possibly due to inflationary pressures and interest rate adjustments. Additionally, both intervals have a positive nexus between energy prices and the

bond market. In contrast, the association of interest rate with the equity market is negative during both time frames. Further, the equity market negatively impacts the bond market during both intervals' economic uncertainty and risk aversion periods.

Based on the findings of the analysis, the following policy recommendations are suggested to enhance the stability of Malaysia's financial landscape: For instance, due to the positive impact of higher energy prices on the Malaysian equity market from 2011 to 2015, policymakers should consider measures to ensure a stable and predictable energy price environment. New strategies should be added to the Malaysian plan; for instance, they must establish mechanisms to regulate energy prices to prevent excessive volatility. Reduce reliance on a single energy type, such as oil. Encourage the consumption of renewable energy. Further, to enhance energy security, they need to maintain reserves cushion. Besides these, investing in energy infrastructure and adopting energy-efficient practices and technologies can help moderate energy costs and make the market less vulnerable to price shocks.

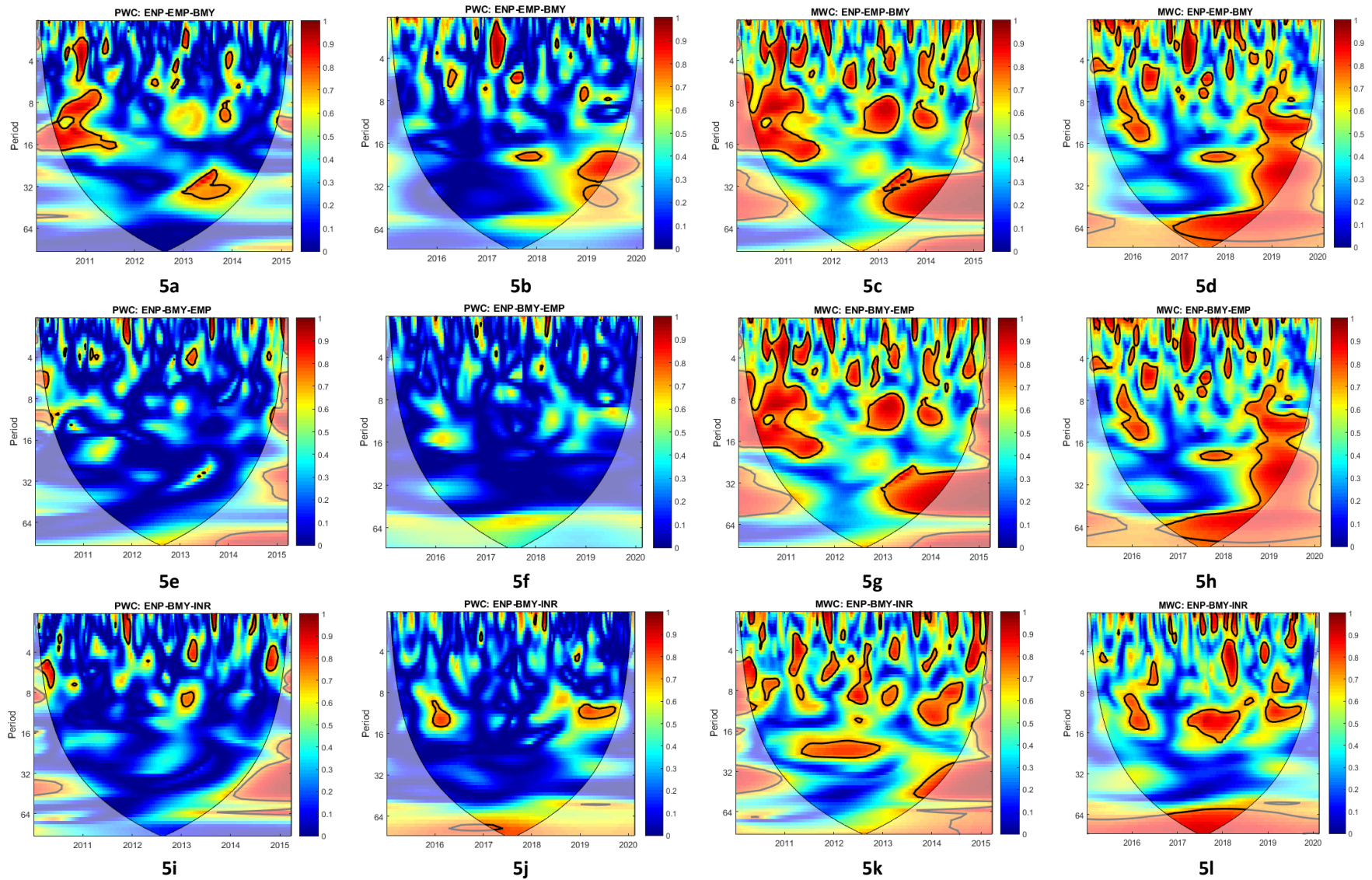


Figure 5: Partial coherence analysis (left panel) and Multiple coherence analysis (right panel) of ENP, EMP, BMY, INT from 3/01/2011 to 28/12/2015 (1st and 3rd column) and from 4/01/2016 to 23/11/2020 (2nd and 4th column).

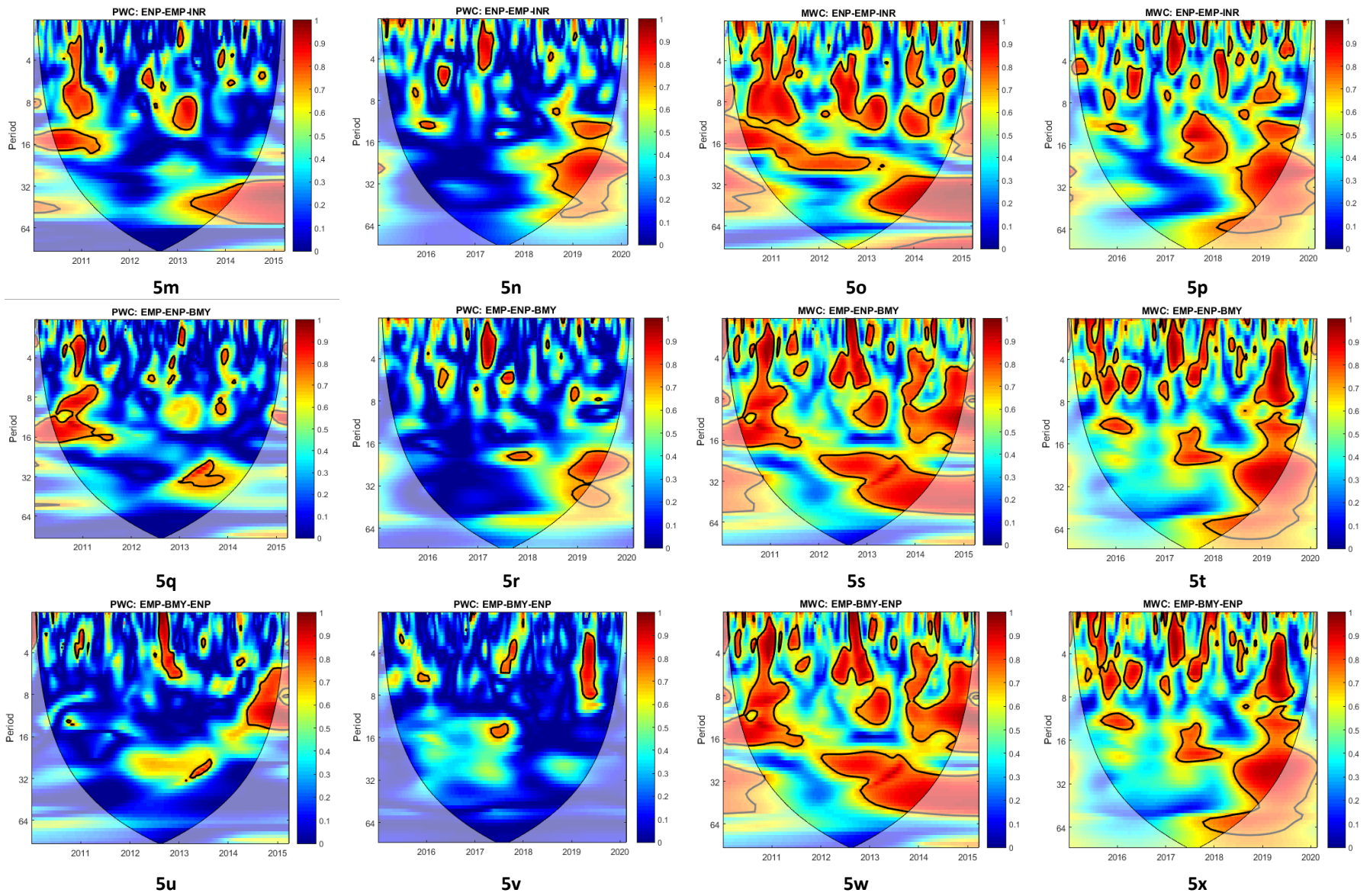


Figure 5: Continue.

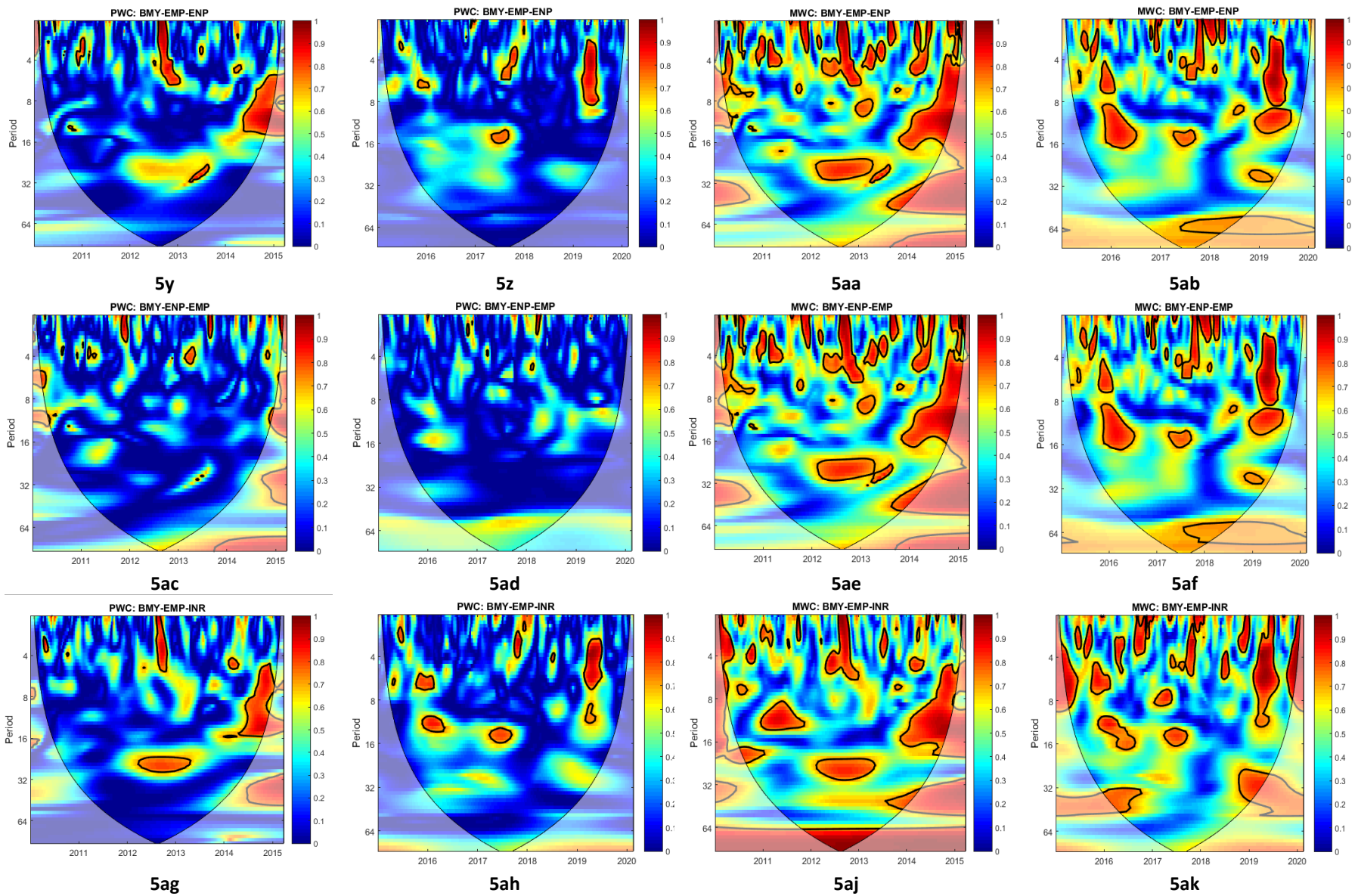


Figure 5: Continue.

Moreover, in light of the nuanced and evolving relationship between energy prices and the equity market in the second interval from 2016 to 2020, investors and policymakers should focus on portfolio diversification and risk management strategies. Diversifying strategies such as sector diversification, commodity diversification, geographic diversification, and asset allocation across various asset classes can help mitigate the potential adverse effects of energy price volatility. Besides this, risk management tools like options and futures contracts and alternative investments such as private equity and infrastructure make diversification more advantageous.

In addition, by recognising the impact of energy price fluctuations on the bond market, particularly in the medium run, authorities should promote resilience within the bond market. They could involve measures such as inflation-indexed bonds and risk management tools to manage inflationary pressures and interest rate adjustments effectively. Moreover, when interest rates were adjusted upwards, the equity market experienced declines in both intervals, highlighting the importance of prudent interest rate management. Policymakers should consider the timing and magnitude of interest rate adjustments to avoid undue negative impacts on equity market performance. In addition, to overcome the negative impact of the equity market on the bond market during periods of economic uncertainty and risk aversion, investors and policymakers should develop and implement risk mitigation strategies, which include maintaining a balanced investment portfolio and monitoring market conditions closely.

References

- Afshan, S., Cheong, C. W. H., & Sharif, A. (2023). Modelling the role of energy price movements toward economic stability in Malaysia: new evidence from wavelet-based analysis. *Environmental Science and Pollution Research*, 30(38), 88861–88875. <https://doi.org/10.1007/s11356-023-28660-0>
- Alexandri, M. B., & Supriyanto. (2022). Volatility Spillover between Stock Returns and Oil Prices during the Covid-19 Pandemic in ASEAN. *International Journal of Energy Economics and Policy*, 12(1), 126–133. <https://doi.org/10.32479/ijeep.11945>
- AMRO. (2022). ASEAN+3 Regional Economic Outlook 2022. In *Macroeconomic Research Data*.
- Andaiyani, S., Ariodillah, H., Fida, M., & Pratama, A. D. (2022). Covid-19, Financial Market Vulnerabilities and Dynamics Monetary Policy: Comparative Analysis. *Management and Economics Review*, 7(2), 159–172. <https://doi.org/10.24818/mer/2022.06-04>
- Balcilar, M., Gupta, R., Wang, S., & Wohar, M. E. (2020). Oil price uncertainty and movements in the US government bond risk premia. *North American Journal of Economics and Finance*, 52, 101147. <https://doi.org/10.1016/j.najef.2020.101147>
- Chang, B. H. (2020). Oil prices and E7 stock prices: an asymmetric evidence using multiple threshold nonlinear ARDL model. *Environmental Science and Pollution Research*, 27(35), 44183–44194. <https://doi.org/10.1007/s11356-020-10277-2>
- Chatrath, A., Miao, H., & Ramchander, S. (2014). Crude oil moments and PNG stock returns. *Energy Economics*, 44, 222–235. <https://doi.org/10.1016/j.eneco.2014.04.010>
- Das, D., Maitra, D., Dutta, A., & Basu, S. (2022). Financial stress and crude oil implied volatility: New evidence from continuous wavelet transformation framework. *Energy Economics*, 115. <https://doi.org/10.1016/j.eneco.2022.106388>
- Demirer, R., Ferrer, R., & Shahzad, S. J. H. (2020). Oil price shocks, global financial markets and their connectedness. *Energy Economics*, 88, 104771. <https://doi.org/10.1016/j.eneco.2020.104771>

- Ekonomi, U. P. (2021). Twelfth Malaysia Plan 2021-2025. In *Economic Planning Unit, Prime Minister's Department*. <https://rmke12.epu.gov.my/bm%0Ahttps://rmke12.epu.gov.my/about-us>
- Fan, Y., & Gençay, R. (2010). Unit root tests with wavelets. *Econometric Theory*, 26(5), 1305–1331. <https://doi.org/10.1017/S0266466609990594>
- Fu, Z., Chen, Z., Sharif, A., & Razi, U. (2022). The role of financial stress, oil, gold and natural gas prices on clean energy stocks: Global evidence from extreme quantile approach. *Resources Policy*, 78, 102860. <https://doi.org/10.1016/j.resourpol.2022.102860>
- Gan, T., Jiang, Y., Wu, X., & Zhang, M. (2023). Oil price uncertainty and the cost of debt: Evidence from the Chinese bond market. *Journal of Asian Economics*, 87. <https://doi.org/10.1016/j.asieco.2023.101637>
- Hayo, B., & Kutan, A. M. (2005). The impact of news, oil prices, and global market developments on Russian financial markets. *Economics of Transition*, 13(2), 373–393. <https://doi.org/10.1111/j.1468-0351.2005.00214.x>
- Huang, S., An, H., Huang, X., & Jia, X. (2018). Co-movement of coherence between oil prices and the stock market from the joint time-frequency perspective. *Applied Energy*, 221, 122–130. <https://doi.org/10.1016/j.apenergy.2018.03.172>
- Ioannidis, C., & Ka, K. (2018). The impact of oil price shocks on the term structure of interest rates. *Energy Economics*, 72, 601–620. <https://doi.org/10.1016/j.eneco.2018.04.032>
- Ji, Q., Liu, B. Y., Zhao, W. L., & Fan, Y. (2020). Modelling dynamic dependence and risk spillover between all oil price shocks and stock market returns in the BRICS. *International Review of Financial Analysis*, 68, 101238. <https://doi.org/10.1016/j.irfa.2018.08.002>
- Jiang, C., Zhang, Y., Razi, U., & Kamran, H. W. (2022). The asymmetric effect of COVID-19 outbreak, commodities prices and policy uncertainty on financial development in China: evidence from QARDL approach. *Economic Research-Ekonomika Istrazivanja*, 35(1), 2003–2022. <https://doi.org/10.1080/1331677X.2021.1930092>
- Jin, C., Razzaq, A., Saleem, F., & Sinha, A. (2022). Asymmetric effects of eco-innovation and human capital development in realizing environmental sustainability in China: evidence from quantile ARDL framework. *Economic Research-Ekonomika Istrazivanja*, 35(1), 4947–4970. <https://doi.org/10.1080/1331677X.2021.2019598>
- Kang, W., Ratti, R. A., & Yoon, K. H. (2014). The impact of oil price shocks on U.S. bond market returns. *Energy Economics*, 44, 248–258. <https://doi.org/10.1016/j.eneco.2014.04.009>
- Kilian, L. (2008). The economic effects of energy price shocks. *Journal of Economic Literature*, 46(4), 871–909. <https://doi.org/10.1257/jel.46.4.871>
- Kilian, L., & Murphy, D. P. (2014). The role of inventories and speculative trading in the global market for crude oil. *Journal of Applied Econometrics*, 29(3), 454–478. <https://doi.org/10.1002/jae.2322>
- Kilian, L., & Park, C. (2009). The impact of oil price shocks on the U.S. stock market. *International Economic Review*, 50(4), 1267–1287. <https://doi.org/10.1111/j.1468-2354.2009.00568.x>
- Krisskumar, K., Naseem, N. A. M., & Azman-Saini, W. N. W. (2022). Investigating the Asymmetric Effect of Oil Price on the Economic Growth in Malaysia: Applying Augmented ARDL and Nonlinear ARDL Techniques. *SAGE Open*, 12(1). <https://doi.org/10.1177/21582440221079936>
- Lee, C. C., Lee, C. C., & Li, Y. Y. (2021). Oil price shocks, geopolitical risks, and green bond market dynamics. *North American Journal of Economics and Finance*, 55, 101309. <https://doi.org/10.1016/j.najef.2020.101309>

- Mensi, W., Naeem, M. A., Vo, X. V., & Kang, S. H. (2022). Dynamic and frequency spillovers between green bonds, oil and G7 stock markets: Implications for risk management. *Economic Analysis and Policy*, 73, 331–344. <https://doi.org/10.1016/j.eap.2021.11.015>
- Mensi, W., Vo, X. V., & Kang, S. H. (2023). Quantile spillovers and connectedness analysis between oil and African stock markets. *Economic Analysis and Policy*, 78, 60–83. <https://doi.org/10.1016/j.eap.2023.02.002>
- Mustaffa, N. K., & Kudus, S. A. (2022). Challenges and way forward towards best practices of energy efficient building in Malaysia. *Energy*, 259, 124839. <https://doi.org/10.1016/j.energy.2022.124839>
- Naeem, M. A., Billah, M., Marei, M., & Balli, F. (2022). Quantile connectedness between Sukuk bonds and the impact of COVID-19. *Applied Economics Letters*, 29(15), 1378–1387. <https://doi.org/10.1080/13504851.2021.1934384>
- Nazlioglu, S., Gupta, R., & Bouri, E. (2020). Movements in international bond markets: The role of oil prices. *International Review of Economics and Finance*, 68, 47–58. <https://doi.org/10.1016/j.iref.2020.03.004>
- Papadamou, S., Fassas, A. P., Kenourgios, D., & Dimitriou, D. (2021). Flight-to-quality between global stock and bond markets in the COVID era. *Finance Research Letters*, 38, 101852. <https://doi.org/10.1016/j.frl.2020.101852>
- Pavlova, I., de Boyrie, M. E., & Parhizgari, A. M. (2018). A dynamic spillover analysis of crude oil effects on the sovereign credit risk of exporting countries. *Quarterly Review of Economics and Finance*, 68, 10–22. <https://doi.org/10.1016/j.qref.2018.03.003>
- Ramzan, M., Adebayo, T. S., Iqbal, H. A., Razi, U., & Wong, W. K. (2023). Analyzing the nexus between financial risk and economic risk in India: Evidence through the lens of wavelet coherence and non-parametric approaches. *Heliyon*, 9(3), e14180. <https://doi.org/10.1016/j.heliyon.2023.e14180>
- Rua, A., & Nunes, L. C. (2009). International comovement of stock market returns: A wavelet analysis. *Journal of Empirical Finance*, 16(4), 632–639. <https://doi.org/10.1016/j.jempfin.2009.02.002>
- Si, D. K., Li, X. L., & Ge, X. (2020). On the link between the exchange rates and interest rate differentials in China: evidence from an asymmetric wavelet analysis. *Empirical Economics*, 59(6), 2925–2946. <https://doi.org/10.1007/s00181-019-01803-4>
- Statistics, H., Helpdesk, P., & Consumption, F. E. (2016). *Statistics - Malaysia Energy Information Hub Energy Balance Statistics - Malaysia Energy Information Hub*. Suruhanjaya Tenaga. <https://meih.st.gov.my/statistics>
- Sujit, K. S., & Ray, S. (2023). Linear and nonlinear asymmetric relationship in crude oil, gold, stock market and exchange rates: An evidence from the UAE. *Resources Policy*, 83. <https://doi.org/10.1016/j.resourpol.2023.103633>
- Talha, M., Sohail, M., Tariq, R., & Ahmad, M. T. (2021). Impact of oil prices, energy consumption and economic growth on the inflation rate in Malaysia. *Cuadernos de Economia*, 44(124), 26–32. <https://doi.org/10.32826/cude.v1i124.501>
- Tian, M., Alshater, M. M., & Yoon, S. M. (2022). Dynamic risk spillovers from oil to stock markets: Fresh evidence from GARCH copula quantile regression-based CoVaR model. *Energy Economics*, 115, 106341. <https://doi.org/10.1016/j.eneco.2022.106341>
- Tiwari, A. K., Bhanja, N., Dar, A. B., & Islam, F. (2015). Time–frequency relationship between share prices and exchange rates in India: Evidence from continuous wavelets. *Empirical Economics*,

48(2), 699–714. <https://doi.org/10.1007/s00181-014-0800-3>

- Tule, M. K., Ndako, U. B., & Onipede, S. F. (2017). Oil price shocks and volatility spillovers in the Nigerian sovereign bond market. *Review of Financial Economics*, 35, 57–65. <https://doi.org/10.1016/j.rfe.2017.03.003>
- Wang, K. H., Su, C. W., Umar, M., & Peculea, A. D. (2023). Oil prices and the green bond market: Evidence from time-varying and quantile-varying aspects. *Borsa Istanbul Review*, 23(2), 516–526. <https://doi.org/10.1016/j.bir.2022.12.003>
- Wei, Y., Qin, S., Li, X., Zhu, S., & Wei, G. (2019). Oil price fluctuation, stock market and macroeconomic fundamentals: Evidence from China before and after the financial crisis. *Finance Research Letters*, 30, 23–29. <https://doi.org/10.1016/j.frl.2019.03.028>
- Wen, D., Wang, G. J., Ma, C., & Wang, Y. (2019). Risk spillovers between oil and stock markets: A VAR for VaR analysis. *Energy Economics*, 80, 524–535. <https://doi.org/10.1016/j.eneco.2019.02.005>
- Yu, Y., Guo, S. L., & Chang, X. C. (2022). Oil prices volatility and economic performance during COVID-19 and financial crises of 2007–2008. *Resources Policy*, 75, 102531. <https://doi.org/10.1016/j.resourpol.2021.102531>

“Breaking the Cycle of Multidimensional Poverty through Social Welfare Programs: Insights from Selected Communities in Manila for Optimizing the Distribution of the 4 Ps Policy”

Dr. Mark Anthony L. Pelegrin^{a*}, Dr. Ruben Nayve, Jr.^b

^a**Adamson University**, 900 San Marcelino, Ermita Manila, Philippines, 1000
mark.anthony.pelegrin@adamson.edu.ph

Dr. Ruben M. Nayve, Jr.*

^b**Adamson University**, 900 San Marcelino, Ermita Manila, Philippines, 1000
ruben.nayve.jr@adamson.edu.ph

*Dr. Mark Anthony L. Pelegrin: mark.anthony.pelegrin@adamson.edu.ph

Abstract

This study examined the impact of the conditional cash transfer program (4Ps) on multidimensional poverty in selected communities in Manila, Philippines. The research employed a quantitative and descriptive research design using probability area sampling. A total of 279 beneficiary respondents participated, and data were collected through closed-ended questionnaires. Statistical tools such as frequency, percentage, weighted mean, and Pearson-R were used for data analysis. The findings revealed a significant relationship between the conditional cash grant and indicators such as nutrition, school attendance, and years of schooling. However, there was no significant relationship found with child mortality. The study suggests that providing financial assistance has a positive effect on multidimensional poverty, and increasing the amount of assistance enhances the program's effectiveness. These findings highlight the significance of government social welfare programs in addressing multidimensional poverty. Furthermore, businesses in the Philippines can contribute by supporting social welfare programs aimed at reducing multidimensional poverty in Manila. In conclusion, this study emphasizes the importance of effective social welfare programs in combating multidimensional poverty in the Philippines. Increasing financial assistance can enhance the effectiveness of such programs. The findings provide valuable insights for the development and improvement of social welfare programs to address multidimensional poverty in the country.

KEYWORDS: multidimensional poverty, social welfare program, conditional cash transfer, poverty alleviation

INTRODUCTION

Poverty poses a substantial obstacle confronted by the Philippines, and the government has taken the initiative to implement initiatives like the Pantawid Pamilyang Pilipino Program (4Ps) to confront this predicament. Specifically, the focus lies on addressing health, nutrition, and education for exceedingly impoverished households and children. The United Nations Development Programme (UNDP) has established the Sustainable Development Goals (SDGs) in an effort to eliminate poverty, including multidimensional poverty, by the year 2030. A study endeavors to evaluate the effects of the 4Ps on selected Manila communities in terms of multidimensional indicators such as school attendance, education, nutrition, and child mortality. Despite providing immediate relief, social welfare programs may not effectively address the underlying causes of poverty. Enterprises possess the capability to contribute by generating employment opportunities and fostering economic growth; however, they must also contemplate their influence on the environment and communities, striving for conscientious and sustainable practices. Poverty leads to severe repercussions for individuals, families, and communities, resulting in insufficient access to necessities like food, shelter, and healthcare, as well as limited opportunities for education and employment. Poverty remains a significant challenge within the Manila communities, necessitating an exploration of the ways in which enterprises can complement social welfare programs and collaborate with a diverse range of stakeholders in order to establish a more equitable and prosperous society.

This research focuses on evaluating how individuals benefiting from the Pantawid Pamilyang Pilipino Program (4Ps) perceive the program's impact on reducing multidimensional poverty, particularly in the areas of health and education. The primary objective of this study is to provide valuable insights that can assist policymakers in assessing the program's effectiveness and making necessary improvements. The study is grounded in the context of the Social Protection System, which encompasses four key components: safety nets, social welfare, labor market reforms, and social insurance.

Ultimately, our research aims to offer recommendations for effectively addressing multidimensional poverty, with a specific focus on health and education indicators. These insights can be instrumental in guiding decision-makers as they work towards improving the lives of program beneficiaries and reducing poverty in these crucial dimensions.

The Social Welfare Program is a government project designed to provide financial or in-kind aid to lessen the negative impacts of, among other things, marginalization, unemployment, and poverty. The government's anti-poverty measures, which aim to help the poorest households and shield them from economic gaps, include the Pantawid Pamilyang Pilipino Program (4Ps). The program offers qualified beneficiaries conditional cash transfers, with varying amounts based on the beneficiary's degree of education. Multidimensional Poverty is a type of poverty that concentrates on deprivations in different spheres, including standard of living, health, and education. The Multidimensional Poverty Index (MDPI) uses ten indicators to calculate poverty rates, with child mortality and nutrition being among the most important ones. Quality education is another indicator of multidimensional poverty, with households deprived of quality education if no family member has completed six or more years of schooling or does not have access to quality education that would improve their literacy at an age where they should technically have it. Figure 1 shows the model used in this study.

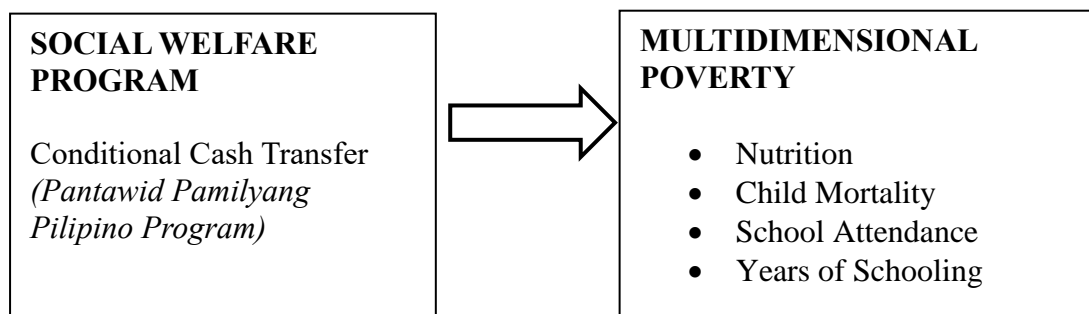


Figure 1. Conceptual Research Model

Conditional Cash Transfer (CCT) programs have been implemented in various countries to alleviate poverty and enhance health and education outcomes among beneficiaries. Studies on these programs have yielded mixed results: Philippines (Pantawid Pamilyang Pilipino Program - 4Ps): well-implemented program, significant positive impact on the health and education of elementary students from low-income families in San Jorge, Samar, non-compliance with school attendance was a problem among respondents. Philippines (San Jose Del Monte, Bulacan): weak but substantial correlation between 4Ps beneficiaries' academic achievement and educational support received, government financial aid improved academic achievement and gave hope for college completion. Sub-Saharan Africa (Conditional Cash Transfer Program): Limited positive impact on children's health among beneficiaries, ineffectiveness is attributed to weak healthcare systems, supply-side issues, religious beliefs, and regional attitudes. Brazil (Bolsa Familia Program): positive impacts on reducing child mortality, improving food security, and enhancing school attendance, no observed positive nutritional outcomes, and intergenerational poverty remained a concern. Mexico (PROGRESA program): positive long-term impact on children's employment opportunities, supported children's education, and improved labor market performance, resulting in higher incomes, and positive spillover effects on non-poor households' education and voluntary work. In summary, CCT programs can have a significant positive impact on the health and education outcomes of beneficiaries. However, their effectiveness can be influenced by factors like compliance, cultural beliefs, supply-side challenges, and weak healthcare systems. Nevertheless, these programs remain valuable tools for addressing poverty and improving the well-being of low-income households.

The studies discussed various interventions aimed at enhancing child nutrition and health, and their key findings are as follows: Morales (2015) - Guagua West District Division of Pampanga, Philippines: significant relationships between age, snack spending, daily snacking intake, parental education, household income, and supplementary school food, and emphasized the role of nutritional attitudes. Gutierrez-Santos (2016) - Sardo Feeding Program: effective in improving the nutritional status of beneficiaries, leading to increased height and weight, and no observed impact on academic performance. Montilla et al. (2015) - Philippines (4Ps Program): Parents rated the 4Ps program favorably, noting that the provision of deworming medication, monthly weight checks, three daily meals, and school allowances helped meet children's nutritional and educational needs. Bliss et al. (2018) - Niger and Nigeria (Emergency Cash Transfers): Emergency cash transfers combined with food supply reduced the likelihood of households experiencing acute malnutrition, preventing child mortality.

Arenas et al. (2019) - Mexico (CCT-POP Program): CCT-POP improved child nutrition and health outcomes, and families purchased more nutrient-dense foods, leading to improved child growth and reduced anemia. Chen et al. (2018) - Rural Hunan Province, China (CCT Intervention): To end the cycle of bad eating habits, CCT intervention enhanced nutritional knowledge and healthy eating habits among caregivers of left-behind children. In summary, these research studies have demonstrated the effectiveness of various interventions such as feeding programs, conditional cash transfers, and other child health initiatives in fostering child growth and reducing malnutrition. Moreover, they underscore the significance of caregiver education and nutritional awareness in sustaining improvements in child health and nutrition. The studies we have discussed highlight specific programs like the Pantawid Pamilyang Pilipino Program in the Philippines and the Bolsa Familia Program in Brazil, both of which provide conditional cash grants to vulnerable families. These programs have shown a positive impact in reducing child mortality rates among children under the age of five. They achieve this by improving access to healthcare services, enhancing living conditions, and increasing spending on essential areas like healthcare, education, and food.

Additionally, the research underscores the importance of various factors such as maternal status, caregiver education, family wealth, access to clean water, toilet facilities, cooking fuel, refrigeration, and household composition in reducing child mortality rates. All these elements play crucial roles in improving child health outcomes and overall well-being.

Programs that provide conditional cash transfers (CCTs), such as the Pantawid Pamilyang Pilipino Program (4Ps) in the Philippines and the Benazir Income Support Program in Pakistan, have had a positive effect on children's education, especially in terms of enrollment and retention. The 4Ps Program (Philippines) was successful in achieving full enrollment and a high retention rate (94.12%) from daycare to grade school, providing educational assistance, and encouraging kids to go to school. Primary and middle school attendance rates rose because to Pakistan's Benazir Income Support Program, and there were initial advances in enrolment as well. However, some students eventually stopped attending because of low labor income or insufficient cash subsidies. In Aligarh, India, children between the ages of 6 and 14 were less likely to attend school because of poverty. Other reasons for non-enrollment included domestic duties, health problems, a distance from the school, inadequate facilities, the attitudes of the teachers, and academic performance. Additionally, dropout rates rose because of low-quality education. In conclusion, these studies show that CCT programs significantly increase kids' school enrolment and retention. However, issues like program viability and the requirement for higher educational standards need to be addressed. Despite these drawbacks, these initiatives could improve the academic performance of disadvantaged children, thereby enhancing their prospects.

Numerous research studies have looked at how Conditional Cash Transfer (CCT) schemes affect educational outcomes. According to Flores, et al. (2019), the Pantawid Pamilyang Pilipino Program (4Ps) improves academic performance among first- and second-year high school students in the Philippines while also lowering school dropout rates. Similarly, Cabaguing and Villanueva (2022) found that 4Ps recipients increased their school enrolment and had a 0% dropout rate. Both studies discovered that financial literacy was a concern and that the cash transfers were insufficient to cover the beneficiaries' essential needs. Lluza (2020) found that while the 4Ps helped defray educational costs, some beneficiaries had to use the money for their family's daily needs, such as sustenance, which led to school dropouts. In South

Africa, Mostert and Castello (2020) found that Conditional Transfers had positive effects on secondary school students, improving reading and writing skills, attendance, and enrollment. The long-term economic outcomes of beneficiaries were also positively affected. Family Hope Program (Indonesia): found to be the most effective in terms of children's school participation compared to Latin American cash grants, encouraged active student participation, and provided support for staying in school, higher education was associated with pride and higher income and external factor of support from the environment influenced schooling (Hartarto, Wardani, & Azizurrohman (2021). Oportunidades Program (Mexico): demonstrated long-term positive effects on middle and high school students' educational outcomes, significantly reduced dropout rates, and increased high school graduation rates, particularly for females (over 27%) and males (over 33%), larger cash grants were linked to higher graduation rates (Araujo, Martinez, M., Martinez, S., Pérez, & Sánchez (2021). These studies collectively indicate that Conditional Cash Transfer (CCT) programs have positive impacts on education outcomes, including increased enrollment, reduced dropout rates, improved academic performance, and long-term economic benefits. However, challenges remain, including addressing beneficiaries' basic needs, promoting financial literacy, and ensuring the proper use of grants. Additionally, external factors such as social support and program design play a crucial role in determining program effectiveness.

To effectively address the complicated problem of multidimensional poverty in Manila's neighborhoods, a comprehensive strategy that goes beyond social welfare programs is needed. Businesses can play a significant role in reducing poverty by providing employment opportunities, assisting people in finding financial stability, enhancing the general well-being of individuals and families, and fostering economic growth in underdeveloped areas. Businesses can also help social welfare programs by providing financial support and other resources.

Several important literature reviews highlight the significant role that businesses can play in poverty reduction. According to Kolk and van Tulder (2010), international businesses have the potential to contribute to poverty reduction by creating job opportunities, fostering economic growth, and supporting social welfare programs. They stress the importance of corporate social responsibility (CSR) and emphasize the need for collaboration between businesses, governments, and civil society organizations. Prahalad and Hammond (2002) argue that businesses can help alleviate poverty by developing affordable and easily accessible products and services for low-income consumers. This approach can open new markets and generate profits, benefiting both businesses and impoverished communities. They advocate for the "bottom of the pyramid" (BoP) approach. London and Hart (2004) emphasize that businesses operating in emerging markets should adopt sustainable and socially responsible strategies. They highlight the importance of collaborating with local communities and stakeholders and suggest the effectiveness of the "beyond transnational" approach. Porter and Kramer (2011) introduce the concept of creating shared value, which underscores the role of businesses in addressing social and environmental challenges while achieving long-term success. This approach aims to create both economic and societal value and necessitates collaboration with a range of stakeholders. Visser (2010) advocates for a holistic and systemic approach to corporate social responsibility. This approach includes creating shared values, investing in education, and training, and supporting social welfare programs. Collaboration and transparency are identified as essential components of this comprehensive approach. In essence, these literature reviews collectively emphasize that businesses can make a substantial positive impact on poverty reduction by adopting socially responsible practices, collaborating

with various stakeholders, and creating value for both them and the communities they serve. In summary, businesses can make a significant contribution to poverty reduction by creating economic opportunities, supporting social programs, and adopting socially responsible and sustainable practices. Collaboration with governments, civil society organizations, and local communities is vital for addressing multidimensional poverty effectively.

Problem Statement

Given the literature review presented above, the researchers seek to address the following questions:

- 1.) What is the demographic profile of the respondents in terms of the age of the beneficiary, gender of the beneficiary, civil status of the parent/guardian, monthly income, family size, no. of the beneficiary in the family, and no. of years of being a beneficiary?
- 2.) How do the respondents evaluate the following indicators in terms of the social welfare program (conditional cash grant) and multidimensional poverty (child mortality, nutrition, school attendance, and years of schooling)?
- 3.) Is there a significant relationship between the social welfare program and the multidimensional poverty indicators?
- 4.) From the results, what are the implications it provides for the researchers, beneficiaries, policymakers, and involved organizations?

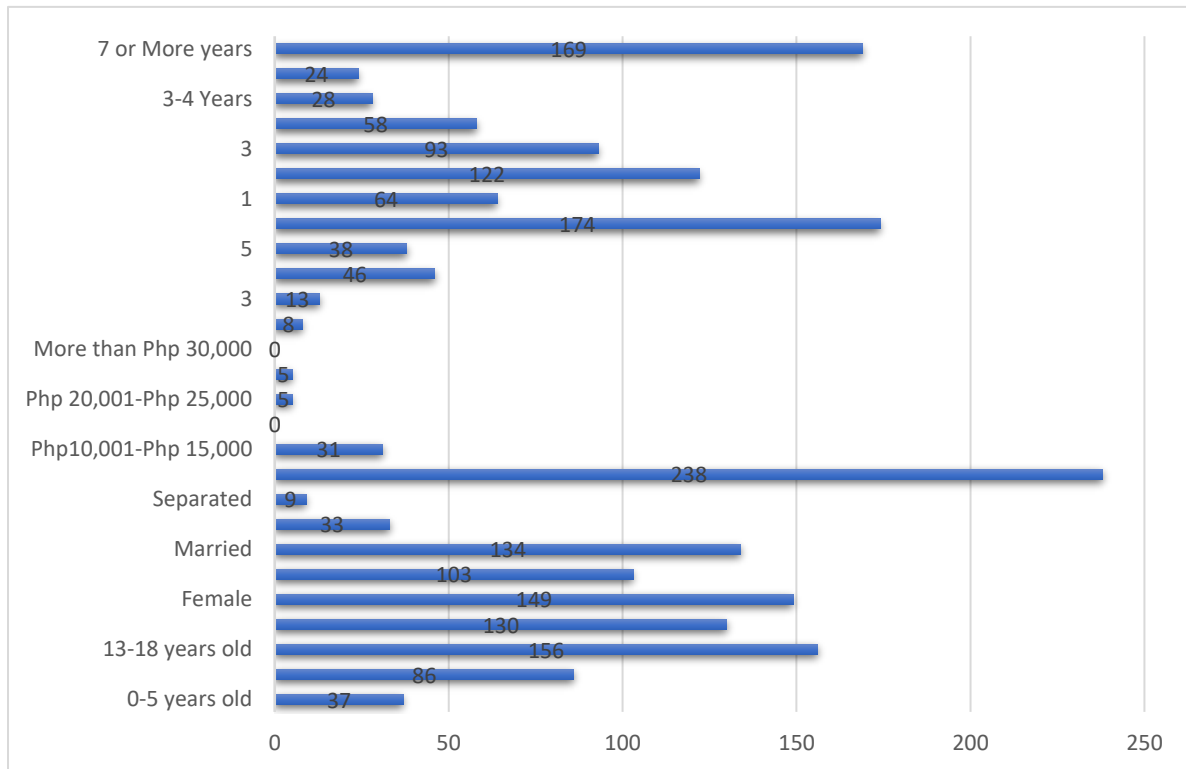
Method

The study is a descriptive quantitative investigation aiming to explain the effect of social welfare programs on multidimensional poverty in selected communities in Manila. The researcher employed probability area sampling to select 279 beneficiaries, allowing for the potential generalization of findings across the City of Manila. To ensure the validity of the questionnaires, the researcher used Cronbach's alpha, and reliability was tested through a pre-survey with 30 participants. The data analysis involved the use of statistical tools such as frequency, percentage, weighted mean, and Pearson-R.

Results

In validating the questionnaire, Cronbach's alpha was used, which revealed a 0.804 reliability from the twenty-item questions. Using the data from 279 respondents, the following results were statistically treated to answer the following questions that the researchers aimed to find that were also backed up by similar studies.

Table 1
Distribution of demographic profile of the respondents (N = 279)



As shown in Table 1, most beneficiaries in the 4Ps program are in the age group of 13-18 years old, with most currently studying at the high school level. Females make up most beneficiaries, and most parents or guardians are married. Most beneficiaries earn less than Php 10,000 and tend to have large households with a high dependency rate on cash assistance. The most common number of beneficiaries in a family is 2 or 3. Beneficiaries typically remain in the program for 7 or more years.

Table 2
Weighted Mean scores among respondents' assessment.

Variables	WX	DR
Conditional Cash Grant	3.36	Strongly Agree
Nutrition	3.48	Strongly Agree
Child Mortality	3.47	Strongly Agree
School Attendance	3.39	Strongly Agree
Years of Schooling	3.36	Strongly Agree

According to Table 2, the beneficiaries consider the 4Ps program to be crucial in meeting their daily needs and supporting their education. The conditional cash grant is highly valued by the respondents, who strongly agree that it can be used to purchase essential items such as food and vitamins. The program instills hope in families that their children can complete their

education and has a positive impact on household income, reducing hunger and improving food security. Children who receive the cash grant are more committed to continuing their education, indicating that the program positively influences their perseverance. The variable of the conditional cash grant receives a weighted mean of 3.36, indicating a strong consensus among respondents.

The children of those benefiting from the Conditional Cash Grant Program exhibit a favorable nutritional status and consistently have three meals a day, which can significantly contribute to their overall productivity. Notably, this program has a noteworthy influence on the dietary habits and nutritional well-being of these households. Beneficiaries overwhelmingly express strong agreement that their children are gaining weight and consuming more nutritious meals. When we look at the weighted mean score of 3.48 for the nutritional variable, it becomes evident that program beneficiaries are effectively meeting their nutritional needs. These findings align with a previous study that demonstrated the substantial impact of cash grants in reducing child malnutrition and improving their overall nutritional status.

The study reveals that participants in the program have a strong belief that their children have improved access to regular checkups, clean water, and a reduced risk of falling ill. Moreover, the Conditional Cash Grant Program positively influences the availability of sanitary facilities, safe disposal of human waste, and access to safe drinking water. Research findings indicate that this initiative leads to a decrease in hospitalizations, respiratory illnesses, infant mortality, and the use of biofuels for cooking. In terms of child mortality, the weighted mean score of 3.47 demonstrates that program recipients are in strong agreement that the 4Ps program effectively reduces the likelihood of a child passing away before reaching the age of five.

As per the study, beneficiaries express a strong belief that their children's educational performance and ability to pursue education are satisfactory, with the conditional cash grant having a positive impact on primary-level school performance and reducing the likelihood of children engaging in domestic work. The grant offers additional income to supplement education and assists in fulfilling educational requirements, leading to long-term advantages and benefits for beneficiaries' education. The program has a sustainable influence on human capital through improved school attendance and exposure to education, with more than 50% of beneficiaries progressing to university or tertiary level education after completing secondary education. The respondents strongly agree that the 4Ps program is beneficial for their primary-level children's education.

The 4Ps program's beneficiaries indicate a strong belief that they can enroll their kids in high school, which is a prerequisite in order to receive program benefits, between the ages of 13 and 18. The approach provides positive benefits for older children's education and enrolment, lowering dropout rates and raising age-appropriate enrollment. The respondents are unanimous in their belief that their kids can succeed academically and continue their education in school. As shown by its impact on the number of completed years of education and the closing of the gender gap in education, the cash award program is successful in increasing human capital. The approach has been shown to lower stunting and boost high school graduation rates in Indonesia.

Table 3
Pearson R Correlation results between the social welfare program and the multidimensional poverty indicators

Variables	R*	p-value	Strength of Correlation	Interpretation
Nutrition	0.3049	0.00001	Weak Correlation	Significant
Child Mortality	0.2766	.097468	Weak Correlation	Not Significant
School Attendance	0.4982	0.00001	Moderate Correlation	Significant
Years of Schooling	0.4266	0.00001	Moderate Correlation	Significant

Table 3 displays the Pearson R correlation between Social Welfare's Conditional Cash grant as the independent variable and Multidimensional Poverty indicators, including Nutrition, Child Mortality, School Attendance, and Years of Schooling, as the dependent variable. Nutrition shows a weak correlation with an R score of .3049, indicating a significant relationship with Conditional Cash Grants. The study suggests that the 4Ps cash grant effectively improves the nutritional outcome of children, especially with its early implementation. Child Mortality with an R Score of .2766 indicates a weak correlation, showing no significant relationship with Conditional Cash Grants. Austerity measures and the reduction of the Bolsa Familia Program and the Estrategia Salud de la Familia are responsible for higher childhood morbidity and mortality. The School Attendance (for 6-12 years old) and Years of Schooling (for 13-18 years old) show moderate correlations with R Scores of .4982 and .4266, respectively, and significant relationships with Conditional Cash Grants. Studies indicate that conditional cash grants, such as Bono Juancito Pinto in Bolivia and Kanyashree Prakalpya in West Bengal, have positive effects on primary-level school attendance and female adolescent enrollment, respectively.

Conclusion

The Pantawid Pamilyang Pilipino Program, popularly known as the 4Ps program, is a social protection program in the Philippines that offers cash grants to low-income households in exchange for them meeting specified health and educational standards. The program's objectives include reducing poverty, enhancing health and educational outcomes, and fostering social inclusion.

According to research, the 4Ps program has been successful in raising children's weight, height, and nutritional status across a range of age groups. Additionally, it has improved the beneficiaries' academic achievement, enrollment, and attendance at school. The approach hasn't been successful in reducing child mortality, though. According to studies, the program's failure to prevent child death is due in part to a lack of awareness of the value of postnatal check-ups and a lack of funding for cash grants.

The researcher recommends that the 4Ps program be evaluated and modified to reduce beneficiary dependency rates on the program, such as by incorporating a cash-for-work program. The amount of cash grants given to beneficiaries should also be increased, particularly for higher academic standing, as an incentive. Monitoring the health and education compliance of the beneficiaries should go beyond that to include community involvement and a digital scoreboard can be developed to efficiently monitor beneficiaries' data.

Businesses must collaborate with social welfare programs, and other stakeholders, and develop sustainable, socially responsible practices in order to combat poverty. By fostering economic growth, providing job opportunities, and assisting social welfare initiatives, businesses can help reduce poverty. Businesses can help build new markets, generate revenue, and improve the lives of the poor by adopting a "bottom of the pyramid" strategy and creating goods and services that cater to the distinct demands and limitations of low-income consumers. However, it is crucial for companies to consider their effects on the environment and neighborhood populations and to work toward sustainable and ethical business practices.

References:

Abenir, C. J., Canlas, J. V. R., Ladao, A. A. A., Ajero, J. A. U., Castillo, J. M., Tamayo, M. B., ... & Serrano, E. A. (2021, December). Pantawid Pamilyang Pilipino Program 4Ps: A Profiling System. In 2021 1st International Conference in Information and Computing Research (iCORE) (pp. 102-106). IEEE.

Acal, C. C., Aguda, R. B., Capillo, K. E. (2015). Educational Assistance Derived From 4P's Among Beneficiaries from San Jose Del Monte, Bulacan and Its Relationship to Their Academic Performance.

Aguado, A. (2021). Implementation of Pantawid Pamilyang Pilipino Program (4ps) in Barangay Talumpok, Batangas City. *International Journal of Research*, 10(7), 13-20.

Ahmed, Z., Kamal, A., & Kamal, A. (2016). Statistical analysis of factors affecting child mortality in Pakistan. *J Coll Physicians Surg Pak*, 26(6), 543-4.

Ajao, K. O., Ojofeitimi, E. O., Adebayo, A. A., Fatusi, A. O., & Afolabi, O. T. (2010). Influence of family size, household food security status, and childcare practices on the nutritional status of under-five children in Ile-Ife, Nigeria. *African Journal of Reproductive Health*, 14(4).

Ali, A. and Şenturk, İ. (2019). Justifying the Impact of Economic Deprivation, Maternal Status and Health Infrastructure on Under-Five Child Mortality in Pakistan: An Empirical Analysis. *Bulletin of Business and Economics*, 8(3),140-154.

Alkire, S. and Jahan,S. (2018). 'The New Global MPI 2018: aligning with the Sustainable Development Goals', OPHI Working Paper 121, University of Oxford

Alkire, S. Kanagaratnam, U. & Suppa, N. (2021). "The global Multidimensional Poverty Index (MPI) 2021," OPHI MPI Methodological Note 51, Oxford Poverty and Human Development Initiative, University of Oxford.

Amadu, I., Seidu, A. A., Duku, E., Okyere, J., Hagan Jr, J. E., Hormenu, T., & Ahinkorah, B. O. (2021). The joint effect of maternal marital status and type of household cooking fuel on child nutritional status in sub-Saharan Africa: analysis of cross-sectional surveys on children from 31 countries. *Nutrients*,13(5), 1541.

Ambong, R. M., Gonzales Jr, A., & Bais, L. (2021). Health-Seeking and Access Promotion among Pantawid Pamilyang Pilipino Program (4Ps) Grantees in San Jose, Occidental Mindoro, Philippines. Occidental Mindoro, Philippines (March 9, 2021).

Araos, N. V. V., Melad, K. A. M., & Orbeta Jr, A. C. (2022). Learning from Stories Behind Unexpected Results: A Qualitative Follow-up Study on the Third Impact Evaluation of 4Ps. *Ivory Myka R. Galang*, 46(2), 71.

Arenas, A. Dommarco, J. Feregrino, R. Gaxiola, A. Guerra, A. Neufeld, L. Rodriguez, F. (December 2019). "Closing the Nutrition Impact Gap Using Program Impact Pathway Analyses to Inform the Need for Program Modifications in Mexico's Conditional Cash Transfer Program," *The Journal of Nutrition*, Volume 149 Issue Supplement_1, Pages 22815-22895.

Araujo, M. C., Martinez, M. A., Martinez, S., Pérez, M., & Sánchez, M. (2021). Do larger school grants improve educational attainment? Evidence from urban Mexico. *Journal of Development Effectiveness*, 13(4), 405-423

Asian Development Bank, (2003). *Social Protection: Our Framework Policies and Strategies*. Banerjee A. V., & Duflo E. (2019). *Good Economics for Hard Times*.

Barrera-Osorio, F., Linden, L. L., & Saavedra, J. E. (2019). Medium-and long-term educational consequences of alternative conditional cash transfer designs: Experimental evidence from Colombia. *American Economic Journal: Applied Economics*, 11(3), 54-91.

Barruga, B., Delavin, E., & Turco, R. (2020). Tracking conditional cash transfer beneficiaries using grades and enrollment rate.

Bauchet, J., Undurraga, E. A., Reyes-García, V., Behrman, J. R., & Godoy, R. A. (2018). Conditional cash transfers for primary education: Which children are left out? *World Development*, 105, 1-12.

Bell, N. P. (2020). The impacts of unconditional cash transfers on schooling in adolescence and young adulthood: Evidence from South Africa (No. 821). *Economic Research Southern Africa*.

Bermejo III, R., Firth, S., Hodge, A., Jimenez-Soto, E., & Zeck, W. (2015). Overcoming Stagnation in the Levels and Distribution of Child Mortality: The Case of the Philippines. *PLoS ONE*, 10(10), e0139458.

Biradar, R., Patel, K. K., & Prasad, J. B. (2019). Effect of birth interval and wealth on under-5 child mortality in Nigeria. *Clinical Epidemiology and Global Health*,7(2), 234-238.

Bizzego, A., Gabrieli, G., Bornstein, M. H., Deater-Deckard, K., Lansford, J. E., Bradley, R. H., & Esposito, G. (2021). Predictors of contemporary under-5 child mortality in low-and middle-income countries: a machine learning approach. *International Journal of Environmental Research and Public Health*, 18(3), 1315.

Bliss, J. Bourahlia, L. Golden, K. Pelletier, D. & Stoltzfus, R. (February 2018). "An emergency cash transfer program promotes weight gain and reduces acute malnutrition risk among children 6-24 months old during a food crisis in Niger," DOI: 10.7189/jogh.08.010410.

Cabaguing, A. M., & Villanueva, J. J. G (2022). Understanding Poverty in Samar, Philippines: A Sociological Perspective.

Cahyadi, N., Hanna, R., Olken, B. A., Prima, R. A., Satriawan, E., & Syamsulhakim, E. (2020). Cumulative impacts of conditional cash transfer programs: Experimental evidence from Indonesia. *American Economic Journal: Economic Policy*, 12(4), 88-110.

Chaudhury, N., Okamura, Y., Chaudhury, N., & Okamura, Y. (2012). Conditional cash transfers and school enrollment: Impact of the conditional cash transfer program in the Philippines (No. 71904). The World Bank.

Chen, J. et. Al. (March 2018). "Effect of a Conditional Cash Transfer Program on Nutritional Knowledge and Food Practices among Caregivers of 3-5 Years Old Left-Behind Children in the Rural Hunan Province," DOI: 10.3390/ijerph15030525.

Cho, Y., Avalos, J., Kawasoe, Y., & Rodriguez, R. (2020). Optimizing Pantawid for Nutrition.

Churchill, S. A., Iqbal, N., Nawaz, S., & Yew, S. L. (2021). Unconditional cash transfers, child labour, and education: theory and evidence. *Journal of Economic Behavior & Organization*, 186, 437-457.

Das, U., & Sarkhel, P. (2019). Conditional Cash Transfer for Secondary Education: Impact Assessment of the Kanyashree Program in West Bengal. Available at SSRN 3455215.

De Castro E. P., (2015), Pantawid Pamilyang Pilipino Program (4 P's): Its Effect To Performance And Nutritional Status Of Intermediate Pupils Of The Selected Schools In The District Of Tiaong.

De Los Reyes, B. X. E., Azarias, R., Mamacalay, K. E., Carranza, C. A., Rayray, A., Directo Jr, F. A., & Jay-r, G. O. (2022). Rang-Ay Babaen ti 4Ps: Its Impact to Selected Ilokano Beneficiaries in Santiago, Ilocos Sur, Philippines. *American Journal of Interdisciplinary Research and Innovation*, 1(1), 44-49.

Department of Social Welfare and Development. (2019). Pantawid Pamilyang Pilipino Program (4Ps) Implementing Rules and Regulations

Diaz, R. (2021). Effects of Pantawid Pamilyang Pilipino Program (4Ps) and other Conditional Cash Transfer (CCT) Programs of Low and Middle-Income Countries on Human Development. *Sapienza: International Journal of Interdisciplinary Studies*, 2(1), 2-11.

Diokno-Sicat, C. J., & Mariano, M. A. P., (2018). A public expenditure review of social protection programs in the Philippines (No. 2018-31). PIDS Discussion Paper Series.

Dodd, W., Kipp, A., Lau, L. L., Little, M., Conchada, M. I., Sobreviñas, A., & Tiongco, M. (2022). Limits to transformational potential: Analysing entitlement and agency within a conditional cash transfer program in the Philippines. *Social Policy and Society*, 1-18.

Dotter, C., & Klasen, S. (2017). The multidimensional poverty index: Achievements, conceptual and empirical issues (No. 233). Discussion Papers.

Dubois, P., De Janvry, A., & Sadoulet, E. (2012). Effects on school enrollment and performance of a conditional cash transfer program in Mexico. *Journal of Labor Economics*, 30(3), 555-589.

Erdener, M. A., & Knoepfel, R. C. (2018). Parents' Perceptions of Their Involvement in Schooling. *International Journal of Research in Education and Science*, 4(1), 1-13.

Espinueva, J. E. (2022). Digitized Scoreboard: Its Use in the Implementation of Conditional Cash Transfer Program in One Province in the Philippines. *Journal of Positive School Psychology*, 6(3), 7129-7135.

Flores, M. J. S., Espinoza, C. A. B., Enrico, H. C., & Casimiro, R. R. (2019). Pantawid Familyang Pilipino Program (4Ps): Its Effect on the Academic Performance of Student-Beneficiaries in Calaba National High School in the Philippines. *Journal of Public Administration and Governance*, 9(2), 193-208.

García, S., Harker, A., & Cuartas, J. (2019). Building dreams: The short-term impacts of a conditional cash transfer program on aspirations for higher education. *International Journal of Educational Development*, 64, 48-57.

Gibbs, B.G., Heaton, T.B., (2014). Drop out from primary to secondary school in Mexico: a life course perspective. *Int. J. Educ. Dev.* 36, 63–71. <https://doi.org/10.1016/j.ijedudev.2013.11.005>.

Gutierrez-Santos A., (2016), Sardo feeding program: Its effect on the nutritional health status and Academic performance of Students.

Hartarto, R. B., Wardani, D. T. K., & Azizurrohman, M. (2021). A qualitative study of conditional cash transfer and education aspirations: Evidence from Yogyakarta. *Journal of Social Service Research*, 47(6), 776-785.

Hindin, M. J. (2005). Family dynamics, gender differences and educational attainment in Filipino adolescents. *Journal of Adolescence*, 28(3), 299-316.

Kapur, R. (2018). Factors influencing the student's academic performance in secondary schools in India. *The University of Delhi*, 575-587.

Klasen, S., & Lahoti, R. (2021). How serious is the neglect of intra-household inequality in multidimensional poverty and inequality analyses? Evidence from India. *Review of Income and Wealth*, 67(3), 705-731.

Lima, G. (2014). AN ASSESSMENT OF PANTAWID PAMILYANG PILIPINO PROGRAM: ITS IMPACT ON THE ACADEMIC PERFORMANCE OF THE BENEFICIARIES IN THE WEST DISTRICT OF ALAMEDA, COTABATO.

Lluz, L. P. P. (2020). SURVIVING AND QUITTING: THE CASE OF 4PS (PANTAWID PAMILYANG PILIPINO PROGRAM) STUDENT DROPOUTS.

Mahmudiono, T., Nindya, T. S., Andrias, D. R., Megatsari, H., & Rosenkranz, R. R. (2018). Household food insecurity as a predictor of stunted children and overweight/obese mothers (SCOWT) in urban Indonesia. *Nutrients*, 10(5), 535.

Mak, T. N., Angeles-Agdeppa, I., Tassy, M., Capanzana, M. V., & Offord, E. A. (2020). Contribution of milk beverages to nutrient adequacy of young children and preschool children in the Philippines. *Nutrients*, 12(2), 392.

Mendoza, E. N. (2019). Are conditional cash transfer programs for women? Engendering the Philippine Pantawid. *Asian Social Work and Policy Review*, 13(1), 78-86.

Mohanty, S. K. (2011). Multidimensional poverty and child survival in India. *Plos one*, 6(10), e26857.

Moncayo, A. L., Granizo, G., Grijalva, M. J., & Rasella, D. (2019). Strong effect of Ecuador's conditional cash transfer program on childhood mortality from poverty-related diseases: a nationwide analysis. *BMC Public Health*, 19(1), 1-10.

Montilla, M., et al. (2015). Pantawid Pamilyang Pilipino Program (4Ps): Assistance to Pupil's Education. *Asia Pacific Journal of Education, Arts and Sciences*, Vol. 2. No. 3

Morales J., (2015), Factors affecting the Nutritional status among grade one pupils in Cluster II of Guagua West District.

Mostert, C. M., & Castello, J. V. (2020). Long run educational and spillover effects of unconditional cash transfers: evidence from South Africa. *Economics & Human Biology*, 36, 100817.

Mughal, A. W., Aldridge, J., & Monaghan, M. (2019). Perspectives of dropped-out children on their dropping out from public secondary schools in rural Pakistan. *International Journal of Educational Development*, 66, 52-61.

Mujeres, P. R. C. (2013). Influence of Pantawid Pamilyang Pilipino Program (4P's) to the Health and Education conditionalities of the elementary pupils of San Jorge Samar.

Murillo, I. J. B. C. (2019). Personal and household profile and level of well-being of Pantawid Pamilyang Pilipino Program (4Ps) beneficiaries in Balete, Aklan (Doctoral dissertation).

Mwanga, U. R. (2020). Assessment of the challenges facing conditional cash transfer (CCT) beneficiaries in improving livelihood: a case of Chamwino district council (Doctoral dissertation, The University of Dodoma).

Neves, J. A., Vasconcelos, F. D. A. G. D., Machado, M. L., Recine, E., Garcia, G. S., & Medeiros, M. A. T. D. (2022). The Brazilian cash transfer program (Bolsa Família): A tool for reducing inequalities and achieving social rights in Brazil. *Global Public Health*, 17(1), 26-42.
Official Gazette. (2013). Republic Act No. 10533 | GOVPH. Official Gazette of the Republic of the Philippines. <https://www.Officialgazette.gov.ph/2013/05/15/republic-act-no-10533/>

Olapane, E. C., Fernandez, M. J. E., & Payongayong, B. G. D. (2021). A Trend Analysis on Pantawid Pamilyang Pilipino Program (4Ps) in the Philippines. *Journal of Humanities and Social Sciences Studies*, 3(11), 111-121.

Once, F., Gabon, V., Cruz, J. D., Gabon, R., & Mustacisa-Lacaba, M. (2019). Financial literacy and satisfaction of beneficiaries to Pantawid Pamilyang Pilipino Program (4Ps): Evidence from the poorest countryside areas of the Philippines. *Countryside Development Research Journal*, 7(1), 11-16.

Onwuchekwa C, Verdonck K, and Marchal B (2021) Systematic Review on the Impact of Conditional Cash Transfers on Child Health Service Utilisation and Child Health in Sub-Saharan Africa. *Front. Public Health* 9: 643621. doi: 10.3389/fpubh.2021.643621

Orbeta Jr, A. C., Melad, K. A. M., & Araos, N. V. V. (2021). Reassessing the Impact of the Pantawid Pamilyang Pilipino Program: Results of the Third Wave Impact Evaluation.

Oxford Poverty and Human Development Initiative (2021a). "Philippines Country Briefing", Multidimensional Poverty Index Data Bank. Oxford Poverty and Human Development Initiative, University of Oxford.

Oxford Poverty and Human Development Initiative. (2021b). Global Multidimensional Index 2021: Unmasking disparities by ethnicity, caste, and gender.

Parreño, N. H., & Eramis-Eslabon, D. (2022). Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries: An Analysis of Their Satisfaction Levels.

Parker, S. W., & Vogl, T. (2018). Do conditional cash transfers improve economic outcomes in the next generation? Evidence from Mexico (No. w24303). National Bureau of Economic Research.

Peñalba, EH (2019). Exploring the Health Outcomes of a Conditional Cash Transfer Program in Rural Philippines. *Journal of Social Work Education and Practice*, 4(3), 37-51.

Pescador, E. (2019). A Qualitative Study on the Impact of the 4P's Program in Lingayen, Pangasinan. *Asian Journal of Business and Technology Studies*, 2(1).

Ramos D, da Silva NB, Ichihara MY, Fiaccone RL, Almeida D, Sena S, et al. (2021) Conditional cash transfer program and child mortality: A cross-sectional analysis nested within

the 100 million Brazilian Cohort. *PLoS Med* 18(9): e1003509.
<https://doi.org/10.1371/journal.pmed.1003509>

Rasella, D., Basu, S., Hone, T., Paes-Sousa, R., Ocké-Reis, C. O., & Millett, C. (2018). Child morbidity and mortality associated with alternative policy responses to the economic crisis in Brazil: A nationwide microsimulation study. *PLoS medicine*, 15(5), e1002570.

Razia, B. (2021). Causes of Deprivation of Elementary Education in Children Living in Slums. *European Journal of Education and Pedagogy*, 2(3), 141-144.

Renzaho, A., Chitekwe, S., Chen, W., Rijal, S., Dhakal, T., Chikazaza, I. R., & Dahal, P. (2018). Impact of a multidimensional child cash grant programme on water, sanitation and hygiene in Nepal. *Journal of Water, Sanitation and Hygiene for Development*, 8(3), 520-532.

Renzaho, A., Chen, W., Rijal, S., Dahal, P., Chikazaza, I. R., Dhakal, T., & Chitekwe, S. (2019). The impact of unconditional child cash grant on child malnutrition and its immediate and underlying causes in five districts of the Karnali zone, Nepal—A trend analysis. *Archives of Public Health*, 77(1), 1-18.

Reyes, J. D., & Briones, M. C. B. (2018). Level of Awareness on Pantawid Pamilyang Pilipino Program (4Ps) in San Carlos City, Pangasinan. *Asian Journal of Business and Technology Studies*, 1(1), 61-67.

Riveral, D. A., Tolomia, P. T., Mira, A. Q., & Real, D. V. C. (2015). THE PERCEIVED EFFECTIVENESS OF PANTAWID PAMILYANG PILIPINO PROGRAM TOWARDS INCREASING PERFORMANCE INDICATORS. *The Pillar-Research*, 20.

Sherr, L., Roberts, K. J., Mebrahtu, H., Tomlinson, M., Skeen, S., & Cluver, L. D. (2020). The food of life: an evaluation of the impact of cash grant receipt and good parenting on child nutrition outcomes in South Africa and Malawi. *Global Health Promotion*, 27(4), 131-140.

Suin, K. A. S., & Agustin, N. A. J. (2022). MULTIDIMENSIONAL POVERTY AND SPATIAL ANALYSIS: THE CASE OF THE PHILIPPINES. *International Journal of Business and Economy*, 4(3), 43-56.

Tabuga, A. D., Arboneda, A. A., & Vargas, A. R. P. (2021). A descriptive analysis of the dynamics of labor market outcomes of 4Ps beneficiaries (No. 2021-34). *PIDS Discussion Paper Series*.

United Nations Development Programme. (2022). [www.undp.org. https://www.undp.org/sustainable-development-goals#no-poverty](https://www.undp.org/sustainable-development-goals#no-poverty)

United Nations Development Programme (2020), 2020 Global Multidimensional Poverty Index (MPI): Charting pathways out of multidimensional poverty: Achieving the SDGs. New York.

United Nation Development Programme. (2015). *The Multidimensional Poverty Index (MPI): TRAINING MATERIAL FOR PRODUCING NATIONAL HUMAN DEVELOPMENT REPORTS*

Waidler, J., & Devereux, S. (2019). Social grants, remittances, and food security: does the source of income matter? *Food Security*, 11(3), 679-702.

Zewudie, A. T., Gelagay, A. A., & Enyew, E. F. (2020). Research Article Determinants of Under-Five Child Mortality in Ethiopia: Analysis Using Ethiopian Demographic Health Survey, 2016.

Zhang, A., & Imai, K. S. (2021). Do Conditional Cash Transfers Improve Education and Labour Market Outcomes in the Future Generation? Available at SSRN 3979641.

Does E-wallet Adoption Affect the Productivity of SMEs in Labuan?: A Bibliometric Approach

Suzanira binti Zaini^a, Suzillah binti Sidek^b

^a**University of Malaysia Sabah**, Labuan Faculty of International Finance, Labuan, Malaysia
suzanira_zaini_mg21@iluv.ums.edu.my

*Corresponding Author: suzi@ums.edu.my

Abstract

An obvious increase in e-wallet adoption was seen during the COVID-19 outbreak as society felt more convenient using e-wallet to exercise social distancing while making transactions. To stay competitive and relevant, SMEs was pressured to adopt e-wallet. The process of moving into a new transaction method definitely difficult especially for SMEs which are frequently a few steps behind in technology development thus this study aims to understand the e-wallet adoption among SMEs and it affect towards productivity. However, past literature related with e-wallet adoption is only focusing on the e-wallet user whose is the buyer in economic cycle and hardly any paper considering the adoption from the sellers' view. Hence, using the bibliometric approach, this research aims to understand the trend of e-wallet adoption. The two main objectives of this paper are i) to determine the factors influenced the adoption behaviour of e-wallet among SMEs and ii) to determine the relationship between e-wallet adoption and the organization's productivity of SMEs. Based on our analysis, we find that all six exogenous variables - performance expectancy, effort expectancy, social influence, facilitating condition, perceived risk and perceived cost are significant positive with the adoption of e-wallet. Next, our review also shows that adoption behaviour indeed has a positive impact towards the endogenous variable of organization's productivity. The findings from this paper will study and discuss the trend from past studies as well as future research trends. In conclusion, this paper will definitely help scholars understand more about the evolution of e-wallet adoption research from a bibliometric perspective especially related with sellers' viewpoint.

Keywords: E-wallet, Bibliometric Analysis, Citation Analysis Technique, Co-word Analysis

1. Introduction

E-wallet is no longer a strange word among Malaysian especially among business owners. Movement Control Order (MCO) has cause many companies including Small and Medium Enterprise (SME) to adopt new technology of e-wallet to stay relevant and maintain competitiveness (Reynold et al., 2020). According to Small and Medium Enterprises Association (Samenta), they had been working hard to encourage SMEs to digitise their business thus clearly that adopting e-wallet is a big challenge for SMEs. Hence, this paper aims to understand the adoption of e-wallet among SMEs and it effect to the productivity. However, this paper find it challenging to observe the pass literature as many papers only study e-wallet adoption from the perspective of e-wallet users whose act as buyer in economy cycle (Aji et al, 2020; Daragmeh et al., 2021; Yang et al., 2021). Thus, this paper is using bibliometric analysis to study the trend of e-wallet adoption and compare it to the definite finding which is directly related with SMEs e-wallet adoption.

2. Objective

This paper aims to study the adoption behaviour of e-wallet and its effect towards productivity. Hence, the two main objectives for this paper are:

- i. To determine the factors that influenced the adoption behaviour of e-wallet among SMEs.
- ii. To determine the effect of e-wallet adoption towards the organization's productivity of SMEs.

3. Methodology

This paper use bibliometric analysis based on the science mapping approach. To differentiate this paper from the previous studies, this paper combines two techniques under the science mapping – co-word analysis and citation analysis. Donthu et al., (2021) stated that co-word analysis is used to explore the existing or future relationships among topics in a research field by focusing on the written content of the publication itself while the citation analysis technique is used to analyse the relationships among publications by identifying the most influential publications in a research field.

3.1 Co-word Analysis Technique

The first technique –co-word analysis technique will be used during the data collection phase. This study collected past papers through only one database to avoid compiling duplicate papers. Hence, SCOPUS is selected as database because it has the largest multidisciplinary database of peer-reviewed literature in the social science (Emrich et al., 2020). Papers were collected from Scopus on 20 September 2023 with the keyword of “e-wallet” and the result shows a total of 344 papers. Through co-word analysis technique, the search then filtered to only related keywords, language and document types thus the result was down to 286 papers. The table below will summarize the keyword, language and document types that has been used:

Table 1
Keyword, Language and Document Types for Co-word Analysis Technique

Keyword			
<ul style="list-style-type: none"> • e-wallet • electronic money • electronic commerce • perceived usefulness • mobile payment • Indonesia • survey • intention to use • perceived ease of use • security • Malaysia • Fintech 	<ul style="list-style-type: none"> • e-payment • e-cash • commerce • cashless payment • behavioural research • UTAUT 2 • QR code • mobile application • Malaysian • IOT • ease of use • e-money 	<ul style="list-style-type: none"> • behavioural intention • payment system • consumer behaviour • UTAUT • technology adoption • adoption • technology • satisfaction • pandemic • mobile application • behaviour intention • COVID-19 	<ul style="list-style-type: none"> • cashless society • user satisfaction • user experience • social influence • payment transaction • internet • financial transaction • e-wallet adoption • digital cash • continuous intention • digitalization • digital wallet
Language		Document Type	
<ul style="list-style-type: none"> • English • Bahasa 		<ul style="list-style-type: none"> • Conference paper • Article • Conference review 	

A total of 286 documents were downloaded and analysed through the Publish or Perish software. The document was sorted based on the most cited to the least cited. The figure below show the analysis of keyword relationship from 286 papers:

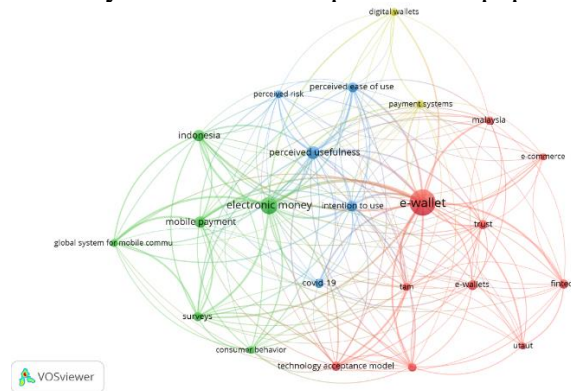


Figure 1
Keyword analysis of E-wallet Keyword

Based on Figure 1 above, there are four colours which representing the four main keywords related with the e-wallet study. The keywords are placed based on the circle size (biggest to smallest) thus the ranked of the four main keywords will be 1. E-wallet 2. Electronic payment 3. Perceived usefulness 4. Digital wallet. The small circles in each colour represent the area of field that has been studied according to the respective keywords. Hence, we can conclude that the main keyword regarding the study of e-wallet is e-wallet - biggest circle. Next, we also could infer that the study involving e-wallet keyword has covered the area related to Malaysia, e-commerce, UTAUT, TAM, trust and Fintech. The second main keyword is electronic money and the areas that have been studied with this keyword are mobile payment, Indonesia, consumer behaviour, survey and global system for mobile community. Comparing the first two keywords between e-wallet and electronic money, these two are actually can be used synonymously. However, it is clear that studies from Malaysia mainly use the keyword of e-wallet while studies in Indonesia use the keyword of electronic money.

3.2 Citation Analysis Technique

The second technique –citation analysis technique will be used during the data analysis phase. Based on Donthu et al. (2021), the data required for this technique are author name, citation, title, journals, DOI and reference thus any paper with zero citation will be removed. As a result, a total of 286 papers is cut to only 187 papers. After applying the two techniques, this paper will follow the same procedures from the previous studies using this technique, any paper that is not related or those which seemed to depend more on the experience of the researcher instead of the field observations will be removed (Salloum et al., 2019). To make this research distinct from past study, papers are selected by inclusion criteria to make sure that there is consistency in the studies for data analysis –only 43 papers are left. The inclusion criteria are as follows:

- The paper must be related to e-wallet
- The paper must apply at least one variable from this study
- Study results should be completed and given
- The study methodology should be clearly described

4. Finding

The finding is analysis based on the seven hypotheses from the theoretical framework build for this study.

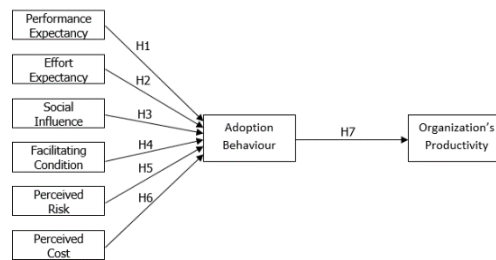


Figure 2
Theoretical Framework of the Study

Based on Figure 2, performance expectancy, effort expectancy, social influence, facilitating condition, perceived risk and perceived cost are the exogenous variables while the organization's productivity is the endogenous variable. Based on bibliometric analysis, the findings for each hypothesis are as Table 2 follows:

Table 2
Finding based on Bibliometric Analysis

Hypothesis	Justification
H1: Performance expectancy has a significant positive impact to the adoption of e-wallet among SMEs.	Based on selected papers, 54% shows that PE has a significant positive impact to the adoption because individuals believe that adopting e-wallet would improve their work performance – save time & effective. -Aji et al. (2020); Daragmeh et al. (2021); Yang et al. (2021); Abbasi et al. (2022); Widodo et al. (2019); Chauhan et al. (2022); Malik et al. (2021); Ariffin et al. (2021); Dewi et al. (2021); Menon & Ramakrishnan (2019); Osman et al. (2021); Hidayat et al. (2021); Rahmayanti et al. (2021); Yaakop et al. (2021); Rosli et al. (2020); Sikdar et al. (2019); Mohd Thas Thaker (2023); Daragmeh et al. (2022); Tang et al. (2022); Hammouri et al. (2023); Latupeirissa et al. (2020)
H2: Effort expectancy has a significant positive impact to the adoption of e-wallet among SMEs.	Based on selected papers, 39% shows EE has a significant positive impact on the adoption because considered it easy to use and less time and energy consuming plus tasks can be completed more efficiently when it is easy to use a new technology - Yang et al. (2021); Abbasi et al. (2022); Abdul-Halim et al. (2022); Chauhan et al. (2022); Malik et al. (2021); Ariffin et al. (2021); Dewi et al. (2021); Osman et al. (2021); Rahmayanti et al. (2021); Rosli et al. (2020); Sikdar et al. (2019); Hamzah et al. (2023); Tang et al. (2022); Latupeirissa et al. (2020)
H3: Social influence has a significant positive impact to the adoption of e-wallet among SMEs	Based on selected papers, 53% shows SI has a significant positive impact to the adoption where we can conclude that social influence of important people, such as family, relatives and friends can influence our intention to adopt e-wallet - Yang et al. (2021); Chauhan et al. (2022); Osman et al. (2021); Ming & Jais (2022); Sikdar et al. (2019); Mohd Thas Thaker (2023); Hamzah et al., (2023); Hammouri et al. (2023)
H4: Facilitating condition has a significant positive impact to the adoption of e-wallet among SMEs	Based on selected papers, 46% shows FC has a significant positive impact on the adoption because there is enough resources and knowledge to use e-wallet - Soodan V & Rana A (2020); Widodo et al. (2019); Chauhan et al. (2022); Adepapo et al. (2021); Sikdar et al. (2019); Mohd Thas Thaker (2023)
H5: Perceived risk has a significant positive impact to the adoption of e-wallet among SMEs	Based on selected papers, 57% shows PR has a significant positive impact to the adoption - Aji et al. (2020); Daragmeh et al. (2021); Chauhan et al. (2022); Adepapo et al. (2021); Ming & Jais (2022); Muhamad Anuar et al. (2020); Tang et al. (2022); Riska et al. (2022). Although most past studies refer PR to Covid-19 risk such as afraid of virus transmission through physical money, a study by Muhamad Anuar et al. (2020) stated that PR has a significant positive because fears of personal error, privacy violation, security violation and not having sufficient battery
H6: Perceived cost has a significant positive impact	Based on selected papers only one paper apply PC in their paper - Muhamad Anuar et al. (2020). This trend has supported the study from Teng & Khong (2021) which stated that

to the adoption of e-wallet among SMEs	perceived cost is the top factor in consumer adoption only during 1998-2006 hence current study no longer applies this variable.
H7: E-wallet adoption has a positive impact to the SMEs productivity	Similarly with PC, only one paper has applied productivity in their study -Ifeyinwa Umeokeke et al. (2017). The study is focusing on farmers and the findings show adoption of e-wallet system has enhanced household chances of escaping poverty.

Notes: PE refers to Performance Expectancy, EE refers to Effort Expectancy, SI refers to Social Influence, FC refers to Facilitating Condition, PR refers to Perceived Risk and PC refers to Perceived Cost.

5. Conclusion

In conclusion, only 2 out of 43 selected papers are doing study related with SMEs – Riska et al., 2022 and Ifeyinwa Umeokeke et al., 2017. However, after observing and comparing the finding of these two papers with others, we find that the result and justification are similar. Meaning to say that the adoption of e-wallet is either for seller or buyer is actually driven by human behaviour. Hence, the finding from this paper has successfully answered all two objectives i) to determine the factors that influenced the adoption behaviour of e-wallet among SMEs and ii) to determine the relationship between e-wallet adoption and the organization's productivity of SMEs. Next, the findings from this paper will help us to verify the impact of six exogenous variables in e-wallet adoption behaviour from a bibliometric perspective especially from the sellers' view. In addition, this study will be able to contribute for future policy implementation regarding e-wallet such as the current service charge involving DuitNow QR as Malaysian has a high cost perceived in adopting e-wallet, a service charge will not be necessary. To fill the gap of study related e-wallet adoption among seller, this paper will make further observation and come up with the definite finding related with SMEs e-wallet adoption and its effect towards productivity.

6. References

- Abbasi, G. A., Sandran, T., Ganesan, Y., & Iranmanesh, M. (2022). Go cashless! determinants of continuance intention to use e-wallet apps: a hybrid approach using pls-sem and fsqca. *Technology in Society*, 68. <https://doi.org/10.1016/j.techsoc.2022.101937>
- Abdul-Halim, N. A., Vafaei-Zadeh, A., Hanifah, H., Teoh, A. P., & Nawaser, K. (2022). Understanding the determinants of e-wallet continuance usage intention in Malaysia. *Quality & quantity*, 56(5), 3413-3439.
- Adedapo Oluwaseyi, O., Olawole, F., Oluwayomi Toyin, O., Chris, A., & Tan, N. L. (2022). Consumer usage intention of electronic wallets during the COVID-19 pandemic in Malaysia.
- Agbarevo, M. N., & Ukagha, O. (2018). Determinants of participation of farmers in the E-wallet agricultural input delivery system in Abia State Nigeria. *Journal of Agricultural Extension*, 22(3), 109-116.
- Aji, H. M., Berakon, I., & Md Husin, M. (2020). COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia. *Cogent Business & Management*, 7(1), 1804181.
- Ariffin, S. K., Abd Rahman, M. F. R., Muhammad, A. M., & Zhang, Q. (2021). Understanding the consumer's intention to use the e-wallet services. *Spanish Journal of Marketing-ESIC*, 25(3), 446-461.
- Astari, A., Yasa, N., Sukaatmadja, I., & Giantari, I. G. A. K. (2022). Integration of technology acceptance model (TAM) and theory of planned behavior (TPB): An e-wallet behavior with fear of COVID-19 as a moderator variable. *International Journal of Data and Network Science*, 6(4), 1427-1436.
- Bakria, M. H., Almansoori, K. K. S. M., & Azlan, N. S. M. (2023). Determinants intention usage of Islamic E-Wallet Among Millennials. *Global Business & Finance Review*, 28(1), 11.

- Chauhan, V., Yadav, R., & Choudhary, V. (2022). Adoption of electronic banking services in India: An extension of UTAUT2 model. *Journal of Financial Services Marketing*, 1-14
- Daragmeh, A., Sági, J., & Zéman, Z. (2021). Continuous intention to use e-wallet in the context of the covid-19 pandemic: Integrating the health belief model (hbm) and technology continuous theory (tct). *Journal of Open Innovation: Technology, Market, and Complexity*, 7(2), 132.
- Daragmeh, A., Saleem, A., Bárczi, J., & Sági, J. (2022). Drivers of post-adoption of e-wallet among academics in Palestine: An extension of the expectation confirmation model. *Frontiers in Psychology*, 13, 984931.
- Dewi, G. M. M., Joshua, L., Ikhsan, R. B., Yuniarty, Y., Sari, R. K., & Susilo, A. (2021, August). Perceived risk and trust in adoption E-wallet: the role of perceived usefulness and ease of use. In *2021 International Conference on Information Management and Technology (ICIMTech)* (Vol. 1, pp. 120-124). IEEE.
- Do, N. B., & Do, H. N. T. (2020). An investigation of generation Z's intention to use electronic wallet in Vietnam. *Journal of Distribution Science*, 18(10), 89-99.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of business research*, 133, 285-296.
- Emich, K. J., Kumar, S., Lu, L., Norder, K., & Pandey, N. (2020). Mapping 50 years of small group research through small group research. *Small Group Research*, 51(6), 659-699
- Esawe, A. T. (2022). Understanding mobile e-wallet consumers' intentions and user behavior. *Spanish Journal of Marketing-ESIC*, 26(3), 363-384.
- Hammouri, Q., Aloqool, A., Saleh, B., Aldossary, H., Frejat, S., Halim, M., ... & Darawsheh, S. (2023). An empirical investigation on acceptance of e-wallets in the fintech era in Jordan: Extending UTAUT2 model with perceived trust. *International Journal of Data and Network Science*, 7(3), 1249-1258.
- Hamzah, M. I., Ramli, F. A. A., & Shaw, N. (2023). The moderating influence of brand image on consumers' adoption of QR-code e-wallets. *Journal of Retailing and Consumer Services*, 73, 103326.
- Hidayat, D., Pangaribuan, C. H., Putra, O. P. B., & Taufiq, F. J. (2021, April). Expanding the technology acceptance model with the inclusion of trust and mobility to assess e-wallet user behavior: Evidence from OVO consumers in Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 729, No. 1, p. 012050). IOP Publishing.
- Ifeyinwa Umeokeke, N., Olusegun Okoruwa, V., & Adenike Adeyemo, T. (2017). Impact of electronic-wallet system on farmer's welfare in Oyo State, Nigeria. *International Journal of Social Economics*, 44(4), 474-490.
- Khoa, B. T. (2020, October). The role of mobile skillfulness and user innovation toward electronic wallet acceptance in the digital transformation era. In *2020 international conference on information technology systems and innovation (ICITSI)* (pp. 30-37). IEEE.
- Latupeirissa, J. J. P., Gorda, A. A. N. O. S., & Subanda, I. N. (2020). Antecedents of intention to use e-wallet: The development of acceptance model with pls-sem approach. *Journal of Advanced Research in Dynamical and Control Systems*, 1416-1429.
- Lee, Y. Y., Gan, C. L., & Liew, T. W. (2023). Do E-wallets trigger impulse purchases? An analysis of Malaysian Gen-Y and Gen-Z consumers. *Journal of Marketing Analytics*, 11(2), 244-261.
- Leong, M. Y., Kwan, J. H., & Ming, L. M. (2021). Technology readiness and UTAUT2 in e-wallet adoption in a developing country. *F1000Research*, 10.
- Malik, A. N. A., & Annuar, S. N. S. (2021). The effect of perceived usefulness, perceived ease of use, reward, and perceived risk toward e-wallet usage intention. In *Eurasian Business*

- and Economics Perspectives: *Proceedings of the 30th Eurasia Business and Economics Society Conference* (pp. 115-130). Springer International Publishing.
- Menon, M. M., & Ramakrishnan, H. S. (2019). Revolution of E-wallets usage among Indian millennial. *Int. J. Recent Technol. Eng*, 8(3), 8306-8312.
- Ming, K. L. Y., & Jais, M. (2022). Factors affecting the intention to use e-wallets during the COVID-19 pandemic. *Gadjah Mada International Journal of Business*, 24(1), 82-100.
- Mohamad Anuar, N. I., Nik Mahdi, N. M., Nik Hashim, N. A. A., Mohamad, S. R., Zainuddin, S. A., Azmi, N. F., & Wan Zulkiffli, W. F. (2020). The barriers towards the adoption of e-wallet payment system. *International Journal of Engineering Research and Technology*, 3772-3777.
- Mohd Thas Thaker, H., Subramaniam, N. R., Qoyum, A., & Iqbal Hussain, H. (2023). Cashless society, e-wallets and continuous adoption. *International Journal of Finance & Economics*, 28(3), 3349-3369.
- Nugroho, A., Siagian, H., Oktavio, A., & Tarigan, Z. J. H. (2022). The effect of e-WOM on customer satisfaction through ease of use, perceived usefulness and ewallet payment.
- Nur, T., & Joviando, J. (2021, October). Determination of E-wallet usage intention: extending the TAM model with self efficacy. In *2021 3rd International Conference on Cybernetics and Intelligent System (ICORIS)* (pp. 1-7). IEEE.
- Osman, S., Jabaruddin, N., Zon, A. S., Jifridin, A. A., & Zolkepli, A. K. (2021). Factors influencing the use of E-wallet among millennium tourist.
- PHAN, T. N., HO, T. V., & LE-HOANG, P. V. (2020). Factors Affecting the Behavioral Intention and Behavior of Using E-Wallets of Youth in Vietnam. *The Journal of Asian Finance, Economics and Business (JAFEB)*, 7(10), 295-302.
- PHUONG, N. N. D., LUAN, L. T., Van DONG, V., & KHANH, N. L. N. (2020). Examining customers' continuance intentions towards e-wallet usage: The emergence of mobile payment acceptance in Vietnam. *The Journal of Asian Finance, Economics and Business (JAFEB)*, 7(9), 505-516.
- Podsakoff, P. M., MacKenzie, S. B., Bachrach, D. G., & Podsakoff, N. P. (2005). The influence of management journals in the 1980s and 1990s. *Strategic management journal*, 26(5), 473-488.
- Rahmayanti, P., Widagda, I. G. N. J. A., Yasa, N., Giantari, I. G. A. K., Martaleni, M., Sakti, D., ... & Anggreni, P. (2021). Integration of technology acceptance model and theory of reasoned action in pre-dicting e-wallet continuous usage intentions. *International Journal of Data and Network Science*, 5(4), 649-658.
- Riska, L. M., Kholid, M. N., & Salsabilla, S. (2022). Perceived Covid-19 Risk and E-Wallet Adoption: An Empirical Evidence MSEs of Indonesia. In *The Implementation of Smart Technologies for Business Success and Sustainability: During COVID-19 Crises in Developing Countries* (pp. 961-971). Cham: Springer International Publishing.
- Rosli, M. S., Saleh, N. S., Md. Ali, A., & Abu Bakar, S. (2023). Factors determining the acceptance of E-wallet among gen Z from the lens of the extended technology acceptance model. *Sustainability*, 15(7), 5752.
- Rustine, M., Ratnapuri, C. I., Karim, N. A., & Alamsyah, D. P. (2022, January). The Antecedent of Relative Advantage in Mobile Payment E-Wallet. In *2021 International Seminar on Machine Learning, Optimization, and Data Science (ISMODOE)* (pp. 278-282). IEEE.
- Salloum, S. A., Alhamad, A. Q. M., Al-Emran, M., Monem, A. A., & Shaalan, K. (2019). Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model. *IEEE access*, 7, 128445-128462.
- Senali, M. G., Iranmanesh, M., Ismail, F. N., Rahim, N. F. A., Khoshkam, M., & Mirzaei, M. (2023). Determinants of intention to use e-Wallet: Personal innovativeness and

- propensity to trust as moderators. *International Journal of Human-Computer Interaction*, 39(12), 2361-2373.
- Shafinah, K., Sahari, N., Sulaiman, R., Yusoff, M. S. M., & Ikram, M. M. (2013). Determinants of user behavior intention (BI) on mobile services: A preliminary view. *Procedia technology*, 11, 127-133.
- Sikdar, P., Kumar, A., & Alam, M. M. (2019). Antecedents of electronic wallet adoption: a unified adoption based perspective on a demonetised economy. *International Journal of Business and Emerging Markets*, 11(2), 168-196.
- Soe, M. H. (2022). Do they really intend to adopt e-wallet? Prevalence estimates for government support and perceived susceptibility. *Asian J. Bus. Res*, 12, 77-98.
- Soodan, V., & Rana, A. (2020). Modeling Customers' Intention to Use E-Wallet in a Developing Nation: Extending UTAUT2 With Security. *Journal of Electronic Commerce in Organizations*, 18(1).
- Syifa, N., & Tohang, V. (2020, August). The use of e-wallet system. In *2020 International Conference on Information Management and Technology (ICIMTech)* (pp. 342-347). IEEE.
- Tang, M. B., Dieo, B. A., Suhaimi, M. K. A. M., & Andam, J. L. A. (2022). The emergence of e-wallet in Sarawak: Factors influencing the adoption of Sarawak Pay. *International Journal of Business and Society*, 23(3), 1423-1442.
- Teng, S., & Khong, K. W. (2021). Examining actual consumer usage of E-wallet: A case study of big data analytics. *Computers in Human Behavior*, 121, 106778.
- Teoh Teng Tenk, M., Yew, H. C., & Heang, L. T. (2020). E-wallet Adoption: A case in Malaysia. *International Journal of Research In Commerce and Management Studies* (ISSN: 2582-2292), 2(2), 216-233.
- Tjandra, R., Alamsyah, D. P., & Susanti, L. (2022, January). Perceived Mobility of Mobile Payments: Mediation Model of User Usefulness. In *2021 International Seminar on Machine Learning, Optimization, and Data Science (ISMODE)* (pp. 228-232). IEEE.
- Widodo, M., Irawan, M. I., & Sukmono, R. A. (2019, July). Extending UTAUT2 to explore digital wallet adoption in Indonesia. In *2019 International Conference on Information and Communications Technology (ICOIACT)* (pp. 878-883). IEEE.
- Yaakop, A., Shi, Y., Foster, B., & Saputr, J. (2021). Investigating e-wallet adoption of COVID19 intra-period among Malaysian youths': Integrated task-technology fit and technology acceptance model framework. *International Journal of Data and Network Science*, 5(3), 295-302.
- Yang, M., Mamun, A. A., Mohiuddin, M., Nawawi, N. C., & Zainol, N. R. (2021). Cashless transactions: A study on intention and adoption of e-wallets. *Sustainability*, 13(2), 831.

Unveiling the Green Revolution: Exploring Purchase Intentions of Bio-Plastics Products through the Theory of Planned Behavior

Mah Pei-Yew^{ab,*}, Low Choon-Wei^c, Wong Kai-Yang^a, Tan Zee-Wei^a

^a**Universiti Tunku Abdul Rahman**, Jalan Universiti, Bandar Barat, 31900 Kampar, Perak, Malaysia.

E-mail address: mahpy@utar.edu.my

E-mail address: kaiyangwong618@gmail.com

E-mail address: zeewei2000@gmail.com

^b**Universiti Utara Malaysia**, 27-1B Tingkat 1, Wisma Sri Muda (UUMKL Menara 2), Jalan Raja Muda Abd Aziz, Kampung Baru, 50300 Kuala Lumpur, Malaysia.

E-mail address: mahpy@utar.edu.my

^c**Universiti Tunku Abdul Rahman**, Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor, Malaysia.

E-mail address: cwlow@utar.edu.my

*Corresponding Author: mahpy@utar.edu.my

Abstract

The public awareness of plastic pollution and climate change has increased. Followingly, Malaysia ranked second in Asia for annual per capita plastic use and ranked eighth in worldwide of plastic mismanagement. It is an alarming problem where 30,000 tonnes of plastic waste were dumped into sea yearly and this issue will weaken the Roadmap Towards Zero Single-use Plastics by 2030. Thus, the global plastic industry is looking for alternatives to ensure the nations to live sustainably. For example, the implementation of plant-based alternatives made from renewable materials including starch from palm, corn, and potato. Bioplastics have essential roles in the New Plastics Economy. This is because it can be decomposed faster with a minimum amount of carbon dioxide (CO₂) emission, which leads the activities to be more environmentally friendly. Not only happened in Malaysia, but bioplastic also had the attention of Asia and Europe countries to produce bioplastic products. Over 10% growth is predicted for the bioplastics market between 2021 and 2030. However, the market for bioplastics is being driven primarily by the eco-friendly properties of bioplastics, consumer acceptance of plant-based products, legislative support for the creation of biodegradable packaging materials, and an abundance of renewable raw material sources. Hence, this study aims to understand the purchase intention of youth in Malaysia. We address two questions in this study, i) how do attitude, social norms, perceived behavioral control (PBC), and perceived awareness affect the purchase intention of bioplastics products in Malaysia? and ii) what is the most important factor influencing the purchase intention of bioplastics products? We formulate a research framework based on the Theory of Planned Behaviour (TPB) model by Ajzen (1991). Our analysis found evidence for the important roles of attitude, perceived behavioral control, and the importance of perceived awareness on the purchase intention of bio-plastic products.

Keywords: Bioplastic, Attitude, Social Norm, Perceived Behavioral Control, Perceived Awareness, Theory of Planned Behavior.

1. Introduction

At present, bioplastics have become a necessity in many consumer products and industrial applications (i.e., food packaging and composting bags). Bioplastics are biodegradable and compostable which made from renewable sources such as sugarcane and corn. The emergence of bioplastics is due to the extensive used of plastics materials which profoundly affect the environment and human health. The accumulation used of plastic materials has caused a long-term effect in the ecosystem in which it causes the increase of carbon dioxide in the atmosphere (Findrik & Meixner, 2023). Followingly, the trend of plastic production is constantly growing, and it reaches 368 million tons in 2019 with approximately 6300 million tons of non-biodegradable plastic waste (Notaro et al., 2022). Evidently, a report published in the World Economic Forum 2023 indicates that plastic waste is one of the major issues which led to the destruction of ecosystems and serves as a global challenge where it calls various parties to combat the climate and biodiversity crisis (Kemene, 2023).

To date, there are vast consumer studies examining bioplastics such as production-related issues, however limited studies investigating customers' response to bioplastic products (Scarpi et al., 2021; Findrik & Meixner, 2023). Although in the recent years, bioplastics have become an alternative product for eco-conscious consumer as a substitute for conventional plastic, it is still a gap for the researcher to explore the response and reaction of consumers on the introduction of bioplastic products (Scarpi et al., 2021). Following through the same direction, consumers may have the same perception towards conventional plastic products and bioplastic products treated it as similar products, however both products are different but not obvious to be seen (Klein et al., 2019). For example, plastic bags could be a single use plastic bags, shopping bags or a single use plastic cup, whereas bioplastic products are completely or partially made from various types of plants.

This is a challenge where consumers are more sensitive with green products and not all green products are well accepted by the market (Notaro et al., 2022). Thus, considering this issue, there is a need to address the problems that is to examine consumers decision in purchasing bioplastic products in specifically or generally perspective. As such, we seek to answer the questions: i) What are the antecedents that relates to consumers' intentions to purchase bioplastic products as compared to conventional plastic products. ii) What is the most important factor influencing consumers' intentions to purchase bioplastic products.

2. Literature review

This study investigates factors that influence the consumers' purchase intention towards bioplastic products. We discuss studies that identify attitude, social norm, perceived behavioral control, and perceived awareness as the predictors of bioplastic purchase intention in the following paragraphs. The theory of planned behavior (TPB) has been used to explain environmental behaviors (Ajzen, 1991). This study uses this theory to explain individual behaviors based on attitudes, social norms, perceived behavioral control, and perceived

awareness in the theoretical framework. Our study applies TPB model to dive deeper into consumers' purchase intention towards bioplastic products in the context of Malaysia.

Consumers' intention to purchase bioplastic products can be as a form of behavioral intention which reflects an individual attitude in forming a behavior. A study conducted by Klein (2019) explains individual intention could possibly influence a purchase behavior. Recent studies conducted by Scherer et al. (2018) and Klein et al (2019) found a connection between consumers' attitude and its behavior towards bioplastic products. Hence, it is proposed that individuals' attitude towards bioplastic influence the intention to purchase bioplastic products positively.

Social norms are connected to the perceived societal pressures where individual tends to behave in a certain way (Fishbein, 1980). Teng et al. (2015) and Klein et al. (2019) explained a positive influence of social in affecting the purchase intention of green products. Hence, it is proposed that social norm influences the intention to purchase bioplastic products positively.

A perceived behavioral control is seen as the power on how it impacts individual behavior. Perceived behavioral control are reflected by personal opinions based on the simplicity and complexity in performing certain behavior (Mohmad Hassan et al., 2020). A study conducted by Maichum et al. (2016) showed that the ability of individual to control their behavior positively affects their intention to purchase green products. Hence, it is proposed that individuals perceived behavioral control towards bioplastic influence the intention to purchase bioplastic products positively.

Consumers' awareness is a pre-condition for a shift towards a responsible consumption and a long-term growth. As such, when consumers are aware of certain products their judgment and perspective of the products are different (Chan et al., 2021). A study conducted by Asif et al. (2018) stated that awareness has a substantial impact in influencing the purchase intention towards organic products. Hence, it is proposed that individuals' awareness towards bioplastic influence the intention to purchase bioplastic products positively.

3. Research Design and Methods

We formulate a research framework based on the Theory of Planned Behaviour (TPB) model by Ajzen (1991). Our framework includes attitude, social norms, perceived behavioral control, and perceived awareness. We conducted surveys for data collection purposes by targeting Malaysian citizens with an age range of 21 – 50 years old. After the data cleaning, we include 314 responses in our data analysis. We ran a reliability test to ensure the responses are reliable for further analysis. We regressed the data to answer the first research question and conducted descriptive analysis for the second research question. Data of the study was collected through an online access panel and a physical distribution. Data analysis was performed using SPSS 23.

4. Results

Table 1 shows the reliability test of variables in this study. We believe the collected responses are reliable as all the Cronbach alpha values are above 0.8. Table 2 presents the regression results. Results show attitude ($\beta = 0.458$, $p = 0.000$), perceived behavioral control ($\beta = 0.302$,

p = 0.000), and perceived awareness ($\beta = 0.121$, p = 0.020) are significant to influence the purchase intention of bioplastics products. Attitude (with the highest coefficient value) is the main factor. The result is supported by previous studies (Klein et al., 2019; Zwicker et al., 2021; 2023). Although substantial research has been conducted in different fields of environmental behavior and green products in the past, policymakers and industry players need to inform consumers and increase their awareness about more sustainable solutions.

Table 1
Reliability Test

Variables	Cronbach Alpha
Purchase intention	0.915
Attitude	0.859
Social norm	0.909
Perceived behavioral control	0.888
Perceived awareness	0.861

Table 2
Regression Results

Variables	Coefficients
Constant	0.575 (0.185)
Attitude	0.458* (0.056)
Social norm	-0.014 (0.031)
Perceived behavioral control	0.302* (0.053)
Perceived awareness	0.121** (0.052)
R-square	0.622

Notes: Dependent variable: Purchase Intention; * Significant at 1% level,
** Significant at 5% level; Figures are coefficients, and standard errors are in parentheses.

5. Conclusions and Implications

This study analyzes the factors influencing consumers' intention in purchasing bioplastic products. Our analysis found evidence for the important roles of attitude, perceived behavioral control, and the importance of perceived awareness on the purchase intention of bio-plastic products. This indicates that communication and information activities in this field are essential. Indeed, consumers' attitudes and feelings can have an impact on whether they decide to buy bioplastic items. Besides, consumer perceived behavioral control reflects consumer's personal opinion on purchasing bioplastic items, lastly, consumer awareness is essentially

crucial whereby it determines the consumers' level of knowledge on their intention to purchase bioplastic products.

6. References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.

Asif, M., Xuhui, W., Nasiri, A. and Ayyub, S. (2018). Determinant factors influencing organic food purchase intention and the moderating role of awareness: A comparative analysis. *Food Quality and preference*, 63, 144-150.

Buerke, A., Straatmann, T., Lin-Hi, N. and Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior. *Review of Managerial Science*, 11(4), 959-991.

Chan, J. X., Wong, J. F., Hassan, A., & Zakaria, Z. (2021). Bioplastics from agricultural waste. In *Biopolymers and biocomposites from agro-waste for packaging applications* (pp. 141-169). Woodhead Publishing.

Findrik, E., & Meixner, O. (2023). Drivers and barriers for consumers purchasing bioplastics—A systematic literature review. *Journal of Cleaner Production*, 137311.

Fishbein, M. (1980). A theory of reasoned action. Some applications and implications. In: *Nebraska Symposium on Motivation*. Nebraska Symposium on Motivation, 27, 65–116

Kemene, E. (2023). Plastic pollution and climate change: 3 leaders chart the path forward. *World Economic Forum*. Retrieved from <https://www.weforum.org/agenda/2023/06/plastic-pollution-and-climate-change-perspectives-on-the-path-forward/>

Klein, F., Emberger-Klein, A., Menrad, K., Möhring, W., & Blesin, J. M. (2019). Influencing factors for the purchase intention of consumers choosing bioplastic products in Germany. *Sustainable Production and Consumption*, 19, 33-43.

Maichum, K., Parichatnon, S. & Peng, K.C. (2016). Application of the extended theory of planned behavior model to investigate purchase intention of green products among Thai consumers. *Sustainability*, 8(10), 1077.

Notaro, S., Lovera, E., & Paletto, A. (2022). Consumers' preferences for bioplastic products: A discrete choice experiment with a focus on purchase drivers. *Journal of Cleaner Production*, 330, 129870.

Scherer, C., Emberger-Klein, A., & Menrad, K. (2018). Segmentation of interested and less interested consumers in sports equipment made of bio-based plastic. *Sustainable Production and Consumption*, 14, 53-65.

Teng, Y. M., Wu, K. S., & Liu, H. H. (2015). Integrating altruism and the theory of planned behavior to predict patronage intention of a green hotel. *Journal of Hospitality & Tourism Research*, 39(3), 299-315.

Zwicker, M. V., Brick, C., Gruter, G. J. M., & van Harreveld, F. (2021). (Not) doing the right things for the wrong reasons: an investigation of consumer attitudes, perceptions, and willingness to pay for bio-based plastics. *Sustainability*, 13(12), 6819.

Zwicker, M. V., Brick, C., Gruter, G. J. M., & van Harreveld, F. (2023). Consumer attitudes and willingness to pay for novel bio-based products using hypothetical bottle choice. *Sustainable Production and Consumption*, 35, 173-183.

The Impact of Product Innovation and Owner's Financial Literacy on Financial Wellbeing of MSMEs in Indonesia

Novia Utami^{a,*}, Marsiana Luciana Sitanggang^b, Fitri Handayani^c

^aAtma Jaya Catholic University of Indonesia, Jakarta, Indonesia
E-mail address: novia.utami@atmajaya.ac.id

^bAtma Jaya Catholic University of Indonesia, Jakarta, Indonesia
E-mail address: marsiana.luciana@atmajaya.ac.id

^cAtma Jaya Catholic University of Indonesia, Jakarta, Indonesia
E-mail address: fitri.202001010011@student.atmajaya.ac.id

*Corresponding Author: novia.utami@atmajaya.ac.id

Abstract

This research investigates the impact of product innovation and financial literacy on the financial well-being of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. Using a sample of 300 respondents across various regions in Indonesia, the study employs Structural Equation Modeling (SEM) to analyze the relationships between variables. The findings highlight the significant and positive influence of product innovation on the financial well-being of MSMEs. Innovating products have enhanced these enterprises' business revenue, stability, profitability, and market share retention. Similarly, financial literacy among MSME owners plays a crucial role in achieving financial well-being. Owners with solid financial knowledge and skills tend to exhibit better financial management, effective decision-making, and sustainable business strategies. The research emphasizes combining product innovation and financial literacy for more substantial financial stability within MSMEs. Strategies that enhance financial literacy through training programs improved access to relevant financial information, and support systems for better financial management are recommended. Additionally, initiatives that foster product innovation through collaborative networks and idea exchange among MSMEs could further bolster the sector's resilience and competitiveness.

Keywords: Product Innovation, Financial Literacy, Financial Well-being, MSMEs.

1. Introduction

The COVID-19 pandemic has affected nearly every business sector in Indonesia on a significant scale, leading to profound changes. On an individual level, this pandemic has also introduced limitations in mobility and economic activities. However, it has also resulted in a pretty drastic decrease in the income of many people, prompting the need for significant adjustments in household expenditure patterns. On the corporate side, both on a macro and micro scale, there has been a significant decline in revenue, compelling drastic measures such as business closures and job terminations to survive these challenging conditions. The sustained

impact of this situation tends to slow down the ability of individuals and entrepreneurs to achieve the expected financial well-being, with a recovery process that may take longer than anticipated (Mallinguh et al., 2020).

Micro, small, and medium enterprises (MSMEs) have emerged as one of the sectors most severely affected by this pandemic. Challenges that existed previously, such as limited capital, access to markets, and digital infrastructure, have become more acute due to the pandemic. Due to decreased demand, difficulties in sourcing raw materials, and logistical constraints resulting from movement restrictions, MSMEs face new challenges. This pandemic has added another layer of complexity to pre-existing challenges, emphasizing the need for more comprehensive solutions and support to assist MSMEs in navigating through these challenging times (Taufik & Ayuningtyas, 2020).

The country's economy has experienced a downturn at the macro level due to reduced consumption and investment. The pandemic has compelled the government to allocate significant funds for healthcare management and economic stimulus to mitigate the adverse effects on economic growth. In a global context, the world economy has also been severely hit by this pandemic. Disruptions in global supply chains, declines in exports and imports, and a reduction in foreign direct investment are some impacts affecting inter-country economic activities. COVID-19 has profoundly altered the economic landscape and has become a significant test for economic resilience in Indonesia and worldwide. For MSMEs, these challenges demand innovation, technological adaptation, and governmental and societal support to recover and enhance competitiveness in the ongoing changes (Avriyanti, 2022).

MSMEs operate within an ever-evolving environment where challenges like market uncertainty, fierce competition, and technological shifts are commonplace. Amidst this landscape, efforts in adaptation and innovation become crucial keys. Confronting risks and uncertainties through innovation entails more than merely adjusting products or services. It involves fostering creative solutions, discovering new ways to reach customers, and enhancing operational efficiency (Archer et al., 2020). Innovation is not confined to products alone. MSMEs can innovate in business processes, marketing models, or how they approach the ever-changing market needs. Through innovation, MSMEs can discover new competitive advantages, expand their customer base, and create new markets. This implies chasing current trends and creating trends that set a business apart from its competitors.

In the context of SMEs, demand, preferences, and customer expectations for products also continue to undergo significant changes. Owners and managers of SMEs face the same challenge: making decisions in an uncertain environment while optimizing limited resources. Amidst fierce competition, SMEs must also pay attention to technological aspects, secure knowledge of the latest innovations, and develop strategies that enable the timely and relevant maintenance and replacement of assets (Kusa et al., 2021).

Adoption of technology is critical for SMEs to remain relevant and competitive. While resources might be limited, understanding future technology trends can help SMEs anticipate changing market needs. This requires gathering information about the latest innovations and the most effective ways to apply them in their business context. Asset maintenance and replacement strategies become crucial, where SMEs need to consider the best ways to maintain existing technology while simultaneously updating or replacing it with more advanced technology (Dai et al., 2020).

In Indonesia, SMEs are currently at the forefront of economic growth (P. O. Irikefe & Opusunju, 2021). SMEs contribute more than 60% of the national GDP in Indonesia (Doni, 2022). Before the Covid-19 pandemic, there were around 64.7 million SMEs in Indonesia. However, since the pandemic struck, more than 30 million SMEs have been forced to close down. The Indonesian government has shown commitment to providing substantial support to strengthen SMEs to achieve the expected level of prosperity. However, to ensure the success

of the government's efforts to empower SMEs, it needs to be accompanied by a strong spirit and willingness from SME entrepreneurs to continuously develop their skills, especially in learning and innovation, particularly in business operational aspects. In this context, SME entrepreneurs become the main actors in developing this sector. At the same time, the government plays more of a role as a mentor, providing guidance and support to facilitate SME growth. One key aspect that SME entrepreneurs should possess is financial literacy skills.

Small and Medium Enterprises (SME) owners make day-to-day decisions related to strategy, organizational structure, product quality enhancement, performance evaluation, and workflow. These decisions strongly impact the company's performance and success. Many of these decisions involve crucial financial aspects. Hence, understanding finance or financial literacy is vital for every SME owner (Eniola & Entebang, 2017). One example is in selecting funding sources for their businesses. The decision on how to finance their business can be a pivotal factor in facing competitors, driving innovation, resolving financial issues, and, most importantly, creating long-term value and enhancing financial stability. However, not all SME owners have a strong understanding of financial concepts. This can have a significant impact; owners less familiar with finance concepts are reluctant to engage in formal financial systems and often have to borrow at higher interest rates than those more financially savvy (Lusardi, 2019). Therefore, a good understanding of financial concepts is crucial for SME owners. It helps them make intelligent decisions, utilize financial services appropriately, and potentially enhance their companies' long-term stability and growth.

Having strong financial literacy skills is crucial for MSME practitioners. With a good understanding of finance, they can be more effective in managing the financial aspects of MSMEs, including cash flow management, funding arrangements, and identifying available financial resources. This plays a significant role in sustaining their businesses. Moreover, financial literacy also opens opportunities to allocate generated income more wisely for day-to-day operational needs and long-term investments that can yield future benefits. One form of such investment is through innovation. By investing in innovation, MSMEs can enhance their competitiveness, develop new products or services, or improve operational efficiency for a more sustainable future. Financial literacy is about managing money well and optimizing the value of the income earned. With this approach, MSMEs can leverage their income to create more excellent added value through investment in innovation or intelligent financial management to maintain the sustainability of their businesses (Hutahayan, 2021).

Several studies related to MSME innovation include Fitriatia et al., (2020), Muñoz-Pascual et al., (2019) and Christa & Kristinae, (2021). These studies concur that product innovation has a positive impact on MSME performance. The implications of these studies encourage businesses to collaborate with market-oriented relevant information to identify changes and needs. It also fosters knowledge sharing and innovation to enhance the performance of local products in line with consumer demands. Another study on MSME sustainability was conducted by Hanaysha et al., (2022). Findings indicated that both product and service innovations significantly impact business sustainability. The results also affirm that process innovation is crucial for achieving business sustainability. Lastly, the research emphasizes that marketing innovation significantly impacts business sustainability. These outcomes confirm the importance of innovative capabilities in assisting MSME entrepreneurs in sustaining their businesses and enhancing competitive strength. However, differing research conducted by (Kiveu et al., 2019), found that while product innovation has a positive influence, it is insignificant. The recommendation from this study is to encourage the implementation of innovations with higher levels of novelty by SMEs to boost competitiveness by fostering collaboration between SMEs and knowledge-generating institutions.

Several studies on financial literacy in MSME, including Susan, (2020), P. Irikefe & Isaac, (2021), Sudewi & Dewi, (2022) and Usama & Yusoff, (2019), concluded that financial literacy

significantly and positively influences MSME performance. This aligns with the view that financial literacy is a primary factor in entrepreneurial business performance. However, different findings were presented by (Rosyadah et al., 2022), stating that the correlation between financial literacy and financial inclusion, based on their findings, did not prove to be a driver of MSME sustainability through financial performance.

2. Literature Review

Micro, Small and Medium Enterprises (MSMEs)

MSME stands for Micro, Small, and Medium Enterprises. It refers to businesses with a small or medium scale, limited number of employees, relatively small turnover, and lower capital than large corporations (Purwanto et al., 2022a). Additionally, MSME significantly contributes to the national economy by contributing to the Gross Domestic Product (GDP). Despite limited individuals and resources, the large number of MSME collectively significantly impacts the country's economic growth. The importance of MSME is also reflected in its ability to generate foreign exchange through the export of various products. As a crucial part of the global supply chain, Indonesian MSME has been able to export its products to various international markets, increasing the country's income and showcasing Indonesia's diverse economic potential. With various benefits and its crucial role, support for MSME in terms of policies, funding, training, and market access is critical in strengthening and developing this sector to support inclusive economic growth in Indonesia (Fitriatitia et al., 2020).

Product Innovation

Entrepreneurship involves creating something new (creativity) and innovating from what already exists, aiming for individual success and adding value to society based on an individual's strengths. Innovation involves the successful application of new technology in economic aspects or combining existing technologies to bring about significant changes in the value and pricing offered to customers (Dubey & Das, 2022). A company becomes a leading entity when added value is generated through innovations in events, capabilities, and systems (Pasaribu, 2016). Untuk mampu berinovasi sebagai persaingan, sebuah perusahaan harus memiliki pengetahuan To innovate competitively, a company must have adequate knowledge. Successful sales and satisfying revenue can be achieved through sustained innovation of its products. Product innovation is creating or enhancing products by introducing new features, designs, technologies, or functionalities. This involves developing new ideas, research, and implementation to produce better products that meet the needs of an evolving market. Often, product innovation becomes a way for companies to remain relevant, competitive, and responsive to the ever-changing demands of the market (Purwanto et al., 2022b).

Financial Literacy

According to Klapper & Lusardi, (2020), financial literacy involves an individual's knowledge, skills, and habits in managing finances effectively. It encompasses the relationship between financial understanding and corresponding financial behaviors. Financial literacy represents a comprehensive understanding of managing finances. Overall, financial literacy assesses an individual's ability to comprehend financial aspects and manage finances, forming the basis for making both short-term and long-term decisions in line with the dynamics of needs and economic conditions. Bongomin et al., 2016) Categorize financial literacy into four dimensions: (a) financial knowledge; (b) financial skills, encompassing technical skills, management skills, and entrepreneurial skills; (c) financial attitudes, which translate into several indicators, including obsession, power, effort, inadequacy, retention, and security, and (d) financial behavior.

Financial Well-being

Financial well-being is a state or inner disposition of feeling secure in financial aspects in both the present and the future (Sang, 2021). In other words, financial well-being encompasses the ability to meet unforeseen needs that may arise at any time. It also indicates that an individual or a family has sufficient funds to lead a comfortable life. Price Waterhouse Coopers conducted a study on financial well-being in 2019 (PWC, 2019). The findings from the research state that an individual can be considered to have achieved financial well-being when they do not feel stressed about money are free from debt, can cover routine living expenses, and have the freedom to make choices related to desired improvements in their standard of living. Therefore, a profound understanding of finances is required to achieve a state of financial well-being. Understanding financial matters is crucial and should be known early because (Sang, 2021):

1. To achieve financial well-being, one must have the ability to manage finances within a specific timeframe, and it needs to be a regular practice.
2. To achieve financial well-being, one must respond appropriately to uncertain (ambiguous) realities.
3. To achieve financial well-being, there needs to be a well-thought-out plan to reach prosperous financial goals.
4. To achieve financial well-being, one must have financial freedom to choose what is needed and fulfill those needs.

3. Method

The instrument utilized in this research was an online questionnaire chosen to acquire broader data coverage and use the Internet as the data collection platform. This study involved participants who are business owners in the SME sector distributed across Indonesia. The sample was selected using convenience sampling techniques, considering availability, time, and cost. 300 respondents were gathered and then processed through several stages of analysis. The questionnaire's validity and reliability were tested using the statistical software SPSS. Using the Smart-PLS analysis tool, hypothesis testing was conducted through Structural Equation Model (SEM) analysis - Partial Least Square (PLS).

4. Results and Discussion Characteristics Responden

Table 1
Length of business more than 1 year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	102	34.0	34.0	34.0
	Yes	198	66.0	66.0	100.0
	Total	300	100.0	100.0	

Source: Authors own estimates

Table 2
Business area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lain - lain	8	2.7	2.7	2.7
	Pulau Jawa	112	37.3	37.3	40.0
	Pulau Kalimantan	56	18.7	18.7	58.7
	Pulau Papua	25	8.3	8.3	67.0

	Pulau Sulawesi	45	15.0	15.0	82.0
	Pulau Sumatra	54	18.0	18.0	100.0
	Total	300	100.0	100.0	

Source: Authors own estimates

Based on the characteristics of the 300 respondents above, it can be concluded that most SME owners have been operating their businesses for more than one year, accounting for 198 respondents. At the same time, the remaining 102 are categorized as newly established businesses operating for less than one year. Furthermore, concerning the business area, the highest number of SMEs are in Java Island, accounting for 37.3%, Kalimantan Island with 18.7%, and Sumatra Island with 18%. The least number of SMEs are located in other regions and Papua Island. Based on this data distribution, the most significant number of SMEs are still concentrated in Java Island, Indonesia's economic center.

Table 3
Validity Testing Result

Variable	Indicator	r Calculated	Results
Product Innovation	P1	0.985	Valid
	P2	0.963	Valid
	P3	0.968	Valid
	P4	0.875	Valid
	P5	0.902	Valid
	P6	0.753	Valid
	P7	0.861	Valid
	P8	0.924	Valid
	P9	0.870	Valid
	P10	0.793	Valid
Financial Literacy	FL1	0.988	Valid
	FL2	0.937	Valid
	FL3	0.983	Valid
	FL4	0.986	Valid
	FL5	0.948	Valid
	FL6	0.935	Valid
	FL7	0.964	Valid
	FL8	0.981	Valid
	FL9	0.955	Valid
	FL10	0.923	Valid
Financial Well- being	FW1	0.759	Valid
	FW2	0.837	Valid
	FW3	0.804	Valid
	FW4	0.826	Valid
	FW5	0.748	Valid
	FW6	0.793	Valid
	FW7	0.716	Valid
	FW8	0.838	Valid
	FW9	0.847	Valid
	FW10	0.765	Valid

Source: Authors own estimates

The validity testing used Pearson's Product Moment correlation, which requires the calculated r-value to be greater than the established table r-value of 0.50. The analysis results in the table above indicate that all variable items have an r-value of > 0.50. Therefore, it can be concluded that all variable items in the research have passed the validity test.

Table 4
Reliability Testing Result

Variable	Cronbach's Alpha	rho_A	Composite Reliability
Product Innovation	0.864	0.869	0.978
Financial Literacy	0.952	0.971	0.990
Financial Well-being	0.885	0.885	0.888

Source: Authors own estimates

The Table 4 above displays the Cronbach's alpha and composite reliability values. Based on the results above, it is evident that Cronbach's alpha and composite reliability values for each variable are > 0.70. This indicates that all research variables are reliable, making them suitable for use as instruments in subsequent research.

Table 5
Path Coefficient Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Product Innovation -> Financial Well-being	0.376	0.374	0.056	6.246	0.000
Financial Literacy -> Financial Well-being	0.425	0.429	0.055	8.243	0.000

Source: Authors own estimates

Based on the results of the inner model evaluation in Table 5 above, it can be concluded that the coefficient of influence of Product Innovation on Financial Well-being is 0.376, with a t-statistic of 6.246 and a p-value of 0.000. Since the coefficient is positive, and the t-statistic > t-table (6.246 > 1.96) or p-value < alpha 5% (0.000 < 0.05), it can be concluded that Product Innovation has a proven positive and significant influence on Financial Well-being. Furthermore, the coefficient of influence of Financial Literacy on Financial Well-being is 0.425, with a t-statistic of 8.243 and a p-value of 0.000. Since the coefficient is positive, and the t-statistic > t-table (8.243 > 1.96) or p-value < alpha 5% (0.000 < 0.05), it can be concluded that Financial Literacy has a proven positive and significant influence on Financial Well-being.

Table 6
R-square Value

	R Square	R Square Adjusted
Financial Well-being	0.448	0.426

Financial Well-being has an Adjusted R Square value of 0.426, meaning that the Product Innovation and Financial Literacy of MSME owners can explain 42.6% of Financial Well-being. The remaining portion ($100 - 42.6 = 57.4\%$) is explained by other variables outside the scope of the research model.

Discussion

The findings of this research provide a highly relevant insight into the influence of product innovation and financial literacy on the financial well-being of SMEs. Product innovation is vital to creating competitive advantages and maintaining market share in SMEs. The research results indicate that product innovation has a significant and positive impact on the financial well-being of SMEs. This phenomenon is closely related to the dynamic evolution of the market, where SMEs capable of innovating their products tend to maintain financial stability, enhance profitability, and remain relevant in rapidly changing markets.

Financial literacy also plays a significant role in the financial well-being of SMEs. SME owners with a good understanding of financial concepts, effective financial management, and the ability to make informed financial decisions tend to have better financial well-being. This encompasses understanding financial reports, debt management, day-to-day financial management, and long-term planning.

This research suggests that SME owners who combine product innovation with solid financial literacy have better financial stability. They can more effectively allocate resources for new product development, maintain business liquidity, and make smarter investment decisions for long-term growth. These findings also highlight the importance of supporting and enhancing financial literacy among SME owners. Training programs, access to relevant financial information, and support to improve financial management understanding could be effective strategies to strengthen the SME sector. Meanwhile, initiatives to encourage product innovation need enhancement by providing platforms or collaborative networks enabling the exchange of ideas and knowledge among SME players.

This research emphasizes that product innovation and financial literacy play crucial roles in SMEs' financial well-being. By strengthening both aspects, SMEs have a better chance to survive, grow, and compete in ever-evolving markets.

5. Conclusion and Limitation

This study reinforces SME owners' urgency to develop innovation skills and financial literacy. By leveraging innovation in their products and gaining a better understanding of financial aspects, SMEs can enhance their financial stability, maintain market share, and ensure sustainable business growth. These findings underscore the government's and relevant institutions' importance in providing SMEs with deep resources and training on innovation and financial literacy. This support will assist SMEs in harnessing their full potential to grow and compete in rapidly changing markets.

However, this study has several limitations to consider:

1. The research employed convenience sampling techniques, which may limit the representation of the entire population of SMEs in Indonesia.
2. Online questionnaires may influence respondent engagement and the quality of the data obtained.
3. Focusing on two variables (product innovation and financial literacy) might only encompass some factors influencing the financial well-being of SMEs.

Therefore, future research could consider more variables and employ more representative sampling methods to gain a more comprehensive understanding of the factors influencing the financial well-being of SMEs in Indonesia.

6. References

- Archer, L., Sharma, P., & Su, J.-J. (2020). SME credit constraints and access to informal credit markets in Vietnam. *International Journal of Social Economics*, 47(6), 787–807.
- Avriyanti, S. (2022). Pengaruh Inovasi Produk Dan Teknologi Informasi Terhadap Perkembangan Usaha (Studi Pada UMKM Bidang Kuliner Di Kabupaten Tabalong). *PubBis: Jurnal Pemikiran Dan Penelitian Administrasi Publik Dan Administrasi Bisnis*, 6(1), 61–73.
- Christa, U., & Kristinae, V. (2021). The effect of product innovation on business performance during COVID 19 pandemic. *Uncertain Supply Chain Management*, 9(1), 151–158.
- Dai, M., Liu, H., & Lin, L. (2020). How innovation impacts firms' export survival: Does export mode matter? *The World Economy*, 43(1), 81–113.
- Doni. (2022). *UMKM Naik Kelas, UMKM Go Digital*. <https://www.kominfo.go.id/content/detail/41205/umkm-naik-kelas-umkm-go-digital/0/artikel>.
- Dubey, V. K., & Das, A. (2022). Role of governance on SME exports and performance. *Journal of Research in Marketing and Entrepreneurship*, 24(1), 39–74.
- Eniola, A. A., & Entebang, H. (2017). SME managers and financial literacy. *Global Business Review*, 18(3), 559–576.
- Fitriatita, T. K., Purwanab, D., & Buchdadid, A. D. (2020). The role of innovation in improving small medium enterprise (SME) performance. *Innovation*, 11(2), 232–250.
- Hanaysha, J. R., Al-Shaikh, M. E., Joghee, S., & Alzoubi, H. M. (2022). Impact of innovation capabilities on business sustainability in small and medium enterprises. *FIIB Business Review*, 11(1), 67–78.
- Hutahayan, B. (2021). The relationships between market orientation, learning orientation, financial literacy, on the knowledge competence, innovation, and performance of small and medium textile industries in Java and Bali. *Asia Pacific Management Review*, 26(1), 39–46.
- Irikefe, P., & Isaac, O. (2021). Effect of Financial Literacy on the Growth of MSMEs. *International Journal of Research Publications*, 90. <https://doi.org/10.47119/IJRP1009011220212541>
- Irikefe, P. O., & Opusunju, M. I. (2021). Effect of financial literacy on the growth of micro, small and medium enterprises (MSMEs). *International Journal of Research Publications (IJRP. ORG)*, 384.

- Kiveu, M. N., Namusonge, M., & Muathe, S. (2019). Effect of innovation on firm competitiveness: the case of manufacturing SMEs in Nairobi County, Kenya. *International Journal of Business Innovation and Research*, 18(3), 307–327.
- Klapper, L., & Lusardi, A. (2020). Financial literacy and financial resilience: Evidence from around the world. *Financial Management*, 49(3), 589–614.
- Kusa, R., Duda, J., & Suder, M. (2021). Explaining SME performance with fsQCA: The role of entrepreneurial orientation, entrepreneur motivation, and opportunity perception. *Journal of Innovation & Knowledge*, 6(4), 234–245.
- Lusardi, A. (2019). Financial literacy and the need for financial education: evidence and implications. *Swiss Journal of Economics and Statistics*, 155(1), 1–8.
- Mallinguh, E., Wasike, C., & Zoltan, Z. (2020). Technology acquisition and smes performance, the role of innovation, export and the perception of owner-managers. *Journal of Risk and Financial Management*, 13(11), 258.
- Muñoz-Pascual, L., Curado, C., & Galende, J. (2019). The triple bottom line on sustainable product innovation performance in SMEs: A mixed methods approach. *Sustainability*, 11(6), 1689.
- Okello Candiya Bongomin, G., Ntayi, J. M., Munene, J. C., & Nkote Nabeta, I. (2016). Social capital: mediator of financial literacy and financial inclusion in rural Uganda. *Review of International Business and Strategy*, 26(2), 291–312. <https://doi.org/10.1108/RIBS-06-2014-0072>
- Purwanto, A. H. D., Nashar, M., Jumaryadi, Y., Wibowo, W., & Mekaniwati, A. (2022a). Improving medium small micro enterprise’(MSME) performance. *International Journal of Advanced and Applied Sciences*, 9(5), 37–46.
- Purwanto, A. H. D., Nashar, M., Jumaryadi, Y., Wibowo, W., & Mekaniwati, A. (2022b). Improving medium small micro enterprise’(MSME) performance. *International Journal of Advanced and Applied Sciences*, 9(5), 37–46.
- PWC. (2019). *Employee Financial Wellness Survey*. <https://www.pwc.com/us/en/private-company-services/publications/assets/pwc-2019-employee-wellness-survey.pdf>.
- Rosyadah, K., Mus, A. R., Semmaila, B., & Chalid, L. (2022). The Relevance of Working Capital, Financial Literacy and Financial Inclusion on Financial Performance and Sustainability of Micro, Small and Medium-Sized Enterprises (MSMEs). *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 4, 203–216.
- Sang, N. M. (2021). Financial well-being of Vietnamese students. *Investment Management and Financial Innovations*, 18(4), 355–365.
- Sudewi, N. N. D., & Dewi, S. K. S. (2022). The Effect of Financial Literacy and Intellectual Capital on Financial Performance. *International Journal of Business Management and Economic Review*, 5(4), 240–251.

- Susan, M. (2020). Financial literacy and growth of micro, small, and medium enterprises in west java, indonesia. In *Advanced issues in the economics of emerging markets* (pp. 39–48). Emerald Publishing Limited.
- Taufik, T., & Ayuningtyas, E. A. (2020). Dampak Pandemi Covid 19 Terhadap Bisnis Dan Eksistensi Platform Online. *Jurnal Pengembangan Wiraswasta*, 22(01), 21–32.
- Usama, K. M., & Yusoff, W. F. (2019). The impact of financial literacy on business performance. *International Journal of Research and Innovation in Social Science*, 3(10), 84–91.

Matching Skills to Careers: The Impact of Human Capital on Job Alignment in Malaysia

Low Choon Wei^{a,*}, Mah Pei Yew^b

^aUniversiti Tunku Abdul Rahman, Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000, Kajang, Selangor

E-mail address: cwlow@utar.edu.my

^bUniversiti Tunku Abdul Rahman, Jalan Universiti, Bandar Barat, 31900, Kampar, Perak

E-mail address: mahpy@utar.edu.my

* Corresponding Author: cwlow@utar.edu.my

Abstract

Job mismatch, characterized by a misalignment between the skills and qualifications possessed by the workforce and the demands of available job opportunities, is a pervasive concern with far-reaching implications for economic growth and labour market efficiency. This phenomenon transcends geographical boundaries, affecting both developing and developed nations alike. In this study, we direct our focus toward the Malaysian context, where the interplay between labour market dynamics and educational expansion has yielded both positive and concerning outcomes. The underemployment rate was increasing in Malaysia, registered at 37.4% in the fourth quarter of 2022. This study provides empirical evidence by using logistic regression modeling to predict the likelihood of job matching with the inclusion of human capital factors, such as working experience, and education attainment. Questionnaires were distributed to Malaysian employees online. A total of 347 responses were included in the analysis. Notably, our analysis underscores the pivotal role of working experience and educational attainment in influencing job-matching outcomes. Individuals with a richer reservoir of working experience quantified in years, are shown to exhibit a reduced likelihood of job mismatch, thus highlighting the importance of accrued expertise in securing suitable employment. Furthermore, those equipped with tertiary education qualifications are similarly found to be better positioned in the job market, further reducing the risk of job mismatch. In essence, this study serves as a clarion call for policymakers, educators, and stakeholders in the Malaysian labour market to heed the crucial role of human capital development in addressing the pressing issue of job mismatch. The implications of these findings extend beyond the borders of Malaysia, resonating with global efforts to foster labour market efficiency and sustainable economic growth by ensuring a harmonious alignment between workforce capabilities and the demands of the contemporary job landscape.

Keywords: Job Mismatches, Employment Gap, Qualifications, Experience, Human Capital

1. Introduction

The Malaysian economy has undergone a successful transformation from agriculture to industry and service-based economy over the past several decades. The changes in the economic structures and diversification of industrial activity have led to changes in the composition of trade and investment. Malaysia was one of the world's main producers and exporters of commodities such as rubber, and palm oil. As the economy started its industrialization strategy, the manufacturing sector emerged as an important sector contributing significantly to the country's growth, development, and export earnings. The manufacturing activities are made up of rubber and oil palm processing and manufacturing, electronics, smelting, logging, and timber processing. Today, Malaysia is one of the world's leading producers and exporters of electrical appliances, electronic parts, and components.

With initiatives under the Sustainable Development Goals (SDGs) and the "Environmental, Social and Governance" initiative, the world is moving towards a greener economy, a more equal society, and better governance (Har, Kee, Lee, & Low, 2022). In terms of sustainable development, income inequality is a persistent problem for policymakers and academic study, but it has only lately been connected to a green economy. Income inequality is one of the consequences of job mismatches. The results of the study by Har *et al.* (2022) show that it is very difficult to achieve the three goals of low inequality, a green economy, and excellent governance, especially in middle-income countries. Among medium-income countries, the transition to a green economy has a statistically insignificant effect on income disparity between the highest and middle quantiles, but it is detrimental among the lowest quantiles.

This study focuses on the labour market and employees' perspectives. A glance at recent labor market statistics shows that there was an expansion in the labor market as indicated by an increase in the number of the labor force by 28.4% between 2010 to 2021. In 2021, the number of the labor force in Malaysia was registered at 15.7 million persons. The number of employed persons had the same trend, increasing by 26.6%. Although there was an increase in the number of employed persons, the unemployment rate in Malaysia was at its highest at 4.6% in 2021. It was the highest in recent years as compared to 2.9% in 2014. Another important note to take was the underemployment issue. The skill-related underemployment increased from 32.2% in 2015 to 37.4 in the fourth quarter of 2022. While time-related underemployment spiked from 1.9% in 2015 to 2.4 in the fourth quarter of 2020 (Department of Statistics Malaysia, 2022).

The expansion in the education sector is indicated by the significantly large number of graduates entering the labor market (5.61 million persons in 2021 compared to 4.28 million persons in 2016) (Ministry of Higher Education, 2022). Employers nowadays are facing difficulties in matching the right talents with their vacancies (Lee, 2022). Various organizations and agencies had been established by the Malaysian Ministry of Human Resources (MOHR) such as Talent Corporation (TalentCorp) Malaysia Berhad and Human Resource Development Corporation (HRDC). With the establishment of agencies and their effort in preparing the reskilling and upskilling programs, Malaysia has proven to have the ability to tackle unemployment (Azalea Azuar, 2022). However, the biggest issue now is not unemployment, is the mismatch of talents.

The objectives of this study are i) to investigate the happening of job mismatch among Malaysian employees, and ii) to examine the impact of human capital factors on the probability of job-matching outcomes. Job mismatch affects economic growth, as it reduces the utilization of skills, then labor productivity. It is therefore important to understand the impact of human capital on job matching.

2. Methodology

Research has primarily focused on the impact of job mismatches, such as wage equilibrium (Kim & Choi, 2018; Mateos-Romero & Salinas-Jiménez, 2018; Veselinovic, Mangafic, & Turulja, 2020); Zhu, 2014) and job satisfaction (Kim & Choi, 2018; Mateos-Romero & Salinas-Jiménez, 2018). Our study provides a unique context to examine how human capital factors link to the happening of job mismatch. This study involves 347 Malaysian employees in a questionnaire survey. As the research framework is guided by the Human Capital Theory by Becker (1961) and Sweetland (1996), this study includes human capital variables such as working experience, education attainment, and rewards. Gender is employed as a control variable. Working experience is expressed as the years of working experience. Education attainment is classified as “with tertiary education” and “without tertiary education”. Rewards refer to the number of rewards provided by employers. While gender is categorized as “male” and “female”. This study employed a logistic regression model to examine the impact of human capital factors on the probability of job-matching outcomes.

3. Results and Discussions

Table 1 shows the summary statistics in this study. Among the Malaysian employees (n=347) involved in this study, 42.4% (n=147) of them were considered mismatched in their job, otherwise. In the qualification mismatched category, 61.9% (n=91) were male while 38.1% (n=56) were female. On marital status, the percentage of respondents who had not yet married (53.1%) was slightly higher compared to respondents (46.9% or n=69) who had married. If we investigated educational attainment, about 70% (n=240) of the respondent had tertiary education. Among the same group, 93% (n=186) were not experiencing job mismatched. The Chi-square test analysis shows gender (p -value = 0.022) and educational attainment (p -value = 0.000) were associated with job matching.

Table 1
Summary Statistics

		Mismatched	Matched	Chi-Square
Gender	Female	56 (38.1)	101 (50.5)	5.263 (0.02)
	Male	91 (61.9)	99 (49.5)	
Ethnicity	Chinese	48 (32.7)	66 (33.0)	2.328 (0.50)
	Malay	77 (52.4)	114 (57.0)	
	Indian	20 (13.6)	19 (9.5)	
	Others	2 (1.4)	1 (0.5)	
Educational Attainment	Without Tertiary Education	93 (63.3)	14 (7.0)	125.766 (0.00)
	With Tertiary Education	54 (36.7)	186 (93.0)	
Looking for Job Switching	Not Looking for Other Jobs	100 (68.0)	131 (65.5)	0.243 (0.62)
	Looking for Other Jobs	47 (32.0)	69 (34.5)	
Marital status	Not Yet Married	78 (53.1)	107 (53.5)	0.007 (0.94)
	Married	69 (46.9)	93 (46.5)	

Source: Authors own estimates

Note: *Figures are frequencies; percentages and p-values are in parentheses; n=347*

Our regression analysis focuses on the impact of human capital factors on job-matching outcomes. Table 2 presents the logistic regression result. Findings show that working

experience and education attainment are negatively associated with job mismatch and can significantly influence job-matching outcomes. For every year's increase in working experience, the odds ratio is 0.964. This indicates that with every year's increase in working experience, Malaysian employees would be less likely to have job mismatch by a factor of 1.03 (1/0.964). Employees with more experience may have a higher self-awareness. They developed a deeper understanding of job demands such as skills, knowledge, and qualification. Also, they would become more familiar with their job roles and career path. As time goes by, they accumulate a wide range of skills and expertise through their work experience. Hence, their knowledge and ability to learn from past experiences can reduce the likelihood of a job mismatch.

Next, for Malaysian employees who received tertiary education, the odds ratio is 0.260. This shows that Malaysian employees with tertiary education would be less likely to experience job mismatch by a factor of 3.85 (1/0.26). Tertiary education provides specialized knowledge and skills in accordance with the field of study. Having relevant knowledge and skills, Malaysian employees are more likely to secure a job that aligns with their educational background. Another key to note is that employers may prefer hiring individuals with higher education qualifications. They assume that higher education qualifications provide individuals with competitiveness and a higher ability in performing their tasks.

Table 2
Logistic Regression Results

	Coefficient	Standard Error	Wald	Exp(B)
Gender (Male)	.267	.258	1.079	1.307
Working experience (in years)	-.037	.016	5.457	.964**
Education Attainment (With tertiary education)	-1.348	.258	27.318	.260*
Number of benefits	-.038	.084	.211	.962
Constant	1.945	.690	7.951	6.992

Source: Authors own estimates

Note: Male as the reference group for gender; "with tertiary education" as the reference group for education attainment; n = 347; * significant at 1% level; ** significant at 5% level

4. Conclusion

The current study provides essential practical implications. The findings revealed that human capital factors including working experience and educational attainment are important for individuals to remain relevant in the job market. These results point to the importance of employers protecting the well-being of their employees such as rewards and benefits, recognitions, promotion opportunities, and work-life balance to enhance job satisfaction, and hence, retain them in the organization. Otherwise, their employees may consider switching organizations and experience job mismatches with irrelevant working experience in their new jobs. In addition, the findings in this study also revealed the importance of tertiary education. As Malaysia is in the era of the Fourth Industrial Revolution (IR4.0), most of the ways of work had changed. Job applicants are encouraged to enhance their skills and obtain relevant skills before joining the job market. It is important for higher education institutions to offer programs and syllabi that are relevant to prepare future-ready talent.

Despite the important implications, the main limitation of this study is the data collected without capturing the program studied by Malaysian employees. Future research should

consider having this information to have a more comprehensive analysis of the human capital factor (from the educational perspective).

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6. References

- Azalea Azuar (2022). Job market is facing mismatch of talents rather than unemployment. *The Malaysian Reserve*. <https://themalaysianreserve.com/2022/08/11/job-market-is-facing-mismatch-of-talents-rather-than-unemployment/>
- Department of Statistics Malaysia (2022). *Labour Force Statistics Report Q3 2022*. Putrajaya.
- Har, W. M., Kee, X. N., Lee, H. S., & Low, C. W. (2022). Green Economy and Good Governance Towards Income Equality: A Quantile Analysis. *Journal of Sustainability Science and Management*, 17(9), 62-74.
- Kim, S. J., & Choi, S. O. (2018). The effects of job mismatch on pay, job satisfaction, and performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 4(4), 49. <http://dx.doi.org/10.3390/joitmc4040049>
- Lee, W. K. (2022). Cover Story: Mismatch in the job market. *The Edge Malaysia*. <https://theedgemalaysia.com/article/cover-story-mismatch-job-market>
- Mateos-Romero, L., & Salinas-Jiménez, M. D. M. (2018). Labor mismatches: Effects on wages and on job satisfaction in 17 OECD countries. *Social Indicators Research*, 140, 369-391. <http://10.1007/s11205-017-1830-y>
- Ministry of Higher Education (2022). *Graduates Statistics 2021*. Putrajaya.
- Sweetland, S. R. (1996). Human capital theory: Foundations of a field of inquiry. *Review of educational research*, 66(3), 341-359.
- Veselinovic, L., Mangafic, J., & Turulja, L. (2020). The effect of education-job mismatch on net income: evidence from a developing country. *Economic research-Ekonomska istraživanja*, 33(1), 2648-2669. <https://doi.org/10.1080/1331677X.2020.1723427>
- Zhu, R. (2014). The impact of major–job mismatch on college graduates' early career earnings: Evidence from China. *Education Economics*, 22(5), 511-528. <https://doi.org/10.1080/09645292.2012.659009>

Research on the Evolution of International Intellectual Property Trade Network and China's Competitiveness

Hou Xiaoli^a, Rini Suryati Sulong^{b,*}

^a Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, 88400, Kota Kinabalu, Sabah, Malaysia

Management College, Beijing Union University, 100101, No. 97, North 4th Ring East Road, Chaoyang District, Beijing, China

E-mail address: houxiaoli@buu.edu.cn

^b Labuan Faculty of International Finance, Universiti Malaysia Sabah, 87000, Jalan Sungai Pagar, Federal Territory of Labuan, Malaysia

E-mail address: yati2002@ums.edu.my

*Corresponding author: yati2002@ums.edu.my

Abstract

China is already a big country in international patent application, but there is still a big gap from becoming an innovation power and a power in international intellectual property trade. Examining the patterns and evolution of international intellectual property trade helps to grasp the scale, internal characteristics, and development trends within the global intellectual property market, enabling a precise assessment of China's standing and competitiveness in the international intellectual property arena. This paper examines intellectual property royalty data from 66 key countries and regions. By analyzing the global intellectual property rights trade volume changes and China's trade growth rates from 2000 to 2019 and using Social Network Analysis, it calculates indicators such as density, centralization, degree centrality, and weighted degree centrality to assess the evolution of the international intellectual property trade network and China's changing status within it. The findings indicate that intellectual property trade between countries has intensified, leading to more frequent trade interactions with a “core-periphery” structure and small-world features. Over time, the centralization pattern in international intellectual property trade initially strengthened but later declined amid turmoil. Developed countries, notably the United States, saw a diminishing core position, while emerging nations experienced rapid growth. China exhibits strong competitiveness, showing a gradual improvement in its position. However, it faces a growing trade deficit and needs to enhance its international influence and position within the global value chain.

Key words: Intellectual Property Trade; Evolution; Social Network Analysis; China's competitiveness

1. Introduction

As one of the three legal texts of the World Trade Organization, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) stipulates that intellectual property rights include the following contents: copyright, trademark, geographical indication, industrial product design, patent, integrated circuit layout design, undisclosed information, etc. Being not

only an intellectual achievement but also a tradable commodity, intellectual property can eliminate the restrictions of natural endowment and become a trade capital. It not only enriches the theory of international trade but also spurs scientific and technological innovation and economic revitalization in practice. As an important growth point of the world economy, intellectual property trade is closely related to the division of labor and the distribution of interests in the global value chain. It has become an important tool for countries to seek international competitive advantage.

China has paid unprecedented attention to intellectual property rights. In September 2021, the CPC Central Committee and the State Council issued *the Outline for Building an Intellectual Property Power (2021-2035)*, which raised the comprehensive strength of China's intellectual property rights and the building of a world-class intellectual property power with Chinese characteristics to the height of national strategy. According to the World Intellectual Property Index Report released by the World Intellectual Property Organization (WIPO), China surpassed the United States in 2019 and became the largest source of international patent applications submitted through WIPO. However, what does not quite match is that in the Global Innovation Report issued by the WIPO in 2021, China only ranks 12th. The quality and quantity of intellectual property rights are unbalanced, which does not meet the national strategic positioning and requirements for high-quality intellectual property rights development, which must be understood and measured in the world pattern. Intellectual property trade is urgently required for China's high-quality economic growth in the new era. What is the current situation of international intellectual property trade? What kind of development and change has it experienced? What is China's position and competitiveness? These are the main problems that this paper focuses on and needs to solve.

As for the current situation and evolution of international trade in intellectual property rights, scholars have mainly carried out some research from the dimensions of developed countries such as America and European countries, China, and some cities. Based on the analysis of the evolution process of the scale, composition, and direction of international trade in the United States, Zhao Y. (2013) proposed that developed countries are currently the main participants in intellectual property trade. However, the proportion of developing countries is rising rapidly. Ren H. (2020) found that China's intellectual property trade has made significant progress in promoting the intellectual property power strategy. However, the difference between China and the international intellectual property trade power is still huge. Xu et al. (2021) believed that China's competitiveness in intellectual property trade has been continuously enhanced, but it is still at a disadvantage in international competition. However, Liu Q. (2016) found that China's global competitive disadvantage is pronounced, and its competitiveness is declining. Xu, X. and Li, Y. (2011) pointed out that China's intellectual property trade structure is still unreasonable, the international market share is still meager, the comprehensive competitiveness of intellectual property trade is also very weak, and the imbalance is severe. Dai, Z. (2007) found through empirical calculation that the competitiveness index of China's patent and licensing trade has decreased significantly yearly, which should be paid great attention to.

The existing research on intellectual property trade is mainly carried out from a static perspective. The international intellectual property trade pattern is not analyzed from the network structure and evolution perspective. The research on the competitiveness of China's intellectual property trade is also primarily based on the competitive advantage index (TC index), the dominant comparative advantage index (RCA index), and other indicators, lacking an analytical perspective on the dynamic trade network.

2 Data Sources and Research Methods

2.1 Data Sources

This paper selects the bilateral intellectual property royalties exports in the OECD database (unit: US \$100 million) of 66 major countries/regions including China based on three-time nodes of 2000, 2010, and 2019. These countries/regions were selected on the basis of five indicators including the import amount of intellectual property royalties, the export amount of intellectual property royalties, the number of patent applications, the ranking of the Global Innovation Index and the total GDP, which can reflect a country's technology, innovation and economic strength. Statistics show that the import and export of intellectual property royalties, the number of PCT patent applications, and the total GDP of the 66 research objects in 2019 accounted for more than 90% of the global annual total, respectively. Therefore, it can basically represent the overall situation of international trade in intellectual property in the past 20 years.

2.2 Research Methods

Social network analysis can visualize the complex relationship between research objects. The main indicators of concern include centrality, density, structural holes, and other indicators mainly formed based on the node relationship, which can easily calculate and evaluate the network's topological properties and spatial structure (Scott, 2011). This paper uses the social network analysis method to construct the international intellectual property trade network (IPTN), analyzes its topological nature and structural evolution law, and visually presents and interprets the current situation of international intellectual property trade and China's status and competitiveness. In the intellectual property trade network, nodes represent countries (regions), and ties represent intellectual property trade relations between countries (regions). The direction of ties indicates import and export relations, and trade volume can be reflected in the thickness of ties as a weight.

IPTN is defined as a directed weighted network. The structure-related indicators include density, average clustering coefficient, and average path length. The nodes-related indicators include degree centrality, weighted degree centrality, out-degree centrality, weighted out-degree centrality, in-degree centrality and weighted in-degree centrality.

3. Characteristics and Evolution of IPTN

3.1 Intensified Relationships and Small-world Characteristics

In the context of the global intellectual property rights trade network, intellectual property trade relations among countries have intensified, with greater frequency and intensity. According to Table 1, the number of edges increased from 3879 in 2000 to 4055 in 2010, and remained basically stable by 2019. The network density and average degree both increased by 2% to 5%, along with higher minimum out-degrees and minimum in-degrees, signifying a gradual rise in the number of trade partners among countries. The increase of trade intensity is reflected in the significant increase of trade amount. The average weighted degree increased from 1356.828 to 6185.567, achieving a significant increase. The increasing frequency and depth of global intellectual property trade activities can also be intuitively reflected in Figure 1. The edges are increased, the lines are thickened, and the horizontal and vertical relationship is deepening day by day.

Table 1 Basic Network Indicators of IPTN in Three Key Time Nodes

Indicators	Time nodes		
	2000	2010	2019
Network density	0.904	0.945	0.924
Number of edges	3879	4055	3963
Average degree	58.773	61.439	60.045
Maximum out-degree	65	65	65
Minimum out-degree	39	43	41
Maximum in-degree	65	65	65
Minimum in-degree	33	43	38
Maximum weighted out-degree	45667.69	100867.87	105598.00
Minimum weighted out-degree	2.12	6.78	4.12
Maximum weighted in-degree	14274.34	36002.35	75323.90
Minimum weighted in-degree	11.89	33.73	63.33
Average weighted degree	1356.828	3923.74	6185.567
Central potential	0.0980	0.1009	0.0280
Central entry potential	0.0286	0.0334	0.0195
Average clustering coefficient	0.916	0.949	0.931
Average path length	1.096	1.055	1.076

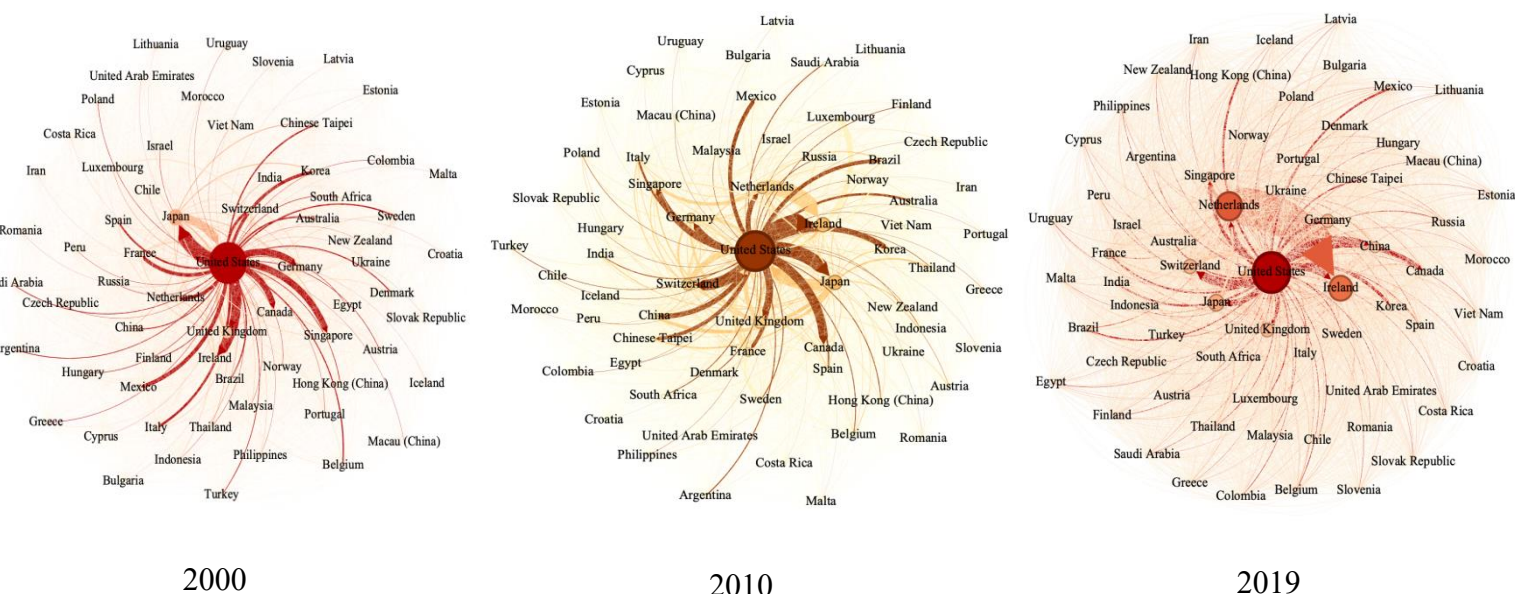


Figure 1 IPTN in 2000, 2010 and 2019

Small world refers to the strong correlation between nodes, which can be established through a shorter path. The criterion is that the average path length is less than 10 and the clustering coefficient is greater than 0.1 (Valverde, et al., 2002). Over the past 20 years, the average clustering coefficient of IPTN has gradually increased from 0.916 to 0.931, and the average path length has gradually decreased from 1.096 to 1.076. The small-world feature has become more apparent, indicating that the consumption and diffusion of intellectual property rights are more frequent and efficient.

3.2 Strengthening Centralization and Gradual Decentralization

The international intellectual property trade network presents a pronounced “core-periphery”

structural feature. The core countries are the United States and Japan in 2000, the United States, Ireland, and Japan in 2010, and the United States, Germany, the Netherlands, Switzerland, and the United Kingdom in 2019. Japan gradually lost its dominant position, while the United States has been at the core. However, the overall centrality of the trade network has undergone an evolutionary process, transitioning from weak to strong and then from strong to weak. This signifies a gradual centralization followed by gradual de-centralization, reflecting a diminishing central and controlling role of core countries and strengthening trade exchanges among peripheral countries and regions. According to the overall centrality of the intellectual property trade network, the centralization pattern of the international intellectual property trade network can be divided into the following three stages (as shown in Figure 2):

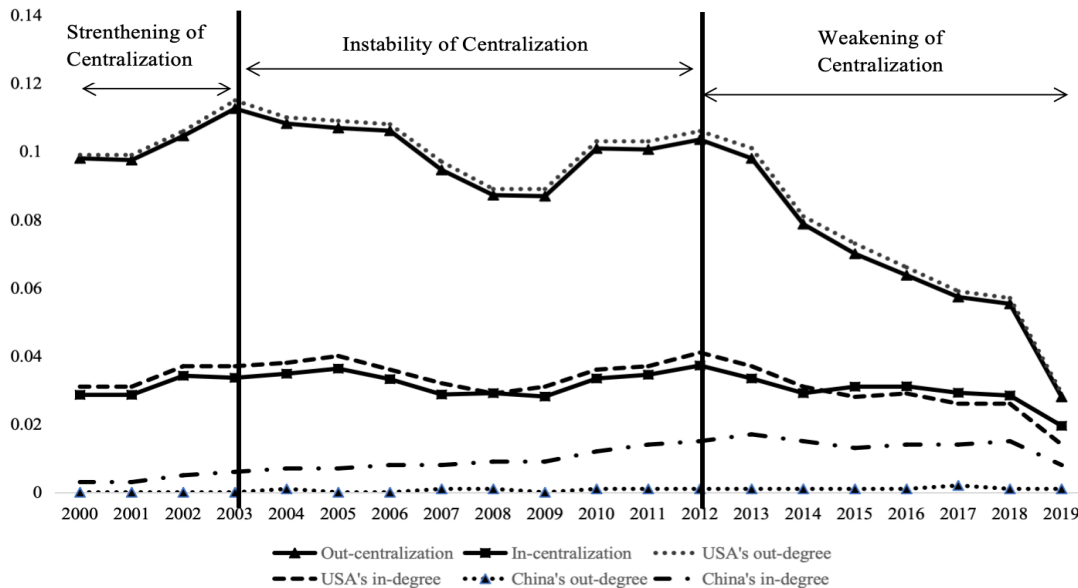


Figure 2 The Centralization of IPTN and the In-degree and Out-degree Centrality of China and the United States

The first stage is from 2000 to 2003, the stage of strengthening centralization. With the gradual growth of intellectual property applications and trade volume, the out-degree centrality of core countries in the network such as the United States (from 0.099 to 0.115), Japan (from 0.021 to 0.022), the United Kingdom (from 0.014 to 0.020), Germany (from 0.008 to 0.011), the Netherlands (from 0.009 to 0.021), Switzerland (from 0.009 to 0.013) has gradually increased, with the United States being the most prominent, with the out-degree centrality rising by 16%, reaching the highest level in 20 years. The increase in the out-degree centrality of major countries has led to a significant increase in the overall out-centralization of the international intellectual property trade network (from 0.098 to 0.1126), indicating that the world's export pattern has been constantly centralized, and the status of core countries has been steadily consolidated. Compared with the out-degree centrality, the in-degree centrality of the main core countries except the United States (from 0.031 to 0.037) has not changed significantly, and the overall in-centralization has increased from 0.0286 to 0.0336. It's evident that the import pattern has also exhibited a trend of continuous centralization during the same period as the export pattern, although it's less pronounced.

The second stage is from 2003 to 2012, the stage of instable centralization. In 2003, there was a downward trend in in the in-centralization and out-centralization. In particular, the trend of out-centralization has been pronounced since 2007, especially in the United States. Japan, Germany, Switzerland, the United Kingdom, and other countries' out-degree centrality is

relatively stable, while the in-degree centrality is relatively volatile. Due to the financial crisis, countries worldwide started emphasizing independent scientific and technological innovation as well as independent intellectual property rights. This shift led to increased intensity and stronger relationships in international intellectual property rights trade. It also gradually reduced dependence on core countries like the United States. The import and export status of core countries in intellectual property trade was severely affected, especially during the 2008 financial crisis, which had a significant impact on the United States and global intellectual property trade, with a noticeable centralization trend.

The third stage is from 2012 to 2019, the stage of weakening centralization. The out-centralization of the overall network has decreased significantly, while the in-centralization is relatively stable. The out-degree centrality of the United States declined greatly, while other countries remain relatively stable. The export pattern of international intellectual property trade has entered a stage of diversified development. On one hand, the economic recovery in developed countries, which form the core of the intellectual property trade network, is sluggish. In contrast, emerging countries like the BRICs are experiencing robust economic growth, accompanied by an increase in their intellectual property capabilities. On the other hand, governments are increasingly focusing on independent intellectual property research and development, leading to greater participation in international intellectual property trade by various countries. In 2013, China put forward the Belt and Road initiative, and the relevant countries continued to strengthen trade exchanges, weakening the position of traditional intellectual property trading power to a certain extent.

It can also be seen from Figure 2 that the out-degree centrality and in-degree centrality of the United States are consistent with the global in-centralization and out-centralization, indicating that the United States plays a decisive role in the pattern of global intellectual property trade. The change of the international intellectual property trade centralization is also the change of the core position of the United States. The center position of the United States in the international intellectual property trade has also been gradually strengthened and gradually weakened in turmoil.

4. China's Competitiveness in IPTN

4.1 Rapid Development Trend

In the process of the gradual centralization and decentralization of the international intellectual property trade network, China has maintained a rapid development trend. The annual average export growth rate (26.03%) and the annual average import growth rate (20.22%) were higher than the growth rate of total international intellectual property trade (8.61%). China's total trade volume of intellectual property rights in 2019 has increased 25 times compared with that in 2000. China's ranking of weighted degree, weighted out-degree and weighted in-degree in the network continues to rise (as shown in Table 2), especially the weighted in-degree, which has risen to the third place in the world, and the weighted degree ranking has also entered the top ten in the world, indicating that China's position in the world's intellectual property trade is becoming stronger and stronger.

Table 2 China's Ranking of Weighted Degree, Weighted Out-Degree and Weighted In-Degree in IPTN

	2000	2010	2019
Weighted degree	22	10	8
Weighted out-degree	31	24	15
Weighted in-degree	18	8	3

4.2 Growing Trade Deficit

It's worth noting that while China has consistently seen substantial growth in its total intellectual property rights trade over the past two decades, it has also experienced a widening trade deficit. In 2019, this deficit reached nearly \$27 billion, a stark contrast to China's world-leading number of patent applications. China's in-degree centrality in the intellectual property trade network has been increasing from 0.003 to 0.008 in 2000, while the out-degree centrality has been hovering around 0.000-0.002. The import-export imbalance is quite pronounced, with a substantial gap when compared to the United States' out-degree and in-degree centrality.

China's enhanced position in the overall network results from its significant acquisition of intellectual property rights, highlighting ample room for improvement in innovation capabilities. Strengthening the development of independent intellectual property rights is essential. While China's overall trade status is on the rise, there's a need to bolster the export capacity of intellectual property trade. Nevertheless, it's undeniable that China's rapidly growing import trade reflects its focus on high-tech imports. The continuous acquisition of intellectual property rights has also spurred domestic independent intellectual property research and development, stimulating foreign trade growth and presenting significant growth potential.

5 Conclusion

Based on the data of intellectual property royalties in the OECD database, this paper uses the social network analysis method to analyze the characteristics and evolution trend of the intellectual property international trade network and China's competitiveness and status in it. The following conclusions are obtained:

- a. From the perspective of the overall intellectual property rights trade network, the trade relationship among countries has increased with greater frequency and intensity, showing a pronounced "core-periphery" structure and small-world characteristics.
- b. The trade of intellectual property rights among countries has increased, with the United States and European nations maintaining their dominant position and influence globally, especially the United States. Nevertheless, following a period of gradual centralization and turbulence, the international intellectual property trade network has exhibited a discernible trend towards reduced centralization since 2012. This suggests a diminishing central and controlling role for core countries, an increasing centralization status for emerging countries like China, and a continuous strengthening of intellectual property trade among other peripheral countries and regions. The international intellectual property trade pattern is evolving towards multi-polarization.
- c. China's performance in the international intellectual property trade landscape is very eye-catching. The annual average export and import growth rate are both higher than the total international intellectual property trade growth rate. The total trade volume of intellectual property rights in 2019 has increased 25 times compared to 2000. China's total import trade of intellectual property rose from the 22nd place in 2000 to the 8th place in 2019. However, there has also been a gradual widening of the trade deficit, highlighting a significant import-export imbalance and substantial growth potential.

When examining the international landscape of intellectual property trade, it is anticipated that China's global intellectual property trade will see future development, though the challenge is substantial. Guided by the intellectual property power strategy, the goal is to maintain leadership in the number of intellectual property applications worldwide, balance trade by boosting exports through imports, and prioritize quality alongside quantity. Concurrently, it is

imperative for China to optimize the industrial structure, achieve transformation and upgrading within manufacturing and service sectors, nurture high-quality innovation entities in the market, increase investments in research and development, strategically plan international patents to take a leading role in innovation and strengthen its position within the global innovation chain. The high-quality development of intellectual property trade is pivotal for improving the international trade environment, mitigating the impact of trade frictions and global economic fluctuations, cultivating China's innovation strengths, optimizing China's global trade standing, and achieving high-quality economic development in China.

References

- Dai, Z. (2007). Analysis and Measurement on the Competitiveness of Chinese Intellectual Property Trade. *Journal of International Trade*, 8, 73 - 77.
- Liu, Q., & Li, B. (2016). A Comparative Research on International Competitiveness Evolution of Intellectual Property Service Trade in 8 Countries. *Science and Technology Management Research*, 12, 135-139.
- Ren Hang.(2020). Comparative Study on the Competitiveness of China-Japan-Korea Intellectual Property Trade. *Jiangsu Commercial Forum* (04),36-38.
- Scott, J. (2011). Social network analysis: developments, advances, and prospects. *Social Network Analysis and Mining*, 1(1), 21 - 26.
- Valverde, S., Cancho, R. F., & Sole, R. V. (2002). Scale-free networks from optimal design. *Europhysics Letters*, 60(4), 51-5172.
- Xu, L., Tan, J., Xie, Y. & Li, Z.(2021).Research on Improving the International Competitiveness of China's Intellectual Property Trade Against the Background of High Quality Foreign Trade Development. *China Circulation Economy*(24),21-25.
- Xu, X., & Li, Y. (2011). Analysis on the International Competitiveness of China' s Intellectual Property Trade. *Price:Theory & Practice*, 5, 83 - 84.
- Zhao, Y. and Du D..(2013).The Characteristics and Trend of American International Trade in Intellectual Property. *Forum on Science and Technology in China*(09),153-160.

Factors Influencing Urban B40 Participation in E-Commerce: Evidence from Selangor, Malaysia

**Azira Abdul Adzis^{a,*}, Md. Shahin Mia^b, Aidi Ahmi^c, Muhammad Muhaizam Musa^d,
Nur Shahira Ahmad Khan@ Ahmad Han^e**

^a**Economic & Financial Policy Institute (ECOFI)**, School of Economics, Finance and Banking, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-mail address: azira@uum.edu.my

^b**School of Economics, Finance and Banking**, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-mail address: shahin@uum.edu.my

^c**School of Economics, Finance and Banking**, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-mail address: shahin@uum.edu.my

^d**School of Economics, Finance and Banking**, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-mail address: shahin@uum.edu.my

^e**School of Economics, Finance and Banking**, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-mail address: shahin@uum.edu.my

*Corresponding Author: azira@uum.edu.my

Abstract

According to World Bank data, Malaysia's urban population increased from 26.6% in 1960 to 76.6% in 2019. Urban poverty has become more prominent, particularly worsened by the Covid-19 pandemic, resulting in job losses due to business closures. However, the pandemic has also witnessed a significant surge in e-commerce, with more people buying and selling goods and services online. This development is seen as a positive step towards improving the economic status of Malaysian citizens, especially among the urban B40 group. This study explores the factors influencing the participation of urban B40 residents in e-commerce in Selangor, one of the urban states in Malaysia. Primary data was collected through online questionnaires sent to B40 residents in Selangor from 2022 to 2023, with a total of 162 responses successfully obtained. Among these, 130 respondents (80.2%) participated in e-commerce, while 32 respondents (19.8%) did not. The findings indicate that e-commerce skills

and knowledge and e-commerce infrastructure significantly influence the participation of urban B40 group in e-commerce. These findings offer valuable insights for the Malaysian government to provide more e-commerce trainings and improve e-commerce infrastructure to encourage lower-income groups in urban areas to participate in e-commerce to enhance their standard of living.

Keywords: E-commerce, B40, and Urban.

1. Introduction

Data from the World Bank shows that the urban population in Malaysia had increased from 26.6% in 1960 to 76.6% in 2019⁴. Malaysian states that recorded high urbanization rate in 2019 are W.P Putrajaya (100%), W.P Kuala Lumpur (100%), Pulau Pinang (96.2%), Melaka (95.2%), Selangor (94.5%), W.P Labuan (89.2%), Perak (81%), and Johor (79.8%). In relation to this, Household Income Survey (HIS) 2019 reported that the rate of relative poverty in Malaysia has increased from 15.9% in 2016 to 16.9% in 2019. Relative poverty is measured based on the standard of living determined by the level of household income, where the HIS 2019 revealed that the urban areas such as Melaka, Selangor, Johor and Penang exhibit a higher relative poverty compared to other states in Malaysia. This implies that the household income in those areas, particularly among the B40 income group, might not be enough to afford anything above the basics.

The Covid-19 pandemic that erupted in late 2019 in Wuhan, China and spread around the world has had a huge impact on the global economy and many had lost their jobs due the drastic economic shutdown. The pandemic however, has witnessed a dramatic increase in e-commerce as the population begins to sell and buy goods & services online due to the restrictions in daily movement to curb the spread of the Covid-19. In relation to this, data from the Department of Statistics Malaysia (DOSM) show that Malaysia's e-commerce revenue nearly doubled within three years, surging from RM447.8 billion in 2017 to RM896.4 billion in 2020, creating opportunities for anyone involved in e-commerce to increase their income.

This scenario is seen as positive to improve the economic status of Malaysian citizens, especially among B40 groups in urban areas. However, there are some challenges that they might face when running an online business such as cyber security threats, lack of digital skills, lack of access to the internet and smart devices, limited production capacity, high fulfilment and logistics cost, and lack of knowledge regarding market access and regulations.

In this regard, empirical studies on factors e-commerce participation suggest that infrastructure factors, social network factors, cognitive factors, and resource endowment factors have a significant impact on the participation of poor households in e-commerce in China (Lin et. al., 2021). Another study in China, Ma et al., (2020) recommend that Internet use plays a significant role in determining farmers' willingness to adopt e-commerce. Moreover, government support also plays a significant role in influencing the adoption of e-commerce, such as government policies and subsidies, appropriate information on e-commerce, financial support, and e-commerce promotion (Alam et al., 2008; Alam and Noor, 2009; Gunto and Alias, 2014; Abu Bakar et al., 2020). Furthermore, Ariansyah et al., (2021) emphasize that digital and IT skills are prerequisites for e-commerce adoption.

⁴ The rate increases to 78% in 2022.

In the Malaysian context, Abd Hadi et. al., (2020) discover that the involvement of B40 entrepreneurs in marketing and selling their products via e-commerce was still low. A majority of them only utilized e-commerce for buying purposes and not for selling purposes even though they had products to be marketed. This triggers interesting questions such as what factors that influence urban B40 in Malaysia to participate in e-commerce? This study will therefore explore the factors influencing urban B40 in Malaysia to participate in e-commerce by employing B40 sample in Selangor, one of the urban states in Malaysia.

2. Methodology

Primary data was employed to explore the factors influencing urban B40 to participate in e-commerce. Questionnaires in the form of Lime Survey had been distributed via electronic medium such as Facebook, Instagram, WhatsApp and e-mail to B40 households in Selangor who are involved in e-commerce starting from July 2022 until August 2023. The data was also collected by engaging directly with merchants at locations like Uptown Damansara and the Selangor State Development Corporation (PKNS) complex to get insight into those who are not involved in e-commerce.

The questionnaire was developed based on Lin et al., (2021), Ariansyah et al., (2021), Huang et al., (2020), Abu Bakar et al., (2020), and Hamdan et al., (2016) and consisted of eight sections; Section A collected information about the type of e-commerce participation, Section B gathered information about the skills and knowledge of the respondents, Section C asked respondents on the government support, Section D obtained information on the e-commerce cost, Section E collected information on the e-commerce infrastructure, and Section F obtained socio-demographic information of the respondents. Five-point Likert-type scale ranging from "1=strongly disagree" to "5=strongly agree" was used to measure the independent variables which are e-commerce skills and knowledge, government support, e-commerce cost, and e-commerce infrastructure, while the dependent variable was measured by binary variable, 1 = If respondents participated in e-commerce, 0 = Otherwise.

The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 26. The Cronbach's Alpha analysis was conducted to assess the reliability (internal consistency) of the questionnaire items. The results showed that all reliability alphas were above the threshold of 0.60, indicating good internal consistency (Nunnally and Bernstein, 1994). Two versions of the questionnaire were provided to the respondents, one in English and one in Malay. In total, 162 respondents, who are categorized as B40 entrepreneurs, participated in the study.

3. Findings

3.1 Descriptive Analysis

Table 1
Description of the Sample

Characteristic	E-commerce Participation (n=162)	
	Yes	No
	130 (80.2%)	32 (19.8%)
Gender		
Male	50 (38.46%)	0 (0%)
Female	80 (61.54%)	32 (100%)
Total	100%	100%

Age		
18 and below	2 (1.54%)	19 (59.38%)
19-29	53 (40.77%)	5 (15.62%)
30-39	48 (36.92%)	8 (25%)
40-49	22 (16.92%)	0 (0%)
50-59	4 (3.08%)	0 (0%)
60 and above	1 (0.77%)	0 (0%)
Total	100%	100%
Marital Status		
Single	55 (42.31%)	20 (62.5%)
Married	72 (55.38%)	12 (37.5%)
Divorce/Single Parents	3 (2.31%)	0 (0%)
Total	100%	100%
Race		
Malay	103 (79.23%)	27 (84.38%)
Chinese	22 (16.92%)	0 (0%)
Indian	2 (1.54%)	5 (15.62%)
Other	3 (2.31%)	0 (0%)
Total	100%	100%
Education		
SPM	12 (9.23%)	6 (18.75%)
STPM/Matriculation/Foundation	9 (6.92%)	1 (3.13%)
Diploma	29 (22.31%)	7 (21.88%)
Degree	57 (43.85%)	15 (46.88%)
Master	16 (12.31%)	2 (9.36%)
PhD	6 (5.38%)	0 (0%)
Other	0 (0%)	0 (0%)
Total	100%	100%
Employment		
Self-employment	42 (32.31%)	10 (31.25%)
Government Sector	13 (10%)	3 (9.38%)
Private Sector	42 (32.31%)	8 (25%)
Full-time Student	17 (13.08%)	5 (15.62%)
Housewife	12 (9.23%)	2 (6.25%)
Unemployment	3 (2.31%)	4 (12.5%)
Retiree	1 (0.76%)	0 (0%)
Total	100%	100%
Monthly Household Income Category		
B1 (RM2,500 Below)	64 (49.23%)	8 (25%)
B2 (RM2,501 – RM3,170)	15 (11.54%)	11 (34.38%)
B3 (RM3,171 – RM3,970)	45 (34.62%)	8 (25%)
B4 (RM3,971 – RM4,850)	6 (4.61%)	5 (15.62%)
Total	100%	100%

Table 1 shows the demographic characteristics of the respondents. Out of the 162 participants, 130 (80.2%) are involved in e-commerce, and 32 (19.8%) are not. Among those in e-commerce, 80 (49.38%) are female, and 50 (30.82%) are male. In terms of age, most are between 19-29 years old, making up 53 (32.72%) respondents, followed by 48 (29.62%) in the 30-39 age group. Regarding marital status, a significant number are married, totalling 72 (44.44%) respondents, while 55 (33.92%) are single, and 3 (1.85%) are divorced or single parents. The

majority of those involved in e-commerce are Malay, making up 103 (63.58%) of the respondents, followed by 22 (13.58%) of Chinese ethnicity, 2 (1.23%) of Indian ethnicity, and 3 (1.85%) from other ethnic backgrounds. Most of those in e-commerce have a higher level of education, with 57 (35.19%) holding a bachelor's degree. Only 42 (25.93%) have other full-time jobs besides their e-commerce ventures. Regarding household income, 64 (39.51%) of the e-commerce sellers have an income of less than RM2,500.

3.2 Binary Logistic Regression

Binary logistic regression analysis was used to analyze the relationship between independent and dependent variables of this study. The dependent variable is e-commerce participation, measured by the dummy variable of 1 if participated in e-commerce, and 0 otherwise. The independent variables are e-commerce skills and knowledge, e-commerce cost, government support, and e-commerce infrastructure.

Table 2 provides the results of binary logistic regression to examine the factors influencing urban B40 in Selangor to participate in e-commerce. The Hosmer and Lemeshow Test assesses the goodness of fit of logistic regression model. The results show that a non-significant p -value (Sig. = 0.295) is obtained, indicating that the model fits the data well. A non-significant result is desirable, as it means that the predicted probabilities closely match the observed probabilities.

Table 2
Logistic Regression

Dependent Variable: E-Commerce Participation				
Independent Variable	B	S.E.	Sig.	Exp(B)
E-commerce Skills and Knowledge (SK)	1.129	0.466	0.015**	3.093
E-commerce Cost (EC)	-0.004	0.274	0.989	0.996
Government Support (G)	0.2570	0.333	0.440	1.294
E-commerce Infrastructure (I)	0.7780	0.393	0.048**	2.178
Constant	-6.779	1.862	0.000	0.001
<i>Hosmer and Lemeshow Test</i>			0.295	

Note: ** and *** represent significance at 5% and 1% level, respectively

Results from Table 2 indicate a significant and positive relationship between e-commerce skills and knowledge and e-commerce participation (p -value = 0.015). This suggests that individuals with e-commerce skills and knowledge are 3.093 times more likely to engage in e-commerce. In this study, e-commerce skills and knowledge encompass IT skills and digital marketing skills, both of which are important in influencing urban B40 participation in e-commerce.

E-commerce costs exhibit a negative sign but are statistically insignificant, implying that cost is not a primary factor influencing participation in e-commerce. Similarly, government support is deemed insignificant, suggesting that whether individuals receive government assistance or not does not have a significant impact on their participation in e-commerce. On the other hand, e-commerce infrastructure displays a positive and significant relationship with e-commerce participation, with a p -value of 0.048. This suggests that good e-commerce infrastructure plays a role in encouraging urban B40 entrepreneurs in Selangor to participate in e-commerce. In this study, e-commerce infrastructure is assessed based on internet coverage, internet connection, courier services, parcel hubs, and digital banking services.

In summary, the key factors influencing urban B40 participation in e-commerce in Selangor are e-commerce skills and knowledge (SK) and e-commerce infrastructure (I).

4. Conclusion

This study explores the the determinants that drive the engagement of the urban B40 group in Selangor, Malaysia to participate in e-commerce. The findings indicate that e-commerce skills and knowledge and e-commerce infrastructure are the factors that influence urban B40 in Selangor to participate in e-commerce. In terms of demographic characteristics, the majority of e-commerce participants are aged 19-29 and hold a bachelor's degree.

The findings provide several important policy implications. Firstly, the government via MDEC may develop and implement comprehensive digital skills training programs targeted at urban B40 populations. These programs should focus on teaching e-commerce skills, such as online marketing, website development, and digital payment methods. This can be done through government-sponsored courses, workshops, and online resources.

Secondly, optimizing e-commerce infrastructure, including enhancing internet coverage and connectivity, is indispensable for boosting the participation of the urban B40 in e-commerce. In addition, the government must ensure affordable access to digital devices and the internet for the urban B40. This might involve subsidizing the cost of smartphones or providing low-cost internet plans to make it easier for them to engage in e-commerce activities and thereby, increase their income.

Lastly, the government may provide funding and support for e-commerce startups, especially those led by young entrepreneurs with bachelor's degrees. This can be done by offering grants, low-interest loans, and mentorship programs to help them get their businesses off the ground.

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6. References

Abd Hadi, F. S., Gan, P. T., Zulkifli, N., Ismail, Z., Romli, N., Ahmad, M. A. & Ahmad Zaidi, M. F. (2020). The Involvement of B40 e ntreprenuers in E-Commerce: experience from Malaysia. *International Journal of Advanced Science and Technology*, 29(6), 265-271.

Abu Bakar, M. F., Talukder, M., Quazi, A., & Khan, I. (2020). Adoption of Sustainable Technology in the Malaysian SMEs Sector: Does the Role of Government Matter? *Information*, 11(4), 215

Alam, S. S., & Noor, M. K. M. (2009). ICT adoption in small and medium enterprises: An empirical evidence of service sectors in Malaysia. *International Journal of Business and management*, 4(2), 112-125.

Alam, S. S., Khatibi, A., Ahmad, M. I. S., & Ismail, H. B. (2008). Factors affecting e-commerce adoption in the electronic manufacturing companies in Malaysia. *International Journal of Commerce and Management*, 17(1/2), 125-139, 2008.

Ariansyah, K., Sirait, E. R. E., Nugroho, B. A., & Suryanegara, M. (2021). Drivers of and barriers to e-commerce adoption in Indonesia: Individuals' perspectives and the implications. *Telecommunications Policy*, 45(8), 102219.

Gunto, M., & Alias, M. H. (2014). The impact of networking on the SMEs' ability to access financial government support in Malaysia. *South East Asia Journal of Contemporary Business, Economics and Law*, 5(3), 9-17.

Hamdan, A. R., Yahaya, J. H., Deraman, A., & Jusoh, Y. Y. (2016). The success factors and barriers of information technology implementation in small and medium enterprises: an empirical study in Malaysia. *International Journal of Business Information Systems*, 21(4), 477-494.

Household Income and Basic Amenities Survey Report 2019, Department of Statistics Malaysia.

Retrieved from:

https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=120&bul_id=TU00TmRhQ1N5TUxHVWN0T2VjbXJYZz09&menu_id=amVoWU54UTl0a21NWmdhMjFMMWcyZz09

Huang, C. C., Jin, H., Zhang, J., Zheng, Q., Chen, Y., Cheung, S., & Liu, C. (2020). The effects of an innovative e-commerce poverty alleviation platform on Chinese rural laborer skills development and family well-being. *Children and Youth Services Review*, 116, 105189.

Lin, H., Li, R., Hou, S., & Li, W. (2021). Influencing factors and empowering mechanism of participation in e-commerce: An empirical analysis on poor households from Inner Mongolia, China. *Alexandria Engineering Journal*, 60(1), 95-105.

Ma, W., Zhou, X., & Liu, M. (2020). What drives farmers' willingness to adopt e-commerce in rural China? The role of Internet use. *Agribusiness*, 36(1), 159-163.

Nunnally, J. and Bernstein, I. (1994), *Psychometric Theory*, McGraw-Hill, New York.

Web source

Department of Statistics Malaysia Official Portal (2023, 31 May). "ICT Use and Access by Individuals and Households Survey Report". DOSM. Retrieved September 19, 2023, from <https://www.dosm.gov.my/portal-main/release-content/82c59a73-8b80-11ed-96a6-1866daa77ef9>

The World Bank website. "Urban population (% of total population) – Malaysia". Retrieved November 5, 2023 from <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=MY>

Analyzing Cross-Border Employment Dynamics Using Inter-Regional Input-Output Analysis

**Intanur Suria Wahabi^{a,*}, Muhammad Daaniyall Abd Rahman^{a,b}, Chakrin Utit^a,
Syamsul Herman Mohammad Afandi^a, Mohd Yusof Saari^{a,b,c}**

^a**School of Business and Economics**, Universiti Putra Malaysia, Serdang, Malaysia
daaniyall@upm.edu.my, chakrin_utit@upm.edu.my, syamsulhma@upm.edu.my,
yusofsaari_upm@upm.edu.my

^b**Centre for Future Labour Market Studies (EU-ERA)**, Putrajaya, Malaysia

^c**Ministry of Human Resources and Emiratization**, Dubai, United Arab Emirates

*Corresponding Author: intanurw@gmail.com

Abstract

The ability of a region to create jobs depends not only on the demand generated locally but also on the demand of the region's export market. In addition to these market segments, demands and exports originating in other regions could also influence the extent to which the region's jobs are created. This situation underscores the intricate network of economic interdependencies, wherein the growth trajectory of employment is linked with economic development both within its boundaries and those of neighboring regions. In order to capture employment creation across borders, this study aims to assess domestic employment creation by distinguishing domestic and other regions' demand structures. Using the recently published Negeri Sembilan inter-regional input-output (IRIO) table, an extended IRIO analysis has been applied to achieve this objective by incorporating skill-specific labor data. The findings reveal that 44.7% of total employment in the state originated from local demand, indicating that employment generation primarily serves the state's needs. Conversely, 11.3% of employment directly emanates from the state's exports to other regions, unraveling the impact of trade on Negeri Sembilan's employment creation. Furthermore, an additional 44% of employment is attributed to demands and exports originating in other regions, highlighting the intricate web of labor market dynamics, where Negeri Sembilan employment creation depends on other regions' domestic demand and export activities. These results provide better insight into policy to review the types of domestic labor upskilling and reskilling needed to respond effectively to the economic demands not only within the state boundaries but also from other regions. Furthermore, policymakers should prioritize coherent strategies to promote cross-border cooperation and synergy among neighboring regions for employment opportunities and equitable economic growth.

Keywords: Inter-Regional Input-Output (IRIO) Analysis, Labor Market, and Regional Economic Development

1. Introduction

Regional economic development has consistently emerged as pivotal strategy nations employ to mitigate the developmental disparities among regions within the same country or economic blocs. Pursuing balanced and equitable growth is instrumental in rectifying and alleviating economic imbalances among states. Governments aim to establish a more equitable playing field by strategically allocating resources and targeted development initiatives to regions experiencing lag. This strategic endeavor ensures that each state is allowed to make a meaningful contribution to the overarching economic development of the nation. Beyond fostering fairness and equity, such an approach contributes significantly to bolstering the country's overall economic resilience and stability. This multifaceted strategy promotes regional cohesion and reinforces the broader national economic framework, positioning the country for sustained and inclusive development.

Regional economic development yields a spill-over effect in the labor market by fostering employment creation, extending to neighboring regions and those integral to its economic value chain—from suppliers of raw materials to processors of finished goods. While it holds that the economic growth of a specific region stimulates employment creation within this locale, the reciprocal relationship is equally valid. The growth experienced by neighboring regions, particularly those within the same national border, contributes significantly to employment generation. This interdependence underscores the interconnected nature of regional economies. It emphasizes the need for a holistic understanding of the spillover effects of economic development on employment dynamics within and across regions.

However, research exploring the interconnectedness of economies remains relatively sparse, with a predominant focus on the impact of growth within a specific economy. These studies often neglect to provide explicit discussions regarding the spill-over effects that a region's growth may have on the labor markets of neighboring areas and their capacity to generate employment opportunities. Consequently, there exists a notable gap in the literature concerning the quantitative assessment of the influence of one economy on the employment creation potential of another.

As such, this study aims to determine the source of employment creation in a region, whether through the region's own domestic demand and export demand or the rest of the region's domestic demand and export demand. Subsequently, our analysis will look into employment creation by categorizing it based on skill types and sectoral levels. By doing this, we will have an insight into how much the region's economic growth provides room for employment creation in the state compared to the rest of the regions. Suppose the rest of the regions have a comparably high influence on a region's employment creation in general. In that case, this supports the importance of balanced regional growth as the spillover is also present in other states regarding employment creation.

The analysis in this study also facilitates the proxying of industry-demand skills, with the skills extension categorizing employment into skilled, semi-skilled, or low-skilled. As a nation moves towards advanced status and enhances access to quality tertiary education, particularly in technical and vocational sectors, a critical need arises to align educational advancements with concurrent employment creation and industry demand. This alignment is pivotal for a nuanced comprehension of the interplay between skill development and employment trends. Consequently, it offers clear insights for policy interventions, enabling the enactment of targeted strategies to foster balanced skill development, particularly in the skilled and semi-

skilled segments, and align employment opportunities with broader national development objectives.

2. Literature Review

The development of economic corridors is linked to numerous advantages, such as opportunities for employment creation, investment, and enhancement in the standard of living. Numerous studies show the link between GDP growth and employment creation starting from the fundamental development through Okun's Law in 1962. Okun's Law establishes a quantitative relationship between the rate of change in a nation's real gross domestic product (GDP) and the corresponding impact on the unemployment rate (Ibragimov & Ibragimov, 2017). This can also be interpreted as the relationship between output and employment creation. For instance, a study by Kapsos (2006) showed that employment tends to respond more to output movement when the share of the services sector is higher in the economy. This result is also supported by a study by Furceri et al. (2012) and Ball et al. (2019).

The process of employment creation, as evidenced by Estevão and Tsounta (2011), extends beyond mere output growth. An additional factor influencing the relationship between unemployment and economic shocks is the presence of skill mismatches, as corroborated by empirical findings in U.S. states. Estevão and Tsounta (2011) introduce a metric for skill mismatch, denoting the disparity between the skills inherent in a state's employment structure and those represented by the educational attainment of the state's labor force. This nuanced measurement offers insight into how skill imbalances can shape the responsiveness of employment generation to economic fluctuations. Additionally, Ball et al. (2019) draw parallels in their findings, extending the observations to developing countries. Specifically, their research underscores that a higher level of skill mismatch correlates with diminished responsiveness of unemployment to output changes, highlighting the intricate dynamics between skills, labor market conditions, and economic fluctuations.

Nevertheless, prevailing studies employing Okun's Law have predominantly concentrated on the localized impacts within specific countries, often overlooking the broader cross-border implications. In a recent investigation on cross-border employment generation, Bai et al. (2024) conducted a meticulous study to quantify the intricate dynamics of employment generation within the complex framework of global value chains (GVCs). Employing an inter-country input-output model from the Analytical Activity of Multinational Enterprises (AMNE) database, provided by the Organization for Economic Co-operation and Development (OECD) and employment data from the Trade in Employment (TiM) Database 2021 edition, the study spans from 2005 to 2016. The focal point of analysis lies in the role of multinational enterprises (MNEs) in driving employment creation within GVCs, mainly through cross-border direct investments. The study reveals a noteworthy global increase in employed persons, surging from 2.82 billion in 2005 to 3.19 billion in 2016.

Notably, the research underscores the substantial contribution of domestic value chain activities to the overall employment landscape. Throughout the study period, employment generated by domestic value chains (ED) consistently accounted for a substantial share, ranging from 78.4% to 80.9% of global employment. This empirical insight underscores the significant role played by domestic value chain activities as a primary source of job creation on a global scale. The findings not only shed light on the overarching impact of GVCs on employment dynamics but also emphasize the critical importance of understanding the interplay between

multinational enterprises, cross-border investments, and domestic value chain activities in shaping the global employment landscape.

The concept of GVCs pertains to global production networks wherein various countries derive value through their involvement in specific production stages of a product much like the dynamics observed within a national border. Investments channeled into regional development corridors yield analogous effects on employment, particularly when a region actively engages in the national value chain through regional development initiatives. Active participation in regional development corridors leads to employment generation as a direct outcome of these activities.

3. Methodology

The structure of the IRIO is extended by reflecting the labor requirements associated with the inter-industry production activity. This augmentation is achieved by establishing a direct linkage between labor and sectoral output, characterized by a linear relationship. Within this framework, each sector is presumed to produce labor demand consistently relative to its output. By assuming a linear relationship between labor and output, the model reflects labor's fundamental role in production, explaining the intrinsic connection between industry-specific output and labor requirements.

The labor matrix utilized in this research is segmented into two main categories: total labor and labor, categorized based on various skill levels. Labor classified by skill types is divided into three groups corresponding to educational levels: skilled, semi-skilled, and low-skilled labor. The classification of labor within the study adhered to a tiered system based on educational attainment. Specifically, individuals holding at least a diploma or degree were categorized as skilled labors, while those with secondary school certificates were classified as semi-skilled. Conversely, individuals lacking formal education or holding only primary school certificates fell into the low-skilled category.

Consequently, Table 1 illustrates the fundamental framework of the extended Input-Output model (IRIO). This table delineates the breakdown of labor, encompassing overall and skill-specific categories, providing a comprehensive view of the labor composition within the study.

Table 1
Basic Structure of the Extended IRIO for Labor Analysis

Sector	Negeri Sembilan 5 Sectors	Rest of the States 5 Sectors	Total Intermediate Demand	Total Final Demand	Total Output
Negeri Sembilan 5 Sectors	Intra and Interstates Transactions		Total Intermediate Demand	Total Final Demand	Total Output
Rest of the States 5 Sectors					
Total Intermediate Input					
Import	Imported Intermediate Input				
Value Added	Value Added				
Total Output	Total Output				

Labor
Type

	1	Overall labor	
	2	Skilled	
	3	Semi-Skilled	
	4	Low-Skilled	

Notes: The extended IRIO is represented by grey color.

The data used for this study is obtained from the Labour Force Survey Report, Malaysia 2015, published by the Department of Statistics Malaysia (DOSM).

4. Results and Discussion

This section will discuss the results of the extended IRIO for labor analysis in two parts. Firstly, we will look at the origins of general employment generation in Negeri Sembilan, divided into four categories: Negeri Sembilan's domestic demand and export demand, and the rest of the states' domestic demand and export demand, as shown in Table 2. Secondly, we will further segregate the four categories into three types of labor groups: skilled, semi-skilled, and low-skilled labor, as shown in Table 3.

The empirical findings of this study shed light on the intricate dynamics of employment generation in Negeri Sembilan. A substantial 44.7% of employment within the state is intricately linked to domestic demand, exemplifying the state's ability to create job opportunities. This result underscores the symbiotic relationship between economic activities and employment prospects within the state, revealing a localized employment ecosystem that responds to and supports the demands within the state's border. In addition to the significance of domestic demand, this study highlights that 11.3% of employment in Negeri Sembilan directly results from the state's exports to other regions. This implies that when Negeri Sembilan engages in trade or exports its products or services to neighboring regions or states, it has a tangible impact on job creation within its borders by 11.3%.

However, the complexity of employment dynamics in Negeri Sembilan extends beyond the domestic demand and exports dichotomy. An additional layer of intricacy emerges when considering external factors, with demand and exports from other states collectively contributing 44.0% to the overall employment landscape. This insight underscores the interconnected nature of regional economies, emphasizing that while internal dynamics play a significant role, external influences also strongly influence employment patterns within the state. The findings illuminate the multi-faceted nature of the employment generation, highlighting the influence of external factors such as the growth of other regions towards the state's employment creation.

Subsequently, a more granular examination of these findings will be conducted at the sectoral level, focusing on five key sectors: agriculture, mining and quarrying, manufacturing, construction, and services. Notably, the construction sector emerges as a dominant contributor, accounting for an impressive 96.9% of employment creation within Negeri Sembilan, primarily driven by the sector's commitment to fulfilling the state's domestic demand. This result aligns with expectations, given that the construction sector predominantly engages in projects to develop Negeri Sembilan's local infrastructure, including housing and industrial buildings.

Nonetheless, when shifting the lens to job creation stimulated by the domestic demand of other states, the agricultural sector takes center stage, contributing significantly at 36.9%. This

observation underscores the sector's pivotal role in catering to the demands of neighboring regions and highlights the interconnectedness of states within a broader economic framework. Furthermore, the agricultural sector plays a substantial role in the overall employment landscape, contributing 37.4% to job creation based on the export demand from other states. This dual role emphasizes the agricultural sector's versatility in meeting local demands and serving as a crucial player in regional economic dynamics.

Our attention will now pivot towards examining the origins of skill-specific employment within the state. Remarkably, 47.1% of skilled employment in Negeri Sembilan is linked to the state's domestic demand. This observation underscores the state's capacity to generate skilled employment opportunities through its internal economic activities. Notably, however, significant percentages are also observed for semi-skilled and low-skilled employment generation from domestic demand, standing at 43.3% and 46.2%, respectively.

Meanwhile, the demand and exports from other states collectively contributed 41.1% of the skilled employment generation. However, the highest proportion within this contextual framework is observed in semi-skilled employment, constituting 44.7%. This may be the effect of other region's economic structure and industry composition that requires semi-skilled labor in production. When looking at the sectoral level, excluding the construction sector due to the nature of the sector, the highest skilled employment generation came from the agriculture sector from the rest of the states at 74.3%. This noteworthy observation underscores the pivotal role of the agriculture sector in driving skilled employment opportunities within the broader regional context.

The compelling evidence based on IRIO demonstrating the intricate interconnectedness of economies, particularly their direct correlation with job creation and employment, underscores the critical significance of policies geared towards promoting regional balance and fostering economic growth across states. The positive spillover effects emanating from the economic development of one state onto others can profoundly impact the broader labor market, necessitating a comprehensive approach to regional economic planning. Moreover, enhancing and fortifying economic cooperation between regions is necessary, embracing an inward-looking strategy. This approach can bolster domestic direct investment, thereby mitigating reliance on foreign direct investment. By prioritizing collaboration between states, policymakers can cultivate an environment conducive to sustained economic growth and job creation, fostering resilience against external economic fluctuations.

Furthermore, optimizing input providers on a larger scale, such as at the national level, presents a strategic opportunity to enhance the efficiency of production processes before exporting goods. This approach allows for improved resource utilization and facilitates adding value for local products. The intricate coordination of input processing at a broader scope enables states to tap into synergies and capitalize on collective strengths, ultimately contributing to a more robust and competitive local economy. These activities will further translate into creating more jobs locally, at least in the semi-skilled category. In essence, policies geared towards promoting regional balance and fostering economic growth should acknowledge the interconnectedness of states and actively leverage it for mutual benefit. Strengthening economic cooperation, adopting an inward-looking perspective, and optimizing resilient and sustainable foundation for job creation and overall economic development across states.

5. Conclusion

Employment creation within a state is a complex phenomenon influenced not only by the internal economic developments occurring within its borders but also by intricate connections with other regions, as revealed by the empirical results. The dynamics of job creation are

Table 2
Total Employment by Sector

Sector	Negeri Sembilan Domestic Demand	Negeri Sembilan Export Demand	Rest of States Domestic Demand	Rest of States Export Demand
Agriculture	0.164	0.093	0.369	0.374
Mining & Quarrying	0.019	0.308	0.282	0.391
Manufacturing	0.277	0.363	0.177	0.183
Construction	0.969	0.025	0.005	0.002
Services	0.471	0.064	0.287	0.178
Total	0.447	0.113	0.254	0.186

Source: Authors own estimates based on IRIO analysis

Table 3
Employment by Sector and Skill

Sector	Negeri Sembilan Domestic Demand			Negeri Sembilan Export Demand			Rest of States Domestic Demand			Rest of States Export Demand		
	Skilled	Semi-Skilled	Low Skilled	Skilled	Semi-Skilled	Low Skilled	Skilled	Semi-Skilled	Low Skilled	Skilled	Semi-Skilled	Low Skilled
Agriculture	0.164	0.164	0.164	0.007	0.093	0.093	0.369	0.369	0.369	0.374	0.374	0.374
Mining & Quarrying	0.019	0.019	0.019	0.308	0.308	0.308	0.282	0.282	0.282	0.391	0.391	0.391
Manufacturing	0.277	0.277	0.277	0.363	0.363	0.363	0.177	0.177	0.177	0.183	0.183	0.183
Construction	0.969	0.969	0.969	0.025	0.025	0.025	0.005	0.005	0.005	0.002	0.002	0.002
Services	0.471	0.471	0.471	0.064	0.064	0.064	0.287	0.287	0.287	0.178	0.178	0.178
Total	0.471	0.434	0.462	0.118	0.120	0.073	0.243	0.257	0.262	0.168	0.190	0.202

Source: Authors own estimates based on IRIO analysis

inherently interwoven with the domestic demand and export activities of neighboring states, highlighting the need for a comprehensive understanding of regional interdependencies to formulate effective economic policies. Understanding how job creation is influenced by neighboring states' domestic and export demand is crucial for developing strategies that promote balanced regional economic development. The approach to economic planning should not be confined solely to internal factors. Still, it should also consider the broader regional context, recognizing the role of inter-state economic relationships in shaping employment opportunities within a given state.

Future research endeavors could adopt a more focused approach by employing a specific state model departing from the current multi-regional framework to enhance the depth of analysis. For instance, a detailed examination of the inter-regional input-output relationship between Selangor and Negeri Sembilan could provide valuable insights into the extent to which Selangor's domestic and export demand influences job creation in Negeri Sembilan and vice versa. Such a focused analysis would contribute to a nuanced understanding of inter-state employment dynamics. Moreover, it is essential to underscore the importance of comparing Negeri Sembilan with other states to ensure a holistic analysis. Examining the employment patterns in the context of multiple states allows for a more comprehensive understanding of the factors influencing job creation. A comparative analysis with other states would enable researchers and policymakers to identify common trends, unique regional dynamics, and potential areas for collaboration or intervention to enhance overall employment prospects.

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7. References

- Bai, S., Zhang, B., & Ning, Y. (2024). Measuring employment in global value chains based on an inter-country input-output model with multinational enterprises. *Structural Change and Economic Dynamics*, 68, 148-162. <https://doi.org/https://doi.org/10.1016/j.strueco.2023.10.010>
- Ball, L., Furceri, D., Leigh, D., & Loungani, P. (2019). Does One Law Fit All? Cross-Country Evidence on Okun's Law. *Open Economies Review*, 30(5), 841-874. <https://doi.org/10.1007/s11079-019-09549-3>
- Estevão, M. M., & Tsounta, E. (2011). Has the Great Recession raised US structural unemployment?
- Furceri, D., Crivelli, E., & Toujas-Bernate, M. J. (2012). *Can policies affect employment intensity of growth? A cross-country analysis*. International Monetary Fund.
- Ibragimov, M., & Ibragimov, R. (2017). Unemployment and output dynamics in CIS countries: Okun's law revisited. *Applied Economics*, 49(34), 3453-3479. <https://doi.org/10.1080/00036846.2016.1262519>
- Kapsos, S. (2006). The Employment Intensity of Growth: Trends and Macroeconomic Determinants. In J. Felipe & R. Hasan (Eds.), *Labor Markets in Asia: Issues and Perspectives* (pp. 143-201). Palgrave Macmillan UK. https://doi.org/10.1057/9780230627383_4

Assessing Brand Switching Patterns of Malaysian Pepper Exports

Jurin Gunsalam* and Wong Hock Tsen

Faculty of Business, Economics and Accounting
Universiti Malaysia Sabah
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia

*Corresponding Author's Email: juringuns@gmail.com

Abstract

This study provides an analysis into the competitive dynamics of pepper exports, focusing on key rival exporting countries: Malaysia, Indonesia, and Vietnam. The research encompasses vital export markets, including China and the USA, employing a structured brand-switching framework to identify shifts in consumer preferences for analogous products and brands. The brand-switching study operates under the assumption of consistent market dimensions throughout the study, where every customer transaction involves exposure to the complete array of evaluated products with a uniform transaction quantity. The forthcoming analysis aims to explore brand competitiveness in specific market contexts, acknowledging the term 'brand' to encompass exporting countries, in line with international trade conventions regarding pepper products. The research delves into two distinct forms of pepper products sourced from the *Piper* genus: neither crushed nor ground pepper (HS090411) and crushed or ground pepper (HS090412). These types wield significant influence in global trade. Furthermore, it presents a comprehensive overview spanning the entire temporal span from 2001 to 2018, enhancing the depth of analytical insights. For Malaysia to maintain global competitiveness, it is imperative to minimize brand switching. Achieving this necessitates the implementation of a robust marketing strategy for pepper products, encompassing assertive publicity efforts and active participation in international trade shows.

Keywords: brand-switching, pepper, competitive dynamics, export markets, international trade

1. Introduction

The historical association between Sarawak, a region within Borneo Island in Malaysia, and pepper cultivation spans over a century (Fischer (2018)). The cultivation of pepper in this locale has roots dating back to 1619 when it commenced in Langkawi. The Chinese Teochew introduced pepper cultivation to Sarawak in 1852, and its systematic development occurred under the governance of Rajah Charles Brooke in 1875. In conjunction with paddy and rubber, the local populace of Sarawak embraced pepper cultivation, evolving it into a significant spice source within Malaysia. Presently, Sarawak maintains its leading position as the primary state for pepper production, contributing approximately 90% to the nation's overall output.

While Johor and Sabah engage in pepper cultivation to a limited extent, their production volumes remain relatively modest. Typically, smallholders in impoverished rural areas undertake pepper planting. In Sarawak, pepper stands as the primary cash crop, supporting around 74,710 households actively engaged in this sector, as reported by the Department of Agriculture in 2005. These pepper farmers have refined their cultivation practices over an extended period, predominantly relying on chemical inputs, as detailed by Khalid et al. (2009).

Malaysia has historically played a crucial role as a trading nation, involved in the import and export of commodities with global markets. Although agriculture no longer occupies a central role in the Malaysian economy compared to the manufacturing and service sectors, it remains a pivotal component, contributing significantly to the nation's Gross Domestic Product (GDP) with an annual contribution of 8%. Substantial quantities of agricultural products are exported to international markets, serving as a vital source of revenue for the country.

2. Literature Review

As delineated by the Cambridge Dictionary (2023), brand switching denotes the act of transitioning from purchasing one product brand to acquiring another. Sampaothong (2016) asserts that brand switching can be systematically analyzed through computer software, aiming to identify trends where: 1) the sales of one brand increase while those of another decrease over a specified number of consecutive periods, and 2) the sales variation between the two brands in each pair falls below a predetermined threshold value (Wakio et al., 2004).

Shinoj and Mathur (2008) characterize brand switching analysis as a quantitative technique to discern changes in the consumer base of products and brands within comparable product categories. This analytical approach emphasizes the detection of market share patterns to assess the competitive standing of various rivals in each sector (Michaelidou and Dibb, 2009). The principles outlined by Karani and Fraccastoro (2010) for brand-switching analysis mirror those mentioned earlier, underscoring its somewhat limited scope as a research method. Nevertheless, this approach proves insightful in uncovering the product tastes and behavioral modifications within a specific set of consumers (Sonthaya, 2016).

The exploration of brand switching is frequently utilized to analyze consumer habits regarding a particular product. Bayus (1992), for instance, investigated brand loyalty and marketing strategy for four major home appliances. The findings demonstrated the efficacy of brand switching studies in determining a company's relative competitive position within primary

customer markets. Cornelius et al. (2015) delved into switching rates within and between brand families, elucidating factors associated with brand and brand style switching among smokers in the USA. Their study highlighted the significance of age, cost, and cigarette type in influencing brand switching. Indah and Elia (2018) examined the consumer behaviour of Generation Y smartphone users, revealing that lifestyle and a quest for variety could heighten brand switching tendencies. Furthermore, the study demonstrated that consumer confidence in a specific brand did not significantly reduce the inclination to switch, and advertising failed to significantly influence brand switching desires.

Beyond consumer behaviour, brand switching analysis proves valuable in scrutinizing export patterns, offering insights into market share and trade directions. Sampaothong et al. (2016) exemplified this utility by studying the brand switching dynamics of Thai and Vietnamese rice exports to China between 1995 and 2012. The investigation disclosed a decline in Thailand's market share of rice exports to China, contrasting with the stable market share of Vietnamese rice. The factors contributing to the latter's robust market share included increased output, lower production costs, farm support programs, competitive pricing, strategic marketing, and overseas rice storage.

This study employs Brand-Switching Analysis (BSA), extending its application from product items to countries viewed as product brands. The focus is on Malaysia and its competitor countries, conceptualized as brands exporting pepper to importing countries. The investigation of pepper as a commodity entails an examination of how brand switching in export destinations, such as China and the United States, could influence the competitiveness of Malaysian exports. The foundational principles guiding brand switching studies stipulate that market share remains constant throughout the analysis period, all consumers are exposed to all evaluated products each time they make a purchase, and each customer consistently acquires a fixed quantity of the product (Theil and Rey, 1966; Sampaothong, 2016).

3. Materials and Methods

3.1 Source of Data

The present analysis utilizing secondary source data of pepper (HS060411 – Pepper of the genus Piper, neither crushed nor ground and HS090412 - Pepper of the genus Piper, crushed or ground) extracted from the UN COMTRADE database. Specifically, the focus was on export data concerning pepper from Malaysia, Indonesia, and Vietnam to China and the USA markets, covering the timeframe from 2001 to 2018.

3.2 Brand-Switching Analysis

Brand-switching analysis, introduced by Theil and Rey in 1966, is a methodological approach used to understand shifts in consumer preferences for products and brands within a similar product category (MM4XL, 2010). Identifying brand switching involves employing computer software to analyse patterns where over a specified number of consecutive periods, one brand's sales increase while another brand's sales decline. Additionally, the two brands in each identified pair must exhibit a sales difference below a predetermined threshold value (Wakio et al., 2004).

4. Results and Discussion

4.1 Retention (Loyalty) and Switching Rates of HS090411 in China and the USA

Transitional probability matrix of exports from Malaysia, Indonesia, and Vietnam to the China market is presented in Table 1. *Diagonal values (retention or loyalty rates)* show that Others had the highest retention rate of 75.6% slightly greater than Malaysia which retained 72.1% preceded by Indonesia's 64.2%. Vietnam retained 48% in the same period. *Row values (switch-to rates, outgoing sales)* show that Malaysia lost 17.9% to Indonesia, 10% to Vietnam and zero percentage switching to Others. Most of Indonesia's share or 24.6% went to Malaysia, and zero percentage switching to Vietnam, however 11.2% gone to Others. For Vietnam, 31.3% went to Malaysia but no percentage switching to Indonesia and 20.7% gone to Others. Furthermore, 23.5% from Others went to Malaysia with zero percentage gone to Indonesia nonetheless only 0.9% went to Vietnam's shares. Finally, *column values (switch-from rates, incoming sales)* display that Malaysia gained 24.6% from Indonesia, 31.3% from Vietnam and 23.5% from Others. Whereas Indonesia got its shares of 17.9% from Malaysia, and zero percentage from both Vietnam and Others. Additionally, Vietnam received 10% from Malaysia, but zero percentage from Indonesia though very small percentage of 0.9% from Others. Lastly, zero percentage from Malaysia acquired by Others, but 11.2% and 20.7% gained from Indonesia and Vietnam, respectively.

As in the Table 2, *Diagonal values (retention or loyalty rates)* show that Vietnam had the highest retention rate of 85.1% and Malaysia's retention rate was 29.5% the lowest among all exporters. Both Indonesia and Others had 58.2% and 64.1% retention rates, respectively. *Row values (switch-to-rates, outgoing sales)* show that Malaysia has lost 70.5% of its market share to Others but have no losses to Indonesia and Vietnam. Indonesia lost a small 2.4% to Malaysia, but 21.9% and 17.5% of its total export shares went respectively to Vietnam and Others. Meanwhile, Vietnam had no loss of shares to Malaysia and Indonesia, but 14.9% went to Others. Others had zero percentage lost to both Malaysia and Vietnam however they lost 35.9% to Vietnam. *Column values (switch-from rates, incoming sales)* suggest that Malaysia had no percentage gain from Vietnam and Others, but only secured 2.4% from Indonesia. Most of the gains for Indonesia came from Others with 35.9% but did not gain from both Malaysia and Vietnam. Vietnam did not receive from either Malaysia or Others but profited from Indonesia alone by 21.9%. Others also earned 70.5% mostly from Malaysia, followed by 17.5% from Indonesia and 14.9% from Vietnam.

Table 1
Matrix of pepper (HS090411) exports of Malaysia, Indonesia, and Vietnam into China market.

	Market Share (%) switched to:				Total (%)
	Malaysia	Indonesia	Vietnam	Others	
Malaysia	72.1	17.9	10.0	0.0	100.0
Indonesia	24.6	64.2	0.0	11.2	100.0
Vietnam	31.3	0.0	48.0	20.7	100.0
Others*	23.5	0.0	0.9	75.6	100.0

*Other exporting countries

Table 2
Matrix of pepper (HS090411) exports of Malaysia, Indonesia, and Vietnam into the USA market.

	Market Share (%) switched to:				Total (%)
	Malaysia	Indonesia	Vietnam	Others	
Malaysia	29.5	0.0	0.0	70.5	100
Indonesia	2.4	58.2	21.9	17.5	100
Vietnam	0.0	0.0	85.1	14.9	100
Others	0.0	35.9	0.0	64.1	100

4.2 Retention (Loyalty) and Switching Rates of HS090412 in China and the USA

Illustrated in Table 3, *Diagonal values (retention or loyalty rates)* show that Others had the highest retention rate at 83.6% followed by Vietnam at 42.2%, Indonesia at 40.8% and the lowest at 34.6% was Malaysia. *Row values (switch-to-rates, outgoing sales)* display that Malaysia lost 14.3% to Indonesia and 51.1% to Others but zero percent lost to Vietnam. Indonesia's shares lost to Malaysia at 12.3% and 46.9% to Others but no losses to Vietnam. Regarding Vietnam, the only loss was 57.8% for Others with no loss to either Malaysia or Indonesia. Meanwhile, Others' shares lost to Malaysia at 5.6% and Indonesia at 3.3% as well as 7.5% to Vietnam. *Column values (switch-from rates, incoming sales)* suggest that Malaysia gained 12.3% from Indonesia and 5.6% from Others but zero percentage from Vietnam. For Indonesia, 14.3% gain came from Malaysia and 3.3% from Others but no gain from Vietnam. Meanwhile, just 7.5% of Vietnam's gain from Others and no gain from Malaysia and Indonesia. Finally, Others gained 51.1% from Malaysia, 46.9% from Indonesia and 57.8% from Vietnam.

As demonstrated in Table 4, *Diagonal values (retention or loyalty rates)* show that Vietnam had the highest retention rate at 92% followed by Others at 85.8% and Indonesia at 44.6%. Nonetheless, Malaysia had zero percentage of retention rate. *Row values (switch-to-rates, outgoing sales)* show that Malaysia lost 100% of its market shares to Indonesia. In addition, Indonesia market shares of 55.4% went to Others and zero percentage lost to Malaysia and Vietnam. Besides, just 8% lost to Others for Vietnam and no loss to either Malaysia or Indonesia. Market shares of Others lost to Malaysia at 0.1%, Indonesia at 6% and Vietnam at 8.1%. *Column values (switch-from rates, incoming sales)* suggest that Malaysia gained only 0.1% from Others and zero percentage gain from Indonesia and Vietnam. For Indonesia, 100% gain came from Malaysia and 6% from Others but no gain from Vietnam. Additionally, just 8.1% of Vietnam's gain from Others and no gain from Malaysia and Indonesia. Others gained 55.4% from Indonesia and 8% from Vietnam but zero percentage from Malaysia.

Table 3
Matrix of pepper (HS090412) exports of Malaysia, Indonesia, and Vietnam into China market.

	Market Share (%) switched to:				Total (%)
	Malaysia	Indonesia	Vietnam	Others	
Malaysia	34.6	14.3	0.0	51.1	100
Indonesia	12.3	40.8	0.0	46.9	100
Vietnam	0.0	0.0	42.2	57.8	100
Others	5.6	3.3	7.5	83.6	100

Table 4
Matrix of pepper (HS090412) exports of Malaysia, Indonesia, and Vietnam into USA market.

	Market Share (%) switched to:				Total (%)
	Malaysia	Indonesia	Vietnam	Others	
Malaysia	0.0	100.0	0.0	0.0	100
Indonesia	0.0	44.6	0.0	55.4	100
Vietnam	0.0	0.0	92.0	8.0	100
Others	0.1	6.0	8.1	85.8	100

The research underscores Malaysia’s robust performance in the Chinese market for product HS060411, securing a loyalty rate of 72.1%. Conversely, in the USA market, the retention rates for the same Malaysian product (HS090411) were markedly lower at 29.5%, trailing behind Indonesia (58.2%) and Vietnam (85.1%). For product HS090412, Malaysia's retention rates in China were lower, standing at a mere 34.6% compared to Indonesia (40.8%) and Vietnam (42.2%). Malaysia lost market shares to Indonesia (14.3%) and other exporting countries (51.1%). Notably, in the USA market, Malaysia recorded zero retention rates for HS090412, with Indonesia monopolizing all of Malaysia’s market shares.

China has become a significant destination for Malaysia’s pepper exports due to its strong trade relations with Malaysia and its large market size. The bilateral trade between the two nations rose to RM487.13 billion in 2022, a 15.6% increase from the previous year (PMO, 2023). China's large population and growing demand for pepper in its food-related industries and the pharmaceutical and cosmeceutical sectors provide a substantial market for Malaysian pepper exporters (Entebang, 2020).

On the other hand, Malaysian pepper exports underperformed in the USA market due to factors such as price fluctuations, supply-demand dynamics, product quality, trade policies, and market preferences. To improve competitiveness in the USA market, the Malaysian Pepper Board (MPB) needs to implement strategies such as enhancing pepper quality, developing premium product branding, modernizing production technology, fostering R&D and innovation, expanding market opportunities, improving smallholder capabilities through modern technology, and enforcing regulations to ensure exported pepper products meet international standards.

5. Conclusion

In assessing the export performance of Malaysian pepper, we utilized the widely adopted marketing tool known as Brand-Switching Analysis (BSA). In our approach, we conceptualized exporting countries such as Malaysia, Indonesia, and Vietnam as distinct brands, while viewing importing countries as customers and pepper as the product. The objective of this research was to scrutinize potential shifts in customer preferences for analogous products and brands. Utilizing the transitional probability matrix, our analysis spanning the period from 2001 to 2018 reveals noteworthy insights into brand loyalty.

During this study period, Malaysia, designated as the brand, exhibited the highest degree of loyalty for the pepper HS090411 product in the Chinese market, its most devoted customer. Conversely, for Vietnam, the USA emerged as the most steadfast customer for the same product. Additionally, concerning the retention rate for pepper HS090412, our findings indicate that Vietnam’s most loyal customers were China and the USA, although these markets did not exhibit similar loyalty to Malaysia. Interestingly, Indonesia did not exhibit a single most loyal

customer. This can be attributed to the dominance of Malaysia and Vietnam in every market destination, despite Indonesia maintaining a consistent market share in those markets.

Despite Malaysia's nearly two-century history in pepper cultivation, Vietnam, having entered the industry merely 15 to 20 years ago, has ascended to the position of the world's leading pepper producer. Thus, it is imperative for the Malaysian government to emulate Vietnam's strategy of inviting foreign investment in the pepper industry, including the provision of land for cultivation. This approach could potentially augment exports and stimulate local employment.

To maintain competitiveness in the global trade arena, it is incumbent upon Malaysia to address the issue of brand switching. This necessitates the deployment of potent marketing strategies for pepper products, which entails a proactive stance through promotional activities and active engagement in international trade exhibitions. Furthermore, the strategy of market matching is of paramount importance, ensuring congruence with authentic consumer preferences, thereby highlighting the crucial role of exhaustive market research. In the realm of regulatory supervision, Malaysian pepper exporters are required to consistently provide high-quality products while simultaneously establishing a competitive advantage for their products.

6. References

Bayus, B. (1992). Brand Loyalty and Marketing Strategy: An Application to Home Appliances. *Marketing Science*, 11(1), 21-38.

Cambridge Dictionary (2023). Retrieved 11 November 2023, from <https://dictionary.cambridge.org/dictionary/english/brand-switching>.

Cornelius, M., Cummings, K., Fong, G., Hyland, A., Driezen, P., Chaloupka, F.J., Hammond, D., O'Connor, R.J., and Bansal-Travers, M. (2015). The prevalence of brand switching among adult smokers in the USA, 2006–2011: Findings from the ITC US surveys. *Tobacco Control*, 24(6), 609-615.

Entebang, H, Wong, S.K., and Zehnder, A-M. (2020). Development and Performance of the Pepper Industry in Malaysia: A Critical Review. *International Journal of Business and Society*. 20. 1402-1423.

Fischer (2018), Cultivating Sarawak Pepper. Retrieved 6 August 2019, from <https://www.malaysia-insights.com/cultivating-sarawak-pepper/>.

Indah Fintikasari and Elia Ardyan. (2018). Brand Switching Behaviour in The Generation Y: Empirical Studies on Smartphone Users. *Jurnal Manajemen Dan Wirausaha*, 20(1): 23-30.

Karani, K.G. and K.A. Fraccastoro, (2010). Resistance to brand switching: The elderly consumer. *Journal of Business and Economics Research*, 8: 77-84.

Khalid, A.B., Wong, S.K. and Audrey, L. (2009). Competitiveness with Sustainable Agriculture: Win, Lose or Draw? *International Journal of Economics and Management*, 3(1): 87-99.

Michaelidou, N. and S. Dibb. (2009). Brand switching in clothing: The role of variety-seeking drive and product category-level characteristics. *International Journal of Consumer Studies*, 33: 322-326.

MM4XL. (2010). Aptrio. Marketing Manager for Excel. Retrieved 14 November 2023, from <http://www.aptrio.com/Business/Spreadsheets/mmxl-marketing-manager-for-excel-full-edition-1478.html>.

PMO. (2023). <https://www.pmo.gov.my/2023/03/china-is-an-important-trade-partner-for-malaysia-anwar/>. Retrieved 11 November 2023.

Theil, H and Rey, G. (1966). A Quadratic Programming Approach to the Estimation of Transition Probabilities. *Management Science*, 12(9).

Sampaothong, S., Zhou, Y., Han, J. and Pruetthichat, P. (2016). The Brand Switching Analysis of Thai Rice in China: A Comparison with Vietnam. *The International Journal of Business and Management*, Vol.4, Issue 1.

Sampaothong, S. (2016). Factors Affecting Export Performance of Thai Rice Exporter in the Chinese Market. *Research Journal of Business Management*, 10: 74-85.

Shinoj, P. and V.C. Mathur (2008). Comparative advantage of India in agricultural exports vis-a-vis Asia: A post-reforms analysis. *Agricultural Economics Research Review*, 21: 60-66.

Wakio, K., Yoshibayashi, T. and Akaboshi, N. (2004). Early detection of changes using Event Sequence Extractor. *Fujitsu Scientific and Technical Journal*, 40(1): 54–60.

The Impact Of Human Development on Economic Growth: Evidence From Asean-4 Countries

Nur Sahfila Aloysius¹, Jaratin Lily^{2*}, Chew Tze Cheng³, Mohd. Rahimie Abd. Karim⁴

¹Postgraduate student, Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Email: nsahfila93@gmail.com

²Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Email: jaratin@ums.edu.my

³Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Email: chewtzecheng@ums.edu.my

⁴Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Email: rahimie@ums.edu.my

*Corresponding author: jaratin@ums.edu.my

Abstract

This paper aims to determine the impact of human development on economic growth in ASEAN-4 countries, namely Malaysia, Indonesia, Thailand, and the Philippines. The analysis is based on data spanning the period from 1990 to 2021. The study employed the Human Development Index (HDI) as a proxy for human development, with GDP per capita as the dependent variable. Trade openness and foreign direct investment (FDI) were included as control factors. The present study applied Autoregressive Distributed Lag (ARDL) approach to examine the long run and short run relationships among the studied variables. The finding indicated evidence of cointegration among the variables across all sample countries. The results also showed mixed evidence on the long run and short run impacts of human development,

trade openness, and FDI on economic growth. The study key findings suggested the existence of a positive and significant long-run impact of human development on economic growth in Malaysia and Indonesia. Meanwhile, there is evidence of a short run effect between human development and economic growth for the whole sample of countries. In addition, trade openness and FDI showed evidence of a long run between Indonesia and Thailand. In the short run, trade openness is significant in Malaysia, the Philippines, and Thailand, while FDI is significant only in Indonesia. This study concludes that the factors that influence economic growth are country dependence and human development, which is considered an important factor in economic planning. Therefore, it was suggested that greater emphasis be placed on developing human capabilities in all fields.

Keywords: Human Development; Economic Growth, ARDL, ASEAN-4

1. Introduction

Economic growth is a fundamental engine of growth and development and plays a central role in influencing the financial stability and health of individuals, communities, and nations worldwide (Miłaszewicz, 2021). Fast economic expansion strongly stimulates the development of a country or area. The advancement of economic growth, which is the goal of society, is being given more emphasis, especially after the COVID-19 pandemic. All countries must redevelop their economies. According to the World Bank (2023), the global economy is rapidly declining because of high inflation, higher interest rates, less investment, and interruptions brought on by the Russia-Ukraine war. The expected growth rates for the world economy are 1.7% in 2023 and 2.7% in 2024. Unfortunately, the forecasts for 2023 have been revised downward for 95% of advanced countries and roughly 70% of emerging market and developing economies, indicating that the significant slowdown in growth is projected to be widespread. When involved in the economic pressure globally, ASEAN countries are not excluded; the countries also feel the impact.

In 1990, the United Nations Development Programme (UNDP) released human development reports that included the Human Development Index (HDI), which consists of educational, health, and income factors, because they realised that understanding human development was essential to promote a healthy life and improve individuals' wellbeing. Taqi et al. (2021) indicated that the HDI refers to a situation where individuals may live long and healthy lives, and it becomes crucial to create conditions in which members of society can support a reasonable quality of life. Measuring human development is very important in evaluating a country's economic growth. A good educational process and excellent health factors can help enhance skills and knowledge. Meanwhile, education, training, and health investments can enhance a person's health and knowledge, resulting in increased production and income (Mariana, 2015; Widarni & Wilantari, 2021; Rajan, 2020).

Although existing studies have investigated the influence of human development factors on economic growth, their findings are inconsistent. For example, Muhamad et al.'s (2018) findings indicated that Malaysia lacked a long-term relationship between human capital and innovation, whereas such a relationship was observed in Indonesia and Thailand. Moreover, the findings of Islam and Alam's (2023) study indicated that health expenditures positively influenced economic growth in the long run but not in the short run. In contrast, education expenditures had a positive short-run effect but a negative long-run correlation with economic

growth. Meanwhile, Adeyemi and Ogunsola (2016) conducted a study in Nigeria using cointegration analysis and time series data from 1980 to 2013. They discovered a negative long-run relationship between enrolment in tertiary education, public expenditure on health, and economic growth. In contrast, Ali et al. (2018) argued for a positive relationship between human capital and economic growth based on data from 132 countries collected between 1996 and 2011. Furthermore, although many studies have attempted to determine the relationship between human development and economic growth in ASEAN countries individually, there is still a lack of comparison on how human development can influence economic growth in ASEAN countries.

Given the knowledge gaps and inconsistency of findings, there is a need for a comparison study on the influence of human development on economic growth in the ASEAN-4 countries. Therefore, this study attempts to determine how human development influences economic growth using the ARDL method in ASEAN 4 countries: Malaysia, Thailand, Philippines, and Indonesia.

This study contributes to the current knowledge in two ways. Firstly, it adds to the methodological framework used to evaluate human development using the Human Development Index (HDI) as a holistic measure. In contrast, earlier research has usually concentrated on discrete elements of human development, such as the number of years in education (e.g., Adeyemi and Ogunsola, 2016; Ali et al., 2018; Islam & Alam, 2023). With a more nuanced knowledge of the complex nature of human growth, this technique improves the evaluation's accuracy and comprehensiveness.

Second, the study employs the Autoregressive Distributed Lag (ARDL) method. ARDL is advantageous for small sample sizes, providing a strong analytical framework when large datasets are unfeasible or unavailable (Pesaran et al., 2001). Furthermore, utilising ARDL for time-series analysis allows for a more nuanced investigation of changes in human development over time, providing vital insights into the temporal dynamics of human development across different countries. This methodological decision shows a fundamental advantage over the existing literature's main emphasis on panel data analysis since it improves the comparability and depth of cross-country assessments.

The structure of the study is in the following order: introduction, literature review, data, methodology, displays and interpretation of data, and lastly, conclusion.

2. Literature Review

2.1 Human development and economic growth

Elistia and Syahzuni (2018) determined the correlation between human development and economic growth in 10 ASEAN countries and found that this study shows that human development and GDP are strongly and significantly correlated in each nation. It has been determined that the HDI level can influence the GDP per capita. Rising levels of human development led to rising chances for economic growth. On the other hand, Ghifara et al. (2022) showed that while capital expenditures and economic growth have a positive and insignificant impact on the inequality of income distribution in Metropolitan Cities in Indonesia, the human development index has a negative and significant impact.

Moreover, Ranis et al. (2000) stated that using the cross-country regression, they found a significant relationship between human development and economic growth where the expenditure in health and education important chain form economic growth and human development whereby the investment and income distribution also significant economic growth. Their study also reported that when people become healthier and more educated, they can contribute more to economic growth. Their study determines the connections between economic growth and human development. Meanwhile, Gonos et al. (2023) concluded that the contribution of human development is achieved by evaluating the growth of life quality.

On the other hand, a study by Duan et al. (2022) showed that the relationship between human development and economic growth is not linear but interverted U-shaped and found only a certain period link between HDI and economic growth. In addition, Karambakuwa et al. (2020) found an insignificant effect of human development on economic growth.

2.2 Trade Openness and Economic Growth

Many studies were interested in discovering the link between international trade and growth because researchers believe that the importance of international trade can influence economic growth. The reasons are that trade can stimulate economic growth by providing access to larger markets, increasing demand for goods and services, and increasing production and economic growth. Besides, trade also improves productivity and induces competitiveness by facilitating the transfer of technology, information, and skills.

Meanwhile, some studies (Ari et al., 2022; Sheng et al., 2019) showed a negative long-run impact of trade openness on economic growth. Besides, Omoju and Adensaya (2012) investigated the relationship between trade and growth, found a significant impact, and suggested that trade has opportunities to enhance growth through capital stock, education stock and increasing productivity. Besides that, supported by the previous study, Keho (2017) stated that trade openness has a positive relationship and can influence economic growth and capital formation in the short and long run. Moreover, trade openness can influence growth when the country deepens and drives its capital formation. However, the other studies found an inconclusive relationship. For example, Cooper (2001) pointed out that theory and empirical evidence are inconclusive when the researcher addresses the influence of foreign trade in developing countries.

2.3 Foreign direct investment and Economic growth

Sahoo and Bishnoi (2021) revealed that FDI has a beneficial influence on economic growth through its positive spillover effects. Meanwhile, the study by Afi et al. (2022) provided evidence of how FDI influences economic growth in emerging countries. It also added that the influence of FDI on entrepreneurship development may depend on economic growth. However, in contrast, a negative impact was found by Imbriani et al. (2011). In addition, the negative relationship between FDI and economic growth is also proven in some previous studies (e.g., Dey & Awal, 2017; Inekwe, 2013; Nurvira & Ichsan, 2022).

3. Model, data, and methodology

3.1 Model

This study implemented the neoclassical growth model and Solow's theory (1956). The model aims to explain long-run economic development regarding capital accumulation, population expansion, and technical progress. The significant elements that derived the model are the amount of capital in the economy, the workforce size, and technical innovation (Solow,1956).

Then, the model of Solow is represented as below:

$$Y = F(K.AL) \tag{1}$$

Y represents the output or income, K is a capital stock, A is a total factor productivity (a measure of technological progress), and L is a labour force. We choose the variables from Rahman & Alam (2021), then the linear augmented empirical model for this study is as follows:

$$GDP_t = \beta_1HDI_t + \beta_2TRA_t + \beta_3FDI_t + \varepsilon_t \tag{2}$$

GDP represents gross domestic product per capita (proxy of economic growth), HDI is a proxy of human development, TRA represents trade openness, FDI is foreign direct investment per capita, and ε is an error term.

For instance, to remove the existence of heteroscedasticity and measure the elasticity directly from slope coefficients, the Equation for natural log form can be rewritten as below:

$$LNGDP_t = \beta_1LNHDI_t + \beta_2LNTRA_t + \beta_3LNFDI_t + \varepsilon_t \tag{3}$$

LN determines the variable's natural logarithm and coefficients and refers to the long-run elasticities of economic growth in terms of human development index, per capita trade, and per capita foreign direct investment.

3.2 Data and methodology

The data was collected from the different secondary materials where gross domestic product, trade openness and FDI were collected from the World Development Database while the HDI was collected from the Global data lab. The data collected is for the period from 1990 until 2021. Table 1 shows the summary of the unit measurement and sources of each data for each variable collected.

Table 1
Unit Measurement and Sources of Data

Variables	Proxy	Measurement	Expected Sign	Sources	Related Theory
Dependent Variable					
Economic Growth	Gross Domestic Product (GDP) per capita	In constant 2015 US Dollar	Positive	World Bank and World Development Database	

Independent Variables					
Human Development	Human Development Index (HDI)	(Life expectancy Index + Education Index + Income Index) / 3	Positive	Global Data Lab	Solow Theory
Trade Openness	Trade per capita	Trade = Export + Import/Total Population	Positive	World Bank and World Development Database	Solow Theory
Foreign Direct Investment (FDI)	FDI per capita	FDI = FDI per capita / Total Population	Positive	World Bank and World Development Database	Solow Theory

3.3 Econometric Approach

3.1 Unit root test

Prior to further analysis, the unit root test in this study is performed by applying the Phillips-Perron, PP unit root test that was suggested by Phillips (1987) and extended by Perron (1988) and Phillips and Perron (1988). The tests were performed to determine whether each researched series's integration was less than $I(1)$ for the ARDL model to be implemented

3.2 Autoregressive Distributed Lag (ARDL) Model

The general ARDL bound test approach (Pesaran et al., 2001) for cointegration analysis is as follows:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 x_{t-1} + \alpha_3 z_{t-1} + \sum_{i=1}^m \beta_i \Delta y_{t-i} + \sum_{j=0}^n \gamma_j \Delta x_{t-j} + \sum_{l=0}^p \vartheta_l \Delta z_{t-l} + u_t \quad (4)$$

Where α_0 is a constant, α, β, γ and ϑ are unknown parameters and μ a random error. The existence of a long-run relationship between variables is tested using the F -test for the joint test of the lagged coefficients (in levels) in Equation (4) where $H_0 : \alpha_1 = \alpha_2 = \alpha_3 = 0$. When independent variables are considered to be $I(0)$ at the bottom and $I(1)$ at the top, two asymptotic critical values are given for cointegration tests. The variables were cointegrated if the test statistic was larger than the upper critical value. If the test statistic is less than the lower criterion value, the test provides no cointegration. However, if the test statistic falls between the upper and lower crucial values, the result is inconclusive.

For long-run relations analysis, the general form of the conditional ARDL(p,q) model is used:

$$y_t = \alpha + \sum_{i=1}^m \beta_i y_{t-i} + \sum_{j=0}^n \gamma_j x_{t-j} + \sum_{l=0}^p \vartheta_l z_{t-l} + u_t \quad (5)$$

3.3 Diagnostic Tests

Diagnostic tests are performed after fitting a testing model to determine whether all the necessary model assumptions are valid before performing inference. Thus, diagnostics tests for serial correlation and heteroskedasticity were performed in this study.

4. Results and discussion

4.1 Unit root test

The result of Augmented Dickey-Fuller (ADF) and Philip Perron (PP) unit root test for four ASEAN countries indicated that all of the studied variables were integrated less than $I(2)$ at the 5 per cent significance level, irrespective of the constant, and the trend included in the unit root models. Therefore, the ARDL model is appropriate for investigating the long-run relationship among the variables.

4.2 Empirical Results

Table 2
Results of ARDL bounds Test

Country	Actual Sample Size	F-Statistics
Indonesia	30	4.5362**
Malaysia	30	11.3580***
Philippines	30	9.3987***
Thailand	31	8.2706***
Critical Values for F-	Lower Bound, I(0)	Upper Bound, I(1)
statistics (n=30)		
1%	4.614	5.966
5%	3.272	4.306
10%	2.676	3.586

Note: Critical values are obtained from Narayan (2005) for k=3. (*), (**), (***) imply the rejection of the null hypothesis at 10%, 5% and 1% (Case II) level of significance respectively.

Following the bounds tests (optimal lag 2), evidence of cointegration between GDP, HDI, FDI and trade openness suggests that the independent variables co-move with GDP over the long run (see Table 2).

Table 3
Long Run Results

Country	Malaysia	Indonesia	Philippines	Thailand
LOGHDI	5.4750***	4.9852***	2.7365	0.2103
LOGTO	-0.1188	-1.0074**	0.4331	0.4259***
LOGFDI	-0.0013	-0.1115**	0.0164	0.0150***
C	11.5765	16.7725	5.8584	4.9206
Diagnostic Tests				
Serial correlation:				
LM(2)	3.0378	1.6677	0.2104	0.4652
Heteroskedasticity:				
ARCH(2)	0.1854	1.2145	1.4626	1.5644
RESET(1)	1.6907	1.2442	1.9579	0.4752
CUSUM	Stable	Stable	Stable	Stable
CUSUM ²	Stable	Stable	Stable	Stable

Note: The dependent variable is GDP in the logarithm. (*), (**), (***) indicate significance at 10%, 5% and 1% significant level respectively. Diagnostic tests confirmed the stability of parameters, no autocorrelation and no heteroscedasticity.

Table 4
Short Run Effect

Country	Variables	T-Statistic
Malaysia	Human Development Index (HDI)	4.1486 ***
	Trade openness	34.3117***
	Foreign Direct Investment (FDI)	-
Indonesia	Human Development Index (HDI)	3.9539***
	Trade openness	-0.0333
	Foreign Direct Investment (FDI)	4.61609**
Philippines	Human Development Index (HDI)	6.0365**
	Trade openness	0.2751***
	Foreign Direct Investment (FDI)	6.92E-06
Thailand	Human Development Index (HDI)	4.1668***
	Trade openness	0.3213***
	Foreign Direct Investment (FDI)	-

Note: *, **, *** indicates significance at 10%, 5% and 1 % level respectively

The study found mixed results on how human development, FDI and trade openness affect economic growth in ASEAN 4 countries (See Table 3 and 4). The long-run tests found a positive long-term relationship between HDI and GDP in Malaysia and Indonesia. Meanwhile, the short-run results show that all sample countries indicated a positive relationship between HDI and economic growth. The results suggest that an increase in human development will also increase the economic growth of a country. More specifically, an increase of 1% in HDI will increase GDP by 5.48% for Malaysia and 4.98% for Indonesia in the long run.

As for trade openness and FDI, only Indonesia and Thailand show a significant relationship towards economic growth in the long run (see Table 3). Except for Malaysia, all other sample countries indicated a short-run relationship between trade openness and economic growth. Meanwhile, only Indonesia has a significant short-run relationship between FDI and economic growth.

In contrast to Indonesia, the research indicates a positive relationship between trade openness, FDI, and economic growth in Thailand. The findings indicated that trade openness and FDI increase are associated with a rise in economic growth in Thailand. It supports the theory that trade openness and foreign investment are often seen as drivers of economic development.

The negative long-run impact of trade openness on economic growth in Indonesia is consistent with some previous studies (Ari et al., 2022; Sheng et al., 2019). Several interconnected factors contribute to Indonesia's negative relationship between trade openness and economic growth. Firstly, increased trade openness frequently results in increased imports, which may weaken domestic production if domestic industries struggle to compete with cheaper foreign alternatives. Second, the impact on trade terms, particularly when a country exports raw materials and imports finished goods, can further reduce export income, exacerbating the negative impact on economic growth. These multifaceted challenges highlight Indonesia's nuanced dynamics of trade openness and economic development.

The negative relationship between FDI and economic growth in Indonesia supports some previous studies (Dey & Awal, 2017; Inekwe, 2013; Nurvira & Ichsan, 2022). One of the possible reasons could be the quality of FDI, as not all investments are created equal. If FDI primarily involves low-value-added activities or does not contribute significantly to local value chains, it may not result in significant economic growth. Foreign investors entering the market may displace domestic firms, reducing local competitiveness and impeding growth. Furthermore, a concentration of FDI in specific sectors, such as extractive industries or low-skilled manufacturing, may fail to drive overall economic development, emphasising the importance of diversification.

5. Conclusion

The study findings have significant consequences for theoretical understanding and management decision-making. The observed relationship between human development and economic growth, especially in Malaysia and Indonesia, emphasises the theoretical significance of investing in human capital for long-term economic development. The findings highlight the need for policymakers to prioritise education, healthcare, and other variables contributing to human development to support long-term economic success.

In addition, the short-run effects observed in all sample countries underscore the need for a nuanced theoretical framework that considers the temporal features of the relationship between human development and economic growth. This discovery motivates additional investigation into the complicated interplay between these variables over various time frames.

Moreover, the identified impact of trade openness on economic growth, particularly in Indonesia and Thailand, provides theoretical support for globalisation's role in fostering long-term economic development. The short-run effects observed in Malaysia, the Philippines, and Thailand highlight the importance of developing a comprehensive theoretical understanding of how trade policies influence immediate economic outcomes.

Similarly, the study emphasises the theoretical significance of FDI as a driver of long-term economic growth in Indonesia and Thailand. In the short run, the transient effect in Indonesia necessitates a theoretical exploration of the factors influencing the immediate impact of FDI. It suggests that managers and policymakers take a more nuanced approach when assessing the short-term implications of foreign investments.

These results provide valuable information from a managerial view. Policymakers can leverage these findings to prioritise human development programs, ranking them for long-term economic expansion. Managers, particularly in industries influenced by FDI and international trade, must be cognizant of the diverse time frames these factors influence.

Future research should have a broader sample, enabling a more comprehensive understanding of economic growth factors. In addition, future research should prioritise exploring the specific factors determining economic growth in the Philippines. The future study could involve an in-depth analysis of the country's unique socio-economic landscape, policy framework, and external influences to provide targeted insights for policymakers and businesses operating in the Philippine context. In addition, the future should also examine the factor behind the negative relationship between trade openness and FDI towards economic growth, as in the case of Indonesia. By addressing this gap, researchers can contribute valuable knowledge that goes beyond the confines of the current study's limitations.

REFERENCES

- Adeleye, J. O., Adeteye, O. S., & Adewuyi, M. O. (2015). Impact of international trade on economic growth in Nigeria (1988-2012). *International Journal of Financial Research*, 6(3). <https://doi.org/10.5430/ijfr.v6n3p163>
- Adeyemi, P. A., & Ogunsoola, A. J. (2016). The impact of human capital development on economic growth in Nigeria: ARDL approach. *IOSR Journal of Humanities and Social Science*, 21(3), 1-7.
- Afi, H., Boubaker, S., & Omri, A. (2022). Do foreign investment and economic freedom matter for behavioral entrepreneurship? Comparing opportunity versus necessity entrepreneurs. *Technological Forecasting and Social Change*, 181, 121761.
- Ali, M., Egbetokun, A., & Memon, M. H. (2018). Human Capital, Social Capabilities and Economic Growth. *Economies*, 6(1), 2.
- Ari, Y. O., Jibir, A., & Hassan, A. A. (2022). The Impact of Trade Openness and FDI on Nigeria's Economic Growth: Revisiting the Unsettled Debate. *Review of Market Integration*, 14(2-3), 133-163.
- Cooper, R. N. (2001). Growth and Inequality: The Role of Foreign Trade and Investment. RePEc: Research Papers in Economics. https://dash.harvard.edu/bitstream/handle/1/3677049/Cooper_GrowthInequality.pdf
- Dey, S., & Awal, B. H. (2017). Impacts of Foreign Direct Investment on Economic Growth of Bangladesh: An Econometric Exercise. *Asian Business Review*, 7(2), 71-78.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366), 427–431. <https://doi.org/10.2307/2286348>
- Duan, C., Zhou, Y., Yuan-Qing, C., Wei, G., Chun-Zhen, Z., & Jian, A. (2022). Investigate the impact of human capital, economic freedom, and governance performance on the economic growth of the BRICS. *Journal of Enterprise Information Management*, 35(4/5), 1323–1347. <https://doi.org/10.1108/jeim-04-2021-0179>
- Elistia, E., & Syahzuni, B. A. (2018). The correlation of the human development index (HDI) towards economic growth (GDP per capita) in 10 ASEAN member countries. *JHSS (Journal of Humanities and Social Studies)*, 2(2), 40–46. <https://doi.org/10.33751/jhss.v2i2.949>
- Ghifara, A. D. G., Iman, A. N., Wardhana, A. K., Rusgianto, S., & Ratnasari, R. T. (2022). The Effect of Economic Growth, Government Spending, and Human Development Index toward Inequality of Income Distribution in the Metropolitan Cities in Indonesia. *Daengku*, 2(4), 529–536. <https://doi.org/10.35877/454ri.daengku1092>
- Gonos, J., Tomkova, A., Čulková, K., & Lisuch, J. (2023). Influence of Human Development Index to the State Economy in V4 Region. *Montenegrin Journal of Economics*, 19(1). <https://doi.org/10.14254/1800-5845/2023.19-1.6>
- Inekwe, J. N. (2013). FDI, employment and economic growth in Nigeria. *African Development Review*, 25(4), 421-433
- Islam, M. S., & Alam, F. (2023). Influence of human capital formation on the economic growth in Bangladesh during 1990–2019: an ARDL approach. *Journal of the Knowledge Economy*, 14, 3010-3027. <https://doi.org/10.1007/s13132-022-00998-9>
- Karambakuwa, R. T., Ncwadi, R., & Phiri, A. (2020). The human capital–economic growth nexus in SSA countries: what can strengthen the relationship? *International Journal of Social Economics*, 47(9), 1143–1159. <https://doi.org/10.1108/ijse-08-2019-0515>

- Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, 5(1), 1332820. <https://doi.org/10.1080/23322039.2017.1332820>
- Mariana, I. (2015). Consequences of the Investment in Education as Regards Human Capital. *Procedia. Economics and Finance*, 23, 362–370. [https://doi.org/10.1016/s2212-5671\(15\)00426-8](https://doi.org/10.1016/s2212-5671(15)00426-8)
- Miłaszewicz, D. (2021). Fundamental factors of economic growth in post-socialist transformation countries. *Ekonomia i Prawo. Economics and Law*, 20(2), 317-335.
- Muhamad, S., Sulaiman, N. F. C., & Saputra, J. (2018). The role of human capital and innovation capacity on economic growth in ASEAN-3. *Jurnal Ekonomi Malaysia*, 52(1), 281-294.
- Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, 37(17), 1979–1990. <https://doi.org/10.1080/00036840500278103>
- Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 1–3. https://econpapers.repec.org/RePEc:spt:stecon:v:5:y:2016:i:4:f:5_4_3
- Nurvira, N., & Ichsan, I. (2022). Analisis Hubungan Inflasi, Pma, Penyerapan Tenaga Kerja Dan Pertumbuhan Ekonomi Indonesia. *Jurnal Ekonomi Regional Unimal*, 4(2), 9-16.
- Omoju, O., & Adesanya, O. (2012). Does trade promote growth in developing countries? Empirical evidence from Nigeria. *International journal of development and sustainability*, 1(3), 743-753.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, 289–326. <https://doi.org/10.1002/jae.616>
- Phillips, P., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75, 335–346. <https://doi.org/10.1093/biomet/75.2.335>
- Ranis, G., Stewart, F., & Ramirez, A. (2000). Economic Growth and Human Development. *World Development*, 28(2), 197–219. [https://doi.org/10.1016/s0305-750x\(99\)00131-x](https://doi.org/10.1016/s0305-750x(99)00131-x)
- Rajan, S. I. (2020). India Migration Report 2020. Kerala Model of Migration Survey. <https://doi.org/10.4324/9781003109747>
- Sahoo, P., & Bishnoi, A. (2021). Impact of outward foreign direct investment: Evidence from Asia. *Journal of Policy Modelling*, 43(5), 1131–1148. <https://doi.org/10.1016/j.jpolmod.2021.06.004>
- Sheng, B., Fatima, S., Irshad, M. S., & Ramzan, M. (2019). Impact of openness on economic growth in developing economies: an empirical analysis. *European Online Journal of Natural and Social Sciences*, 8(3), 411.
- Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70, 65-94.
- Taqi, M., Ali, M. S. E., Parveen, S., Babar, M., & Khan, I. D. (2021). An analysis of Human Development Index and Economic Growth. A case study of Pakistan. *iRASD Journal of Economics*, 3(3). <https://doi.org/10.52131/joe.2021.0303.0042>
- Widarni, E. L., & Wilantari, R. N. (2021). The Relationship Between Human Capital Development and Economic Growth: Evidence from Malaysia. *Journal of Asian Finance, Economics and Business*, 8(6), 641–650. <https://doi.org/10.13106/jafeb.2021.vol8.no6.0641>
- World Bank Group. (2023, February 3). Sharp, Long-lasting Slowdown to Hit Developing Countries Hard. World Bank.

Assessing Sectoral Capacity in Achieving Targeted Compensation of Employees' Composition: A Post-Mid-Term Review of the 12th Malaysia Plan

Chakrin Utit^{a,*}, Normaz Wana Ismail^a and Zera Zuryana Idris^b

^aSchool of Business and Economics, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.

^bKulliyah of Economics and Management Sciences, International Islamic University Malaysia, 50728 Kuala Lumpur, Kuala Lumpur, Malaysia.

*Corresponding Author: chakrin_utit@upm.edu.my

Abstract

The successful implementation of eleven Malaysia Plans in charting and navigating economic growth has seen the transformation of Malaysia from an agricultural economy to an industrialised one and subsequently into a services-based economy. However, despite the developmental progress, Malaysia's growth quality was highly debatable due to the lower implications of growth on the compensation of employees (COE). In line with the mid-term review of the Twelfth Malaysia Plan (12MP), this study was structured to reassess the sectoral capacity towards supporting the achievement of 40% targeted COE composition. Applying the reassessment models developed based on the input-output modelling technique yields positive outcomes, with 19 sectors central to COE target achievement identified. The sectors were grounded based on three areas of potential that are capable of guiding policy decisions to improve the COE composition: (i) sectors that have achieved the 40% targeted COE composition with strong backward (BW) and forward (FW) linkages; (ii) sectors that have achieved the 40% targeted COE composition with strong BW or FW linkage; and (iii) sectors over 30% achieved COE composition with strong BW or FW linkage, or both.

Keywords: Compensation of employees; Twelfth Malaysia Plan (12MP); mid-term review; input-output model.

1. Introduction

Sixty-six years of development since the independence from the colonial master in 1957 have evidenced the successful implementation of eleven Malaysia Plans in charting and navigating Malaysia's economic growth. The success enabled Malaysia to transform from an agricultural economy to an industrialised one and subsequently into a services-based economy. From the policy perspective, the diversification approach in growth planning contributed significantly to the transformation outcomes, in addition to the impacts of key policy areas such as entrepreneurship, technology, investment, finance, and institutions (Briones & Felipe, 2013; Hill & Gochoco-Bautista, 2013).

However, despite the positive outcomes, Malaysia's growth quality was highly debatable due to the sluggish income growth⁵ (see, for example, DOSM, 2023). Evident from the Department of Statistics Malaysia (DOSM) showed that the national income share hovered at rates lower than 38% between 2015-2022, implying that 1 *Ringgit* growth in the gross domestic product (GDP) contributed less than 38 cents to compensation of employees (COE) (DOSM, 2023). The situation implies that capital owners enjoyed most of the growth benefits, with an average of 60% of the GDP recorded as the gross operating surplus (OS).

Marginal improvements in COE composition of less than 0.5% annually were recorded between 2015 and 2019, making the compositions comparably lower than the major Asian economies. For instance, the percentages for Japan, Singapore, South Korea and Taiwan were estimated between 42.8% and 52.7% in 2020 (DOSM, 2023). Although a slightly substantial improvement of 1.5% was registered in 2020, the overall sluggish growth proved detrimental, with Malaysia failing to achieve the projected COE share of 40% of the total GDP by the end period of the Eleventh Malaysia Plan (11MP) (EPU 2015, 2021).

The 40% COE target extends into the 12MP but faces heightened challenges due to the changing local and global economic landscapes in the post-pandemic period. The growth results of the COE over the initial two years of the 12MP revealed a concerning trend, with growth rates of only 35.1% and 32.4%. These figures highlight a significant disparity between the achieved and targeted outcomes, which has expanded from a 4.9% difference in 2021 to a more substantial 7.6% gap in 2022. This widening gap is also notably larger compared to the end period of the 11MP, where the difference stood at 2.9%.

Moving towards the end of 2023, the mid-term review was tabled to assess the performance of selected outcomes, targets, strategies and initiatives, as well as identify the way forward to address the arising issues. Complementing to this effort, this study reassessed the sectoral capacity towards supporting the achievement of targeted COE composition in the post-mid-term review period. Two scopes of capacities were highlighted: (i) the sectoral capacity to generate COE and (ii) the sectoral capacity to promote COE growth in other sectors. Overall, the reassessment models were developed based on the input-output modelling technique.

The presentation of this study is structured into five sections. Section 2 discusses the literature gaps to justify our contribution to the literature. Section 3 explains the methodological approach. Section 4 presents the main findings, and section 5 provides the concluding remarks.

2. Literature Review

Reviewing existing literature brings attention to two research gaps. First, multiplier and conventional linkages measures were commonly employed in the context of sectoral capacity reassessment. However, these measures are not appropriate in some cases, as the multiplier only informs the sectoral potential, while the conventional linkages only view the interdependencies aspect from input and output perspectives. Second, existing studies concerning the 12MP mainly concentrated on the plan content, with most focusing on topics under the Sustainable Development Goals (SDGs) scope. Hence, this study provided empirical contributions to the existing literature by effectively addressing the specified gaps.

⁵ This paper views income growth from the national account perspective, with specific attention given to the COE component.

In Malaysia, extensive literature has utilised multiplier and conventional linkages measures as the primary economic tools for assessing various aspects of development. For instance, Akhir et al. (2018) employed the multiplier measure to examine the economic contribution of the batik industry, while Yen et al. (2015) utilised a similar approach to assess the income and employment effects of the higher education sector. On the other hand, Saari et al. (2015) adopted the linkages measure to determine the sources of income growth and inequality across ethnic groups.

Although the studies have significantly contributed to the body of knowledge, several areas demand further methodological improvement. One pertinent area based on the current time setting includes the models' extension for assessing the achievements of the multidimensional targets of the 12MP. For example, to evaluate the achievement of the GDP growth target, measures such as content analysis must be utilised instead of the multiplier since the former informs the achieved growth, while the latter only apprise the growth potential. In addition, the linkages measure also needs to be extended accordingly. Evaluating the achievement of income targets, for example, must be based on income linkages instead of the conventional approach. Past studies by (KRI, 2018) and Lenzen (2003) have highlighted such requirements.

In relation to the existing 12MP studies, none was found to focus on topics related to the mid-term review. Recent studies showed that most focused on SDG issues, aligning with the global movement to promote a long-term approach to addressing global challenges. Taking Abdullah et al. (2022) as an example, the study delved into the prospective impacts of the 12MP on urban and regional development. Meanwhile, the studies by Aun (2021) and Ito et al. (2022) were primarily concerned with inequality. Pivoting their study to the educational perspective, Nalathambi et al. (2023) researched the efforts of Technical and Vocational Education and Training (TVET) institutions in supporting the move towards the SDGs under the 12MP.

Building upon the gaps, this study was structured to offer empirical contributions to the literature by addressing them. The following section outlined the methodological approach to achieve the study's objective.

3. Methodological Approach

The input-output modelling technique was utilised as the primary approach in this study due to its wide application for policy analysis. Such a perspective is vital, especially for a study that reassessed the sectoral capacity to generate COE and promote COE growth in other sectors.

3.1 COE Content and Linkages Measures

The measure for COE content in value-added was developed in the first part of the reassessment procedure to reassess the sectoral capacity in generating COE. In this case, the content not only measures the creation of COE per *Ringgit* of value-added but also tracks the changes in COE composition in GDP. Value-added was utilised to represent GDP in this model as the indicator accounted for 99% of Malaysia's GDP, while taxes less subsidies on production and imports only constituted about 1%.

The modelling approach for the COE content in value-added, \mathbf{w} is given as follows:

$$\mathbf{w} = \mathbf{u}\mathbf{v}^{-1} \tag{1}$$

where \mathbf{u} denotes the COE amount and \mathbf{v} is the sectoral value-added. Therefore, Equation (1) gives the measure for COE content in value-added.

Following the first part of the reassessment procedure, the COE linkages measures were developed to inform the sectoral capacity to promote COE growth in other sectors. Methodologically, the conventional linkages measures, which focus only on input and output perspectives, were extended for COE in this study to achieve the underlined objective. The measures were modelled using the normalised index to inform the BW and FW COE linkages. Precisely, BW linkage measures a sector's COE integration level with sectors that serve as its input supplier. In contrast, FW linkage measures the level of COE integration with sectors that act as output buyers.

BW is derived from the Leontief inverse matrix, while the FW is estimated from the Ghosh inverse matrix (see, for example, Lenzen, 2003). The derivation process can be explained through the following equations.

$$BW_i = \left(\frac{(1/n) \sum_i l_{ij}}{(1/n^2) \sum_i \sum_j l_{ij}} \right) \quad \text{for backward COE linkage} \quad (2)$$

$$FW_i = \left(\frac{(1/n) \sum_j b_{ij}}{(1/n^2) \sum_i \sum_j b_{ij}} \right) \quad \text{for forward COE linkage} \quad (3)$$

where l_{ij} indicates the element of the Leontief inverse matrix and b_{ij} represents the element of the Ghosh inverse matrix.

The sectors are considered to have robust COE linkages if the index for BW and FW equals or is higher than 1.

3.2 Data Sources and Classifications

This study used two primary datasets, including the national account statistics and the national input-output tables, which were sourced directly from DOSM (2023 and 2022). Concerning the national account statistics, the dataset was obtained from the publication "Gross Domestic Product (GDP) by Income Approach" for 2015-2022 to provide the statistical background of COE compositions in GDP and guide the sectoral grouping for modelling and analysis. The second dataset, the input-output tables, were obtained from the DOSM's e-Statistik platform for two base years, 2019 and 2020, to enable sectoral capacities comparison. Harmonising the databases yielded 32 sectors available for analysis.

4. Results and Discussions

Improving the COE composition is indeed a noble strategy towards elevating the living standard of the people. However, the effort was tainted by uncertainties due to changing economic landscapes and various structural issues. Moving into the second quarter of the 12MP, the target seems far beyond reach, as data in 2022 indicated that COE composition shrunk to 32.4%, the lowest since 2015. Therefore, complementing the mid-term review process, this study reassessed the sectoral capacity towards supporting the achievement of the targeted COE composition in the post-mid-term review period.

4.1 Sectoral Capacity to Generate COE

Overall findings point to two critical policy areas that could support the achievement of the targeted COE composition in the remaining 12MP periods. Strengthening the growth promotion strategies in sectors which have achieved the 40% COE target would be the top priority area. Out of 32 sectors, 15 have proven their capacities with Accommodation; Construction; and Wood products, furniture, paper products and printing, leading to more than 70% COE creation. Separating the sectors into broad sectors level, ten were found to operate under the manufacturing segment, and the remaining five were under construction and services. These findings corroborated the observation on the COE movement trend, which further emphasised the roles of construction and services-based sectors towards COE generation and the influence of manufacturing on the national COE movement trend.

On top of strengthening the growth promotion strategies, four sectors were found to possess critical 'push factors' towards achieving the targeted national COE composition. The factors include their capacity to generate COE and size of economic contribution (percentage contribution to GDP). The sectors include Oil palm; Food processing; Wholesale and retail trade; and Finance, insurance, real estate and business services. Although their contributions were relatively lower than the targeted 40% composition, currently standing between 30.9% and 32.3%, pairing the sectors with the proper growth promotion strategies may invigorate their contribution to COE. In terms of economic contributions, the sectors in total accounted for 34.2% of the GDP (DOSM, 2023). Therefore, leveraging the push factors may help realise the national policy target.

4.2 Sectoral Capacity to Promote COE Growth

Considering the limited time frame for stimulating COE growth in all sectors between 2023-2025, the findings in Table 1 summarise the sectors critical for achieving the targeted COE composition. In short, the sectoral focus must revolve around sectors in Panels A, B and D due to their immense potential for stimulating COE spillover. For Panel A, the growth in the Food processing COE, for instance, will induce the COE growth in sectors that act as its input suppliers. Taking Forestry and logging from Panel D as an example, the growth of COE in this sector will also support the COE creation in sectors purchasing its output. Compared to sectors in Panels A and D, the growth of COE in sectors under Panel B would bring in the most spillover impacts due to the integration between the sectors with other sectors along their value and supply chains.

Table 1
COE linkages matrix, 2019-2020

Index		Forward Linkages (FW)	
		<1	≥1
Backward Linkages (BW)	≥1	Panel A: BW ≥1 and FW <1 1. Food processing ^b 2. Soft drinks, mineral waters and other bottled waters 3. Rubber and plastic products ^b 4. Machinery and equipment 5. Electrical and electronics ^a 6. Medical devices	Panel B: BW ≥1 and FW ≥1 1. Oil palm 2. Textiles, wearing apparel and leather products ^a 3. Wood products, furniture, paper products and printing 4. Pharmaceuticals, medicinal chemical, and botanical products

	7. Food and beverage ^b	5. Non-metallic mineral products 6. Optical and scientific ^a 7. Other manufacturing and repair ^a 8. Construction 9. Wholesale and retail trade 10. Accommodation 11. Transportation and storage 12. Information and communication services 13. Finance, insurance, real estate and business services 14. Other services (including government services)
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Table 1 (cont.)
COE linkages matrix, 2019-2020

Index		Forward Linkages (FW)	
		<1	≥1
Backward Linkages (BW)	<1	Panel C: BW <1 and FW <1 1. Food crops and other agriculture ^b 2. Poultry farming and livestock 3. Fishing and aquaculture 4. Mining and quarrying ^b 5. Spirits, wines and liquors 6. Tobacco products 7. Coke and refined petroleum products ^b 8. Chemicals 9. Transport equipment ^b	Panel D: BW <1 and FW ≥1 1. Forestry and logging 2. Basic metal and fabricated metal products ^b

Notes: (a) sectors moving up the value chain between periods of 2019-2020; (b) sectors with strengthening backward and forward COE linkages between periods of 2019-2020.

Sectors in Panel C, however, were less critical in terms of their capacities to promote COE growth in the economy, in addition to their marginal contribution to COE creation. As such, the sectors must be positioned under the long-term plan to allow policymakers to work towards carefully designed strategies that may improve the sectoral impacts in both areas (COE composition and linkages).

4.3 Sectors Central to COE Target Achievement

The mapping of findings from Subsections 4.1 and 4.2 separates the list of sectors central to achieving the 40% COE target based on three areas of potential. Each area considered two essential criteria—the COE content in value-added and sectoral capacity to promote COE growth via linkages. Sectors failing to meet any criteria are excluded from the list.

Table 2
Sectors central to COE target achievement by areas of potential

Sectors	Areas of potential
1. Textiles, wearing apparel and leather products 2. Wood products, furniture, paper products and printing 3. Non-metallic mineral products 4. Optical and scientific 5. Construction 6. Accommodation 7. Transportation and storage 8. Other services (including government services)	Sectors that have achieved the 40% targeted COE composition with strong BW and FW linkages.
1. Soft drinks, mineral waters and other bottled waters 2. Rubber and plastic products 3. Machinery and equipment	Sectors that have achieved the 40% targeted COE composition with strong BW or FW* linkage.

4. Electrical and electronics	
5. Medical devices	
6. Food and beverage	
7. Basic metal and fabricated metal*	
1. Food processing*	Sectors over 30% achieved COE composition with strong BW* or FW linkage, or both.
2. Oil palm	
3. Wholesale and retail trade	
4. Finance, insurance, real estate and business services	

Based on Table 2, 19 sectors were determined as the leading sectors capable of supporting the national policy target to elevate people's living standards through COE composition improvement. Considering the context of the study that aims to reassess the sectoral capacity towards supporting the achievement of targeted COE composition, no specific strategies or initiatives are laid out. A primary justification for excluding such context lies mainly in the fact that sectoral COE contribution is determined by factors unique to others. For example, the Oil palm sector's contribution to COE is partly determined by issues such as the banning of palm oil imports by the European Union (for example, Purnomo et al., 2020; Rum et al., 2022). Therefore, inputs in Table 2 were mainly structured to guide policy decisions, especially those concerning focused sectors for achieving the COE composition target in the post-mid-term review periods of 2023-2025.

5. Conclusion

This study reassessed the sectoral capacity towards supporting the achievement of targeted COE composition in the post-mid-term review period. The reassessment procedures were performed by developing two measures based on the input-output modelling techniques—COE content in value-added and COE linkages, using input-output tables for 2019 and 2020.

An initial viewpoint based on the national account statistics indicated that Malaysia's growth quality was highly debatable due to the lower implications of growth on COE generation. Despite the issue being elevated as a national policy concern, the targeted improvement of COE composition to 40% seems far beyond reach, especially when Malaysia moves into the second quarter of the 12MP. Nevertheless, applying the reassessment models on 32 input-output sectors yields positive outcomes, with 19 sectors central to COE target achievement identified. Overall, the sectors were grounded based on three areas of potential that are capable of guiding policy decisions to improve the COE composition: (i) sectors that have achieved the 40% targeted COE composition with strong BW and FW linkages; (ii) sectors that have achieved the 40% targeted COE composition with strong BW or FW linkage; and (iii) sectors over 30% achieved COE composition with strong BW or FW linkage, or both.

Despite the novelty aspects offered, this study had two limitations. First, detailed policy directions regarding strategies or initiatives that could improve the sectoral COE composition were not provided due to unique issues surrounding the sectors. Second, only 32 sectors were covered in the reassessment procedures, following the sectoral mapping between national account statistics and input-output tables. Addressing these limitations should be among the key considerations in future studies.

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References

- Abdullah, J., Zanudin, K., & Marzukhi, M. A. (2022). Twelfth Malaysia Plan: Prospective Impacts on Urban and Regional Development. *Planning Malaysia*, 20(23), 331-345. <https://doi.org/10.21837/pm.v20i23.1170>
- Akhir, N. H. M., Ismail, N. W., & Utit, C. (2018). Malaysian batik industry contribution analysis using direct and indirect effects of input-output techniques. *International Journal of Business and Society*, 19(1), 181-194.
- Aun, L. H. (2021). *Mapping Errors and Missed Opportunities in the Twelfth Malaysia Plan*. ISEAS Perspective 2021, No. 152. Available at: https://www.iseas.edu.sg/wp-content/uploads/2021/10/ISEAS_Perspective_2021_152.pdf
- Briones, R., & Felipe, J. (2013). *Agriculture and Structural Transformation in Developing Asia: Review and Outlook*. Asian Development Bank Economics Working Paper Series No. 363. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2321525
- Department of Statistics Malaysia. (DOSM, 2022). *Input-output Tables Malaysia 2019 & 2020*. Department of Statistics Malaysia, Putrajaya.
- Department of Statistics Malaysia. (DOSM, 2023). *Gross Domestic Product Income Approach 2015-2022*. Department of Statistics Malaysia, Putrajaya.
- Economic Planning Unit. (EPU, 2015). *Eleventh Malaysia Plan*. Economic Planning Unit, Putrajaya.
- Economic Planning Unit. (EPU, 2021). *Twelfth Malaysia Plan*. Economic Planning Unit, Putrajaya.
- Hill, H., & Gochoco-Bautista, M. S. (Eds.). (2013). *Asia rising: growth and resilience in an uncertain global economy*. Edward Elgar Publishing.
- Ito, M., Keeni, M., & Fuyuki, K. (2022). Knowledge, Attitude and Awareness towards Malaysia's Economic Policy and Income Inequality: A Comparison between Malays and Chinese Malays. *Journal of Social Science for Policy Implications*, 10, 1-12. <https://doi.org/10.15640/jsspi.v10a1>
- Khazanah Research Institute. (KRI, 2018). *Structure of the Malaysian Economy: An Input-Output Analysis*. Khazanah Research Institute, Kuala Lumpur.
- Lenzen, M. (2003). Environmentally important paths, linkages and key sectors in the Australian economy. *Structural Change and Economic Dynamics*, 14(1), 1-34. [https://doi.org/10.1016/S0954-349X\(02\)00025-5](https://doi.org/10.1016/S0954-349X(02)00025-5)
- Nalathambi, D. K., Salleh, K. S. M., Noh, S. H. M., Solaiman, H. S., & Jayaraman, R. (2023). Effort of Politeknik Malaysia as TVET institute in Attaining Sustainable Development Goals (SDGs) Through Twelfth Malaysia Plan. *Borneo Engineering & Advanced Multidisciplinary International Journal*, 2(1), 37-46.
- Purnomo, H., Okarda, B., Dermawan, A., Ilham, Q. P., Pacheco, P., Nurfatriani, F., & Suhendang, E. (2020). Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. *Forest Policy and Economics*, 111, 102089. <https://doi.org/10.1016/j.forpol.2020.102089>
- Rum, I. A., Tukker, A., de Koning, A., & Yusuf, A. A. (2022). Impact assessment of the EU import ban on Indonesian palm oil: Using environmental extended multi-scale MRIO. *Science of The Total Environment*, 853, 158695. <https://doi.org/10.1016/j.scitotenv.2022.158695>

- Saari, M. Y., Dietzenbacher, E., & Los, B. (2015). Sources of income growth and inequality across ethnic groups in Malaysia, 1970–2000. *World Development*, 76, 311-328. <https://doi.org/10.1016/j.worlddev.2015.07.015>
- Yen, S. H., Ong, W. L., & Ooi, K. P. (2015). Income and employment multiplier effects of the Malaysian higher education sector. *Margin: The Journal of Applied Economic Research*, 9(1), 61-91. <https://doi.org/10.1177/0973801014557391>

The Impact of COVID-19 on the Stock Markets of BRICS Countries

Sook Ching Kok
Caroline Geetha

Faculty of Business, Economics and Accountancy,
Universiti Malaysia Sabah, Malaysia
koksookching@ums.edu.my
caroline@ums.edu.my

Abstract

This paper examines the weak-form efficiency of the BRICS stock markets for the periods before and during the outbreak of the COVID-19 pandemic. The five countries of BRICS are Brazil, Russia, India, China, and South Africa. The performance of Brazil's stock market is shown by the BOVESPA Index. The MOEX Russia Index is used to show the performance of Russia's stock market. For India's stock market, the S&P BSE SENSEX Index is used. For China, the stock market is represented by the SHCOMP Shanghai Stock Exchange Composite Index. South Africa Top 40 Index represents South Africa's stock market. We use unit root tests to assess the random walk properties of the series. We found that Brazil's stock market and China's stock market were following a random walk or efficient for both the periods before and during the outbreak of the COVID-19 pandemic. For the period before the pandemic, Russia's stock market and India's stock market did not follow a random walk or were inefficient only when the trend was included in the testing of unit root. For the period during the outbreak of the pandemic, both the stock markets were following a random walk or became efficient. For the period before the pandemic, we also found that South Africa's stock market was not following a random walk when only intercept is included in the testing of unit root. During the pandemic, South Africa's stock market was following a random walk or became efficient. The interesting results showed that all the BRICS countries' stock markets were or became efficient during the pandemic period. This may show that the market confidence was strong even though these countries, like other countries, were badly impacted by the pandemic catastrophe.

Keywords: BRICS countries, COVID-19 pandemic, Weak-form efficiency

1.0 Introduction

For the background of the study, it can be seen that the literature on stock market weak-form efficiency is abundant. However, there are special interests in this research area. According to Chong et al. (2010), there are two strands of literature that attract attention from researchers, i.e. the effectiveness of trading rules and the focus on emerging markets' efficiency. This is consistent with Kiran and Rao.R. (2019) that, the behavior of stock returns which impacts trading opportunities is in the interest of investors and policymakers. It is also stated that emerging markets are of growing interest due to globalization and liberalization. BRICS countries' gross domestic product is about USD 16 trillion and their population is about 40 percent of the world population (Iqbal, 2023). Chong et al. (2010), Kiran and Rao.R. (2019), and Iqbal (2023) highlighted the importance of the BRICS emerging markets. The economic growth of the emerging economies of BRICS is contributing to the global economy, and these economies are the important destinations for foreign direct investment (Ataman and Kahraman, 2022).

The COVID-19 pandemic is affecting the global economy including the world stock markets. According to Ameer et al. (2023), the pandemic has led to reduced working hours and increased unemployment around the world. The pandemic has had a severe negative impact on global economic activities and the efficiency of stock markets is doubted. Investors may withdraw themselves from the stock market by selling the shares of stocks because of uncertainty. This will cause lower stock prices in the market. If the market is efficient, the prices will meet a new equilibrium. Inversely, if the market is inefficient, the falls in stock prices are only temporary and the stock prices tend to revert (Munir et al. 2012). If the stock prices are predictable, investors may take advantage of the lower stock prices by buying at a lower price and selling at a higher price. Market efficiency has important implication for resource allocation especially in emerging markets like BRICS, therefore examining the efficiency of the markets is needed for comparison before and during the COVID-19 pandemic.

This study aims to examine the weak-form efficient market hypothesis (EMH) of the BRICS stock markets for the periods before and during the COVID-19 pandemic. The BRICS emerging markets are growing important therefore it is of great interest to investors as well as policymakers to know whether the efficiency of the markets is affected by the pandemic. We apply unit root tests to assess the random walk properties of the stock market indices' prices of Brazil, Russia, India, China, and South Africa. The remainder of this paper is organized as follows: Section 2 is a literature review, Section 3 is data and methodology, Section 4 is estimated results, and Section 5 is the conclusion.

2.0 Literature Review

The Efficient Market Hypothesis states that the current stock price reflects all information available. The weak form of the hypothesis is intensively examined for the stock price to reflect all the past price information. However, it is not surprising to get different findings regarding a weak form of market efficiency because of the methods of testing used. In some cases, we may expect the findings of market efficiency to be based on the methods of testing. For example, Chong et al. (2010) applied trading rules, Mukhacheva and Oleg (2015) used detrended fluctuation analysis, Khanna and Mittal (2016) employed unit root tests, Kiran and Rao.R. (2019) used a non-linear approach, Saluja (2019) used runs test, Ataman and Kahraman (2022) used artificial neural network, and Ameer et al. (2023) used multifractal detrended fluctuation analysis.

Chong et al. (2010) employed several trading rules to check whether the investment strategies were effective in gaining abnormal returns from the BRICS stock markets. They found mixed results in the case of the Chinese stock market. Besides that, the investment strategies could bring abnormal returns in the Russian and Indian stock markets, but not so much in the Brazilian stock market. The most efficient stock market was the Brazilian stock market, and the most inefficient market was the Russian stock market. Mukhacheva and Oleg (2015) used detrended fluctuation analysis to examine the efficient market hypothesis for four BRICS countries' stock markets, including Brazil, Russia, India,

and China. Mixed results were obtained. Khanna and Mittal (2016) employed unit root tests to study the day-of-the-week effect on the BRICS stock markets. The anomaly was found in the Chinese and Indian stock markets. There were opportunities to gain abnormal returns using technical analysis. Applying the non-linear test, Kiran and Rao.R. (2019) found non-linear dependence in all the emerging markets of BRICS therefore based on the method used these markets were inefficient for the study period. Saluja (2019) applied runs test to analyze the weak-form efficiency of the BRICS countries' stock markets. The weak-form EMH was found to be valid for the tested markets. Ataman and Kahraman (2022) used an artificial neural network to analyze the correlation between selected macroeconomic variables and the BRICS stock markets. The findings showed a strong correlation between the macroeconomic variables and the stock markets. Ameer et al. (2023) studied the BRICS stock markets' efficiency using multifractal detrended fluctuation analysis for the periods of pre- and post-COVID. In the period before the pandemic, all the stock markets were found to be inefficient. The inefficiency of all the stock markets increased in the post-pandemic period, except for China which experienced increased efficiency in the post-pandemic period.

3.0 Data and Methodology

We obtained the daily prices of stock markets' indices from Bloomberg. The data include the BOVESPA Index to represent the performance of the Brazilian stock market; the MOEX Russia Index (MICEX Index); the S&P BSE SENSEX Index of the Indian stock market; the SHCOMP Shanghai Stock Exchange Composite Index for China; and the South Africa Top 40 Index. For the study periods, we separated the daily data into two periods, i.e. the period before the COVID-19 pandemic from 3/1/2017 to 29/11/2019, and the period during the COVID-19 pandemic from 2/12/2019 to 29/12/2022. We run the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root tests to assess the random walk properties of the data series. These tests showed whether the unit root hypothesis was rejected and thus the random walk was invalid and the weak-form efficiency was violated. Inversely, the unit root hypothesis might have failed to be rejected, and showed that the data series followed a random walk or the weak-form efficient market hypothesis was valid.

4.0 Estimated Results

The ADF and PP unit root tests were used to assess the random walk properties of each index price series, separately for the periods before and during the pandemic. This means that we have the data series for two periods. Series 1 is the index prices for the period before the pandemic, and series 2 is the index prices for the period during the pandemic. The estimated results are shown in Table 1 below. For both the BOVESPA 1 and BOVESPA 2, both the ADF and PP tests' results failed to reject the unit root null hypothesis. This indicated that the Brazilian stock market was efficient in both the periods before and during the pandemic. The Brazilian stock market index prices followed a random walk process in each of the two periods.

Next, for the MOEX Russia 1, the results of ADF and PP unit root tests with intercept failed to reject the unit root null hypothesis. When included trend, the results of the two tests rejected the unit root null hypothesis at the 5% significance level. The rejection of the null hypothesis indicated that the index price series did not follow a random walk process and the Russian stock market was inefficient in the period before the pandemic. Further, for MOEX Russia 2, the ADF and PP tests' results with both intercept and trend failed to reject the null hypothesis of a unit root, indicating the stock market was efficient and the index price series followed a random walk process in the period during the pandemic.

The SENSEX 1 was found to reject the null hypothesis of a unit root when tested with the trend using the ADF and PP unit root tests. The results were significant between 5% to 10%. When tested only with intercept, the results failed to reject the null hypothesis. We can conclude that the Indian stock market was inefficient in the period before the pandemic. For SENSEX 2, the null hypothesis of a unit root failed to be rejected. This indicated that the index price series followed a random walk process and the Indian stock market was efficient in the period during the pandemic.

The Chinese stock market index price series in the periods before and during the pandemic were represented by SHCOMP 1 and SHCOMP 2. The ADF and PP unit root tests' results showed that the Chinese stock market was efficient in each of the two periods, as both the index price series 1 and 2 followed a random walk process.

The results of both the ADF and PP unit root tests with intercept showed that the unit root null hypothesis was rejected for the South Africa Top 40 1. The results were significant between 5% and 10% significance levels. This indicated the African stock market was inefficient and the index price series did not follow a random walk process in the period before the pandemic. The ADF and PP tests' results further showed that the null hypothesis of a unit root was not rejected for the South Africa Top 40 2. The African stock market became efficient in the period during the pandemic, and the index price series 2 followed a random walk process.

Table 1: Unit Root Tests' Results

Series	ADF		PP	
	Intercept	With Trend	Intercept	With Trend
BOVESPA 1	-0.734866	-3.025616	-0.617034	-2.922011
BOVESPA 2	-1.819801	-1.932797	-1.980586	-2.099220
MOEX Russia 1	0.179103	-3.877160**	0.151616	-3.924726**
MOEX Russia 2	-0.813785	-1.093378	-0.959769	-1.207754
SENSEX 1	-1.661848	-3.387584*	-1.653525	-3.477410**
SENSEX 2	-0.690886	-2.081179	-0.716101	-2.161812
SHCOMP 1	-1.541940	-2.029074	-1.581152	-2.083229
SHCOMP 2	-2.243647	-2.021245	-2.184665	-1.925766
South Africa Top 40 1	-2.832390*	-2.734437	-2.955586**	-2.880099
South Africa Top 40 2	-1.529014	-2.634721	-1.477923	-2.623390

Note: *, **, and *** denote 10%, 5% and 1% significance levels.

5.0 Conclusion

In this paper, we examined the weak-form efficient market hypothesis for the stock markets of the BRICS countries, i.e. Brazil, Russia, India, China, and South Africa. We use unit root tests to assess the random walk properties of the stock market index price series. Our analysis included the periods before and during the COVID-19 pandemic.

As a whole, it can be seen that the Brazilian and Chinese stock markets were efficient in both the periods before and during the pandemic. The Russian, Indian, and South African stock markets were inefficient in the period before the pandemic and became efficient in the period during the pandemic. In an efficient market, there is a unit root and the series follows a random walk. Conversely, in an inefficient market, the unit root null hypothesis is rejected and the series does not follow a random walk. It is surprising to find out that all the BRICS countries became efficient during the period of the pandemic. The market confidence was strong and investors could trade at a fair price. Our results are inconsistent with Ameer et al. (2023). In that study, it was found that the inefficiency of all the BRICS stock markets except the Chinese stock market, was increased in the post-pandemic period. These different findings may suggest that the weak-form efficiency of stock markets should be examined by using different methods for more insights and understanding.

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References

- Ameer, S., Nor, S.M., Ali, S., and Zawawi, N.H.M. (2023). The Impact of COVID-19 on BRICS and MSCI Emerging Markets Efficiency: Evidence from MF-DFA. *Fractal and Fractional*, Vol.7, No.7.
- Ataman, G. and Kahraman, S. (2022). Stock Market Prediction in BRICS Countries Using Linear Regression and Artificial Neural Network Hybrid Models. *The Singapore Economic Review*, Vol.67, No.2, pp.635-653.
- Chong, T-L, Cheng, S.H-S, and Wong, E.N-Y (2010). A Comparison of Stock Market Efficiency of the BRIC Countries. *Technology and Investment*, Vol.1, No.4, pp.235-238.
- Iqbal, B.A. (2023). COVID-19: Its Impact on BRICS Economies. *BRICS Journal of Economics*, Vol.4, No.1.
- Khanna, V. and Mittal, A. (2016). Does Day-of-the-Week Anomaly Influence BRICS Stock Markets? A Unit Root Testing Approach. *Journal of Business*, Vol.5, No.1, pp.9-17.
- Kiran, S. and Rao.R., P. (2019). Analysis of Stock Market Efficiency in Emerging Markets: Evidence from BRICS. *The Romanian Economic Journal*, XXII, No.72, pp.60-77.
- Mukhacheva, G. and Oleg, D. Assessing BRIC Countries' Stock Market Efficiency with the Detrended Fluctuation Analysis. In 7th International Conference Economic Challenges in Enlarged Europe. Tallinn: Tallinn University of Technology, 2015. p.1-11. ISSN 2382-6797.
- Munir, Q., Kok, S.C., Furouka, F., and Mansur, K. (2012). The Efficient Market Hypothesis Revisited: Evidence from the Five Small Open ASEAN Stock Markets. *The Singapore Economic Review*, Vol.57, No.3, 12 pages.
- Saluja, H.S. (2019). Efficiency and Co-integration of BRICS Nations Stock Markets: An Empirical Study. *Journal of Emerging Technologies and Innovative Research*, Vol.6, No.3.

**EMPOWERING SOCIOECONOMIC DEVELOPMENT
THROUGH FINANCIAL TECHNOLOGY INCLUSION AND INTEGRATION
IN RURAL COMMUNITY OF MALAYSIA
- A CASE STUDY OF KUDAT, SABAH**

Researchers:

Mat Salleh @ Salleh Wahab, Rasid Mail, Mohd. Rahimie Abd. Karim, Jakaria Dasan,
Borhan Sareya Abdullah, Toh Pei Sung, Syarifah Hanum Ali, Datu Razali Datu Eranza,
Rudy Ansar, Faerodz Madli, Shaierah Gulabdin

Faculty of Business, Economics and Accountancy,
Universiti Malaysia Sabah, Jalan UMS,
88400 Kota Kinabalu, Sabah Malaysia

Abstract

The main objective of this study is to examine the potential impact of Financial Technology (fintech) as a tool to promote socioeconomic development in rural communities in Malaysia. Despite significant progress in promoting growth, there's limited research on fintech and its consequences, particularly among the marginalized population of Kudat, Sabah. The majority of them have been underserved and left behind. This study will primarily concentrate on the impact of enhancing the community's financial literacy, integrating Non-field Communications (NFC) for cashless transactions, and creating an e-payment gateway to catalyze business growth and efficiency. By equipping the community with financial knowledge and enabling access to modern financial tools, this study strives to foster sustainable development in rural communities while establishing a replicable model domestically and beyond.

Keywords: financial technology, fintech, financial literacy, financial inclusion, financial integration, cashless transactions, socioeconomic development

1.0 Introduction

Financial technology (fintech) is a broad term for a variety of technological advances that aim to improve and automate financial services. This includes mobile payments, digital banking, blockchain, robo-advisors, cryptocurrencies, and others that could change standard banking and financial systems in terms of productivity, accessibility, and friendliness.

Fintech plays an important role in promoting socioeconomic development by facilitating greater financial inclusion, improving access to capital, and improving efficiency and transparency within financial institutions. It ultimately provides and fosters economic development and empowerment throughout a wide range of diverse sectors. Fintech innovation has disrupted traditional financial systems by offering faster, cheaper, and more convenient financial services. Fintech increases financial inclusion by providing access to financial services for previously excluded individuals due to high transaction costs, geographic barriers, and a lack of documentations (Beck, 2020).

Studies have emphasized the impact of fintech on socioeconomic development. The World Bank (2018) notes that increasing access to finance can help small and medium-sized enterprises (SMEs) grow, thereby creating employment opportunities and driving economic growth. Fintech innovation also promotes advanced financial literacy by providing easy-to-use financial management tools and enhancing transparency in financial transactions (World Bank, 2018, Wahab et al., 2022). Fintech adoption can improve financial literacy and awareness, reduce transaction costs, and enhance the efficiency of financial transactions (Alam et al., 2021).

In Malaysia, fintech is rapidly expanding, reshaping people's access to financial services and diversifying the country's economy. The Financial Technology Enabler Group (FTEG), for example, was established in 2016 to promote equitable development. To encourage innovation and ensure compliance, FTEG introduced regulatory sandboxes. This proactive approach underscores Malaysia's dedication to fintech as a catalyst for economic growth (BNM, 2021), including factors such as trust, reputation, privacy, security, the quality of information associated with it (Kim et al., 2008).regulatory sandboxes that further support innovation and regulatory compliance (Lee et al., 2019, Gan & Nasir, 2020).

2.0 Problem Statements

Despite the outstanding achievement in bolstering socioeconomic development, widespread access to fintech, however, remains complicated in rural communities. The district of Kudat, Sabah, is one example that faces various socioeconomic challenges, including poverty and limited access to traditional banking services.

Geographic isolation, low agricultural productivity, and reliance on traditional livelihoods are a few factors that also affect the prevalence of poverty in Kudat (Malaysia Economic Monitor, 2017). Further complicating matters, they also lack proper financial information, have limited access to banking services, and are isolated from other areas. Factors like a lack of financial literacy, inadequate infrastructure, and cultural divides may make it more difficult for them to accept and use fintech similarly to urban areas.

Efforts should be made to ensure the effective utilization of fintech services in the region. The development of robust and reliable infrastructure is essential for maximizing the

effectiveness of fintech solutions, ensuring their dependability, and enabling seamless financial operations. This can be done by empowering them with better financial knowledge, integrating Non-field Communications (NFC) for a cashless environment, and introducing e-payment gateways to expand transaction scope and accessibility (Ling, 2019, Loo, 2020).

3.0 Hypotheses and Research Questions

The main hypothesis for this study is that fintech inclusion and integration have the potential to promote socioeconomic development in Kudat, Sabah. This would be accomplished through increasing financial inclusion and literacy, as well as integrating NFC and e-payment systems. Therefore, the study will explore the following research questions:

1. What is the level of financial literacy in the Kudat communities with regard to fintech inclusion and integration?
2. What are the obstacles to fintech inclusion and integration in the Kudat community?
3. How has fintech inclusion and integration affected socioeconomic development in the Kudat communities?
4. What are the most effective methods for fostering fintech inclusion and integration in Kudat communities?

4.0 Research Objectives

The study makes an effort to take an extensive approach in order to thoroughly examine the impacts of fintech inclusion and integration on the socioeconomic development of the rural community of Kudat, Sabah, with the following objectives:

1. To study the levels of financial literacy and fintech interventions within the community of Kudat, Sabah;
2. To assess the level of adoption and integration of NFC technology to promote secure and streamlined digital transactions within the community of Kudat, Sabah;
3. To investigate the impact of e-payment gateways on business growth, efficiency, and transactional security in the community of Kudat, Sabah; and
4. To promote financial inclusion by developing a replicable model for fintech inclusion and integration in marginalized communities based on the experiences and outcomes in the community of Kudat, Sabah.

5.0 Research Methodology

A mixed-methods approach will be used in this study to integrate surveys, interviews, and focus groups in order to collect complete data and insights on the effects of fintech interventions. on the socioeconomic well-being of the Kudat community in Sabah, Malaysia.

In addition, the target population for the surveys will represent a diverse cross-section of the community. A representative sample will be selected using appropriate sampling techniques

to ensure the results are generalized to the larger population of interest. Surveys will be conducted to assess the present level of financial literacy within the community and to evaluate the effect of fintech interventions on socioeconomic well-being. The questionnaire will be designed based on existing validated instruments and customized to the local context of Kudat.

6.0 Data Analysis

The quantitative and qualitative data collected through surveys, interviews, and focus groups will be integrated during the data analysis phase. The findings from both data sources will be triangulated to provide a comprehensive understanding of the impact of fintech interventions on financial literacy, socioeconomic well-being, and community perspectives. The integration of data will help in corroborating and complementing the findings, providing a more robust and holistic interpretation of the research objectives.

7.0 Ethical Considerations

Ethical guidelines and protocols will be followed throughout the research process. Informed consent will be obtained from all participants, ensuring their voluntary participation and understanding of the research purpose. Anonymity and confidentiality of the participants will be maintained throughout the data collection, analysis, and reporting stages. Ethical considerations will also include sensitivity towards cultural and social aspects, ensuring respect and cultural appropriateness in conducting the research.

8.0 Timeline

This study will be segmented into eight (8) distinct phases, spanning a duration of two years from September 15, 2023. It encompasses problem identification, review of relevant literature, formulation of research questions, development of a conceptual model, selection of an appropriate methodology, collection of data, analysis and testing of the model, discussion of findings, research recommendations, and a comprehensive conclusion.

According to estimates, all of these phases will be completed by the end of September 2025. The concluding part will consist of a discussion of any practical implications, policy initiatives, or managerial recommendations that have been drawn from the findings. In addition, this study will entail providing a synopsis of the research procedure, putting an emphasis on major findings, and determining possible paths for additional areas of study in the future.

9.0 Conclusion

The result of this study is expected to produce a wide range of interesting and encouraging findings in the end. The aim of the study is to bring about positive change in the marginalized community of Kudat by improving financial literacy, promoting the adoption of NFC technology and e-payment systems, and contributing to an enriched socioeconomic landscape.

10.0 References

Alam, M.M., Awawdeh, A., & Muhamad, A. I. (2021). Using E-Wallet for Business Process Development: Challenges and Prospects in Malaysia. *Business Process Management Journal*, 27(4), 1142-1162. (online) <https://doi.org/10.1108/BPMJ-11-2020-0528>

Bank Negara Malaysia. (2021). Interoperable Credit Transfer Framework (ICTF) for Malaysia's Instant Transfer Services. Retrieved from <https://www.bnm.gov.my/-/interoperable-credit-transfer-framework-ictf-for-malaysia-s-instant-transfer-services>

Beck, T. 2020. Fintech and Financial Inclusion: Opportunities and Pitfalls. ADBI Working Paper 1165. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/fintech-financial-inclusion-opportunities-pitfalls>

Gan, C., & Nasir, N. (2020). E-Payment Adoption Among SMEs in Malaysia: The Role of Trust and Perceived Risk. *Journal of Small Business and Enterprise Development*, 27(2), 200-219.

KIM, Dan J.; FERRIN, Donald L.; and RAO, H. Raghav. A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. (2008). *Decision Support Systems*. 44, (2), 544-564. Available at: https://ink.library.smu.edu.sg/lkcsb_research/1147

Ling, G. S. (2019). Impact of Mobile Payment Application Towards Cashless Society. *Journal of Mobile Computing, Communications & Mobile Networks*, 5(2), 64-73.

Loo, J. C. (2020). E-Payment Systems in Malaysia: The Challenges and Potential Opportunities. *International Journal of Business and Society*, 21(2), 863-876.

Malaysia Economic Monitor. (2017). Data For Development (English). Retrieved from <http://documents.worldbank.org/curated/en/993771497248234713/Malaysia-economic-monitor-data-for-development>

Wahab, M.S.S., Karim, M.R.A., T.S.Lim., (2022). Financial literacy and behavioural disposition in retirement saving – A study on employee's preparedness for a fully defined contribution pension scheme in Malaysia. *Kasetsart Journal of Social Sciences* 43 (2022). 619-628., Retrieved from <https://so04.tci-thaijo.org/index.php/kjss/article/view/260322/176251>

World Bank. (2018). The World Bank Annual Report 2018 (English). Retrieved from <http://documents.worldbank.org/curated/en/630671538158537244/The-World-Bank-Annual-Report-2018>

The Impact of Adopting Artificial Intelligence (AI) on Malaysia's Economic Environment

Caroline Geetha^a, Mat Salleh Ayub^{b,*}, Elijah Vivin Vincent Chandran,^c

^aFaculty of Business, Economics and Accountancy, Universiti Malaysia Sabah,
Kota Kinabalu, Malaysia
caroline@ums.edu.my

^bFaculty of Business, Economics and Accountancy, Universiti Malaysia Sabah,
Kota Kinabalu, Malaysia
mayub@ums.edu.my

^cFaculty of Science and Information Technology, Universiti Teknologi Petronas,
Seri Iskandar, Perak Darul Ridzuan, Malaysia
elijahvivin@gmail.com

*Corresponding Author's email: mayub@ums.edu.my

ABSTRACT

This study aims to conduct a systematic review of the implications of adopting Artificial Intelligence (AI) on the economic landscape of Malaysia. Drawing on various economic growth theories, the research underscores the pivotal role of AI in transforming resources characterized by diminishing marginal returns into assets with increasing marginal returns. The analysis is multifaceted, addressing three fundamental perspectives. First, it examines AI adoption's impact on microeconomic and macroeconomic dimensions. At the macroeconomic level, the research observes the influence of AI adoption on demand-pull inflation and cost-push inflation, thereby affecting overall price levels within the Malaysian economy. In contrast, at the microeconomic level, AI adoption is associated with increased productivity and the efficient allocation of resources, leading to economies of scale. In innovative and competitive

business environments, AI adoption further enhances the quality of goods and services while ensuring competitive pricing strategies. Second, the study differentiates between AI adoption's positive and negative consequences across various sectors and demographic groups. It delves into specific examples to illustrate how different industries and segments of the population may either benefit from or face challenges resulting from AI implementation. Finally, the analysis contemplates both the short-term and long-term impacts of AI adoption. In the short term, immediate changes in employment, productivity, and consumer prices are evaluated, while the long-term analysis explores more structural changes, including income redistribution and sustained productivity growth. The findings of this research highlight the net positive impact of AI adoption in Malaysia, emphasizing that its benefits outweigh the associated costs. It underscores the significance of government involvement, particularly in formulating well-designed policies and providing necessary infrastructure. This proactive government role aligns with the principles of Romer's theory of economic growth, ultimately driving the successful and sustainable adoption of AI technology for fostering economic development.

Keywords: artificial intelligence, economic landscape, Malaysia, microeconomics, macroeconomics.

1.0 Introduction

It is no secret that artificial intelligence (AI) is rapidly changing the world as we know it. The development of technology that can mimic human intelligence is having a profound impact on the way we live and work. (Ed Burns et al., July 2023). However, one area where AI is having a particularly significant impact is on the global economy. Across the globe, businesses are already integrating AI into their operations, and this trend is only going to continue. In fact, according to a study by PwC, AI is set to contribute up to US\$15.7 trillion to the global economy by the year 2030. This is a staggering sum of money and highlights the scale of the economic impact of AI. (PwC, 2017).

One of the primary reasons that AI is having such a substantial impact on the economy is because of its ability to automate tasks that have historically required human workers. A great example of this is in manufacturing, where robots can take over much of the production line and greatly increase efficiency. This is leading to significant cost savings for businesses, allowing them to invest more money in other areas. There is strong empirical evidence that adoption of AI has reduced the demand for labour as well the cost of running a business significantly. This can be discussed from various angle from the perspective of economics.

First, the automation of tasks. AI and robotic process automation have made it possible to automate a wide range of tasks that were previously performed by human workers. This has led to a reduction in the demand for labour in industries such as manufacturing, logistics, and customer service. For example, Amazon has implemented robots in their warehouses to transport and package products. (Gills, S. Alexander et al., 2014). This has significantly reduced the time taken to complete tasks and has allowed the company to process more orders without hiring additional workers. Thus it has helped the company to benefit from large scale production. The average cost for every unit of products produced has been reduced significantly. Therefore it can be concluded that the company is experiencing economics of

scale. Based on the survey conducted by PwC, in 2019 almost 20% of the enterprises wanted to deploy the usage of AI but in 2020, 90% of the enterprises agreed that it gives opportunity and only 4% felt that they needed to deploy it. It automates from the automation of driving for the elderly to the scanning of the smallest tumour in medical science. (McClellan, Toby, 2020)

Second, AI helps to promote efficiency. AI systems can process large amounts of data and perform tasks at a much faster rate than human workers. This leads to improved economic efficiency and productivity, which translates to cost savings for businesses. For instance, IBM's AI system, Watson, can analyse large amounts of medical data and provide medical professionals with actionable insights, helping them to diagnose and treat patients more efficiently. The economic efficiency is obtained because the companies can produce more output with minimum input in the process of production.

Third, AI has predictive analytics capabilities. AI-powered predictive analytics can help businesses to make better decisions and reduce costs. By analysing data, machine learning algorithms can predict outcomes and identify potential problems before they occur, allowing businesses to take preventative measures. For example, predictive maintenance systems can identify when equipment is likely to fail and recommend maintenance or repair before it breaks down. This can help businesses to avoid costly downtime and repair expenses.

Fourth, providing excellent customer service which adds value to the product. AI-powered chatbots and virtual assistants can provide automated customer support, reducing the demand for human customer service representatives. This not only reduces labour costs but also provides a faster and more personalized experience for customers. For instance, Capital One's chatbot Eno can help customers with their account-related queries, saving the company time and resources in handling customer queries. (Cosette Goldstein & Alison Chi, 2022).

The empirical evidence suggests that AI has led to a reduction in the demand for labour and the cost of running a business. While this may create challenges for workers, the benefits of AI in terms of increased efficiency, productivity, and cost savings for businesses are difficult to ignore.

Other than the reduction of cost due to economics of scale, AI has also helped expand business. Another key way in which AI is impacting the economy is through the creation of new industries and markets. As AI technology becomes more advanced, it is opening up new possibilities and creating new opportunities for entrepreneurs and businesses. One area that is already seeing significant growth is the development of AI-driven healthcare solutions, which have the potential to revolutionize the industry. This has helped in increasing the market share which can result in an increase of monopoly power over the business.

Despite the many benefits of AI, there are also concerns about the impact it could have on human jobs. As AI becomes more prevalent, there is the possibility that many jobs currently done by humans could become automated. This could lead to significant job losses in some industries and sectors. However, it is worth noting that AI is likely to create many new jobs as well, particularly in areas such as data science and machine learning.

It can be concluded that the impact of AI on the economy is already significant and is set to become even greater in the years to come. While there are challenges to be addressed, there is no denying the transformative power of AI. As businesses embrace this technology and invest

in its development, there is no doubt that AI will continue to shape and reshape the global economy in profound ways.

2.0 Problem Statement

Malaysia, like many other countries, faces significant issues and challenges in adopting Artificial Intelligence (AI) from the perspective of economics. There are some empirical evidence-based challenges that have taken place in relation to the development of AI.

First, there is a lack of awareness and infrastructure to support the adoption of AI in businesses. According to a study by the Malaysia Digital Economy Corporation (MDEC) (2022), 68% of Malaysian businesses have not yet implemented or set up any plans for AI. This indicates that there is less awareness and readiness of businesses to adopt AI. The lack of infrastructure in terms of training, research and development to support the implementation of AI in the country is also a challenge. (South East Asia. Digital Content Industry Talent Report. 2022).

Second, there is a skills gap. The lack of skilled labor is another issue faced by Malaysia in the adoption of AI. According to a survey by the World Economic Forum (WEF), Malaysia ranks 83rd out of 130 countries in terms of digital skills. (World Economic Forum, 15th May, 2023). This indicates the need for upskilling and reskilling of the current workforce to meet the demands of an AI-driven economy.

Third, AI is strongly associated with privacy and security. Malaysia has several challenges in terms of data privacy and security, which could hinder the adoption of AI. The Personal Data Protection Act (PDPA) has limited the use of personal data in AI, making it difficult for businesses to implement AI-powered solutions that need personal data to function.

Fourth, the cost of implementation of AI based production involves high cost. Implementing AI technology requires a significant investment in terms of infrastructure and technology. This is a significant challenge for Malaysian businesses, which are often small and medium-sized enterprises (SMEs) with limited financial resources.

Fifth, the disruption in terms of economic activity. The adoption of AI will lead to an economic disruption in the Malaysian economy. Many jobs, particularly those that involve repetitive tasks, may become obsolete. This could lead to unemployment and the widening of the income gap, creating challenges for social inclusion.

Addressing these challenges is of major concern in the impact of adopting AI in business from the perspective of the economy. Therefore this study aims to investigate the progress of confronting these challenges from various approaches, like microeconomics versus macroeconomics, positive versus negative impact, short term versus long term impact from the economic landscape.

3.0 Research Objective.

The overall research objective is to evaluate the impact of booming AI on business from the economic landscape. The specific research objectives of the studies are as follows:-

- a. To discuss the impact of AI growth from the microeconomics and macroeconomics perspectives.
- b. To distinguish the positive and negative impact of AI growth in Malaysia.
- c. To evaluate the short term and long term impact of AI growth in Malaysia.

4.0 literature Review

The confluence of contributions by Adam Smith, David Ricardo, and Robert Malthus during the 18th and 19th centuries posits that every economy inherently maintains a consistent GDP steady state. Any deviation from this equilibrium is considered transient, with the system naturally readjusting to the steady state—a concept contemporarily recognized as the sustainability of growth. Economic growth, denoting the augmentation of goods and services within an economy, is synonymous with heightened productivity. As GDP expands, so does the population, disrupting the economy's long-term growth trajectory away from its stable state or sustainability. The expanding population exerts heightened demands on finite resources, thereby triggering a reduction in available resources. This scarcity subsequently diminishes the population size, leading to a contraction in GDP growth until it reverts to the steady state. Conversely, if GDP falls below the steady state, a decline in population occurs, resulting in reduced resource demands. This prompts GDP to ascend back to its sustainable growth level. Consequently, it can be inferred that the classical economic concept of the steady state aligns with the contemporary understanding of the sustainable level of economic growth within a nation.

The two famous economist that developed the neo-classical theory was T.W.Swan and Robert Solow. They developed the Solow-Swan Growth Model. The growth theory focuses on three factors of production, capital, labour and technology. The growth per unit of labour is known as output per labour, the growth per unit of capital is known as output per capital. The output per labour increases with output per capital but at a diminishing marginal of returns. It will reach a point where the labour and the capital will experience an equilibrium state. Since a nation can theoretically determine the amount of labour and capital needed to reach an equilibrium state, it is technological advances that can make an economic growth. When technological advances take place then the amount of labour and capital needed to achieve the growth needs to be adjusted. It is also suggested that if all the country has the same amount of technological advances, then we would experience the same level of economic growth. The standard of living would also be the same. The weaknesses in the model is to explain the technological advances and the diminishing marginal returns of capital and labour.

As for the endogenous growth model, the diminishing marginal returns can be reverted to increasing marginal returns in the long run. There are increasing return to scale when labour is give education and training. This can improve the quality of labours and increase productivity. Government should enact policies to create new entrepreneurs which can help to create new jobs and businesses. Investment should be directed to improve infrastructure and manufacturing process that can encourage innovation. Intellectual property rights such as copyright and patent are incentives for business to expand their operations.

Within the framework of the endogenous growth model, prominent models include the AK Arrow Model, Uzawa-Lucas Model, and Romer Model, all of which underscore the paramount

significance of technology. The AK Arrow Model, also recognized as the learning by doing model, posits that economic transformations can occur through innovation and technology. It elucidates how self-practice and innovation contribute to enhanced productivity and improved human capital, ensuring the efficient use of labor to generate one unit of output.

The Uzawa-Lucas Model serves as an economic growth model elucidating the rise in GDP per capita over time. Central to this model is the premise that technological progress, embodied in the knowledge and skills of the workforce, propels economic growth. The model identifies two primary drivers of economic growth: capital accumulation, encompassing physical capital growth like infrastructure and machinery, and human capital accumulation, referring to the augmentation of workforce knowledge and skills.

According to the Uzawa-Lucas Model, nations with high levels of human capital accumulation are poised for accelerated economic growth. This is attributed to the adeptness of a skilled workforce in adapting to technological changes, thereby fostering higher productivity and increased output. The model also posits that economic growth may decelerate over time as capital and human capital levels approach their maximum thresholds—a phenomenon known as diminishing returns to capital. In essence, the Uzawa-Lucas Model furnishes a theoretical framework for comprehending the interplay between capital accumulation, human capital accumulation, and economic growth, serving as a cornerstone in empirical research on economic growth.

Moreover, according to the Romer model, knowledge is considered a non-rival good, indicating that the generation and utilization of knowledge by one individual or company do not diminish its accessibility for others. This signifies that the creation of knowledge carries positive externalities, underscoring the significance for governments to offer incentives that foster knowledge creation and dissemination to foster economic growth. In summary, the Romer model has played a significant role in influencing policy dialogues regarding the pivotal role of human capital and innovation in fostering sustained long-term economic growth.

5.0 Methodology

A systematic review was conducted on the impact of AI on business in Malaysia. The analysis begins with a discussion. There are several ways to divide the discussion on the impact of AI on economics perspective. In this study, three possible approaches were used.

- a. **Macroeconomic vs. microeconomic impact:** One way to divide the discussion is to focus on the different levels of impact that AI can have on the economy. Macroeconomic impact refers to the effects of AI on the overall performance of the economy, such as GDP, inflation, employment, and productivity. Microeconomic impact, on the other hand, refers to the effects of AI on individual firms, industries, and consumers, such as changes in production processes, market structure, and consumer behaviour.

There are three major issues utilizing AI and robots in business. The issues related to cost, trust and job displacement. Since the initial cost of investment for AI is high, the impact of AI may not be linear but it may growth at an accelerating rate over a pace of time. This is in line with the S pattern curve of AI adoption. A slow start with substantial cost and

investment associated with learning and deploying these technologies. Unfortunately, the acceleration must be accompanied with cumulative effect of competition and an improvement in complementary capabilities. It takes time for the productivity to unfold, in line with the Solow Paradox.

- b. Positive vs. negative impact: Another way to divide the discussion is to distinguish between the positive and negative effects of AI on the economy. Positive impacts of AI might include increased efficiency, lower costs, and higher innovation, while negative impacts might include displacement of workers, higher inequality, and lack of privacy. This approach could also consider the trade-offs between the positive and negative impacts, and how they might vary across different sectors, regions, or groups of people.
- c. Short-term vs. long-term impact: A third way to divide the discussion is to look at the temporal dimension of the impact of AI on the economy. Short-term impacts might include the initial adoption and diffusion of AI technologies, as well as the immediate effects on employment and productivity. Long-term impacts, on the other hand, might include the transformation of entire industries and the emergence of new ones, as well as the changes in social norms, institutions, and values that could accompany the AI revolution. This approach could also examine the uncertainties and risks associated with the long-term impacts, such as the potential for unintended consequences or systemic failures.

Finally, the study synthesizes the findings to provide a comprehensive discussion on the impact of AI on business. It will identify the barriers for the adoption of AI in order to maximize the benefits of AI while minimizing its negative impacts.

6.0 Findings.

6.1 The development of AI can be analysed based on macroeconomic and microeconomic impacts.

6.1.1 Macroeconomic impacts.

- a. Inflation. In the traditional economic theory, there are various determinants that can cause inflation. Monetarist claim that increase in money supply can increase the inflation rate. In contrast Keynesian theory emphasizes that increase in consumer expenditure, government expenditure, surplus in trade and investment can stimulate the demand for goods and services. This would create excess demand for goods and services and the price of the goods can increase resulting in a demand push inflation. In contrast some researchers perceive that AI can lead to increased efficiency in businesses, reducing costs and increasing productivity, which can lead to a decrease in inflation. In addition, AI can also lead to increased automation of jobs, which can reduce employment opportunities and lead to a decrease in consumer spending, potentially decreasing inflation or disinflation.

Financial technology adds value to the development of financial market. At the end of the financial crisis in 2008, many firms have left the financial market and entered into

the adventures of entrepreneurship. The development of crowdfunding activities, mobile apps, cryptocurrencies and financial payment has increase investment. Investment is an injection to the economy. The returns from the investment increases ones purchasing power. At the same time financial technology also known as fintech can increase the demand for goods and services through consumer spending. Consumer spending is an injection to the economy which can lead to demand pull inflation. Barro (1997) also stressed that AI also increases the speed of the transaction. In the quantity theory of money introduced by Fisher, when velocity of money increases, general price level will increase. Increase in general price level is known as inflation. (Simpasa and Gurara, 2012). There are many empirical evidence that supports that Fintech has directly influence the purchasing power because it I influences consumer choice. Taherdoost (2018) stresses it is due to convenient transaction, checking account balance and performing fund transfer.

- b. Interest rate. Interest can have both positive and negative impact towards the macroeconomic fundamentals with the development of AI. The positive impact is when AI is introduced via Fintech, AI can help financial institutions process vast amounts of data, identify trends, and make predictions more accurately and quickly. This can lead to a decrease in uncertainty in financial markets, resulting in more stable interest rates. At the same time, mobilization of fund is also made easier by the usage of AI through Fintech. The demand for fund and the supply of fund is made convenient for those in the money market. This also reduced the information cost incurred in the financial system. Thus with the increase in the demand and supply and the interest rate would be stable in the financial market. In contrast, interest rate can also have a negative impact to the economy. When there development of AI in the economy, there is a possibility of inflation. With inflation, the government practices contractionary monetary policy. Contractionary monetary policy increases the interest rate, thus increases the cost of borrowing money.
- c. Employment. While AI can lead to increased automation of jobs, it can also create new opportunities in fields such as data analysis, software development, and machine learning. Additionally, the increased efficiency and productivity generated by AI can lead to overall economic growth, resulting in an increase in employment. The nature of employment has gone through transformation with the existence of AI. The demand for AI knowledge based workers have increased. This might create Unemployment among the graduates who does not have the knowledge and skills based on the need of the job market. Currently Malaysia is ranked as 43 in the world for unemployment with 3.73% (2022). (Statista, 2023). Since Malaysia is facing shortage of labour in certain industries especially in the agriculture and the manufacturing industries. The Federation of Manufacturing Malaysia (2022) claimed a shortage of 600,000 workers. Even though the unemployment rate is high but the shortage of labour is also high in Malaysia. In 2022, around 1.6 million application was received for foreign labour. Even though the manufacturing and the restaurants provide an attractive salary package for the employees, due to social status, Malaysians shun away to work in these sectors.(New Strait Times, February, 13, 2023). The need for AI based knowledge and skilled labours

might increase the wage that the firms need to pay. This might create wage inflation or cost push inflation.

The reason for the shortage was clarified as documentation problem from the source countries which are time consuming. In addition, the shortage is also due to the uninterested locals and vocational graduates who does not meet the demand for business. Some of the employees who lost their jobs have already joined the gig economy and does not show any interest in joining the formal work environment because they have already tasted of being their own boss. (New Strait Times, February 13, 2023). No doubt many claim that there is a loss of employment due to the introduction of robots but this might not be the true picture. The introduction of these robots would be a blessing to certain sectors who are facing serious shortage of workers. With a more reliable AI, the uncertainty in the production process may be resolved. Further more it also enhances the production efficiency.

- d. Exchange rate. Artificial neural network has been recently widely used in the field of finance as well as other related fields. (Kemal Güler & Abdulkadir Tepecik, 2019). Since exchange rates and gold exchange rates are vital for financial institution, the accuracy on the estimation of these values are vital for the stock market as well as for business. The researcher used monthly data from 2006 to 2018. The study included independent variables like the BIST 100 Index data, US inflation rate, the Turkey inflation rate, the Turkey interest rate and the US interest rate to estimate the exchange rate between US and Turkey. Similarly the gold exchange rate was also estimated by using the BIST 100 index data, price of silver and price of gold, inflation rate of US and Turkey as well as interest rate of US and Turkey. The artificial neutral network provides accurate forecasting results on the exchange rate and the gold exchange rate. The network also enables forecasting of the financial crisis in the future. The use of AI in international trade and finance can lead to increased efficiency and accuracy, resulting in more stable exchange rates. Additionally, AI can facilitate the use of cryptocurrencies and other forms of digital currency, which can further impact exchange rates.
- e. GDP. The use of AI in businesses can result in increased efficiency, productivity, and innovation, leading to overall economic growth. Additionally, the development and implementation of AI systems and infrastructure can create new job opportunities and stimulate investment, further contributing to GDP growth. With the adoption of AI by 2025, GDP is expected to increase as much as 26% through increase in productivity. (Economic Planning Unit, 2022).

From the context of companies, AI technology can increase productivity but it creates dualism. There would be a performance gap between front runners in one side and slow adopters or non-adopters over the other side. The front runners can double their cash flow and increase their economic benefits within 5 to 7 years after minusing the transition cost and the investment cost. In the other side they may be slow adopters who are not involved in creating the technology but may be innovative in the deploy them. Those who adopt or do not adopt AI by 2030 is expected to experience a 20%

decline in cash flow. (Economic Planning Unit, 2022). Therefore, it can be concluded that the most important drivers that encourages the firms to adopt as well as the speed of adoption is the competitive dynamics among firms in the industry. Thus the firms may shift the market share to front runners and try to gain from the competitive advantage.

6.1.2 Microeconomic Impacts.

AI technology is already making a significant impact on microeconomics in Malaysia. As the adoption of AI continues to grow, we can expect to see further changes and transformations in the way businesses operate and the economy performs. It includes productivity, competitiveness, innovation and entrepreneurship.

- a. **Productivity.** AI technology can boost the productivity of the firm by reducing the effort taken on time consuming activities. The Center of Public Policy claims that with the adoption of AI, productivity in service sector has increased from 0.6% to 1.2% meanwhile for the manufacturing sector it is accepted to increase by 30% by 2030. (The Edge Malaysia, 19 May 2023) Higher productivity with minimum inputs will result in higher profit. Higher profits will help the company to grow through investments. Investments will lead to higher net worth for the firm. This increases the demand for the firm's stock. Excess demand will lead to higher stock price. Higher stock price provides room for future growth in the firm by increasing the value of the firm.
- b. **Competitiveness.** AI can help Malaysian businesses gain a competitive edge by improving their efficiency and offering better customer experiences. According to a survey conducted by PwC (2017), 75% of Malaysian CEOs view AI as a strategic priority for their business, and over 40% are already using AI or plan to do so in the next three years.
- c. **Innovation.** AI can help Malaysian businesses gain a competitive edge by improving their efficiency and offering better customer experiences. According to a survey conducted by PwC (2017), 75% of Malaysian CEOs view AI as a strategic priority for their business, and over 40% are already using AI or plan to do so in the next three years.
- d. **Entrepreneurship.** AI is creating new opportunities for entrepreneurship by enabling the development of AI-powered start-ups. According to a study by Startup Genome (2022), Kuala Lumpur is ranked among the top 40 start-up ecosystems in the world, with a growing number of AI start-ups and investors.

6.2 **The overall positive and the negative impact of AI based on sectors and groups of people.**

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence, such as perception, reasoning and decision-making. The use of AI technology has become increasingly widespread across various sectors

and industries in recent years. While AI technology has proven to be beneficial in many ways, there are also potential negative impacts that can differ according to sectors, companies and different groups of people. From the perspective of economics, it is important to assess the costs and benefits of AI technology in order to better understand its potential impact.

The positive impacts of AI can be discussed from various points. First, it improved efficiency and productivity. AI technology can help businesses improve their efficiency and productivity by automating tasks that were previously done manually. For example, in the manufacturing sector, AI-powered robots can handle repetitive tasks such as assembly line work, freeing up human workers to focus on more complex tasks. This can lead to increased outputs and lower costs per unit, driving greater profitability for businesses.

Second, it increased accuracy and precision. Machine learning algorithms used in AI can help to fine-tune processes and increase the accuracy and precision of outputs. This can improve quality control in manufacturing and distribution, leading to fewer defects and returns, and ultimately, higher customer satisfaction.

Third, it helped in faster decision-making. AI can help businesses make faster and more informed decisions by leveraging big data and machine learning algorithms. By analyzing large amounts of data, AI can identify patterns and predict outcomes, helping businesses to make more accurate and effective decisions.

The overall negative impacts can be discussed as follows. First, job displacement. One of the potential negative impacts of AI is the displacement of human jobs. As more tasks become automated, there is a risk that workers may lose their jobs. While AI can create new job opportunities in fields such as data analysis and AI development, these jobs may require a different set of skills and qualifications from those displaced by automation. This has created a gap in skills. Many graduates are unable to meet the industry demand where they need to be retrained. This increases the cost for both government at macro level as well as the firms at micro level.

Second, there is lack of data privacy and security. AI relies on large amounts of data to operate effectively. However, the collection and use of data raise concerns about privacy and security. As AI technology becomes more advanced, there is the potential for sensitive personal information to be misused or hacked. Finally, biasness and discrimination are one of the adverse effects of AI. Another potential negative impact of AI is the risk of bias and discrimination. Machine learning algorithms are only as good as the data they are trained on. If the data is biased, the algorithm will be biased as well, leading to unfair or discriminatory outcomes. This can have negative impacts on individuals and communities who are unfairly impacted by biased algorithms.

In conclusion, AI technology has the potential to greatly benefit businesses and society as a whole by improving efficiency, accuracy, and decision-making. At the same time, there are potential negative impacts such as job displacement, lack of data privacy and security, and bias and discrimination. These impacts can differ according to sectors, companies, and different groups of people. Policymakers and businesses need to carefully assess the costs and benefits of AI technology in order to ensure that its benefits are maximized while minimizing its potential negative impacts.

6.2.2 The impact of AI development based on sectors.

Artificial Intelligence (AI) is an emerging technology in Malaysia, with increasing use across various sectors. Here are some of the positive and negative impacts of AI in different sectors in Malaysia.

I. Health Sector.

The positive impact of AI in the health sector. AI-powered systems such as chatbots, telemedicine, and symptom checkers are being used to improve access to healthcare services and diagnosis in Malaysia. According to a survey conducted by Telenor Group (2021), 53% of Malaysians stated that they are willing to use chatbots and other digital health tools to access healthcare services. In contrast, the use of AI may also lead to medical errors if AI-powered systems are not calibrated properly. In 2021, a report by the American Medical Association highlighted the risk of bias and errors in AI healthcare systems, which could lead to misdiagnosis and incorrect treatment. (Natalia Norori et al., 2021)

II. Education Sector.

AI technology can help personalize learning for students in Malaysia. For example, AI-powered learning systems can adapt to the learning style and pace of individual students, providing tailored learning experiences. According to a report by Hoot suite and We Are Social (2022), 74% of Malaysians believe that online learning is an effective way to improve their skills. Adversely, the use of AI in education could lead to job displacement for educators and support staff. According to a report from the World Economic Forum (2023), up to 50% of teachers' work in Malaysia could be automated by 2030.

III. Retail Sector

AI-powered systems such as chatbots and personalized recommendations can improve the customer experience. According to a report by McKinsey & Company, personalizing the customer experience with AI-powered recommendation engines can lead to a 1-5% increase in revenue for retailers in Malaysia. Unfortunately, the use of AI in retail could lead to job displacement for retail workers. McKinsey & Company's report also states that up to 47% of retail jobs in Malaysia could be automated by 2030. (Julien Bousset, Brian Gregg, Kathryn Rathjie, Eli Stein & Kai Volhardt, July 18, 2019)

III. Finance Sector.

AI technology can help improve fraud detection and risk assessment in the financial sector. According to a report by Accenture, AI-powered systems can reduce the risk of fraud by up to 40% and improve risk assessment accuracy by up to 90%. But the use of AI in finance could lead to job displacement for finance workers. Accenture's report also states that up to 31% of finance jobs in Malaysia could be automated by 2030. (Hannah Unkefer, 2017)

While the use of AI technology can bring significant benefits to different sectors in Malaysia, such as improved efficiency and productivity, there are also potential negative impacts such as job displacement and the risk of errors or bias. Policymakers and businesses need to carefully assess the costs and benefits of AI technology in specific sectors to ensure that its use maximizes the benefits and minimizes the negative impacts.

6.2.3 The impact of AI based on the group of people.

Artificial Intelligence (AI) technology also has the potential to impact different groups of people in Malaysia in unique ways. Here are some examples of the positive and negative impacts of AI technology based on different groups of people in Malaysia.

I. Workers

AI technology can help improve the productivity and efficiency of workers in Malaysia. According to a report by Accenture, by 2035, AI could add up to MYR 155 billion to Malaysia's annual GDP and increase labor productivity by up to 30%. (Hannah Unkefer, June 21, 2019) But the use of AI in industries such as manufacturing, retail, and finance could lead to job displacement for workers. According to a report by the World Economic Forum (2023) up to 54% of jobs in Malaysia are susceptible to automation by 2025.

II. Consumers

AI-powered systems can improve the customer experience for consumers in Malaysia. For example, chatbots and personalized recommendations can help consumers find the products and services they need more easily. According to a survey conducted by PwC (2017), 89% of consumers in Malaysia are willing to share their data with companies in exchange for personalized experiences. In contrast, the use of AI could lead to privacy concerns and a lack of transparency. Consumers may be unsure of how their data is being used and whether it is being protected. According to the 2020 Data Protection Survey by the Centre for Governance, Institutions and Organisations, 67% of Malaysians are concerned about how their personal data is being used. (Ipsos, March 18 2018).

III. The Elderly

AI-powered systems can be used to improve healthcare services for elderly people in Malaysia. For example, AI-powered wearable devices can monitor vital signs and alert healthcare providers in case of an emergency. According to a survey conducted by Telenor Group, 56% of elderly people in Malaysia would be willing to use digital health tools to manage their health. But the use of AI in elderly care may lead to concerns about data privacy and a lack of human interaction. Some elderly people may prefer human caregivers to AI-powered systems. (Natalia Norori et al., 2021).

While the use of AI technology can bring significant benefits to different groups of people in Malaysia, such as improved productivity and customer experiences, there are also potential negative impacts such as job displacement and privacy concerns. Policymakers and businesses need to carefully assess the costs and benefits of AI technology for specific groups of people in order to maximize its positive impacts and minimize the negative ones.

6.3 Short term versus long term impact with the development of AI.

There are several studies and reports that shed light on the potential impacts of AI on the Malaysian economy in the short run and the long run.

In the short-term, AI-powered automation can increase productivity by reducing manual tasks and speeding up processes, leading to cost savings and improved efficiency in industries such

as agriculture, manufacturing, and logistics. Meanwhile AI creates new job opportunities because it can significantly displace low-skilled labour in industries such as call centres and manufacturing. Finally it increases competitiveness. Companies that adopt AI early will have a significant competitive advantage over those that do not. As for the long term effect, it can reduce income gap especially the middle-income trap. AI could help Malaysia move beyond its middle-income status by enabling higher productivity, advanced manufacturing, and innovation in various sectors. But it can also create an adverse effect through inclusion and inequality. AI could exacerbate economic inequality if adoption is concentrated among large firms or industries, leading to a digital divide between those who have access to AI and those who do not. This is because large firms have the fund to investment on R&D. Investment in R&D for AI can drive long-term growth and innovation, as well as attract foreign investment in the country.

Overall, the adoption of AI could have significant long-term benefits for the economy of Malaysia. However, careful planning and strategic investment are required to address the potential negative impacts and ensure that the benefits of AI are distributed more equitably across society. (Refer to Table 1).

Table 1 shows the summary on the impact of AI on Malaysia.

Impact of AI adoption in Malaysia	Positive Impact.	Negative Impact
Inflation rate	Economic growth through injection, disinflation	Demand-pull inflation Cost-push inflation
Interest rate	Reduces the cost of borrowing money due to digital currency	Increase in interest to curb inflation. Increases cost of borrowing money.
Employment	Transformation in the type of labour. Higher skills and pay	Increases cost of labour. Job displacement.
Exchange rate	Better prediction on the exchange rate and the gold exchange rate.	None.
GDP	Productivity Increases. Production efficiency.	Dualism in the economy is where you have front runners and the slow or no adopters.
Microeconomics		
Productivity	Increases.	None

Cost of production	Economics of scale	Initial high cost for the infrastructure.
Competition	Quality goods with competitive prices. No price discrimination.	Competition destroys the business if not equipped.
Innovation	Competitive advantage	None
Entrepreneurship	Increase the number of entrepreneurs	None
Sectors.	Manufacturing, health, finance, agriculture and service sectors.	
Group of people	All age groups.	
Short term	Productivity, Increased efficiency, high skill labour and competitiveness	High cost of the infrastructure
Long term	Productivity, eradicating middle-income trap, investment and R&D.	

7.0 Conclusion

As we enter the era of AI, assured economic growth is substantiated by various economists through their theories on economic growth. The indispensability of technology is emphasized, and its synergy with human resources and capital is crucial. Both human resources and capital exhibit diminishing marginal returns with increased utilization, necessitating the integration of technology for sustained increasing marginal returns. The advent of AI significantly influences the fundamental macroeconomic aspects, dynamically impacting local economies heavily reliant on trade and foreign direct investment. The introduction of AI introduces external influences to the domestic economy, altering GDP, inflation rates, interest rates, employment, and exchange rates.

In response, Malaysia must exhibit resilience at the micro level to adapt to these changes. Failure to adapt can lead to uncertainty, risks, reduced competitiveness, and job displacement. However, a proactive approach can effectively address these issues over time, facilitating a smooth transition and minimizing the short-term and long-term adverse effects of adopting AI. Despite acknowledging the challenges, the positive net benefits of AI adoption outweigh the costs, making it imperative for businesses to strategically incorporate artificial intelligence. The effectiveness of this adoption relies on the institution, with the Malaysian government playing a pivotal role in crafting appropriate policies and infrastructure, aligning with Romer's theory of economic growth. Malaysia is one of Southeast Asia's fastest-growing economies and has made some strides in developing its AI capabilities. However, there are several economic barriers the country is facing that may hinder its progress toward full AI development. Some of the key challenges are as follows:

1. Lack of awareness and understanding. A lack of awareness or understanding of AI's potential is a primary barrier to adoption in Malaysia. According to a 2018 survey by Microsoft, only 29% of small and medium-sized businesses in Malaysia have adopted AI technologies, with 62% of businesses unaware of technologies that could help them.
2. Insufficient infrastructure. Limited infrastructure, including data storage and processing capability, restricts the development and deployment of AI systems in Malaysia. Data privacy regulations also create complications in collecting, managing, and sharing data.
3. Scarce funding and investment. Despite the government's efforts to promote the adoption of AI, Malaysian businesses and start-ups still face difficulty receiving funding and investment for AI development. As per a Deloitte report, Malaysia's investment in R&D for AI is negligible compared to other countries like Singapore, South Korea, and China.
4. Shortage of AI experts. The insufficient supply of skilled AI professionals is another challenge that Malaysia faces. The country has relatively few qualified data scientists or machine learning experts to help companies implement sophisticated AI solutions.
5. Regulatory issues: The absence of a standardized regulatory framework makes it difficult to evaluate and benchmark technology among industry players, hampering AI's adoption.

Addressing these challenges will be key to Malaysia's development of a competitive and sustainable AI industry. The government's initiatives to increase awareness, invest in infrastructure and R&D, and introduce a regulatory framework can help to alleviate these concerns and improve Malaysia's AI readiness.

References

- Barro, R. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*. MIT Press.
- Colleen Christison. (2022). Using Social Media in Education: 8 Can't-Miss Tips. <https://blog.hootsuite.com/social-media-in-education>.
- Cosette Goldstein & Alison Chi. (February 1, 2022). A Chatbot in the Crowd. How to build a time-saving bot for a multi-topic community forum?, Capital One Tech. <https://www.capitalone.com/tech/machine-learning/chatbot-in-the-crowd>.
- Economic Planning Unit. (2022). National 4th Industrial Revolution Policy, Prime Minister Department.
- Ed Burns, Nicole Laskowski & Linda Tucci. (July, 2023). What is AI? How does it work?, <https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence>.

Federation of Malaysian Manufacturers. (December 4, 2021). FMM: M'sia needs to replenish over 600,000 foreign workers by 2022 to overcome current acute manpower shortage that could derail its economic recovery. https://www.fmm.org.my/FMM_In_The_News-@-FMM-;_M'sia_needs_to_replenish_over_600,000_foreign_workers_by_2022_to_overcome_current_acute_manpower_shortage_that_could_derail_its_economic_recovery.aspx.

Gilis, S. Alexander, & Culverhouse, Tim. (2014). <https://www.techtarget.com/searchaws/definition/Amazon-AI#:~:text=Amazon%20AI%20services%20integrate%20with,experience%20and%20business%20metrics%20improvement>.

Hannah Unkefer. (June 21, 2017). Accenture Report: Artificial Intelligence Has Potential to Increase Corporate Profitability in 16 Industries by an Average of 38 Percent by 2035. <https://newsroom.accenture.com/news/accenture-report-artificial-intelligence-has-potential-to-increase-corporate-profitability-in-16-industries-by-an-average-of-38-percent-by-2035.htm>

Ipsos. (12 March, 2018). Malaysians Confident About Current Data Protection Measures. <https://www.ipsos.com/en-my/malaysians-confident-about-current-data-protection-measures>.
Ilyia Marsya Iskandar, Aliza Shah. (News Strait Times, February 16, 2023). Employers doubt govt's aim to solve labour shortage issue in 3 months. https://www.nst.com.my/news/nation/2023/02/880350/employers-doubt-goverts-aim-solve-labour-shortage-issue-3-months#google_vigne.

Julien Bousset, Brian Gregg, Kathryn Rathjie, Eli Stein & Kai Volhardt. (July 18, 2019). The future of personalization—and how to get ready for it. <https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/the-future-of-personalization-and-how-to-get-ready-for-it>

Kemal Güler & Abdulkadir Tepecik. Exchange Rates' Change by Using Economic Data with Artificial Intelligence and Forecasting the Crisis, *Procedia Computer Science* 158:316-326. DOI:10.1016/j.procs.2019.09.057

PwC. (2017). Sizing the prize. What's the real value of AI for your business and how can you capitalise?. <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>.

Mc Clean, Toby. (2020). Building Economics of Scale in Artificial Intelligence, <https://www.forbes.com/sites/forbestechcouncil/2020/07/27/building-economics-of-scale-in-artificial-intelligence>.

Malaysian Digital Economic Corporation (MDEC). (2022). Southeast Asia. Digital Content Industry Talent Report. Talent Corporation.

Natalia Norori, Qiyang Hu, Florence Marcelle Aellen, Francesca Dalia Faraci, and Athina Tzovara. (2019). Addressing bias in big data and AI for health care: A call for open science, *Patterns* (N Y). 2021 Oct 8; 2(10): 100347. Published online 2021 Oct 8. doi: 10.1016/j.patter.2021.100347.

Simpassa & Gurara. (2012). Inflation Dynamics in selected East African countries: Ethiopia, Kenya, Tanzania and Uganda, African Development Bank Brief.

Startup Genome. (2022). The Global Startup Ecosystem Report 2022, Global Startup Ecosystem Ranking 2022 (Top 30+ Runners-up). <https://startupgenome.com/article/global-startup-ecosystem-ranking-2022-top-30-plus-runners-up>.

Statista. (2023). Malaysia Unemployment Rate From 1999 to 2022. <https://www.statista.com/statistics/319019/unemployment-rate-in-malaysia>.

Taherdoost, H. (2018) A Review of Technology Acceptance and Adoption Models and Theories. *Procedia Manufacturing*, 22, 960-967. <https://doi.org/10.1016/j.promfg.2018.03.137>

Telenor Group. (2021). Human vs. Chatbot in the customer service game, <https://www.telenor.com/stories/advance/human-vs-chatbot-in-the-customer-service-game/>.

The Edge Malaysia. (19 May, 2023). Malaysians see AI as a hope for productivity more than a job threat. <https://www.mida.gov.my/mida-news/malaysians-see-ai-as-a-hope-for-productivity-more-than-a-job-threat>.

World Economic Forum,. (15th July, 2023). Centre for the Fourth Industrial Revolution Malaysia to Accelerate Green Transition, Digital Transformation. <https://www.weforum.org/press/2023/05/centre-for-the-fourth-industrial-revolution-malaysia-to-accelerate-green-transition-digital-transformation/>.

Halal Traceability System and Halal Food Performance of SMEs Food and Beverage in Malaysia

Haslinda Hadis^a, Shahrizin Abd Sarhadat^b, Masran Tamin^a, Azaze-Azizi Abdul Adis^{a*},

^aFaculty of Business, Economics, and Accountancy, Universiti Malaysia Sabah

^bMajlis Amanah Rakyat (MARA) Negeri Sabah

*Corresponding Author: azizi@ums.edu.my

Abstract

Small and Medium Enterprise (SMEs) in food and beverage industry is one of the major sectors that contribute to Malaysia's economic growth. The industry is a dynamic and growing sector that serves both the domestic Muslim population and the global market. An innovative halal

traceability system is an integral to the halal food and beverage industry's growth and success. The innovation system contributes to improved production, quality control, transparency, increase consumer trust and compliance with halal standards. The adoption of halal traceability system among SMEs is crucial to improve the halal food and beverage industry performance. Hence, this study aims to investigate the impact of Technology Acceptance Model (TAM), entrepreneurship marketing dimension (EMD), and intention to adopt halal traceability system towards halal food performance among Malaysian food and beverage SMEs. The systematic random sampling will be employed in this study and self-administered questionnaire through both online and offline will be used to collect approximately 189 of potential respondents from East Malaysia (Sabah and Sarawak) and Peninsular Malaysia (Selangor and Kuala Lumpur). The expected result of this study will be useful to the importance growing of the halal traceability system in the food industry.

Keywords: Halal Traceability System, Halal Food Performance, SMEs.

1. Introduction

Malaysia is a predominantly Muslim country, and the concept of "Halal" holds significant importance in various aspects of daily life, including food, beverages, cosmetics, pharmaceuticals, and financial transactions. The term "Halal" refers to what is permissible or lawful in Islamic law, and it is the opposite of "Haram," which denotes what is forbidden (Rosly, 2010). Moreover, the Halal business in Malaysia is a dynamic and multifaceted sector that reflects the country's commitment to Islamic principles and its vision of being a global leader in the Halal industry. The comprehensive approach to Halal certification and the diversification of the Halal market contribute to the growth and sustainability of Halal businesses in Malaysia.

The Malaysian SME (Small and Medium Enterprise) halal food and beverage industry is part of a global market that is steadily growing. The Malaysian Halal Food Industry is expected to grow to RM500.17 billion by 2023, contributing 8.1% to the national GDP (Harinderan, 2023). As of 2021, there were approximately 200,000 enterprises engaged in the halal food business in Malaysia. Malaysia has positioned itself as a global Halal hub and is recognized internationally for its expertise in the Halal industry. In addition, Malaysia's Halal certification is widely recognized and accepted in many countries, making Malaysian Halal products easily exportable to international markets (Hughes and Malik, 2017; Bohari et al., 2017). Hence, with increased consumer demand for Halal products, SMEs in the food and beverage industry recognize the need for quality assurance and transparency. Consumers seek assurance that the Halal products they consume meet their religious requirements. SMEs respond by implementing robust Halal traceability systems and obtaining Halal certification from recognized authorities. This commitment to quality and transparency is driven by consumer demand for trustworthy Halal products.

1.1 Background of SMEs Food and Beverage Industry in Malaysia

In Malaysia, SMEs are defined as businesses with revenues, assets, or employees that fall below a certain number, and the definition varies across different countries and industries. For instance, SME in manufacturing sector are company sales turnover not exceed RM50 million or employees not exceeding 200 workers. Meanwhile, SME in service and other sectors are

company with sales turnover not exceed RM20 million or employees not exceeding 75 workers (SME Corp, 2023). In addition, SMEs form the backbone of the economy, accounting for a substantial portion of business establishments. SMEs are often seen as the drivers of economic growth, fostering entrepreneurship, and promoting regional development. The Halal food and beverage industry in Malaysia has experienced significant growth and has become a key sector within the country's SMEs (Mohamed et al., 2020). The Malaysian government has recognized the potential of the Halal industry and has actively supported its development through various initiatives. In addition, the Malaysian government has established the Department of Islamic Development Malaysia (JAKIM) as the central authority for Halal certification. SMEs in the food and beverage industry seeking Halal certification can apply through JAKIM or one of the state-level Halal certification bodies.

2. Literature Review

2.1 Overview of Halal Traceability System and Halal Food Performance

In a country where the majority population is Muslim, the ability to identify a product as Halal is essential for consumers to choose a certain brand. Customers appear more drawn to adopting a brand than others if they perceive it to be compliant with Halal standards and Islamic regulations (Alserhan, 2010). Moreover, a recent rise in the number of Halal-certified businesses and goods indicates a growing interest in Halal standards (Giyanti, et al., 2021; Hewege & Perera, 2020; Ab Talib et al., 2016). On the other hand, halal food performance is closely linked to consumer trust and satisfaction, as it ensures the purity and safety of halal food in accordance with Shari'ah law (Hendijani and Seyyed, 2018). Therefore, previous studies have proven that the adaptation of halal standards and technology has an impact on SME performance and the perception of Muslim customers in the halal food market. For instance, Han et al., (2021) found that enhancing the availability, health, nutrition, accreditation, cleanness, safety, and hygiene aspects of halal food is imperative for non-Islamic destinations to appeal to Muslim visitors. Moreover, empirical evidence suggests that the halal label amplifies Muslim consumers' buying intention, indicating the importance of halal certification for SMEs in a Muslim-majority environment (Silahi, 2023).

According to Hendijani and Seyyed (2018), adopting a halal traceability system, SMEs can build trust and confidence among Muslim consumers, leading to increased sales and business growth. Halal traceability system is the ability to track and trace all information about a product from the raw materials until finished goods. Moreover, to develop halal traceability technology, a company must develop the integration of technologies such as blockchain, RFID, or other traceability tools to enhance the transparency and efficiency of the traceability system (Fernando et al., 2023). Hence, traceability systems can help to alleviate the confidence deficit for the SMEs assurance regarding the halalness of the product. However, Ab Talib et al., (2015) found that due to a dearth of studies on the factors influencing the adoption of halal practices, it is still unknown what motivates halal operations preparedness.

Nevertheless, the halal traceability system is a critical practice for preserving halal integrity in the food supply chain. The halal traceability system enables the identification of products and their ingredients' halal status throughout the production chain. Several studies have been conducted to analyze the effectiveness of halal traceability systems and their impact on halal food supply chain performance. For instance, Masudin et al., (2022) argue the food product

traceability system provides transparency in food manufacturing, enabling customers to trust halal product claims. The study found that food supply chain information systems can enable traceability and transparency.

To attain the specified research purposes, this study incorporates three established theories, specifically the resource-based view (Barney, 1991); technology acceptance model (TAM) (Davis et al., 1989) and entrepreneurial marketing dimension (EMD). In this study, RBV as an underlying theory highlighting the effect of firm's resources on competitive advantage. In addition, this study is important in expanding the understanding and academic literature regarding the intention to adopt halal traceability system among SMEs in the food and beverage industry. Furthermore, as a nation with developing economies, it is crucial to understand SMEs halal business growth such as halal food performance. The understanding will help the company to redirect their strategy in order to stay competitive in the marketplace.

2.2 Resource-Based View Theory

This study used the resource-based view (RBV) to support the examination of how SMEs adopt halal traceability system to improve the halal food performance. According to Barney (1991), the RBV is a management theory that can help SMEs identify sources of competitive advantage and drivers of success. RBV is a well-established and useful organizational theory that explains how businesses handle resource complexity to increase capacity and performance. (Fernando et al., 2019; Fernando and Chukai, 2018). In the context of halal food performance of SMEs, RBV suggests that resources and capabilities offer substantial gain for halal SMEs with lower transaction costs and access to external resources and capabilities (Tumiwa et al., 2023). The RBV framework has been applied in previous research on the halal food industry to investigate operational capabilities, halal standards implementation, business excellence, supply chain integration, and competitive strategies (Rejeb et al., 2021; Mabkhot, 2023). These studies have highlighted the importance of strategic orientation, intangible resources, and capabilities for SMEs to achieve a competitive advantage and improve their performance in the market. For instance, Tamam et al., (2020) study on the halal food industry used the RBV framework to investigate operational capabilities in food manufacturing. Hence, the study highlighted the importance of operational capabilities in achieving a competitive advantage in the halal food industry.

2.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a widely used theoretical framework that helps researchers and practitioners understand and predict how users accept and adopt new information technology (Davis et al., 1989). TAM represents the behaviors, as the outcome predicted by perceived ease of use, perceived usefulness, and behavioral intention (Yeo et al., 2019). TAM has been widely applied in various contexts and has been used to study the adoption of technologies such as computer software, mobile applications, and information systems (Yuan and Cheah, 2020; Malatji et al., 2020). Conversely, research on SMEs food and beverage industry application is still limited at this time. Hence, this study proposes the modified TAM, which offers better clarity on users' behavior from SMEs halal traceability

system and halal food performance context. According to Davis et al., (1989) perceived usefulness refers to the degree to which a person who thinks that by utilizing a specific method, they will be able to accomplish their objectives or perform better at work. Prior research suggests that people think utilizing a technology will improve performance (Meigasari et al., 2020). On the other hand, perceived ease of use measure of how much someone thinks utilizing a specific system would be effortless. A technology has a higher chance of acceptance and adoption among users if it is thought to be simple to use (Nedra et al., 2019).

2.4 Entrepreneurship Marketing Dimension

Entrepreneurial marketing dimension (EMD) refers to the various dimensions or aspects of marketing that are particularly relevant to SMEs and entrepreneurial firms. Deku et al., (2023) study on entrepreneurial marketing effect on halal food SMEs suggests that halal food SMEs should be innovative and adopt entrepreneurial marketing dimensions to improve their performance. The inconsistent results about the impact of entrepreneurial marketing dimension on the success of SMEs and the suggestions made by earlier research to delve deeper into the meaning of entrepreneurial marketing dimension showed how crucial it is to evaluate entrepreneurial marketing dimension as a key component of SMEs' performance (Sheikh et al., 2017; Lechner and Gudmundsson, 2014). In addition, entrepreneurial marketing dimension in halal food and beverages SMEs can gain a competitive edge by deploying innovative and creative thinking as a tactical tool to enhance their performance (Deku et al., 2023). Hence, this research examines three dimensions of EMD out of the seven that are defined below, namely, innovativeness, proactiveness, and risk-taking.

2.5 Integration of resource-based view, technology acceptance model, and entrepreneurship marketing dimension

In order to examine the conceptual framework, this study will employ three theories naming, 1) Resource-Based View (Barney, 1991); 2) Technology Acceptance Model (TAM) (Davis et al., 1989) and Entrepreneurial marketing dimension (EMD). The approach of theories integration in this study is relevant as it is in line with the proposition made by Hameed and Arachchilage (2017). The scholars highlighted that, the integration of the theories and the models could enhance and contribute better results for the anticipation of innovation adoption among the users. Therefore, the following hypothesis is developed with the help of previous studies:

- H1: Perceived usefulness has positive relationship with intention to adopt halal traceability system.
- H2: Perceived ease of use has positive relationship with intention to adopt halal traceability system.
- H3: Innovativeness has positive relationship with intention to adopt halal traceability system.
- H4: Proactiveness has positive relationship with intention to adopt halal traceability system.
- H5: Risk taking has positive relationship with intention to adopt halal traceability system.
- H6: Intention to adopt halal traceability system has positive relationship with halal

food performance.

3. Methodology

The primary objective of this research is to investigate the factors of intention to adopt halal traceability system and halal food performance among SMEs halal food and beverage in Malaysia. The research design has been carefully crafted to provide a comprehensive understanding of the impact of intention to adopt halal traceability system and halal food performance. This current study is descriptive research which aims to address current issues or problems through a process of data collection that enables a more comprehensive description of the situation. Thus, this study investigates the relationships between factors of independent variables, including perceived usefulness, perceived ease of use, innovativeness, proactiveness, and risk-taking. The dependent variable of this study is the intention to adopt halal traceability system, and the relationship of intention to adopt halal traceability system and halal food performance. Hence, a self-administered questionnaire is developed using structured questions. For the purpose of this study, a cross-sectional survey method is utilized in collecting data. A cross-sectional study is a type of observational research that analyses data of variables collected at one given point in time across a sample population.

Moreover, the target population for this study is the SMEs in food and beverage industry in Malaysia. The target population for this study is the SMEs in halal food and beverage industries in Malaysia. The company lists are based on the SME registrations with Majlis Amanah Rakyat Agencies (MARA) and SME Corp Malaysia. The sample size in this study is 150 and was determined using G*Power. The respondents of this study will be selected by using systematic random sampling. Thus, the data collection for this study will be conducted in (2) regions in Malaysia which consists of Selangor (Central region), Sabah and Sarawak (East Malaysia). The data for this study would be collected through the distribution of questionnaire via online (Google form and email) and offline (hand delivery) to potential respondents in the study area. The location of the study will be covering East and Peninsular Malaysia.

4. Conclusion

This study underscores the critical role played by halal traceability systems in shaping the performance and reputation of SMEs within the halal food sector. The concept of traceability extends beyond a mere technological infrastructure; serves as the cornerstone for ensuring the integrity and authenticity of halal products throughout the supply chain. In conclusion, the research findings contribute to the understanding of halal traceability systems and halal food performance among SMEs in the halal food and beverage industry in Malaysia. By addressing the challenges and opportunities identified in the study, SMEs can improve their halal food performance and contribute to the overall integrity and growth of the halal food industry in Malaysia.

5. Reference

Ab Talib, M.S., Abdul Hamid, A.B. and Chin, T.A. (2016). Can halal certification influence logistics performance? *Journal of Islamic Marketing*, Vol. 7 No. 4, pp. 461-475.

Ab Talib, M.S., Abdul Hamid, A.B. and Zulfakar, M.H. (2015). Halal supply chain critical success factors: a literature review, *Journal of Islamic Marketing*, Vol. 6 No. 1, pp. 44-71.

Alserhan, B.A. (2010). On Islamic branding: Brands as good deeds, *Journal of Islamic Marketing*, Vol. 1 No. 2, pp. 101-106.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Bohari, A.M., Hin, C.W. and Fuad, N. (2017). The competitiveness of halal food industry in Malaysia: a SWOT-ICT analysis, *Geografia-Malaysian Journal of Society and Space*, Vol. 9 No. 1, pp. 1-9.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, Vol. 35 No. 8, pp. 982-1003.

Deku, W.A., Wang, J. and Das, N. (2023). Innovations in entrepreneurial marketing dimensions: evidence of Halal food SMES in Ghana. *Journal of Islamic Marketing*, Vol. 14 No. 3, pp. 680-713.

Fernando, Y. and Chukai, C. (2018). Value co-creation, goods and service tax (GST) impacts on sustainable logistic performance. *Research in Transportation Business and Management*, Vol. 28, pp. 92-102.

Fernando, Y., Jabbour, C.J.C. and Wah, W.X. (2019). Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: does service capability matter? *Resources, Conservation and Recycling*, Vol. 141, pp. 8-20.

Fernando, Y., Wahyuni-TD, I.S., Zainul Abideen, A. and Mergeresa, F. (2023). Traceability technology, halal logistics brand and logistics performance: religious beliefs and beyond, *Journal of Islamic Marketing*, Vol. 14 No. 4, pp. 1007-1031.

Giyanti, I., Indrasari, A., Sutopo, W., & Liquiddanu, E. (2021). Halal standard implementation in food manufacturing SMEs: Its drivers and impact on performance. *Journal of Islamic Marketing*, 12(8), 1577–1602.

Han H, Lho LH, Raposo A, Radic A, and Ngah AH. (2021). Halal Food Performance and Its Influence on Patron Retention Process at Tourism Destination, *International Journal Environment Res Public Health*, Vol 18, No. 6.

Harinderan, K., (2023). Commentary: Malaysia's Halal Food Industry's Exponential Growth Continues To Soar, Business Today, <https://www.businesstoday.com.my/2023/07/14/commentary-malaysias-halal-food-industrys-exponential-growth-continues-to-soar/>

Hendijani Fard, M. & Seyyed Amiri, N. (2018). The effect of entrepreneurial marketing on

halal food SMEs performance. *Journal of Islamic Marketing*, Vol. 9 No. 3, pp. 598-620.

Hewege, C., & Perera, C. (2020). The impact of religio-cultural institutional hegemony on Sri Lankan (halal) supply chains: Theorising the interplay between the certification body, social institutions and the government. *Journal of Muslim Minority Affairs*, 40(3), 351–370.

Hughes, R. & Malik, R. (2017). The global halal industry: an overview, *Global Islamic Finance Report*, Vol. 13, pp. 140-158.

Husin, M. M., Kamarudin, S., & Mohd Rizal, A. (2021). Food and beverage industry competitiveness and halal logistics: Perspective from small and medium enterprises in Malaysia. *Asian Journal of Islamic Management (AJIM)*, 3(1), 1–10.

Lechner, C. and Gudmundsson, S.V. (2014). Entrepreneurial orientation, firm strategy and small firm performance. *International Small Business Journal*, Vol. 32 No. 1, pp. 36-60.

Mabkhot H. (2023). Factors Affecting the Sustainability of Halal Product Performance: Malaysian Evidence. *Sustainability*, Vol. 15(3):1850.

Malatji, W.R., van Eck, R. and Zuva, T. (2020). Understanding the usage, modifications, limitations and criticisms of technology acceptance model (TAM). *Advances in Science, Technology and Engineering Systems Journal*, Vol. 5 No. 6, pp. 113-117.

Masudin I, Rahmatullah BB, Agung MA, Dewanti IA, Restuputri DP. (2022). Traceability System in Halal Procurement: A Bibliometric Review. *Logistics*, Vol. 6(4), pp. 67.

Meigasari, D.A., Handayani, P.W., Hidayanto, A.N. and Ayuningtyas, D. (2020), “Do electronic personal health records (E-PHR) influence people behavior to manage their health?” *Proceedings of 2020 International Conference on Information Management and Technology, ICIMTech 2020*, pp. 482-487.

Mohamed, Y.H., Rahim, A.R.A. and Ma’aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia, *Journal of Islamic Marketing*.

Nedra, B.A., Hadhri, W. and Mezrani, M. (2019). Determinants of customers’ intentions to use hedonic networks: the case of Instagram. *Journal of Retailing and Consumer Services*, Vol. 46, pp. 21-32.

Rejeb, A. (2021). Integrating the Internet of Things in the halal food supply chain: A systematic literature review and research agenda. *Internet of Things*, Vol. 13.

Sheikh, A.A., Shahzad, A. and Ishaq, A.K. (2017). The growth of e-marketing in business-to-business industry and its effect on the performance of businesses in Pakistan: marketing success. *International and Multidisciplinary Journal of Social Sciences*, Vol. 6 No. 2, pp. 178-214.

Silalahi, S.A.F. (2023). Do consumers need halal label? Evidence from small and medium enterprises segment in a major Muslim environment, *Journal of Islamic Marketing*,

<https://doi.org/10.1108/JIMA-12-2021-0401>

Tamam, M.N., Abdurahman, A.Z., Abdullah, F., & Subramaniam, G.A. (2020). Halal Operational Capabilities in Food Manufacturing Industry. *Academy of Strategic Management Journal*, 19.

Tumiwa, R., Ningsih, G., Romarina, A., Setyadjit, S., Slamet, B., Waruwu, E., Ie, M & Utomo, Y. (2023). Investigating halal food Supply chain management, halal certification and traceability on SMEs performance. *Uncertain Supply Chain Management*, 11(4), 1889-1896.

Yeo, K.J., Al-Ashwal, R.H.A., Handayani, L. and Lee, S.H. (2019). Healthcare receivers' acceptance of telecardiology in Malaysia. *Telkomnika (Telecommunication Computing Electronics and Control)*, Vol. 17 No. 3, pp. 1128-1135.

Yuan, Y.S. and Cheah, T.C. (2020). A study of internet of things enabled healthcare acceptance in Malaysia. *Journal of Critical Reviews*, Vol. 7 No. 3, pp. 25-32.

Anticipated and Unanticipated Monetary Variables Effectiveness in Measuring Financial Stability in Malaysia during Crisis

Caroline Geetha^a, Roslinah Mahmud^b

^aFaculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, 88999 Kota Kinabalu, Sabah.

^bFaculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, 88999 Kota Kinabalu, Sabah.

Corresponding Author's email: roslinah@ums.edu.my

Abstract. The study aims to investigate whether the anticipated and the unanticipated changes in monetary variables can influence the stock returns during crisis. The financial stability was measured by the stock returns which was the dependant variable of the study. The independent monetary variables used were interest rate, inflation rate, exchange rate, money supply and the GDP. All the variables were measured in the form of anticipated and unanticipated monetary variables. The analysis began with unit root test that revealed that both anticipated and unanticipated monetary variables were having unit root problem at level but not at 1st difference. Thus, the variables were found to be integrated at 1st difference. The ARDL method was used to establish the long run relationship and error correction modelling for short run relationship. Monthly data from January 2010 to September 2020 were used. The anticipated monetary variables did have a long run relationship with stock returns, but all the monetary variables were insignificant at 5% significance level. But the anticipated monetary variables did establish a short run relationship with stock returns. Unfortunately, when unanticipated monetary variables were used both short run and long run relationship was established. **All the unanticipated monetary variables were significant in explaining the changes in the stock returns except for unanticipated interest rate.**

Keywords: anticipated, unanticipated, monetary variables, financial stability, crisis, Malaysia

JEL Codes: E43, E44, E52.

1 Introduction

In March 2020, the Malaysian government experienced a health pandemic, and the World Health Organization declared a lock down. The lockdown which began in China was later implemented in various developed and developing nations. It brought the entire world economy to a standstill. The government had no choice but to proceed with the lockdown since the health care system in the country could not cope with the increase in number of cases. There was no vaccine, and the spread was drastic in the early 2020. In Malaysia the massive and ongoing outbreak created a profound impact to the nation from the context of economy and social. Due to the drastic rise in the cases, the economic actor of the nation, the government decided to impose the movement control order. The movement control order restricted movement of goods and services as well as the resources. Both the demand and supply were disrupted. The goods market was distorted. The goods market determines income which encourages investment. A highly volatile goods market created uncertainty in investment. Investment in turns depends on interest rate. Interest rate is an important monetary variable in the money market. Thus, the changes in the goods market affected the income that decreased money demand for transaction. For the money market to reach equilibrium, the money demand for speculation needs to be increased. This can take place with the fall in interest rate. No doubt a fall in interest rate is considered a blessing for borrowers who can borrow and increase consumption and investment but the pandemic had created a situation in the financial market where it was in a verge of collapse. Moreover, it created uncertainty in terms of production in various sectors like agriculture, tourism, manufacturing, entertainment, service industry. The workers in these sectors were either laid off, receive a pay cut or requested by the organization to go on unpaid leave until the economy recovers. This led to the closure of many small and medium scale business. Many were not able to sustain themselves. Eventually for some it led to bankruptcy.

Thus, the government had to weigh the benefit and the cost of the lock down. The benefit would be to prevent the spread of the disease. This believed to help flatten the contagion curve as fast as possible and the economy can recover. Moreover, the government can also reduce the health care expenditure if the number of cases declines. This decreases the government expenditure for a country which is already deficit in certain developing countries. Some countries especially the developing countries opt to borrow money or in kind to cope with the pandemic. Contribution in terms of mask, protective outfit for health care workers, gloves and also sanitizers flew in from other countries to collectively combat the virus. If the number of cases declines the need to borrow will also decline.

As for the cost of the lock down, it can be analysed from various perspective. First, the negative consequences of the lock down would be increase in the number of those who have mental health issues like anxiety, depression and panic attacks, increase in domestic violence, suicidal rate and the number of deaths due to other diseases like cancer because there are not enough healthcare workers or facilities to attend to all of them. Second, due to loss of jobs, unemployment increases. This has resulted in loss of income. Loss of income leads to reduced purchasing power in the family which decreases the standard of living. Those in the lower income bracket faces dilemma when they do not have the essential goods to feed their dependence. Third, the loss of income decreases the demand for goods. A fall in the demand for goods reduces sales and service tax collected by the government. Moreover, loss of income also decreases the personal income tax collected by the government. This results in a deficit at the government budget. Based on the cost and benefit analysis and also due to political pressure many countries had to opt to implement the lock down even though by doing so it would cost them more.

In order to curb the economic stress, the Malaysian government came up with various economic stimulus packages using macroeconomic instruments. From the perspective of fiscal policy, the government handed out

basic essential goods like rice, rice noodles, cooking oil, sugar, salt and eggs. In addition, the households that belong to the lower income bracket were given cash. This did not only ease the financial burden of the household but at the same time help to increase the economic growth through the demand for these essentials. These short-term remedies resulted in price and output increase indicating a small percentage of growth. The government of Malaysia was least concern about the increase in price. They were content with the increase in output. They found the values of the macroeconomic fundamentals like the inflation rate was still manageable as long as the citizen of the nation was pleased with the stimulus package.

At the initial stage, the fiscal stimulus packages handed out was covered in a blanket basis. Citizens who were not affected by the pandemic also received help as long as you belong to certain income category. This resulted in an economic leakage because subsidy should be given to those who qualify and need the assistance but this was not the case. Other than the fiscal stimulus packages, monetary policy was also used as an instrument to boost the economy. The government practiced expansionary monetary policy. The government exempted all Malaysians who had loans in the banking institutions need not pay their loans for six months. These exemptions were given for reducing the non-performing loans due to loss of job or a pay cut and to enable the Malaysians to use the money to purchase essential items to sustain themselves during the pandemic. The expected outcome by the Malaysian government was to increase the demand which would rise the productivity to meet the demand. A rise in productivity leads to the demand for employment eventually decreasing the unemployment in the country. This decision was also supported by the deflation rate which was -1.14%. Therefore, the expansionary monetary policy was found to be appropriate to boost domestic demand without worrying about the disruption in price stability.

2 Problem Statement

Both the macroeconomic instruments were used to initiate economic growth. The expansionary fiscal as well as the monetary policy were aimed to be the solution. Unfortunately, the fiscal stimulus package as well as the monetary policy was not sufficient to create the economic growth as expected. Loss of purchasing power by the workers did not give room for savings. In fact, they were dissaving taking place in the economy. In addition, the moratorium reduced the money supply in the economy. There were less deposits and at the same time repayment was relieved either by the stimulus package or the borrower did not have the means to pay back his or her loan. This reduced the effectiveness of the monetary transmission channel in ensuring the aim of the government to be achieved thru the design of the stimulus package. The consequences of a decrease in money supply when there is a pandemic created adverse effect to the economy.

Due to the pandemic and the stimulus packages, deposits decline. According to the theory quantity of money, when money supply reduces, money demand exceeds money supply resulting in an increase in interest rates. A rise in interest rates makes borrowing expensive and reduces investment. A fall in investment which is a component in the aggregate demand can reduce the income of the nation as well as the general price of the goods and services. This creates deflation. A rise in interest rate will resort to borrowers looking for external funding to manage their daily business operations. Some small and medium scale industries might be willing to pay more to get funding for their business. The willingness to pay more could create adverse selection. Adverse selection increases the cost of doing business. In line with the credit view, increase in interest rate decreases the value of the firms by decreasing the price of the equity. It also decreases the income earned by the firms with a low earnings per share. The outcome of the macroeconomic instruments used can be clearly seen with the negative growth in Malaysia's national income for 2020 (-5.6%) compared to 4.4% in 2019 and a deflation of -1.14% in 2020. Overall, in 2020, all sectors recorded negative growth with the Services sector decelerated to 5.5% (2019: 6.2%), Manufacturing 2.6% (2019: 3.8%) and Agriculture 2.2% (2019: 2.0%). However, two other sectors, namely Construction and Mining & quarrying sectors recorded two digits decline of negative 19.4% (2019: 0.4%) and 10.6% (2019: -0.6%) respectively in 2020.

If the effects of the changes in the monetary variables were anticipated, the impact on the real economic variables like national income and inflation will exists only in the short run. Thus, the effect of money would be non-neutral. These active changes in the long run are expected to stabilize resulting in the anticipated changes in the monetary variables to become neutral in the long run. But the neutralization of the changes greatly depends on the strength of the Malaysian financial system in absorbing shocks. If the dynamics of the changes in the monetary variables are unanticipated by the financial system, then money would create an active impact immaterial whether it is in the short run or in the long run. Thus, money would be non-neutral for unanticipated changes in monetary variables. Therefore, the study aims to determine whether anticipated or unanticipated changes in monetary variables were able to influence the financial stability in Malaysia effectively during the crisis.

3 Research Objectives

The overall study aimed to investigate whether the anticipated and unanticipated monetary variables were effective in influencing the financial stability in Malaysia during a crisis.

4 Literature Review

4.1 The Effectiveness of Monetary Transmission Channel in Developing Economics

The effectiveness of monetary transmission channel depends on the monetary variable that the nation would like to tackle. Researchers (Ufuk Can et al., 2020) claims that the central bank in Turkey uses the interest rate channel for inflation targeting. Turkey is a country which can be classified as emerging economics. The interest rate channel changes the nations interest rate which eventually influences the output of Turkey. The Vector Auto regression method was employed measure the short run dynamics of the interest rate on the output in Turkey. The result confirmed that the influence was due to changes in liquidity as well as asset pricing. Other researchers (Disyatat and Vongsinsirikul, 2003) also support the effectiveness of the interest rate channel for inflation targeting in Sri Lanka. Thailand is highly integrated with the international trade which makes exchange rate channel more effective. Small and emerging Economics have various channels like credit, money to achieved the objective that they need to fulfil at a particular time frame. Whether the effect is transitory and for a short term period depends on the financial system of the nation to absorb the external shocks.

Researchers like Kamin, Turner and Van 't dack (1998) pointed out that the monetary transmission channel influences the credit view through the position of the balance sheet, financial system deepening and the expected policy in the future. Many researchers have argued whether the aim of the monetary policy is solely for inflation targeting. Focus should also be on using the monetary policy to achieve the desired output and employment. claim that understanding and implementing the transmission process is important in designing and implementing the monetary policy. If the aim of the country is to use the monetary transmission channels for inflation targeting, it should also consider the country's economic development. If it is a highly industrialized country, the inflation rate would be around 2% to 3%. But in a developing country, the measures that need to be taken is more intense because in some developing countries the inflation rate is double digit. Some countries are relatively sensitive to exchange rate because it deals with international trade and there is a huge influx of foreign capital. For countries with such characteristics, the exchange rate channel would be appropriate. Moreover, these countries also need to take the necessary measures to ensure adequate amount of reserve to stabilize the balance of payment. The reserve is essential to strengthen the local currency and the financial system as a whole.

The appropriate channels to be utilized and its effectiveness depends largely on the financial structure and the legal structure of the country (Abdul Aleem, 2010). In India, the financial structure is bank based. Unanticipated changes in money supply are used by the central bank of India to influence the exchange rate of Rupees. Similar situation can also be found in Malaysia. 70% of the funds are obtained through banks but not the capital market. This indicates in developing countries, banks still play an important role as a financial intermediary. Other form of financial institution still lacks in its role as a resort for alternative banking. In the monetary transmission channel bank lending channel plays an important role as an effective channel in influencing the real sectors. The appropriate channel is also determined by the legal structure between the central banks and the commercial banks. The laws governing the shareholders and credit rights determines the financial structure of the countries in Europe. The enforcement of these laws creates a different impact when each channel is implemented.

The financial system in Malaysia is influence by the banking services offered, growing capital market and the international openness (Ooi Sang Kuang, 2020). The ratio of total assets to the Malaysia's GDP is 386% indicating that Malaysia bank based financial structure because 50% of the financial assets originates from the banking system. Since the financial crisis in 1997, the entire financial system changed in Malaysia. The banks were asked to merge and consolidate to create a more resilient financial system. The banks were consolidated into nine banks. The merger and the consolidation resulted in a stronger balance sheet of the financial institution. This was followed by the decline in the net interest margin. The decline in the net profit margin encouraged the banks to focus on operation efficiency. Eventually the New Interest Rate Framework 2004 was designed. This framework liberalized the asset pricing and increased the competition among the financial intermediaries. At the same time, Malaysia also focused on the development of the capital market. Bonds and equity were issued for households and business to raise capital.

5 Methodology

The study aims to investigate the effectiveness of the monetary policy implemented by the government to overcome economic stress due to crisis created by political scandals and health pandemics and financial crisis. The economic stress in a country can be identified by measuring the financial stability of the country. Monetary policy has a significant impact on the country's financial stability because it deals with the Central Bank that maintains the reserve which is stated in the Balance of Payment and the exchange rate stability. Monetary policy also deals with controlling of money supply that can influence the inflation rate and the interest rate. Thus, it can be concluded that monetary policy is a highly sensitive macroeconomic policy that deals with both internal and external shocks. It is not political driven policy like the fiscal policy. The monetary policy oversees the financial performance of the country through monetary variables like interest rate, inflation rate, exchange rate and money supply. The data published in the Financial Reports are all known as anticipated variables. Unfortunately, Malaysia is a country that experiences various shocks both internal and external. These shocks create the variables to be extremely volatile. Volatility results in risk. The risk created by this volatility is known as systematic risk which cannot be diversified through diversification in portfolio. The impact of this risk can be reduced through a stable financial system. In economics, researchers look at the impact in two-time frame, short run, and long run. If the impact of the shocks influences the monetary variables in the short run or long run, it can be concluded that the financial system was not able to absorb the shocks at the specific time period. Thus, the financial system was not strong enough to enable the shock to be neutralized and does not influence the stock returns. A sustainable, resilient and strong financial system is a system that is able to absorb shocks fast and neutralizes its impact. Unlike monetary policy, fiscal policy is more discretionary because the decision to spend as government expenditure and collect tax differ according to the political needs of the country.

Most researchers in the field of finance or economics usually use the anticipated variables to do the analysis. But the anticipated variables do not reflect the real situation. It has statistical adjustments to the data to overcome missing values. It does not include the leakages and the mismanagement. All these issues are usually included in the error term. The error term reflects the deviation between the predicted and the actual observation. Since the expected value does not reflect the real value, the deviation is the element that needs to be considered in the policy making. It reveals the shock. Thus, this study did not only use the anticipated monetary variables, but it used the unanticipated monetary variables. The unanticipated monetary variables were taken from the study done by Barro (1980) and by Geetha (2010). The anticipated monetary variables are regressed with lagged one and two of the anticipated monetary variables. The error term obtain from the regression of each monetary variables will be powered by two to obtain the variance. The variance represents the unanticipated monetary variables. Thus, the monetary variables chosen in this study were interest rate, exchange rate, consumer price index and money supply M_2 . All these variables were converted to unanticipated. The data was obtained from the Malaysian Financial Report from January, 2010 till September, 2020. There was a monthly observation of 117. The analysis began by running a unit root test. The ADF and the PP tests aims to identify whether the monetary variables were stationary. The monetary variables were run three times. First the anticipated monetary variables. Second the unanticipated monetary variables and third as the averaged unanticipated monetary variables. The aim is to determine the differences in the results obtained which the policy makers should take into consideration. The variables were run at level and first difference. The unit root test was run with only intercept and intercept with trend. The unit root did not include the structural Breaks. The result revealed that at level both intercept and intercept with trend were not stationary for all the monetary variables in anticipated, unanticipated and averaged unanticipated form. The variables were only stationary at first difference.

The analysis extended to determine the long run relationship between the different forms of monetary variables with the stock returns. The anticipated monetary variables were found to bound or establish long run relationship but unfortunately all the monetary variables were insignificant at 5% significance level. But when the monetary variables were converted into unanticipated monetary variables, the bound was established in the long run. In addition, other than unanticipated interest rate, all other monetary variables like unanticipated money supply M_2 , unanticipated exchange rate and unanticipated consumer price index were able to explain the changes in the stock returns at 5% significance level in the long run. When the averaged unanticipated monetary variables were used, the bound test failed to establish the long run relationship and the monetary variables were also found to be insignificant at 5% significance level.

This was followed by the establishment of short run relationship between the different form of measuring monetary variables with stock returns. The anticipated monetary variables seem to have a short run relationship with stock returns. Similar outcome can be found when the averaged unanticipated monetary variables were used. The error correction term had a negative sign and it was significant at 5% significance level. The negative sign and the significance show the dynamics for the equation to reach equilibrium in the long run. When the unanticipated monetary variables were used, the coefficient terms were significant but positive. The result indicated that it is positive and significant because the vector error correction was run using second differences.

If the vector error correction is run with first differences than it will show a negative sign and significant. Finally, diagnostic test was conducted for the error term for serial correlation, heteroscedastic and normality.

6 Findings

6.1 Unit Root Test Results

Table 1. Shows the Augmented Dickey Fuller Test without the structural break (without converting it to unanticipated values)

Variables	Intercept				Trend & Intercept			
	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)
LG CPI	-1.8254	0.3668	-8.6657	0.0000	-0.6854	0.9715	-8.962	0.0000
LGEXCR	-0.926	0.7772	-7.6000	0.0000	-2.692	0.2418	-7.584	0.0000
LGIR	-1.5251	0.517	-13.889	0.0000	-1.8114	0.6936	-13.921	0.0000
LGM2	-2.419	0.1385	-11.760	0.0000	-1.7045	0.7843	-12.215	0.0000
LGSR	-1.3015	0.627	-11.523	0.0000	-3.137	0.1022	-11.507	0.0000

Table 1 shows the Augmented Dickey Fuller test results using anticipated monetary variables. The data were tested using the intercept and also intercept with trend. The monetary variables tested were consumer price index, exchange rate, interest rate, M₂ of money supply and stock returns. At level, all the monetary variables were found to be insignificant. This is because the estimated T Statistics for all the monetary variables had a probability value of greater than 0.5. Thus, it can be concluded the variables were insignificant at 5 % significance level. They were not stationary at levels. When the variables were differentiated at 1st difference, the estimated T Statistics for all the anticipated monetary variables had a probability value of less than 0.5. Thus, it can be concluded at 1st difference all the monetary variables were significant at 5% significance level. Thus, it can be concluded that all the monetary variables included in this study were stationary at 1st difference. Similar result was also found when the data were analysed using intercept and trend. This indicates after differentiating the data by including intercept and trend, the data became stationary at 5% significance level.

Table 2. Shows the Augmented Dickey Fuller Results for unanticipated monetary variables.

Variables	Intercept				Trend & Intercept			
	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)
LGUCPI	-1.7804	0.3887	-8.6740	0.0000	-0.7223	0.9687	-8.894	0.0000
LGUEXCR	-0.9735	0.7612	-7.5550	0.0000	-2.662	0.2543	-7.536	0.0000
LGUIR	-1.799	0.3795	-13.587	0.0000	-2.0360	0.5756	-13.591	0.0000
LGUM ₂	-2.282	0.1791	-11.799	0.0000	-1.698	0.7466	-12.198	0.0000

LGUSR	-1.258	0.647	-11.499	0.0000	-3.102	0.110	-11440.	0.0000
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Table 2 shows the Augmented Dickey Fuller test for unanticipated monetary variables. The variables were tested with intercept and also with intercept and trend. But the monetary variables were converted into unanticipated values following the Barro (1988) method. At the level, the unanticipated monetary variables had an estimated T value with probabilities higher than 0.5 indicating the unanticipated monetary variables were not stationary at 5 % significance level. But when the values were differentiated at 1st difference, all the unanticipated monetary variables were significant at 5% significance indicating the variables were stationary at 1st difference. Similar outcome was found when the intercept and trend were included in the analysis.

Table 3. Shows the Philip Perron test result for anticipated changes in monetary variables.

Variables	Intercept				Trend & Intercept			
	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)
LG CPI	-1.812	0.373	-7.952	0.0000	-0.531	0.981	-8.193	0.0000
LGEXCR	-0.743	0.8300	-7.483	0.0000	-2.229	0.4688	-7.466	0.0000
LGIR	-1.082	0.721	-3.973	0.002	-1.139	0.917	-4.994	0.0004
LNM2	-1.448	0.556	-1.696	0.430	-3.077	0.116	-1.793	0.701
LGSR	-0.816	0.810	-3.333	0.015	-3.134	0.103	-3.430	0.052

Table 3 shows the anticipated values of the monetary variables where the Philip Perron stationary test was conducted. The estimated T values at the level showed that the variables were not stationary at 5% significance level for both intercept and intercept with trend. This was due to the probability values of the estimated T values were more than 0.05. In contrast when the anticipated values of the monetary values were differentiated at 1st difference, the estimated T values all had a probability value of less than 0.05. Therefore, the variables were stationary at 1st difference with intercept and intercept with trend. Table 4 shows the stationary test result for Philip Perron when the monetary variables were converted to unanticipated with intercept and intercept with trend. The result revealed that at level the estimated T Statistics for the unanticipated monetary variables were having probability values of more than 0.05. In contrast when they were differentiated, the probability values of the estimated T Statistics showed values less than 0.05. This means the unanticipated monetary variables were all stationary at 1st difference.

Table 4. Shows the Philip Perron with unanticipated variables.

Variables	Intercept				Trend & Intercept			
	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)	Level (T-statistic)	Level (Prob.)	1st Difference (T-statistic)	1st Difference (Prob.)
LGUCPI	-1.765	0.396	-7.599	0.0000	-0.602	0.977	-8.223	0.0000
LGUEXCR	-8.209	0.809	-7.512	0.0000	-2.259	0.453	-7.493	0.0000
LGUIR	-1.468	0.546	-14.042	0.0000	-1.727	0.773	-14.249	0.0000
LGUM ₂	-2.323	0.166	-11.788	0.0000	-1.694	0.748	-12.916	0.0000
LGUSR	-1.258	0.647	-11.486	0.000	-3.183	0.092	-11.479	0.0000

Table 5. Shows the bound test result for the anticipated monetary values

Test statistic	Value
F-statistics	3.1633

Table 5 shows the bound test result between the anticipated monetary variables and the stock returns. The result revealed that the estimated F Statistics had a value of 3.1633. This indicates that the estimated F Statistics value was greater than the critical value of F for the bound test at level I (0) which is 2.56 at 5% significance level. This means the anticipated monetary variables will bound and create a long run relationship at level. It can bound and create a long run relationship at level (2.2) and 1st difference (3.09) at 10% significance level because the estimated F Statistics are greater than the mentioned critical value.

Table 6. Shows the coefficient and the estimated T values for the anticipated monetary variables at different lag length.

Independent Variables	ARDL (1, 0, 2, 2, 0)
LGCPPI	-0.6129 (0.5411)
LGEXCR	1.5611 (0.1213)
LGIR	0.0484 (0.9143)
LGM2	0.8103 (0.4424)
C	0.0062

Table 6 indicates the long run relationship between the anticipated monetary variables and the stock returns at different lag length. All the anticipated monetary variables were insignificant at 5% significance level. This is because the estimated T values were less than the critical value of T at 5% significance level. The anticipated monetary variables were insignificant in establishing long run relationship with stock returns.

Table 7. Shows the ECM for the anticipated monetary variables and the stock returns.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)	-0.113396	0.025396	-4.465054	0.0000

Table 7 shows the error correction term has a coefficient with a negative sign and it is significant at 1% significant level (t= -4.465054, p=0.0000). This indicated that there is short run relationship between the anticipated monetary variables and the stock return. Table 8 reveals the diagnostic test for the long run relationship between the variables. For the serial correlation, probability value of 0.7566 indicates hypothesis null cannot be rejected. Thus, it can be concluded that there is no serial correlation in the model. Similarly, the heteroskedastic reveals a

probability value of 0.2277. Hypothesis null cannot be rejected. There is no heteroscedastic problem in the model. Finally, the normality test confirms that hypothesis null cannot be rejected that the data is normally distributed.

Table 8. Shows the correlation analysis on the anticipated monetary variables and the stock returns.

Correlation	LGSR	LGM2	LGEXCR	LGIR	LGCPPI
LGSR	1.000000				
LGM2	0.716433	1.000000			
LGEXCR	0.748270	0.818075	1.000000		
LGIR	-0.097179	-0.293198	-0.061905	1.000000	
LGCPPI	0.7777526	0.964210	0.888186	-0.147159	1.000000

Table 8 shows that there is a strong relationship between money supply M_2 and stock returns. Similarly, there is also a strong relationship between consumer price index and exchange rate with stock return where respectively the correlation value is 0.716433, 0.748270 and 0.7777526. The value of money supply M_2 and consumer price index seem to have a correlation value of 0.964210 which is greater than 0.9 indicating the existence of multicollinearity problem. The relationship between consumer price index and the exchange rate also high with a correlation value of 0.888186. Since the value does not exceed 0.9 thus it need not necessarily be removed. No doubt consumer price index and money supply M_2 have a high correlation, but the variables were not removed since the aim of the study was to see the effectiveness of the monetary policy in handling the crisis. Thus the inclusion of all monetary variables were important.

The study was extended by converting all the anticipated values of the monetary variables to unanticipated. The bound test result in Table 9 shows that the estimated F Statistics was greater than the critical value of F at 1 percent significant level. Thus, it can be concluded that the unanticipated monetary variables bound with the stock returns in the long run.

Table 9. Shows the bound test result between the unanticipated monetary variables and the stock returns.

Test statistic	Value
F-statistics	23.5E+27

Table 10. Shows the long run relationship between the unanticipated monetary variables and the stock returns

Independent Variables	ARDL (1, 0, 2, 2, 0)
LGUCPI	5.510669 (0.0000)
LGUEXCR	-3.953752 (0.0001)
LGUIR	-0.815517 (0.4164)
LGUM ₂	-4.776219 (0.0000)
C	0.0020

Since all the monetary variables were converted to unanticipated values, the ARDL shows that unanticipated consumer price index, unanticipated exchange rate and unanticipated money supply of M_2 were significant in explaining the changes in the stock returns in the long run with the probability values of 0.000, 0.0001 and 0.0000 respectively. The unanticipated consumer price index had a positive coefficient. This means that when consumer price index increases the stock returns increases. But the unanticipated exchange rate and the unanticipated money supply M_2 both had negative relationship with stock returns. The only monetary variable that did not influence stock returns was the unanticipated interest rate (Refer to Table 10). Table 11 shows the short run relationship between the unanticipated monetary variables and stock returns.

Table 11. shows the error correction modelling between the unanticipated monetary variables and the stock returns.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)	-0.517331	3.84E-09	1.35E+08	0.0000

Table 11 reveals that the error correction term was significant and negative. This means there is a short run relationship between the unanticipated monetary variables and the variables were dynamic enough to reach equilibrium if there was disequilibrium in the economy. The findings from the diagnostic test results revealed that there was no serial correlation problem, heteroscedastic issues as well as normality problem when unanticipated monetary variables were used in establishing the long run and short run relationship with stock returns.

7 Conclusion

The study aimed to identify the effectiveness of the monetary policy in influencing the financial stability during a crisis in Malaysia. The monetary variables were differentiated into anticipated and unanticipated monetary variables. The financial stability was measured using stock returns meanwhile the monetary variables were represented by money supply, consumer price index, interest rate and exchange rate. Monthly data from January 2010 to September 2020 were used. The analysis began with a unit root test followed by ARDL and error correction modelling. Therefore, it can be concluded the best result was obtained when the unanticipated monetary variables were used to establish long run and short run relationship with stock return.

References

1. Abdul Aleem. Transmission mechanism of monetary policy in India, *Journal of Asian Economics*, 21(2): 186-197(2010).
2. Ahmed,R., & Mustafa, K. Real Stock Returns and Inflation in Pakistan. *Department of Economics, University of Karachi* (2003).
3. Asteriou, D. and Hall, S. *Applied Econometrics: A Modern Approach*. Palgrave Macmillan, New York (2007).
4. Barro, Robert.J. Federal Deficit Policy and the effects of public debt shocks, NBER Working Paper Series. Working Paper No. 443. National Bureau of Economic Research.1050 Massachusetts Avenue Cambridge (1980).
5. Chen, Nai-Fu, Roll, Richard. & Ross, Stephen.A. *Economic forces and Stock Returns*, *Journal of Business*, 59(3): 383-403(2004).
6. Disyatat, Piti. & Vongsinsitikul, Pinarat. Monetary Policy and the Transmission Mechanism in Thailand, *Journal of Asian Economics*. 14(3): 389-418. [https://10.1016/S1049-0078\(03\)00034-4](https://10.1016/S1049-0078(03)00034-4) (2003).
7. Dickey, David.A. & Fuller, Wayne.A. Distribution of the estimators Autoregressive Time Series with a unit root, *Journal of American Statistical Association*. 74(366a): 427-431(1979).
8. Engle, R. and Granger, C. Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55, 251-276 (1987). <http://dx.doi.org/10.2307/1913236>.
9. Glynn, John; Perera, Nelson; and Verma, Reetu. Unit root tests and structural breaks: a survey with applications. <https://ro.uow.edu.au/commpapers/455> (2007).
10. Hoffman, Dennis.L. Two-Step Generalized Least Squares Estimators in Multi Equation Generated Regressor Models, *The Review of Economics and Statistics*. 69 (2): 336-346 (1986): <https://doi.org/10.2307/1927242>
11. Johansen, S. "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models," *Econometrica*, 59(6): 1551–1580 (1991).
12. ———. *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models* (New York: Oxford University Press) (1995).
13. Kutty, G.The Relationship between Exchange Rates and Stock Prices: The Case of Mexico. *North American Journal of Finance and Banking Research*,4(4): 1-12 (2010).
14. Kamin, Steven. Turner, Philip & Van 't dack, Josef. The transmission mechanism of monetary policy in emerging market economies: an overview, Policy Paper No. 3. Monetary and Finance Department, Bank of International Settlement. Basle (1998).
15. Lucas, Robert E. & Sargent, Thomas J. *Rational Expectations and Econometric Practice: Volume 1*. NED New Edition. University of Minnesota Press (1981).
16. Frederic S. Mishkin. "Anatomy of a Financial Crisis," *NBER Working Papers* 3934, National Bureau of Economic Research, Inc.(1991).
17. Muth, John. F. Rational Expectations and the Theory of Price Movements, *Econometrica*. 29(3): 315-335 (1961).
20. MH Pesaran, Y Shin, RJ Smith. Bounds testing approach to the analysis of level relationship, *Journal of applied econometrics*, Wiley. 16(3): 289-306 (2001).
21. Ooi Sang Kuong. Cari Asean, Research and Advocacy. <https://www.cariasean.org/about-us/advisors-fellows/ybhg-dato-ooi-sang-kuang/#.YiYiJh7mgwA>(2020).
22. Ross, Stephen.A. The arbitrary theory of capital asset pricing. *Journal of Economic Theory*. 13(2): 341-360. [https://doi.org/10.1016/0022-0531\(76\)90046-6](https://doi.org/10.1016/0022-0531(76)90046-6). (1976).

23. Ufuk Can, Mehmet Emin Bocuoglu & Zeynap Gizem Can. How Does Monetary Transmission Mechanism works? Evidence from Turkey, Borsa Istanbul Review: <https://10.1016/j.bir.2020.05.004>(2020).
24. Yiswaree Palansamy. Deputy Minister: No fixed allocation for Nadma's Covid 19 Fund for 2022 as fund derived from public donations, government will add in a new wave, <https://Malaysia.news.yahoo.com/deputy-minister-no-fixed-allocation-053100930.html> (2021).

Satisfaction: The Moderating Role of psychological Detachment

Fahmida Abbas Shabbir ^a*Jakaria Dasan^b Suddin Lada^c

^aUniversiti Malaysia Sabah, Kota Kinabalu, Malaysia
fehmdaabbas123@gmail.com

^bUniversiti Malaysia Sabah, Kota Kinabalu, Malaysia
jakaria@ums.edu.my

^cUniversiti Malaysia Sabah, Kota Kinabalu, Malaysia
E-mail address:suddin@ums.edu.my

*Corresponding Author: fehmdaabbas123@gmail.com

Abstract

The purpose of this study is to examine harmonious and obsessive work passion impact on work-life enrichment and how it affects life satisfaction with the moderating role of psychological detachment. The primary instrument employed for data collection was a survey questionnaire, which was administered across diverse education sectors in Pakistan. The data collection process utilized a combination of online and face-to-face approaches, culminating in a total sample size of 102 participants. Given the absence of comprehensive information such as names and contact numbers for all employees, a non-probability sampling technique was employed. This methodology was chosen to ensure inclusivity in the absence of a complete list of potential participants. We adapted conservation of resource theory in this study to investigate the impact of harmonious and obsessive work passion on life satisfaction mediating role of work life Enrichment and the moderating role of psychological detachment. The research findings indicate that harmonious work passion positively influences work-life enrichment. When work-life enrichment is high, it, in turn, has a positive effect on life satisfaction. However, constant pressure associated with obsessive work passion can lead to a negative impact on work-life enrichment, and this, in turn, negatively affects life satisfaction. Notably, the moderating effect of psychological detachment is observed in the relationship between harmonious work passion and its impact, but it does not play a moderating role in the case of obsessive work passion under constant pressure.

Keywords: Work-life enrichment, Harmonious work passion, Obsessive work passion, Psychological detachment, life satisfaction

1. Introduction

Steve Jobs said that being passionate about one's work will lead to satisfying success. (Anderson, 2013). For many, a deep passion for work are implicitly associated with perseverance (Duckworth et al., 2007), job performance (Ho et al., 2011), and significant effort and time investment. (Vallerand, 2010). Even though work passion has many positive outcomes, it may not predict similar outcome. Astakhova and Ho, 2018; Astakhova and Porter, 2015. Burke et al., 2015; Ho and Pollack, 2014). When you love your work and are happily

ready to go your work you will perform as much as you can and meet the acceptance and goals and very promptly other people grab the passion from you. Sam Walton, Founder of Wal-Mart Stores argued that passionate workers will not be easily disturbed by others. Thus passion can be defined as a strong affection toward things that you like to do. According to recent findings attention of people toward passion rapidly increased on Google I Billion people search about passion. Passion for work has different consequences it might be positive or negative. "Passion inspires people to maintain the work that they are doing." (Michel Dell). This research paper talks about the most important work passion and life-related issues whether work passion has positive outcomes or negative outcomes. Work is part of life and plays a very vital role in a person's life but how people take their work is interesting because some people take their work as a milestone for career growth some people do their work as an occupation or to the point and some peoples take work just for salary cheque. (Wrzesniewski, McCauley, Rozin, & Schwartz, 1997). Work is important for those who value them (Morin & Dassa, 2006; Wrzesniewski, 2003) and work makes their identification. (Vallerand & Houliort, 2003). Most scholars work on dualistic models of passion like harmonious work passion and obsessive work passion by advancing theoretically and support practically. (Vallerand and Helford 2003).

Both types of work passion originate from two different processes in which a task or activity is incorporated into one's identity. Independent internalization is linked to Harmonious work passion in which people freely engage in activities without any pressure willing to perform tasks. (Vallerand and Houliort 2003. while in obsessive work passion, people face internal and constant pressure because of the control internalization people are not happily engaged with work. Harmonious passionate people remain balanced in their work and their family. But in contrast, people with obsessive passion mostly don't maintain a balance between their work and family which mostly leads to work-family conflict.

In this paper, we have taken Harmonious and obsessive work passion as an independent variable and life satisfaction as a dependent Variable. According to (Diener et al., 1985) Life satisfaction can be demonstrated as a cognitive judgment of life quality according to self-set standards and criteria. Beyond the discipline researchers commonly look to life satisfaction as key indicator of subjective well-being. But the result of both types of passion has different harmonious work passion has a positive impact on life and obsessive work passion harms life wellbeing. (Carpenter et al., 2012, Philippe et al., 2009). Life satisfaction is a person's positive views related to their life either person is enjoying a quality life. In life satisfaction person examines the cognitive and affective domain of his /her life. (Diener et al., 2002). Work passion affects life satisfaction. Obsessive work passionate people face constant internal pressure and they are bound to complete their tasks even if they leave after their off time or go to their homes with lots of office work. But in contrast to harmonious work passionate people have autonomous internalization they happily perform their jobs and feel free and enjoy other social activities like spending time with their family and friends. Harmonious passionate people have a positive impact on work-life enrichment. Work life enrichment describe either people have positive or negative experience in work and non-work (Home) related activities interact to gains health, and satisfaction, and performance. Obsessive work Passionate people cannot give proper time to their family which creates a negative impact on work-life enrichment. To support our model we used COR theory (Hobfoll, 1989, 1998) and self-determination theory SDT that make sense to understand work Passion and its impact on work-life enrichment and life satisfaction. COR theory covers the broader concepts not only applied in burnout and stress literature (Halbesleben, 2006). COR theory also demonstrates that individuals hook up toward their work because they have some resources like energy, time, and attention for the other

character allocation e.g. Family and society. (Halbesleben et al., 2009). COR theory also explains dispute between work and family cause a reduction of resources like energy and attention and create negative consequences for the people and the availability of resources cause less negative outcomes. (Premeaux et al., 2007). In this paper, we also consider the Moderating effect of psychological detachment on Harmonious and obsessive work passion. The significance of this research we make a major and important contribution is that in the previous paper, only a conceptual study was done with little variation we tested this study empirically. In this paper we also give direction for future research they work on different contexts of job performance they examine the impact of obsessive work passion on contextual performance, task performance, and counterproductive behavior they can also assess the impact of both harmonious and obsessive work passion on job performance context.

1.1 MainText

The current study focuses on important issue that is life-related issues of employees when they are doing their job either they keep balance in work and life. Nature of work is different of all employees for example employee who working in industrial sector they have different key performance indicators KPI, s. Employees who are working in medical field they have different KPI,s and the employee who are working in education sector they have different KPI,s their job description is entirely different from the other sectors. In education field employee need a passion for this type of career but in contrast employee who are passionate with their work and their life is affected by the passion may be positively or negatively. In education sector turnover rates of employees is 37% which is very high and increased day by day.

The study aims at examining the Harmonious and obsessive work passion that contribute life satisfaction as guided by the following questions:

1. What are the effects of Harmonious and obsessive work passion on employee life satisfaction?
2. What are the effects of Harmonious and obsessive work passion on work-life Enrichment?
3. What is the effect of work-life enrichment on employee life satisfaction?
4. What are the mediating effects of work-life enrichment on the relationship between Harmonious and Obsessive work passion and employee life satisfaction?
5. What are the moderating effects of psychological detachment on the relationship between Harmonious and obsessive work passion and employee life satisfaction?.

The specific objectives of this study are as follows;

1. To examine the effects of Harmonious and obsessive work passion on employee life satisfaction.
2. To investigate the effects of Harmonious and obsessive work passion on work-life Enrichment.
3. To investigate the effect of work –life Enrichment on employee life satisfaction.
4. To examine the mediating effects of work life Enrichment on the relationship between Harmonious and obsessive work passion and employee life satisfaction.
5. To investigate the moderating effects of psychological detachment on the relationship between Harmonious and Obsessive work passion and employee life satisfaction.

1.2

The current research focuses on employee's life satisfaction. The employees of private education sector in Pakistan are selected as the population of the study. It was apparent from the literature review that a passion such as harmonious work passion and obsessive work passion predict the criterion variable which is employee life satisfaction. Passion especially harmonious work passion seems to have strong positive effect on the employee life satisfaction and obsessive work passion has strong negative effect on employee life satisfaction. In addition, the mediating effect of work-life enrichment is believed to mediate the relationship between the work passion and life satisfaction. The psychological detachment moderates the relationship between the predictor and criterion variable.

Theoretical contribution

The present study fill the gap in employee life satisfaction by addressing the influence of work passion specially harmonious and obsessive work passion with the mediating role of work-life enrichment and psychological detachment moderate the relationship between harmonious and obsessive work passion and employee life satisfaction. Based on conservation of resource theory (COR, Hobfall, 1989) and self-determination theory we enhanced the literature on work passion and employee life satisfaction. In short, this study will advance the employee life satisfaction literature. The two variable harmonious and obsessive work passions are selected based on their specific corresponding characteristics to academician's life satisfaction. Specifically this means that the two variable harmonious and obsessive work passions are the common aspects which are related to employee life satisfaction. In addition to those factors, work-life enrichment will strengthen the theoretical operation of the overall relationship of variables involve.

Practical contribution

The current study provides input to the relevant authorities such universities management and policy makers in devising strategies to improve the life satisfaction of their employees. When employee work have positive impact on their lives it play important role in quality of education, decrease employee turnover rate and overall it will participate in the economy growth. In short, investigating impact of harmonious and obsessive work passion on employee life satisfaction will provide important feedback that can be practical when solving perceived higher education human resource problems.

Table 1
Description of the samples

Source: Authors own estimates

**Statistically significant at 5 percent significance level

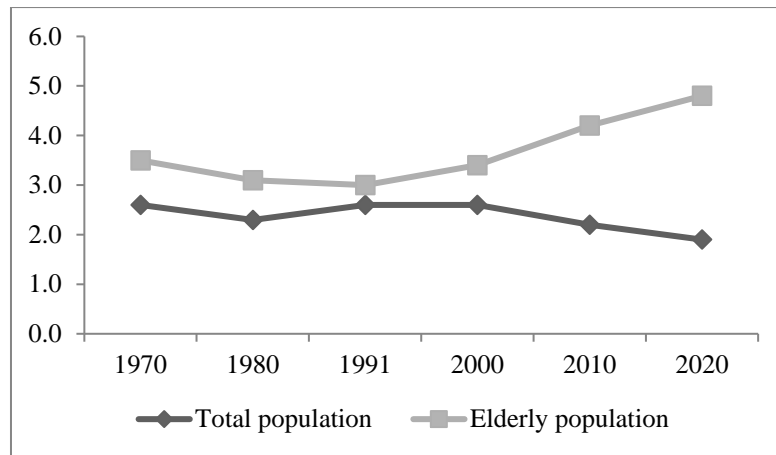


Figure1
Trend of elderly population, 1970 – 2020

2. Literature Review

“Passion on the work that we are doing becomes the key factor to succeed” .A study found that passion positively turns employees into fully devoted at work. As a consequence, increasing organizational growth and development. (Lajom et al., 2018). Work passion is classified into two categories Harmonious and obsessive work passion Vallerand et al. (2003). Harmonious work passionate people engage with their work very actively and feel happy and the work experience of harmonious passion is positive. So people who have harmonious work passion have a positive impact on work-life enrichment. So we hypothesized that:

H1: Harmonious work passion has a positive impact on work-life Enrichment.

According to (Vallerand et al, 2010) obsessive work passion results from a controlled internalization process of the passionate activity into one’s identity. As a result, they are engaged for a long time with their work and cannot entertain other social and family activities. People having obsessive work passion are motivated by the reward, having monetary benefit and getting high self-respect. Nevertheless, is a drive for motivation employee engages with their work to get reward, monetary benefit, and high self-respect .Nevertheless, due to the continual drain of resources, and mismanagement of time of prioritizing works, obsessive passion creates a negative impact on work-life enrichment.”

H2: Obsessive work passion has a negative impact on work-life enrichment.

Harmonious work passionate people are autonomous which is positively related to work-life enrichment and Obsessive work passionate people have a strong affiliation to their work, and work makes their identity (Vallerand, 2010). Obsessive work passion is inordinate importance in a person's identity. Vallerand et al., 2003), and other aspects of a person's identity like society and family are ignored creating conflict (Donahue et al., 2012). Obsessive passionate people engaged with work might face negative (Frustration, anger, loneliness, and guilt) emotions before and after performing the activity. (Vallerand et al., 2010) as a result depletion of precious resources.OWP people experience different types of conflict like time-base and strain-base conflict (Greenhaus and Beutell,1985) When they spend the majority of their time fulfilling their work requirements they might be exhausted, may be stressed, or may be tired commonly. Obsessive work passionate not only devote too much time and energy to their work they also

experience some psychological changes that deal with negative emotions like anger, stress, anxiety, and frustration which carry on from work to home as well that leads (Rothbard, 2001; Voydanoff, 2004). Psychological distress and burnout are heavily related to obsessive work passion (Carbonneau et al, 2008; Philippe et al., 2009). Another negative outcome of obsessive work passion is lack of energy when a person highly committed to their work for a prolonged time does not have the same level of energy for their family and other social activities. Obsessive work has continuously depleted their resources (cognitive, energy time) so according to COR theory OWP people need ample time to stop the drain of their resources. When people continually think about their work even when job timing is off and they are in their home it creates a negative impact on the quality of life. (Sonnentag et al, 2008).

H3: Work-life Enrichment mediates the positive relationship between harmonious work passion and life satisfaction

H4: Work-life enrichment mediates the negative relationship between obsessive work passion and life satisfaction.

2.1 Moderating the role of Psychological detachment with harmonious and obsessive work passion

Psychological detachment is abstaining or refraining from job activities at that time when you are not performing your job (Singh et al., 2016.) When people psychologically detach they feel free from job thoughts even if they are doing a job or not doing a job they disengage from the job physically or mentally as well. Psychological detachment keeps the person away from work-related thoughts. When people are highly linked with psychological detachment they screen themselves from job stress and work-life conflict. (Sonntag et al., 2010). Psychological detachment from work is "an individual's sense of being away from the work situation" (p. 579). Psychological detachment keeps the person far away from job-related thoughts says Sonntag and Fritz (2007). Harmonious passion people easily disengage him or her from work thoughts and they happily enjoy other work-related activities. (Donahue et al., 2012).

H5: Psychological detachment moderates the positive relationship between harmonies work passion and work-life enrichment.

People with obsessive passion have fewer chances to drag him or herself from work even if they are not in at workplace (Ratelle et al., 2004; Vallerand et al., 2003). Because people are under constant pressure they take their work in their homes so they have fewer chances to abstain from work-related thoughts. So in this research argument, people who have OWP have less ability to take off from the situation.

H6: Psychological detachment moderates the negative relationship between harmonious work passion and work-life enrichment.

3. Theoretical Framework

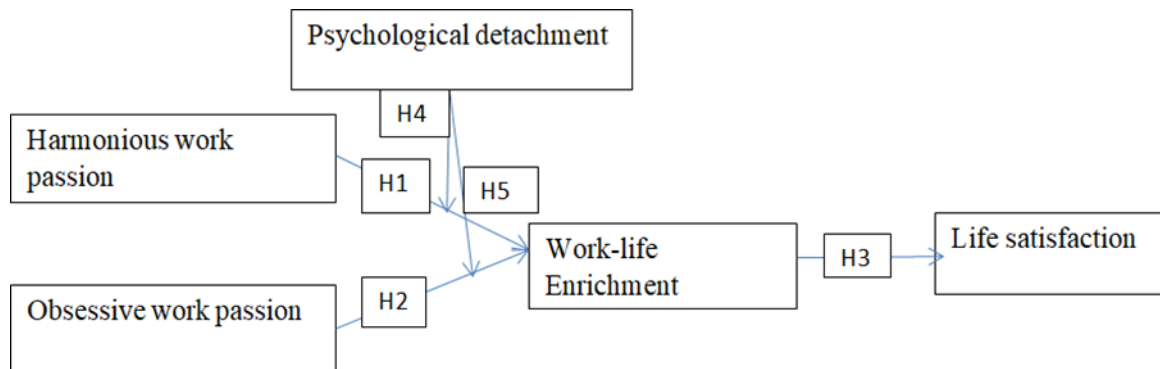


Figure 2.0

Figure 2.0 shows a research model which represents the theoretical framework of the current study. The dependent variable is life satisfaction which is the variable of primary interest. The researcher attempt to explain the variance in this dependent variable by the two independent variable (1) Harmonious work passion and (2) obsessive work passion. Work –life enrichment is the mediating variable that affects the relationship between each independent variable and dependent variable. COR theory (Hobfoll, 1989, 1998) and self-determination theory (SDT) is used as the main theories to explain the relationship of all variables involved in this theoretical framework.

Data were gathered through a survey questionnaire administered across various education sectors in Pakistan. Random sampling was employed to collect data from both male and female employees. The measurement of both obsessive work passion and harmonious work passion utilized a 7-item scale developed by Vallerand et al. (2003). The assessment of psychological detachment was conducted using a 4-item scale created by Sonnentag S. and Fritz C. (2007). Life satisfaction was measured using a 5-point Likert scale based on Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). Work-life enrichment was gauged through a 9-item scale established by Carlson et al. (2006). Detailed items can be found in Appendix A.

4. Methodology

Data were gathered through a survey questionnaire administered across various education sectors in Pakistan. Random sampling was employed to collect data from both male and female employees. The measurement of both obsessive work passion and harmonious work passion utilized a 7-item scale developed by Vallerand et al. (2003). The assessment of psychological detachment was conducted using a 4-item scale created by Sonnentag S. and Fritz C. (2007). Life satisfaction was measured using a 5-point Likert scale based on Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). Work-life enrichment was gauged through a 9-item scale established by Carlson et al. (2006). Detailed items can be found in Appendix A.

5. Analysis

Variable	Frequency	Percentage%
Male	57	55.9%
Female	45	44.1%
Qualification		
Matric	4	3.9%
Intermediate	4	3.9%
Graduation	32	31.4%
Master	48	47.1%
MPhil	9	8.8%
PHD	5	4.9%
Age		
25-35	49	48.0%
36-45	30	29.4%
46-50	8	7.8%
51-55	12	11.8%
Over 55	3	2.9%
Total	102	100%

We use the aggregation of variables in different situations for example when changing the level of data and when changing the unit of analysis and in demographic Analysis In this study we have 102 sample size of which 57 are male (55.9%) were male percentage is and 45 are females percentage is (44.1%). In the qualification category, 4 people have intermediate (3.9%) 32 with graduation which is (31.4%) 48 people are a master's degree percentage is (47.1%) and 9 people have an MPhil degree which is(8.8%) 5 people have a Ph.D. degree which (4.9%).49 people belong to in the age of 25-35 which is (48.0%) 30 people belong to 36-45 age group which is (29.4%) and 8 people belong to 46-50 age group which is (7.8%) and 12 people are in the age of 51-55 which is (11.8%) and 3 people are above 55 year which is(2.9%).

Reliability Analysis

Table 1

Constructs	Cronbach alpha	ITEMS
Hammonious work passion	.765	7
Obsessive work passion	.872	7
Work-life Enrichment	.930	9
life satisfaction	0.75	5
Psychological detachment	.811	4

Analyze the uniformity of constructs other words items are accurately measured or not reliability test shows that. The trash hold of reliability is 0.7%. The value of alpha is 0.7% which shows items are reliable to measure the constructs. How much value of alpha it is good for constructs? In this paper, all five variables are Harmonious work passion, obsessive work passion, Work-life Enrichment, life satisfaction, and psychological detachment alpha value is greater than o.7%.

Descriptive statistics and Corelation matrix

Table 2

	Mean	Std. Deviation	1	2	3	4	5	6	7	8
Gender	1.44	.499								
Age	1.92	.140	-.391**							
Education	3.67	1.00	-.107	.202*						
HWP_A	12.04	.84	-.018	-.013	-.095					
OWP_A	17.28	.60	-.057	.122	.083	.383**				
PD_A	11.42	.62673	-.053	.114	.179	-.158	.301**			
WLE_A	27.14	7.35812	-.184	.118	.260**	-.032	.267**	.403**		
WLS_A	8.93	2.46737	.066	-.174	-.101	.452**	.262**	-.007	-.199*	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The above table shows the results of descriptive statistics and correlation matrix in this study.

Multicollinearity

Table 3

Model	Coefficients							
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	4.506	1.485		3.033	.003		
	HWP_A	.355	.085	.409	4.154	.000	.770	1.299
	OWP_A	.075	.055	.140	1.358	.178	.699	1.430
	WLS_A	-.092	.032	-.275	-2.864	.005	.812	1.231
	PD_A	.119	.095	.126	1.254	.213	.736	1.359

a. Dependent Variable: WLS_A

Common method biased

Principal analysis of all items shows that there is no common method-biased first-factor analysis extracted 34.50% and second-factor analysis extracted 67.22% of the total variance. Results show that there is no severe type of common method bias because the first factor is <50 and the second factor is >50.

6. Discussion

This study shows the relationship between harmonious and obsessive work passion with work-life enrichment and its impact on life satisfaction with the moderating role of psychological detachment. The finding shows that harmonious work passion has a positive relation with work- life enrichment and its positive impact on life satisfaction. While obsessive work passion has a negative relation with work-life enrichment and its negative impact on life satisfaction. Psychological detachment in the shed of findings shows that harmonious work-passionate people detach their self from job-related thoughts which means psychological detachment moderates the relationship but obsessive work-passionate people due to constant pressure don't easily detach their self from job-related thoughts due to constant pressure which shows psychological detachment cannot moderate the relationship. We examined harmonious and obsessive work passion impact on work-life enrichment, and life satisfaction outcomes in the Pakistani context. We hypothesized that harmonious work passion would generally lead to

more positive outcomes, whereas obsessive work passion would result in more negative outcomes. We initiate appreciable support for the hypothesized relationships between harmonious work passion and work outcomes. In the main, these findings are linked with previous research that demonstrates positive attitudinal and behavioral consequences of harmonious work passion (Burke and Fiksenbaum 2009; Vallerand et al. 2003). In the current paper, there are many theoretical implications are proposed. In the previous study researcher presented a dual model of passion harmonious work passion and obsessive work passion with different outcome variables. (Chen et al., 2019; Lavigne et al., 2012). Based on COR (conservation of resource theory) we examine the effect of harmonious and obsessive work passion on work-life enrichment. Harmonious passionate people actively do their work they don't have any constant internal pressure so harmonious work passionate people also maintain balance in their work and family. We develop a positive relationship between harmonious work passion and work life enrichment.

According to COR theory when resources like time and energy constantly drain it harms work-life enrichment because people do not maintain balance in their work and life due to constant internal pressure. In a previous study, the researcher investigated work passion with the mediating role of work engagement in the hospitality field. Grobelna, 2019, Teo et al., 2020). We enhance the existing literature to check work Passion by mediation the role of work-life enrichment. Another theoretical aspect of this study is to demonstrate work passion by moderating the role of psychological detachment. Psychological detachment is abstaining or being far away from a person from work-related thoughts, especially at a time when a mortal is not performing work-related activities. So in the current study, intimate harmonious passionate people easily derive out of workplace thoughts but in contrast, obsessive passionate people do not drain themselves from workplace thoughts because they have internal constant pressure. In a previous study abusive supervision was mediated as a moderator. Finally, in the current sensation, we advance the theoretical implication by examining the effect of both work passion on life satisfaction in previous studies job performance, and job embeddedness treated as dependent variables. In the current study after empirical evidence, we give several suggestions for the managers of the organization. An organizational supportive culture and supportive supervision can change the effect of obsessive work passion. Obsessive work passion negatively impacts work-life enrichment and also negative impact on life satisfaction due to constant internal pressure. Harmonious work-passionate people abstain their self from job-related thoughts their work-life enrichment is high as compared to obsessive work-passionate people their work-life enrichment is low and harms life satisfaction as well. Due to a constant drain of resources, employees are exhausted and depressed. Managerial support flexible work environment saves the employees from low levels of enrichment and low levels of life satisfaction.

7. Limitations and future directions

In the current study, we examine the impact of harmonious and obsessive work passion in the Pakistani context. In essence, this study was limited in its scope since the time and resources available were limited in their capacity. This hampered the study from developing grounds that could allow it to compensate for multicultural interpretations and complete comprehension of the subject at hand. Therefore future researchers are requested to upgrade the scope of this study by making more efforts and allocating resources for the data collection process. One way of doing it is by extrapolating the data over multiethnic and multicultural grounds. Another way of delimitating this study would be to change the lens of the theoretical framework of the

conceptual model to come to a more diverse understanding of the reviewed phenomena. This would allow for the generalization of the phenomena under review, hence substantiating the underpinning theory of Conservation of Resource Theory (CORT, Dr. Stevan E. Hobfoll, 1989) and social Difference Theory (SDT.). In the current study, we collect data from the education sector only may lead to results generalized issues for future researcher It is an edge to expand their different sector like the industrial sector, education sector, and banking sector to minimize results generalized issues. The author take life satisfaction as a dependent variable future researcher conduct empirical studies on more organizational context for example they take job performance as a dependent variable and different context of job performance like contextual performance, counterproductive behavior, etc.

8. Limitations and future directions

Employing survey methods, this research delved into the distinct impacts of harmonious and obsessive work passion on employee life satisfaction. The study identified work-life enrichment as a fundamental mechanism, with psychological detachment serving as a boundary condition. Consequently, our research makes both theoretical and empirical contributions to this specific area of inquiry. However, it is imperative to acknowledge certain limitations within the study. Notably, the utilization of time-lagged data and the contextual focus on Pakistan may constrain the generalizability of the findings to other contexts. Nevertheless, the study offers valuable insights for future researchers, pointing towards potential directions for further exploration in this field.

References

Astakhova, M.N. and Ho, V.T. (2018), "Chameleonic obsessive job passion: demystifying the relationships between obsessive job passion and in-role and extra-role performance", *European Journal of Work and Organizational Psychology*, Vol. 27 No. 3, pp. 362-374.

Astakhova, M.N. and Porter, G. (2015), "Understanding the work passion–performance relationship: the mediating role of organizational identification and the moderating role of fit at work", *Human Relations*, Vol. 68 No. 8, pp. 1315-1346.

Burke, R.J. and Fiksenbaum, L. (2009), "Work motivations, work outcomes, and health: passion versus addiction", *Journal of Business Ethics*, Vol. 84 No. 2, pp. 257-263.

Carpentier, J., Mageau, G.A. and Vallerand, R.J. (2012), "Ruminations and flow: why do people with a more harmonious passion experience higher well-being?", *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, Vol. 13 No. 3, pp. 501-518.

Casper, W.J., Eby, L.T., Bordeaux, C., Lockwood, A. and Lambert, D. (2007), "A review of research methods in IO/OB work-family research", *Journal of Applied Psychology*, Vol. 92 No. 1, pp. 28-43.

Carbonneau, N., Vallerand, R.J., Fernet, C. and Guay, F. (2008), "The role of passion for teaching in intrapersonal and interpersonal outcomes", *Journal of Educational Psychology*, Vol. 100 No. 4, pp. 977-987.

Chen, Z. and Powell, G.N. (2012), "No pain, no gain? A resource-based model of work-to-family enrichment and conflict", *Journal of Vocational Behavior*, Vol. 81 No. 1, pp. 89-98.

- Donahue, N. M., Kroll, J. H., Pandis, S. N., & Robinson, A. L. (2012). A two-dimensional volatility basis set—Part 2: Diagnostics of organic-aerosol evolution. *Atmospheric Chemistry and Physics*, 12(2), 615-634.
- Duckworth, A.L., Peterson, C., Matthews, M.D. and Kelly, D.R. (2007), “Grit: perseverance and passion for long-term goals”, *Journal of Personality and Social Psychology*, Vol. 92 No. 6, pp. 1087-1101.
- Diener, E., Emmons, R.A., Larsen, R.J. and Griffin, S. (1985), “The satisfaction with life scale”, *Journal of Personality Assessment*, Vol. 49 No. 1, pp. 71-75.
- Diener, Edward, Lucas, R. E., & Oishi, S. (2002). Subjective well-being: The science of happiness and life satisfaction. In C. R. Synders & S. J. Lopez (Eds.), *the Oxford Handbook of Positive Psychology* (Vol. 2, pp. 63–73). Oxford University Press.
- Greenhaus, J.H. and Beutell, N.J. (1985), “Sources of conflict between work and family roles”, *Academy of Management Review*, Vol. 10 No. 1, pp. 76-88.
- Hobfoll, S.E. (1989), “Conservation of resources: a new attempt at conceptualizing stress”, *American Psychologist*, Vol. 44 No. 3, pp. 513-524. Hobfoll, S.E. (1998), *Stress, Culture and Community*, Plenum Press, New York, NY
- Halbesleben, J.R.B. (2006), “Sources of social support and burnout: a meta-analytic test of the conservation of resources model”, *Journal of Applied Psychology*, Vol. 91 No. 5, pp. 1134-1145.
- Halbesleben, J.R.B., Harvey, J. and Bolino, M.C. (2009), “Too engaged? A conservation of resources view of the relationship between work engagement and work interference with family”, *Journal of Applied Psychology*, Vol. 94 No. 6, pp. 1452-1465.
- Ho, V.T., Wong, S.S. and Lee, C.H. (2011), “A tale of passion: linking job passion and cognitive engagement to employee work performance”, *Journal of Management Studies*, Vol. 48 No. 1, pp. 26-47.
- Ratelle, C. F., Guay, F., Larose, S., & Senécal, C. (2004). Family correlates of trajectories of academic motivation during a school transition: a semi-parametric group-based approach. *Journal of Educational Psychology*, 96(4), 743.
- Ho, V.T. and Pollack, J.M. (2014), “Passion isn’t always a good thing: examining entrepreneurs’ network centrality and financial performance with a dualistic model of passion”, *Journal of Management Studies*, Vol. 51 No. 3, pp. 433-459.
- Lajom J, Amarnani R, Restubog S, et al. (2018) Dualistic passion for work and its impact on career outcomes: Scale validation and nomological network. *Journal of Career Assessment* 26(4): 631–648.
- Lavigne, G.L., Forest, J. and Crevier-Braud, L. (2012), “Passion at work and burnout: A two-study test of the mediating role of flow experiences”, *European Journal of Work and Organizational Psychology*, Vol. 21 No. 4, pp. 518-546.

Morin, E.M., & Dassa, C. (2006). Giving meaning to work and promoting occupational health. Manuscript in revision for the Canadian Journal of Behavioural Science, HÉC Montréal, Montréal, Canada.

Sonnentag S, and Fritz C. (2007). "The Recovery Experience Questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work". *Journal of Occupational Health Psychology*, Vol. 12, pp. 204–221.

Philippe, F.L., Vallerand, R.J. and Lavigne, G.L. (2009), "Passion does make a difference in people's lives: a look at well-being in passionate and non-passionate individuals", *Applied Psychology: Health and Well-Being*, Vol. 1 No. 1, pp. 3-22.

Premeaux, S.F., Adkins, C.L. and Mossholder, K.W. (2007), "Balancing work and family: a field study of multi-dimensional, multi-role work-family conflict", *Journal of Organizational Behavior*, Vol. 28 No. 6, pp. 705-727.

Rothbard, N.P. (2001), "Enriching or depleting? The dynamics of engagement in work and family roles", *Administrative Science Quarterly*, Vol. 46 No. 4, pp. 655-684.

Sonntag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, 12(3), 204.

Sonnentag, S., Binnewies, C. and Mojza, E. (2010), "Staying well and engaged when demands are high: the role of psychological detachment", *Journal of Applied Psychology*, Vol. 95 No. 5, pp. 965-976.

Singh, P., Burke, R.J. and Boekhorst, J. (2016), "Recovery after work experiences, employee well-being and intent to quit", *Personnel Review*, Vol. 45 No. 2, pp. 232-254.

Vallerand, R.J., Paquet, Y., Philippe, F.L. and Charest, J. (2010), "On the role of passion for work in burnout: a process model", *Journal of Personality*, Vol. 78 No. 1, pp. 289-312.

Vallerand, R.J., Salvy, S.J., Mageau, G.A., Elliot, A.J., Denis, P.L., Grouzet, F.M. and Blanchard, C. (2007), "On the role of passion in performance", *Journal of Personality*, Vol. 75 No. 3, pp. 505-534

Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., ... & Voydanoff, P. (2004), "The effects of work demands and resources on work-to-family conflict and facilitation", *Journal of Marriage and Family*, Vol. 66 No. 2, pp. 398-412.

Marsolais, J. (2003). Les passions de l'ame: on obsessive and harmonious passion. *Journal of personality and social psychology*, 85(4), 756.

Vallerand, R. J., & Houliort, N. (2003). Passion at work: Toward a new conceptualization. In D. Skarlicki, S. Gilliland, & D. Steiner (Eds.), *Social issues in management* (Vol. 3, pp. 175–204). Greenwich, CT: Information Age Publishing

Wrzesniewski, A. (2003) Finding Positive Meaning in Work. In: Cameron, K.S., Dutton, J.E. and Quinn, R.E., Eds., Positive Organizational Scholarship: Foundations of a New Discipline, Berrett-Koehler Publishers, San Francisco, 296-308.

www.forbes.com/sites/amyanderson/2013/03/27/does-being-passionate-about-the-work-you-do-increase-your-chance-of-success/#4cd7592d4dac (accessed May 25, 2016).

Wrzesniewski, A., McCauley, C., Rozin, P., & Schwartz, B. (1997). Jobs, careers, and callings: People's relations to their work

The study on the service quality and relation to customer satisfaction on logistic services in Sabah

Nur Faizilah Rizal^a, Sidah Idris^{b*}

^aFaculty of Business, Economics & Accountancy, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah
nurfaizilah@gmail.com

^bFaculty of Business, Economics & Accountancy, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah
syaidah@ums.edu.my

*Corresponding Author: syaidah@ums.edu.my

Abstract

The competition among logistic companies has significantly increased, which has led these companies to strive to understand more about their customers' needs and to maintain the customers' satisfaction with the services that they offer, as online shopping has expanded dramatically during the COVID-19 endemic. This purchasing behaviour factor has also been driven by customers that are gaining the access to make a purchase decision only by using their gadgets at anytime and anywhere. This study aims to identify the relationship between online purchases to be related in the discussion of delivery, especially in the aspects of performance and service quality among logistic users. This study will employ literature analysis from previous research and find the gaps specifically in this area of concern. In total, 45 journal articles were involved in this analyses which came from various journals. The findings from this systematic literature research will be used for further research on this topic by extend it to an empirical study by using the quantitative method to analysis the findings from the perspective of the scope of this study. The significance of this study is expected to contribute to extend the current study in this area and will contribute to the managerial aspect of the logistic industry.

Keywords: Post-Covid 19, customer satisfaction, service quality, logistic industry, behaviour

INTRODUCTION

The studies of logistics service quality have significantly become a relevant topic in the extant literature when it comes to the discussion related to online purchases and deliveries by service providers. In an article written by Maryam Mohsin (2022), it was stated that online purchasing has grown tremendously over the years and it doesn't appear that this trend will slow down in the future. In order to maintain the customer satisfaction, a study by Mohd and Alam (2010) identified that delivery performances is one of the huge influencing factors that highly affects customers' satisfactions in an online purchase. Therefore, this has shown the relevant relationship of online purchases to be related in the discussion of delivery especially in the aspects of performances and service quality.

Service quality is known as the instrument that introduced by service providers to measure the value on how the organization understands the customers' needs and fulfil expectations that perceived by the customers (QuestionPro, 2023). Thus, the value perceived or widely known as customers' satisfaction can be measured among the customers that subscribe to these service provides' products especially goods delivery from their online purchases. Significantly, online purchasing behaviour has been increasing since the booming introduction of Internet across the globe. The quick technology development and adoption of the Internet has contributed to the evolution of online purchasing or the e-commerce platforms. This purchasing behaviour factor has also been driven by customers that are gaining the access to make a purchase decision only by using their gadgets at anytime and anywhere. Nevertheless, this logistic service quality topics are tightly correlated to the expand of e-commerce businesses among users where logistics industries mainly service providers play an important role in order to delivery customers online purchases.

According to the study conducted by Ozturk (2020), customers' purchasing habits and quantities changed during the COVID-19 endemic. Due to the existing of e-commerce platforms and other business opportunities, the competition of logistic companies has significantly increase which made these companies to strive in understanding more on their customers' needs and to maintain the customers' satisfaction on the services that they offered as online shopping has expanded dramatically during the COVID-19 endemic. Hence, service industries all around the world are being required to take proactive action to restore work and production in a timely and orderly way critically focused during the COVID-19 hits which has affected lots of businesses industries (Gursoy & Chi, 2020). Nonetheless, in serving customers through these online platforms of e-commerce, it is important for companies to bear in mind that delivering their goods effectively by choosing efficient service providers in order to meet the customers' satisfaction.

METHODOLOGY

In this paper, the systematic review of literature method will be adapted to help the researcher in defining gaps that are available to be discussed in this topic of studies.

Search Strategy

For this systematic research, search strategy is developed in order to identify the relevant literature where it was tailored to one main database to be used which is SCOPUS. The search terms used were "Service Quality", "Customer Satisfaction", and "Logistics Service Quality". All searches covered the period from database creation to the year 2023, and included journal articles, review papers, and research reports which published in English language only.

Selection Criteria

The selection criteria that were used in this paper were adapted based from the PRISMA Statement (Moher et al., 2009). The search in this systematic literature review is mainly focused on the mapping existing literatures that are related to the discussion of service quality and customers satisfaction in the logistics industry. Then, the search were narrowed down accordingly to the related subject and field of discussion as Social Science, Behaviours, Psychology, Business and Economics.

Quality Assessment

The study relies solely on original research publications, review papers, and conference papers. All duplications were extensively examined in order to preserve the review's quality. The abstracts of the papers were thoroughly verified for analysis and purification to verify the quality and relevance of academic material included in the review process. Later, each research report was carefully evaluated. The following exclusion criterion was to limit the papers to those published in English exclusively. After reviewing each article against the previously mentioned inclusion and exclusion criteria, 45 papers were chosen.

Data Extraction

In this data extraction stage, 45 articles were selected and the characteristics extracted were:

1. Article must be original paper, review paper and conference paper.
2. The article must be in English language.
3. The article is related to the field of social science, behaviours, psychology, business and economics, and logistics.
4. Extracted articles chosen were published from 2020 to 2023.

RESULTS

Table 1: Documents and papers published on SCOPUS related to the study from 2020 – 2023 (post-COVID era).

Year	Documents	Filtered (Logistics related)
2020	405	155
2021	360	170
2022	382	159
2023	380	152
TOTAL	1874	636

Throughout the collection on the related papers in this systematic review, the total of 1874 documents are available in the discussion related to the area of studies in SCOPUS database at the early search. This result is then filtered down to the related discussion of logistics area in measuring the service quality and customer satisfaction in this scope. From the filtered result obtain, the published papers showed fluctuation amount of publications from the year 2020 to 2023 where the total recorded of publication in this scope is 636 papers.

This search is then narrowed down to pick the relevant discussions to be reviewed in this paper where only 45 of the articles are chosen related to the keywords of “service quality”, “customer satisfaction” and “logistics”.

DISCUSSION

Dependant Variable: Customer Satisfaction

According to Sin et al. (2022), customer satisfaction is a measure of how pleased customers feel with the products or services provided by a company. In a nutshell, customer satisfaction happens when the perceived performance of products or services fulfils customer expectations. Customers who are satisfied with the service quality that they received are more likely to recommend and talk about their experiences to their friends and relatives. On the other side, those dissatisfied customers can decide to switch brands and give the company a poor review. All customer input is very valuable since it may assist a company increase the efficacy and efficiency of operational tasks like decision-making.

Independent Variable: Service Quality

In the study made by Oh et al. (2022), it is mentioned that the logistics delivery service quality positively influence the level of customers loyalty on the business where service quality has a significant impact influence on customers' ability in maintaining a strong and loyal relationships with a business especially when it comes to service providers.

The Relationship between Customers Satisfaction and Service Quality

In a research conducted by Sin et al. (2022), it was stated that customer satisfaction and service quality does have a favourable relationship with each other. Customer satisfaction is expected to result from high service quality which resulted when customers are happy with the service offered. According to Loo and Mohd Arsah (2022), the five dimension of service quality has a significant has a positive relationships towards the customers satisfaction which indicates that a high service quality received by customers would enhance a positive result on the customer satisfaction.

CONCLUSION

In conclusion, the systematic study of service quality and customer satisfaction in logistics offers a full comprehension of the delicate connection that exists between these two significant variables within the logistics industry. The combination of numerous research gives significant insights into the present status of service quality and its direct influence on customer satisfaction. Hence, the result obtained in this study is available to be adapted into future quantitative research that is able to be measure specifically in Sabah in order to understand the logistics users and drivers of the logistics industry.

REFERENCES

- Gursoy, D., Chi, C.G., (2020). Effects of COVID-19 pandemic on hospitality industry: review of the current situations and a research agenda. *J. Hosp. Mark. Manag.* 29 (5), 527–529.
- Loo, K., & Mohd Arsah, N. (2022). Survey on Customer Satisfaction Towards Courier Services in Johor. *Enhanced Knowledge in Sciences and Technology* , 2(2), 186–196. doi:<https://doi.org/10.30880/ekst.2022.02.02.020>

- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), Article e1000097. <https://doi.org/10.1371/journal.pmed.1000097>
- Mohsin, M. (2023). 10 online shopping statistics you need to know in 2023 [infographic]. Retrieved from <https://www.oberlo.com/blog/online-shopping-statistics>
- Oh, K.-Y., Kang, S.-Y., & Oh, Y.-G. (2022). The moderating effects of eco-friendliness between logistics service quality and customer satisfaction in cross-border e-commerce: Evidence from overseas direct purchasers in Korea. *Sustainability*, 14(22), 15084. <https://doi.org/10.3390/su142215084>
- Ozturk, R., (2020). Health or death? The online purchase intentions of consumers during the COVID-19 pandemic. *Transnational Marketing Journal* 8 (2), 219–241.
- QuestionPro. (2023). Retrieved from <https://www.questionpro.com/blog/service-quality/#:~:text=What%20is%20Service%20Quality%3F,quality%20is%20a%20valuable%20art.>
- Sin, L. G., Leong, J. W., Lee, S. J., & Lee, Z. Q. (2022). Factors affecting customer satisfaction at J&T Express in Malaysia. *International Journal of Tourism & Hospitality in Asia Pasific*, 5(3), 38–49. doi:10.32535/ijthap.v5i3.1878

The Technological Context and Organizational Context Cross-Border E-Commerce Small and Medium-Sized Enterprises' Performance in Hebei

Zhang Jingjing

Sidah Idris

Faculty of Business, Economics and Accountancy

University Malaysia Sabah

zhangjingjingxt@gmail.com,syaidah@ums.edu.my

Abstract

The scale of cross-border e-commerce (CBEC) transactions in China has been developing rapidly. In 2011, the total scale of cross-border e-commerce transactions in China was 1.8 trillion yuan, growing to 12.5 trillion yuan in 2020, with the average annual year-on-year growth rate close to maintaining a high level. However, overall, the growth rate is decreasing. The support from the government and national policies has promoted the rapid development of cross-border e-commerce in China. The aim of this study is to investigate the demand for information technology in international trade as it has spawned the development of cross-border e-commerce. The study will focus on the technological, and organizational contexts and their effects on SMEs' performance in Hebei Province. It is the embodiment of a new economic form, paving the way for a new path of development by combining the Internet with traditional industries. This study will explore the influencing factors of cross-border e-commerce SMEs' performance in Hebei Province. The study adopts a systematic literature analysis on cross-border e-commerce SMEs in China, which is still limited. This study plays a significant role in

industry innovations that have been emerging by focusing on new industries, new models, and new engines for foreign trade.

Keywords: CBEC, SMEs Performance, Hebei Province

Introduction

With the development of economic globalization, trade between countries worldwide has become increasingly frequent, and cross-border e-commerce has become the theme of the times. Consumers can easily enjoy quality products worldwide without leaving home (Zhu, 2020). China, as the world's second-largest economy and a representative of emerging countries, has been deeply integrated into the process of economic globalization during the 40 years of reform and opening up. China has changed from a participant and beneficiary of economic globalization to a reformer and leader of a new type of economic globalization.

There are several reasons for choosing Hebei province as an example. Firstly, it has a policy advantage due to being a part of the Beijing-Tianjin-Hebei metropolitan economic circle, which is a primary national strategy emphasized by The President on February 26, 2014. Secondly, Hebei has well-developed and historically significant traditional characteristic industries. Thirdly, its position advantage is provided by the numerous ports in the province and surrounding areas, making cross-border e-commerce export convenient for Hebei.

Studies have shown that SMEs tend to lag behind larger companies in using e-commerce, but are generally more receptive to new technologies, such as e-commerce (Al-Qirim, 2007; Hadi Putra & Santoso, 2020). This prompts the question of what influences SME behavior in this area. The purpose of this study is to investigate the relationships between contextual factors on firm performance. The study attempts to create a model for enhancing the performance of SMEs using e-commerce.

Literature Review

In this section, we examine relevant research that forms the basis of this study. This includes factors that impact the performance of SMEs. For this study, we utilized the Scopus database and entered the keywords "cross-border e-commerce factors" and "SMEs performance". The search yielded 81 results, out of which 39 articles were eliminated as they were non-quantitative research, after reviewing their titles and abstracts. Finally, we included 42 papers in our study.

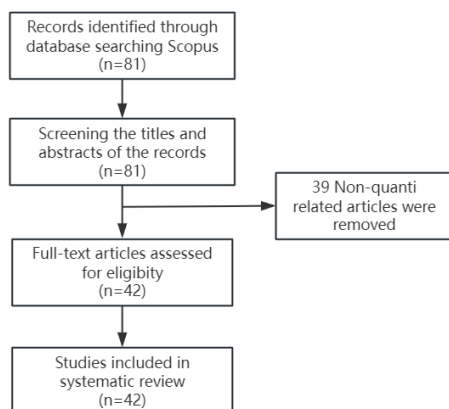


Figure 1. Flow Diagram

Methodology

Systematic review is a research approach that involves identifying and critically assessing relevant research, collecting and analyzing data to answer a specific research question or hypothesis (Liberati et al., 2009). In this study, the systematic review method has been used to review articles and all available evidence related to the influencing factors of cross-border e-commerce SMEs performance to minimize bias and obtain reliable findings and conclusions.

Discussion

We find that technological factor plays a very important role in e-commerce enterprises, and organizational factors should not be ignored. Combining the previous studies and the actual situation in China we will use technological capability, top management support and firm size as the antecedents to explore the cross-border e-commerce SMEs in Hebei province. It is hoped that it can provide some ideas for the research of cross-border e-commerce enterprise performance in China and supplement the research in developing countries.

Conclusion

This study explored the influencing factors of cross-border e-commerce SMEs' performance in Hebei Province. It provides a theoretical foundation for future empirical analysis and addresses a gap in research on cross-border e-commerce SMEs in the region. This research offered insights for analyzing the performance of SMEs in Hebei Province. This study explored the influencing factors of cross-border e-commerce SMEs' performance in Hebei Province and played a significant role in industry innovations that have been emerging by focusing on new industries, new models, and new engines for foreign trade.

References

- Al-Qirim, N. (2007). A research trilogy into e-commerce adoption in small businesses in New Zealand. *Electronic Markets*, 17(4), 263-285.
- Hadi Putra, P. O., & Santoso, H. B. (2020). Contextual factors and performance impact of e-business use in Indonesian small and medium enterprises (SMEs). *Heliyon*, 6(3), e03568. <https://doi.org/10.1016/j.heliyon.2020.e03568>

- Hamad, H., Elbeltagi, I., & El-Gohary, H. (2018). An empirical investigation of business-to-business e-commerce adoption and its impact on SMEs competitive advantage: The case of Egyptian manufacturing SMEs. *Strategic Change*, 27(3), 209-229.
- Hussain, A., Akbar, M., Shahzad, A., Poulouva, P., Akbar, A., & Hassan, R. (2022). E-Commerce and SME Performance: The Moderating Influence of Entrepreneurial Competencies. *Administrative Sciences*, 12(1), 13. <https://doi.org/10.3390/admsci12010013>
- Hussain, A., Shahzad, A., & Hassan, R. (2020). Organizational and Environmental Factors with the Mediating Role of E-Commerce and SME Performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 196. <https://doi.org/10.3390/joitmc6040196>
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., ... & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Annals of internal medicine*, 151(4), W-65.
- Zhu, K., & Kraemer, K. L. (2005). Post-Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry. *Information Systems Research*, 16(1), 61–84. <https://doi.org/10.1287/isre.1050.0045>
- Zhu, K., Kraemer, K. L., & Dedrick, J. (2004). Information Technology Payoff in E-Business Environments: An International Perspective on Value Creation of E-Business in the Financial Services Industry. *Journal of Management Information Systems*, 21(1), 17–54. <https://doi.org/10.1080/07421222.2004.11045797>
- Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: A cross-country assessment of the facilitators and inhibitors. *European Journal of Information Systems*, 12(4), 251–268. <https://doi.org/10.1057/palgrave.ejis.3000475>

The impact of real effective exchange rate, gold prices and oil prices on stock market

Siow Xiu Yun and Wong Hock Tsen
Universiti Malaysia Sabah
Email: xiu_yun_siow_mb22@iluv.ums.edu.my

Abstract

This study estimates the asymmetric impact of the real effective exchange rate, gold prices, and oil prices on the stock market of selected Four Asian Tigers, namely Hong Kong and Taiwan, using monthly data from January 2005 to August 2023. The analysis employs autoregressive distributed lag and non-linear autoregressive distributed lag models. Our study on the stock markets of Hong Kong and Taiwan reveals distinct, asymmetric effects of the real effective exchange rate, gold prices, and oil prices. In Hong Kong, a positive REER change positively impacts the market in the long run, while gold and oil prices demonstrate complex, asymmetric effects. Taiwan displays different patterns, with substantial impacts from REER changes. Short-term dynamics reveal gradual adjustments in Hong Kong and diverse influences in Taiwan, highlighting the significance of control variables like the China stock market and Money Supply. This study provides valuable insights for investors and researchers.

Keywords: *real effective exchange rate, gold prices, oil prices, asymmetric, ARDL, NARDL*

JEL Codes: *F31, E44, G15, G10*

1.0 Introduction

To make good investment choices, investors need to understand how the stock market moves because it can change quickly. Exchange rates, gold prices, and oil prices, whether on a domestic or international scale, can influence the stock market.

According to Corporate Finance Institute (2015), Hong Kong and Taiwan, part of the Four Asian Tigers, have consistently maintained robust economic growth since the 1960s, propelled by exports and rapid industrialization. Both economies are export-oriented and highly dependent on international trade. Taiwan's export-oriented economy, as emphasized by Atradius (2020), is deeply integrated into global supply chains, with mainland China (including Hong Kong) constituting approximately 40% of Taiwanese exports and 20% of imports. Trading Economics (2023) notes that Hong Kong, with a 99% reliance on re-exports Movements in the real effective exchange rate, gold prices, and oil prices may impact the demand and pricing of these key export categories.

Changes in the real exchange rate can lead to either an increase or a decrease in real stock prices (Wong, 2022). Fluctuations in oil prices can exert a direct influence on the stock market due to their impact on future cash flows. When oil prices experience depreciation, it can lead to increased costs for companies reliant on oil-related inputs, such as energy or transportation. These rising costs can erode profit margins, reducing the expected future cash flows of affected firms. As a result, investors may become more cautious about the profitability and growth prospects of these companies, potentially leading to a decrease in their stock prices. Conversely, when oil prices appreciate, it can reduce input costs for businesses and contribute to enhanced profitability, which may result in increased stock prices. Thus, the fluctuations in oil prices can directly shape the stock market's performance (Salisu & Oloko, 2015). Investors often respond to fluctuations in gold prices because they view gold as a viable alternative to stocks. Gold is more accessible and can serve as a hedge against inflation. When gold prices experience significant changes, they tend to exert a substantial influence on the stock market (Gokmenoglu and Fazlollahi, 2015).

The goal of this research is to determine the asymmetric effects of real effective exchange rates, gold prices, and oil prices on the stock markets in Hong Kong and Taiwan during the period from January 2005 to August 2023. The study employs the linear autoregressive distributed lag (ARDL) approach (Pesaran et al., 2001) and the nonlinear autoregressive distributed lag (NARDL) approach (Shin et al., 2014) to account for potential asymmetry in the impact of real effective exchange rates, gold prices, and oil prices on the stock market.

2.0 Literature review

This review examines the impact of real exchange rates, gold prices, and oil prices on the stock market, with a focus on key studies. Wong (2022) used ARDL and NARDL approaches across nine countries and found no asymmetry in Malaysia, the Philippines, and Germany. Japan and Hong Kong showed both short- and long-run asymmetry. Yau and Nieh (2009) studied the NTD/USD exchange rate and stock prices in Taiwan and Japan, revealing long-term equilibrium and causal relationships using a TECM model. Bahmani-Oskooee and Saha (2016) focused on diverse economies, highlighting asymmetric effects of exchange rate changes on stock prices using a nonlinear approach.

Aloui et al. (2012) explored the impact of oil price risk on stock returns in 25 emerging market countries include Taiwan from September 1997 to November 2007, using an international multifactor model. Their findings revealed that oil price risk significantly influences stock pricing in emerging markets. Notably, they observed asymmetric sensitivity in stock returns during rising oil markets, especially in markets positively correlated with oil price movements. Jiang and Liu (2021) employed a nonlinear Autoregressive Distributed Lag (NARDL) model to investigate the period from January 2007 to March 2020. Focusing on stock prices in China, Hong Kong, the United States, Japan, Britain, and Germany, the study revealed asymmetric effects of positive and negative changes in fluctuating oil prices on stock prices. Particularly, this asymmetry was observed in the long run for China, Hong Kong, the United States, and the United Kingdom.

Gold is regarded as a safe haven asset in times of unstable financial and economic conditions (Choudhry et al., 2015). According to Reboredo (2013), researchers have become more interested in studying the connections between gold and oil due to their recent movements happening together. This is important because the way their prices change can have significant effects on an economy and financial markets, especially in times of inflation. Zhu et al. (2022) found that money supply has an impact on the stock market.

Many studies focus on nominal values Exchange rates (Bahmani-Oskooee & Saha, 2016; Yau & Nieh, 2009), gold price (Zhu et al., 2022), oil prices (Aloui et al., 2012; Jiang & Liu, 2021) on stock market but limited research examines the impact of real exchange rates, real stock indices, real oil prices, and real gold prices on actual stock indices. However, a notable gap exists in the literature concerning the examination of the impact of real exchange rates, real stock indices, real oil prices, and real gold prices on actual stock indices. This gap underscores the need for a more nuanced exploration of the relationship between these real variables and the stock market. In addressing this gap, this paper adopts the ARDL approach (Pesaran et al., 2001) and the NARDL approach (Shin et al., 2014), aiming to provide valuable insights into the asymmetric impact of real effective exchange rates, gold prices, and oil prices on the stock market.

3.0 Data and Methodology

3.1. Data

This study investigates the influence of the real effective exchange rate (REER), gold prices (GOLD), and oil prices (OIL) on the stock markets of Hong Kong and Taiwan, utilizing both linear and nonlinear Autoregressive Distributed Lag (ARDL) models. The model selection method is based on the Akaike Information Criterion (AIC). The study spans from January 2005 to August 2023, with the dependent variable being the stock market performance in Hong Kong and Taiwan, and REER, GOLD, and OIL serving as independent variables. Control variables, including China's stock market performance (CSM) and money supply (M2), as well as a dummy variable (DUMMY) used to capture the influence of the COVID-19 pandemic on the stock markets of Hong Kong and Taiwan, are incorporated to account for potential confounding factors, specified between December 2019 and April 2023. Rigorous Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) unit root tests are conducted before model estimation to ascertain variable stationarity and ensure an order of integration not exceeding one.

3.2 Methodology

3.2.1 Linear Autoregressive Distributed Lag (ARDL)

This study applied the ARDL to test the long-run and short-run impact. The study employed the ARDL model by Pesaran et al. (2001).

The long-run ARDL is as follow :

$$\log SM_t = \beta_{1i} \log SM_t + \beta_{2i} \log REER_t + \beta_{3i} \log GOLD_t + \beta_{4i} \log OIL_t + \beta_{5i} \log CSM_t + \beta_{6i} \log M2_t + \beta_{7i} DUMMY_t + \varepsilon_t$$

In this equation, The coefficients $\beta_{1i}, \beta_{2i} \dots \beta_{7i}$ represent the effects of logarithms of Variable. The term ε_t captures unobserved factors influencing the change in the real stock market. This approach accounts for any structural changes or shocks in the economy during this period.

The F-test will be used to either accept or reject the hypothesis. The null hypothesis states that there is no long-term relationship between the variables, suggesting that all coefficients are zero. To evaluate cointegration, we investigate the collective significance of lagged variable values by comparing the estimated F-value with upper and lower critical values.

The short-run ARDL is as follow :

$$\Delta \log SM_t = \sum_{i=1}^q \beta_{1i} \Delta \log SM_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta REER_{t-i} + \sum_{i=0}^q \beta_{3i} \Delta GOLD_{t-i} + \sum_{i=0}^q \beta_{4i} \Delta OIL_{t-i} + \sum_{i=0}^q \beta_{5i} \Delta \log CSM_{t-i} + \sum_{i=0}^q \beta_{6i} \Delta \log RM2_{t-i} + \beta_{7i} DUMMY_t + \beta_{8i} ECT_{t-1} + \mathcal{U}_t$$

The coefficients $\sum_{i=0}^q \beta_{1i}, \beta_{2i}, \beta_{3i} \dots \beta_{7i}$ indicate the short-term effects of these lagged variables on the change in the real stock market. \mathcal{U}_t represents the error term. ECT_{t-1} represents the error correction term from the previous period, capturing the adjustment process towards the long-term equilibrium impact among the variables.

3.2.2 Non-Linear Autoregressive Distributed Lag (NARDL)

The NARDL model is employed to examine asymmetric impacts, as suggested by Shin et al. (2014). This implies that positive shocks are expected to produce dissimilar effects in comparison to negative shocks.

The long-run NARDL equation is as follow :

$$\log SM_t = \beta_{1i} \log SM_t + \beta_{2i} \log REER_{t-i}^+ + \beta_{3i} \log REER_{t-i}^- + \beta_{4i} \log GOLD_{t-i}^+ + \beta_{5i} \log GOLD_{t-i}^- + \beta_{6i} \log OIL_{t-i}^+ + \beta_{7i} \log OIL_{t-i}^- + \beta_{8i} \log CSM_{t-i} + \beta_{9i} \log RM2_{t-i} + \beta_{10i} DUMMY_t + \varepsilon_t$$

In this equation, The model notably addresses asymmetric effects by taking into account both positive (+) and negative (-) changes in the specified macroeconomic variables.

To examine long-run asymmetry, we employed the Wald test on the coefficients under the null hypothesis $H_0 : \beta_2^+ = \beta_3^-$. If the null hypothesis is rejected $H_A : \beta_2^+ \neq \beta_3^-$, It indicates the existence of long-run asymmetry. An asymmetric effect in the long run is evident when the coefficients of E_{t+} and E_{t-} differ. This can be assessed through the Wald statistic.

The short-run NARDL equation is as follow :

$$\Delta \log SM_t = \sum_{i=1}^q \beta_{1i} \Delta \log SM_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta REER_{t-i}^+ + \sum_{i=0}^q \beta_{3i} \Delta REER_{t-i}^- + \sum_{i=0}^q \beta_{4i} \Delta GOLD_{t-i}^+ + \sum_{i=0}^q \beta_{5i} \Delta GOLD_{t-i}^- + \sum_{i=0}^q \beta_{6i} \Delta OIL_{t-i}^+ + \sum_{i=0}^q \beta_{7i} \Delta OIL_{t-i}^- + \sum_{i=0}^q \beta_{8i} \Delta \log CSM_{t-i} + \sum_{i=0}^q \beta_{9i} \Delta \log M2_{t-i} + \beta_{10i} DUMMY_t + \beta_{11i} ECT_{t-1} + \mathcal{U}_t$$

In this equation, the coefficients $\sum_{i=0}^q \beta_{1i}, \beta_{2i}, \beta_{3i} \dots \beta_{10i}$ capture the effects of these variables on short-term fluctuations in the stock market. Within the NARDL framework, short-run and long-run non-linearities are formulated as positive and negative partial sum decompositions of the distributed lag variables. The partial sum of positive and negative changes is presented as $POS_t = \sum_{i=1}^q \Delta ER_i^+ = \max(\Delta ER_i, 0)$ and $NEG_t = \sum_{i=1}^q \Delta ER_i^- = \min(\Delta ER_i, 0)$. To test short-run asymmetry, the Wald test can be applied to the coefficients with the null hypothesis $H_0: \sum_{i=0}^q \beta_{t-i}^+ = \sum_{i=0}^q \beta_{t-i}^-$. If the null hypothesis is rejected $H_A: \sum_{i=0}^q \beta_{t-i}^+ \neq \sum_{i=0}^q \beta_{t-i}^-$, it suggests the presence of significant short-run asymmetry.

3.0 Result

The outcomes of the Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) unit root tests, although not providing specific unit root test statistics, reveal that all variables were initially non-stationary in their levels but exhibited stationarity when considered in their first differences. This indicates that both the ARDL and NARDL methodologies are appropriate for our estimation.

Table 1 : Non-Linear Autoregressive Distributed Lag (NARDL)

	Region	
	Hong Kong	Taiwan
Panel A: ARDL long-run		
logREER(-1)	0.9711(0.0009)*	-0.0087(0.9919)
logGOLD(-1)	0.2664(0.3733)	-0.1881(0.1823)
logOIL(-1)	-0.1159(0.6016)	0.0049(0.9617)
Panel A: ARDL short run		
D(REER)	-1.0521(0.0006)*	4.1051(0.0196)**
D(GOLD)	0.1774(0.0266)**	0.1364(0.0822)***
D(GOLD(-1))	-0.1301(0.1016)	-
D(OIL)	0.1570(0.0000)*	0.2330(0.0000)*
logCSM	-0.0144(0.0466)**	-0.0119(0.0884)***
logM2	-0.0522(0.0005)*	0.1582(0.0000)*
DUMMY	-0.0121(0.0189)**	0.0103(0.0608)***
ECT(-1)	-0.0712(0.0002)*	-0.1566(0.0000)*
Diagnostic tests		
F-statistic	3.5547***	8.4524*
LM	0.1400(0.8695)	0.7100(0.2929)
HETERO	2.0288(0.0112)**	2.4870(0.0078)*
RESET	1.1614(0.2468)	0.5892(0.5564)
CUSUM	STABLE	STABLE

Notes: Values in brackets represent p-values, while those in parentheses denote t-statistics or F-statistics. Significance levels: * (1%), ** (5%), *** (10%). F-statistic from Pesaran et al. (2001) bounds testing for cointegration, with critical values from the same source. ECT(-1) represents the error correction term. LM is the Lagrange multiplier test for disturbance serial correlation. 'Hetero' is the heteroscedasticity test using the White test. Reset indicates the functional form test, and CUSUM and CUSUM.S are employed for cumulative sum and cumulative sum of squares test

In the Hong Kong ARDL long-run analysis, the real effective exchange rate (REER) from the previous period significantly and positively influences the stock market (SM), as indicated by the substantial coefficient of 0.9711 with a low p-value of 0.0009. However, gold prices (DOLD) and oil prices (OIL) from the previous period show non-significant relationships with the stock market, as reflected in their coefficients of 0.2664 (p-value: 0.3733) and -0.1159 (p-value: 0.6016), respectively. Conversely, in the Taiwan ARDL long-run analysis, none of the variables—REER, gold prices (DOLD), and oil prices (OIL)—exhibit statistically significant effects on the stock market. The coefficients for REER (-0.0087), gold prices (-0.1881), and oil prices (0.0049) are accompanied by p-values of 0.9919, 0.1823, and 0.9617, respectively, indicating no substantial long-run relationships between these variables and the stock market in Taiwan.

In the short-run analysis for Hong Kong, fluctuations in the real effective exchange rate (D(REER)) exhibit a significant negative impact on the stock market (SM), indicating that immediate changes in REER lead to a corresponding decrease in the stock market. Gold prices (D(GOLD)) positively influence the stock market, but the lagged effect (D(GOLD(-1))) shows a non-significant negative influence. Conversely, oil prices (D(OIL)) have a strongly positive and statistically significant impact on the stock market. Control variables such as changes in the China stock market (CSM) and money supply (M2) both negatively affect the Hong Kong stock market in the short run, while the dummy variable capturing the COVID period (DUMMY) and the lagged error correction term (ECT(-1)) have negative impacts. In Taiwan, short-term fluctuations in the real effective exchange rate (D(REER)) positively impact the stock market, along with a strong positive effect from oil prices (D(OIL)), while money supply (M2) and the lagged error correction term (ECT(-1)) also positively influence the stock market. The dummy variable capturing the COVID period (DUMMY) shows a positive but statistically insignificant impact.

Table 2 : Non-Linear Autoregressive Distributed Lag (NARDL)

	Region	
	Hong Kong	Taiwan
Panel A: NARDL long-run		
logREER ⁺	2.3769(0.0203)**	-52.8205(0.0007)*
logREER ⁻	-2.6086(0.0208)**	`10.5642(0.1112)
logRGOLD ⁺	-0.3308(0.0665)***	1.2796(0.0052)*
logRGOLD ⁻	0.7548(0.0051)*	-0.6009(0.0430)**
logROIL ⁺	-0.2055(0.0218)**	-0.0954(0.5098)

logROIL ⁻	0.2388(0.0079)*	-0.3462(0.0408)**
Panel A: NARDL short run		
D(logSM(-1))	-0.1067(0.0848)***	-0.1472(0.0000)*
D(REER_POS)	-1.7562(0.0007)*	-1.6561(0.6120)
D(REER_NEG)	-0.5751(0.2258)	6.4487(0.0402)**
D(REER_POS(-1))	-	1.6811(0.6100)
D(REER_NEG(-1))	-	5.0372(0.0924)***
D(GOLD_POS)	-0.0250(0.8464)	0.2814(0.0320)**
D(GOLD_NEG)	0.4308(0.0035)*	0.1007(0.4984)
D(GOLD_POS(-1))	-	-0.2402(0.0680)***
D(GOLD_NEG(-1))	-	0.1007(0.0146)
D(OIL_POS)	0.1941(0.0049)*	0.1028(0.1554)
D(OIL_NEG)	0.1569(0.0016)*	0.2561(0.0000)*
D(OIL_POS(-1))	-	-0.1142(0.1135)
D(OIL_NEG(-1))	-	0.1027(0.0552)***
logCSM	-0.0354(0.0000)*	-0.0710(0.0000)*
logM2	0.4523(0.0000)*	0.1606(0.0000)*
DUMMY	0.0069(0.1560)	0.0139(0.0064)*
ECT(-1)	-0.2517(0.0000)*	-0.1472(0.0000)*
Diagnostic tests		
F-statistic	8.3885*	10.3218*
F-statistic LR	7.0576(0.0085)*	-4.3207(0.0000)*
F-statistic SR	11.9119(0.0000)*	-2.8731(0.0062)*
LM	0.1400(0.8695)	1.1450(0.3203)
HETERO	2.0288(0.0112)**	2.6850(0.0001)*
RESET	1.1614(0.2468)	0.8501(0.3963)
CUSUM	STABLE	STABLE
CUSUM.S	UNSTABLE	STABLE

Notes: '+' and '-' stand for Positive and Negative, respectively. F-statistic LR reflects the long-run asymmetric effect, while F-statistic SR signifies the short-run asymmetric effect.

In the long-run analysis of Hong Kong and Taiwan stock markets using the Nonlinear Autoregressive Distributed Lag (NARDL) model, the study reveals distinct asymmetric impacts of real effective exchange rate (REER), gold prices (DOLD), and oil prices (OIL) on stock market dynamics. In Hong Kong, a positive change in REER is associated with a significant positive impact on the stock market, while a negative change has a significant negative effect. Gold prices exhibit asymmetric effects, with a positive change having a marginally significant negative impact and a negative change showing a more pronounced and statistically significant positive impact. Similarly, oil prices in Hong Kong demonstrate asymmetric effects with significant negative impacts following positive changes and significant positive impacts following negative changes. In Taiwan, the results differ, as a positive change in REER has a substantial negative impact, while the impact of a negative change is not statistically significant. Gold prices and oil prices in Taiwan also exhibit asymmetric impacts on the stock market, with positive changes having significant positive effects and negative changes having significant negative effects.

In the short-run analysis of Hong Kong and Taiwan, distinct asymmetric impacts of key variables on stock market dynamics emerge. In Hong Kong, lagged stock market performance exhibits a gradual adjustment effect. The real effective exchange rate (REER) demonstrates a

significant negative impact following positive changes, possibly reflecting increased export costs, while the impact of negative REER changes is less pronounced. Gold prices show a significant positive impact after negative changes, indicating a potential safe-haven role for gold during economic uncertainties. Oil prices exhibit positive impacts following both increases and decreases, suggesting a complex relationship with market sentiment. Control variables, such as the China stock market (CSM) and Money Supply (M2), exert significant short-run effects, emphasizing regional interdependence and liquidity influence. In Taiwan, similar asymmetric impacts are observed, with REER influencing stock markets differently based on the direction of change. Gold prices demonstrate a significant positive impact after positive changes, and oil prices influence the market positively regardless of the direction of change. Control variables, including the China stock market and Money Supply (M2), exhibit significant short-run effects.

4.0 Conclusion

This study estimated the asymmetric impact on stock markets in Hong Kong and Taiwan, focusing on the real effective exchange rate, gold prices, and oil prices. In both Hong Kong and Taiwan, we found distinct asymmetric impacts: positive changes in the real effective exchange rate positively influenced the stock market in the long run, whereas negative changes had a significant negative impact. Gold and oil prices exhibited asymmetric effects, with positive changes in gold prices having a slightly negative impact, while negative changes had a more pronounced positive effect. In Hong Kong, oil prices demonstrated asymmetric effects, resulting in significant negative impacts following positive changes and significant positive impacts following negative changes. In Taiwan, unlike Hong Kong, a positive change in the real effective exchange rate had a substantial negative impact, whereas the effect of a negative change was not statistically significant. Similarly, both gold and oil prices in Taiwan exhibited asymmetric impacts, with positive changes having significant positive effects and negative changes having significant negative effects on the stock market. This study provides insights for investors and policymakers, offering a comprehensive understanding of risk management and investment strategies.

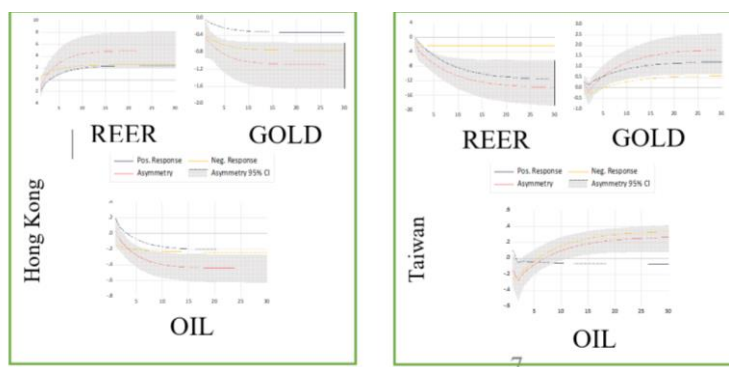


Figure 1: Cumulative Dynamic Multiplier Graphs

References

Aloui, C., Nguyen, D. K., & Njeh, H. (2012). Assessing the impacts of oil price fluctuations on stock returns in emerging markets. *Economic Modelling*, 29(6). <https://doi.org/10.1016/j.econmod.2012.08.010>

Atradius. (2020, April 15). *Country Report Taiwan 2020*. Atradius. <https://group.atradius.com/publications/country-report-asia-taiwan-2020>

Bahmani-Oskooee, M., & Saha, S. (2016). Do exchange rate changes have symmetric or asymmetric effects on stock prices? *Global Finance Journal*, 31, 57–72. <https://doi.org/10.1016/j.gfj.2016.06.005>

Choudhry, T., Hassan, S. S., & Shabi, S. (2015). Relationship between gold and stock markets during the global financial crisis: Evidence from nonlinear causality tests. *International Review of Financial Analysis*, 41, 247–256. <https://doi.org/10.1016/j.irfa.2015.03.011>

Corporate Finance Institute. (2015). *Four Asian Tigers*. Corporate Finance Institute. <https://corporatefinanceinstitute.com/resources/economics/four-asian-tigers/>

Gokmenoglu, K. K., & Fazlollahi, N. (2015). The Interactions among Gold, Oil, and Stock Market: Evidence from S&P500. *Procedia Economics and Finance*, 25, 478–488. [https://doi.org/10.1016/s2212-5671\(15\)00760-1](https://doi.org/10.1016/s2212-5671(15)00760-1)

Jiang, W., & Liu, Y. (2021). The asymmetric effect of crude oil prices on stock prices in major international financial markets. *North American Journal of Economics and Finance*, 56. <https://doi.org/10.1016/j.najef.2020.101357>

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>

Reboredo, J. C. (2013). Is gold a hedge or safe haven against oil price movements? *Resources Policy*, 38(2). <https://doi.org/10.1016/j.resourpol.2013.02.003>

Salisu, A. A., & Oloko, T. F. (2015). Modeling oil price-US stock nexus: A VARMA-BEKK-AGARCH approach. *Energy Economics*, 50, 1–12. <https://doi.org/10.1016/j.eneco.2015.03.031>

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework. In *Festschrift in Honor of Peter Schmidt* (pp. 281–314). https://doi.org/10.1007/978-1-4899-8008-3_9

Trading Economics. (2023). *Hong Kong Exports*. Trading Economics. <https://tradingeconomics.com/hong-kong/export-prices#:~:text=Export%20Prices%20in%20Hong%20Kong,points%20in%20January%20of%201982.>

Wong, H. T. (2022). The impact of real exchange rates on real stock prices. *Journal of Economics, Finance and Administrative Science*, 27(54). <https://doi.org/10.1108/JEFAS-03-2021-0011>

Yau, H. Y., & Nieh, C. C. (2009). Testing for cointegration with threshold effect between stock prices and exchange rates in Japan and Taiwan. *Japan and the World Economy*, 21(3). <https://doi.org/10.1016/j.japwor.2008.09.001>

Zhu, H., Yu, D., Hau, L., Wu, H., & Ye, F. (2022). Time-frequency effect of crude oil and exchange rates on stock markets in BRICS countries: Evidence from wavelet quantile regression analysis. *North American Journal of Economics and Finance*, 61. <https://doi.org/10.1016/j.najef.2022.101708>

Human Capital and the Involvement of Urban B40 Women in The Informal Sector in Sabah

Roslinah Mahmud ^a, Dayangku Aslinah Abd Rahim ^{b*}, Beatrice Lim Fui Yee ^c, Khairul Hanim Pazim @ Fadzim ^d, Siti Hajar Samsu ^e & Caroline Geetha ^f

Faculty of Business, Economics and Accountancy
Universiti Malaysia Sabah

Corresponding Author *: asdayang@ums.edu.my

Abstract

Human capital typically refers to an individual's possession of attributes such as knowledge, skills, and professional experience. The cumulative levels of education, skills, and diverse knowledge contribute to an economic value that can enhance an individual's overall productivity. The augmentation of human capital assets not only has the potential to bolster personal savings and income but also serves as a significant factor in fostering the economic involvement of women, notably in the informal sector, to elevate their families' quality of life. The informal sector encompasses economic activities conducted by entities or entrepreneurs that are not formally registered, along with workers lacking protection (ILO, 2003), such as street vendors and individuals engaged in private businesses. This research aims to assess the status or profile of human capital about the participation of urban B40 women in the informal sector in Sabah. The study utilizes a sample-based approach, employing questionnaires to gather data from urban B40 women involved in informal sector activities, with a focus on descriptive analysis. The objective of this study is to unveil the average profile concerning education levels, attitudes toward training, and the impact of skills and experience on the participation of B40 women in the informal sector in Sabah. The results underscore the significance of programs that invest in human capital among B40 women, particularly in urban settings, as crucial contributors to enhancing the living standards of B40 women in Sabah.

Keywords: Human capital, Women B40, City, Informal sector, Sabah

INTRODUCTION

In Malaysia, the challenge of imbalanced development and job opportunities between urban and rural areas has led to a frequent migration of rural communities to urban centers. Rokis (2019) concurs that this issue is attributable to industrial challenges and the rapid urbanization process, resulting in an escalation of inadequate employment opportunities in cities. The factors contributing to the economic growth gap within a country often stem from fluctuations in income levels. Nevertheless, the struggle for an enhanced quality of daily life has notably impacted the B40 low-income group in major Malaysian cities like Kuala Lumpur, Penang, Ipoh, and others, as highlighted by Shahlan, Malek, and Khasnim (2015).

The high poverty rate significantly impacts the daily lives and sustainability of the impoverished B40 community within urban settings. This prevalent issue is particularly observed in major cities across Malaysia. Among the B40 demographic affected by urban poverty are various groups, such as family heads, individuals with disabilities, the elderly, and women responsible for household support, as noted by Azman and Nor (2019).

Zulkifli Manzor (2023) states that in Malaysia, poverty is categorized into three main groups: B40, M40, and T20, determined by the overall average income of households or families in society. Specifically, the B40 group is identified as those with an average household income of RM4,850 or below.

According to Laili Paim (2019), the assessment of the poverty line involves considering not only total income but also internal and external factors. These factors include location, such as

residing in urban areas, the number of dependents, monthly financial commitments, and human resource aspects like the health condition of the household.

For individuals belonging to the more affluent categories, namely the M40 and T20 groups, the chance to fulfill their daily requirements and access superior services plays a crucial role in enhancing their quality of life. This improvement is particularly notable in terms of human capital elements such as health, education, training, access to nutritious food, and various other factors. Simultaneously, this progress contributes to enhancing the overall well-being of their lives, as emphasized by Easterlin (2003).

This research aims to provide a descriptive analysis of the human capital profile among urban B40 women engaged in the informal sector in Sabah. The study utilized a purposive sample, consisting of 229 women actively participating in the informal sector within the urban areas of three major cities in Sabah: around Kota Kinabalu, Sandakan, and Tawau. Primary data was collected through the administration of questionnaires during the data collection period, spanning from the beginning of 2021 to the end of 2022. However, for this paper, the focus is solely on presenting the descriptive analysis of the respondents' human capital profiles.

LITERATURE REVIEW

Numerous economists and researchers highlight a robust connection between human capital and poverty, particularly within the context of Malaysia where poverty is often classified under the B40 category. The development of human capital yields several economic advantages, including improved income equality, heightened productivity, and a decrease in unemployment rates, as asserted by Becker (1975), Santos (2009), Silva and Sumarto (2014), and the World Bank (2005). Empirical evidence presented by Becker (1995) further substantiates the existence of a correlation between human capital and the poverty rate.

Approximately 8 percent of the global population, comprising more than 340 million women and girls, is projected to be at risk of extreme poverty by the year 2030, according to estimates from the United Nations (UN) in 2023. Susianti (2019) asserts that the participation of women in the economy and their pursuit of livelihoods for their families is an undeniable reality, both globally and in individual countries. This underscores the significant role women play in economic distribution. The increasing trend of women's involvement in the economy further supports this point. Women have been instrumental in making noteworthy contributions to the social and economic development of countries in the present and are expected to continue doing so in the future, as highlighted by Uddin (2010).

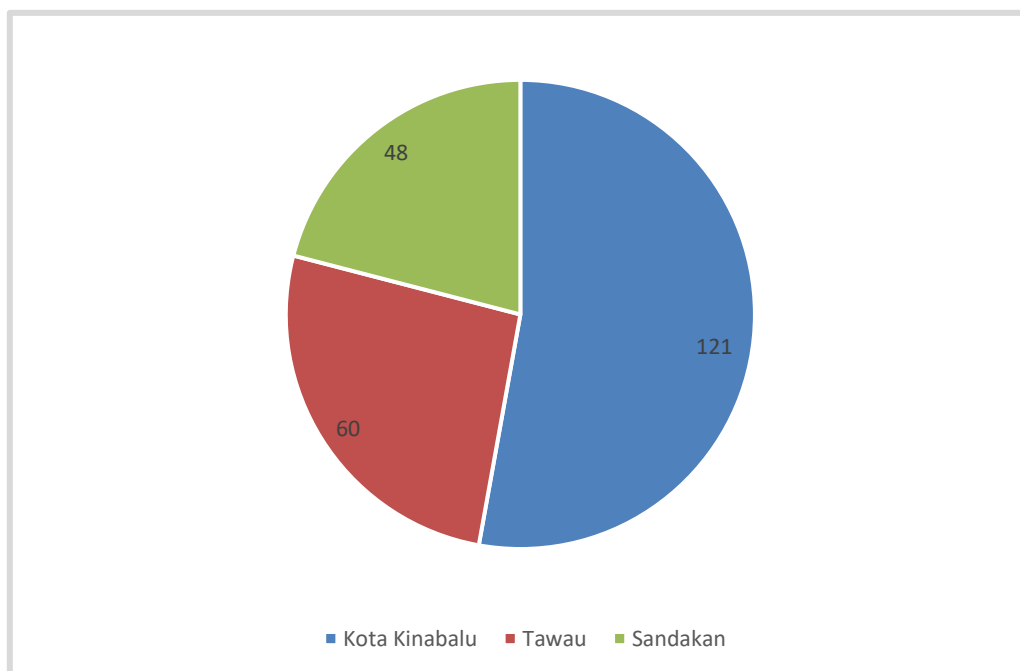
Many women are actively participating in the informal sector, particularly in small-scale sales, as a means to enhance their family's economic situation. The informal economic sector holds a natural appeal for women, likely due to its inherent flexibility and ease of entry, aligning well with the fundamental norms associated with women's needs and responsibilities, as noted by Ramani (2013). Furthermore, factors related to human capital, such as education level, skills, and training, play a significant role in driving women's engagement in the informal sector. Azman and Nor (2019) suggest that higher education levels can positively influence various aspects of women's work involvement, including factors related to the work environment, health, and family.

The educational background within the realm of human capital serves as a motivating factor for women to engage in informal economic activities, as demonstrated in a study conducted in Palembang, Indonesia (Taufik, Monanisa, Nengyanti, Soebyakto & Armansyah, 2020). Similarly, findings from Manel and Perera's (2017) research, focused on identifying factors driving women's involvement in the informal economic sector in Colombo, Sri Lanka, indicate that low educational attainment is a primary factor leading urban women in Colombo to participate in the informal sector. This underscores the correlation between human capital factors, particularly education, and the decision of impoverished women to participate in the informal economy sector.

RESEARCH FINDINGS

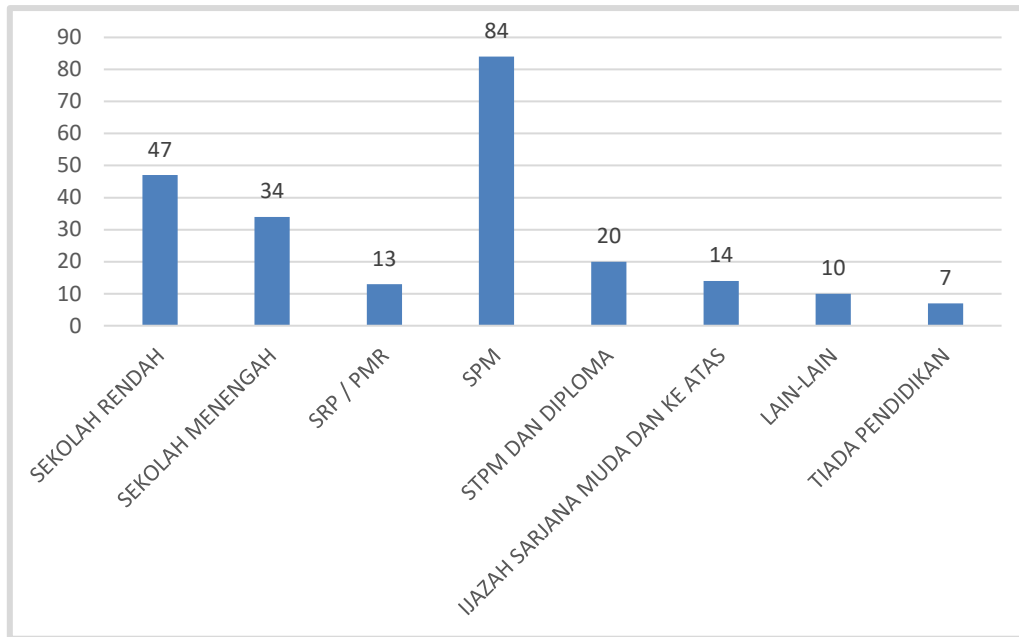
In general, the objective of this paper is to provide a descriptive analysis of the human capital profile among B40 women engaged in the informal sector in urban areas of Sabah, specifically concentrating on Kota Kinabalu, Sandakan, and Tawau. The study involved a total of 229 respondents as participants.

Figure 1.1 Number of Urban B40 Women involved in the Study



As illustrated in Figure 1.1, the study's focus on 121 B40 urban female respondents reveals a higher representation of women from Kota Kinabalu, reflecting the city's larger population size compared to other cities in Sabah. Specifically, 60 respondents are from Tawau, Sabah, while Sandakan, Sabah, contributed a total of 48 respondents to the study.

Figure 1.2 Level of Respondent's Human Capital Investment in Education



In Figure 1.2, the illustration depicts the extent of human capital investment in the education of the participants in this study. The most significant human capital investment is observed among those who pursued tertiary education, specifically Bachelor's Degree and above, constituting 14 respondents. However, this segment accounts for only 6.11 percent of the total 229 respondents in the study. Additionally, 20 respondents, equivalent to 8.7 percent, have invested their human capital in education up to STPM or Diploma level.

A total of 84 respondents, constituting 36.7 percent, have invested their human capital in education up to the SPM level, representing the highest percentage. Meanwhile, 47 respondents, accounting for 20.5 percent, have limited their human capital investment to primary school education only. Additionally, 34 individuals, equivalent to 14.8 percent, have completed secondary school education without taking any exams, and 13 respondents, or 5.68 percent, possess education up to the SRP/PMR certificate. Furthermore, 4.37 percent of respondents have acquired education from alternative sources such as skill certificates, tahfiz schools, and others. Notably, there are also 7 respondents, comprising 3.05 percent, among the B40 women in this city who do not have any formal education.

Generally, the extent of human capital investment in education among the surveyed urban B40 women in Sabah is relatively modest, with the majority possessing education up to the Lower Secondary Certificate level and below, falling within the secondary education category. Specifically, 178 respondents, representing 77.7 percent, have educational qualifications ranging from primary school to secondary school or hold an SPM certificate. Additionally, 7.4 percent, comprising 17 respondents, lack formal education and possess only skills certificates.

This finding aligns with assertions made in prior research, such as the study conducted by Manel and Perera (2017) in Sri Lanka and the research by Taufik et al. (2020) in Indonesia. Their findings indicated that a low level of human capital investment is a contributing factor to increased participation in the informal sector. This underscores the trend observed among urban B40 women in Sabah, where their involvement in the informal economic sector in cities like Kota Kinabalu, Tawau, and Sandakan is influenced by human capital factors, particularly their

educational levels. A deficiency in education tends to drive them towards engagement in the informal economic sector.

Item / likert scale	(1) strongly disagree	(2) disagree	(3) Not Sure	(4) agree	(4) Strongly agree	Total (respondent)
I have skills in my field.	2	13	101	86	24	229
I need formal training.	2	34	85	91	17	229
I have the necessary experience.	4	40	24	94	67	229

Table 1.1 Respondents' opinions on Human Capital Investment in Skills, training and Experience

Table 1.1 pertains to the perspectives of urban B40 women respondents regarding statements addressing the human capital element, encompassing their skills, training, and experience as factors influencing their participation in the informal economic sector in Sabah. Their views are gauged using a Likert scale ranging from 1 to 5, with options ranging from strongly disagree to strongly agree. The respondents' statements or opinions are considered affirmative when their responses fall under the categories of "agree" or "strongly agree."

Regarding the statement concerning the human capital element of skills, a total of 110 respondents affirmed that skills play a role in their involvement in the informal economic sector. This signifies that over 48 percent of the respondents acknowledged possessing skills relevant to the activities they undertake in this informal economy sector.

In terms of the human capital dimension related to training, 108 respondents concurred that formal training is necessary to sustain their involvement in the informal economy sector. This indicates that a substantial percentage, approximately 47 percent of the respondents, recognize the significance of investing in human capital through training.

Experience constitutes a crucial element within human capital, serving as a motivating factor for individuals to advance in their respective occupations. Among the 229 respondents, a significant majority of 161 individuals, accounting for 70 percent, acknowledged having experience in the specific informal sector in which they were engaged. This suggests that possessing experience in a particular field instills confidence in them to participate actively in the informal sector.

CONCLUSION

This study was conducted on a sample basis, utilizing questionnaires among urban B40 women engaged in the informal sector and solely employing descriptive analysis. The objective was to depict the average profile of education level, opinions on training, skills, and experience influencing the participation of B40 women in the informal sector in Sabah. The findings

suggest that initiatives involving human capital investment among B40 women, particularly in urban settings, play a crucial role in enhancing the living standards of B40 women in Sabah.

While the results indicate that the profile of B40 women participating in informal economic sector activities predominantly involves secondary education, the significance of investing in human capital through education cannot be overlooked. Higher education has the potential to enhance women's productivity even within the confines of the informal sector. Government policies such as Sabah Maju Jaya, Malaysia Madani, and ongoing and future Malaysia Plans concentrate significantly on supporting women in the labor market and addressing poverty in both urban and rural areas. These policies can continue to bolster the involvement of women in the informal sector and contribute to the overall economic well-being.

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REFERENCES

Azman, A. S., & Nor, F. M. (2019). Satu Tinjauan Awal Faktor Keupayaan dan Dorongan Kekekalan Dalam Sektor Ekonomi Tidak Formal: Kajian Kes Asnaf Dalam Kalangan Wanita Di Banting Selangor. *Journal of Islamic, Social, Economics and Development (JISED)*, 4(19), 1-13.

Becker (1975). *Human Capital: A Theoretical and Empirical Analysis*, with Special Reference to Education. NBER (1975), pp. 13-44. <http://www.nber.org/books/beck75-1>

Bosede Comfort Olopade, Henry Okodua, Muyiwa Oladosun, Abiola John Asaleye (2019). *Human capital and poverty reduction in OPEC member-countries*. ScienceDirect. Heliyon. Volume 5, Issue 8, August 2019, e02279. <https://www.sciencedirect.com/science/article/pii/S2405844019359390>

Easterlin, R. A. (2003). *Explaining happiness*. Proceedings of the National Academy of Sciences, 100, 11176-11183.

G.S. Becker (1995). *Human Capital and Poverty Alleviation*. Human Resources Development and Operations Policy (HRO) Working Papers 14458 (1995). <http://documents.worldbank.org/curated/en/121791468764735830/pdf/multi0page.pdf>

Manel, K., & Perera, S. (2017). Factors Affecting on Females' Employment in the Urban Informal Sector in Colombo District, Sri Lanka. *International Journal of Humanities and Social Science Research*, 3(10), 49-55.

International Labour Office (2002a): *Decent Work and the Informal Economy*; Report of the Director-General; International Labour Conference, 90th Session; Report VI; International Labour Office, Geneva, 2002

Pertubuhan Bangsa-Bangsa Bersatu (PBB). (2023) dalam *Lebih 340 juta wanita, kanak-kanak perempuan diancam kemiskinan tegar menjelang 2030*. Berita Harian. 8 September 2023. <https://www.bharian.com.my/dunia/amerika/2023/09/1149983/lebih-340-juta-wanita-kanak-kanak-perempuan-diancam-kemiskinan-tegar>

Ramani, S. V., Thutupalli, A., Medovarszki, T., Chattopadhyay, S., & Ravichandran, V. (2013). *Women in the Informal Economy: Experiments in Governance from Emerging Countries*. Maastricht: United Nations University.

Rokis, R. (2019). Social Enterprising Observance among B40 Urban Women for Socioeconomic Sustainability. *European Journal of Sustainable Development*, 8(5), 397-408. doi:10.14207/ejsd.2019.v8n5p397

Santos (2009). *Human Capital and the Quality of Education in a Poverty Trap Model*. Oxford Poverty & Human Development Initiative (OPHI). Oxford Department of International Development (2009).

Schultz (1962). *Investment in Human Beings*. JPE Supplement, University of Chicago Press, Chicago (1962).

Shahlan, N. N., Malek, M. I., & Khasnim, N. F. (2015). *Tipologi Perumahan Bandar Mikro Bagi Golongan Bujang B40 Di Kuala Lumpur*. *Journal Design + Built*, 136-150.

Silva, S. Sumarto (2014). *Dynamics of Growth, Poverty and Human Capital: Evidence from Indonesian Sub-national Data*, Munich Personal RePEc Archive (MPRA) Paper No. 65328 (2014).

Susianti. (2019). Pemberdayaan Wanita Di Sektor Informal Dalam Usaha Meningkatkan Pendapatan Keluarga: Studi Kasus Di Kabupaten Sleman. *Jurnal Kelitbangan*, 7(1), 31-48.

Taufik, M., Monanisa, Nengyanti, Soebyakto, B. B., & Armansyah. (2020). The Evidence of Women's Labor Reasons Performing Informal Economic Activities in Palembang, South Sumatera, Indonesia. doi:10.4108/eai.10-7-2019.2299322

World Bank (2005). *Introduction to poverty analysis*. World Bank Institute (2005) <http://siteresources.worldbank.org/PGLP/Resources/PovertyManual.pdf>

Zulkifli Manzor (2023). *Pengelasan T20, M40, B40 bukan kasta*. Analisis semasa Kosmo. 8 Mac 2023. <https://www.kosmo.com.my/2023/03/08/pengelasan-t20-m40-b40-bukan-kasta/>

Laily Paim (2019) dalam Wan Noor Hayati Wan Alias (2019). *Faktor semasa tingkat miskin rentan*. Berita Harian. 3 April 2019. <https://www.bharian.com.my/berita/nasional/2019/04/548333/faktor-semasa-tingkat-miskin-rentan>

Rozmi Ismail & Nurfatim Akila Jeli (2020). *Pengaruh Atribusi Kemiskinan, Keadilan Dunia Dan Gaya Pembuatan Keputusan Terhadap Kesejahteraan Psikologi Dalam Kalangan*

Kumpulan B40 Di Malaysia. Jurnal Psikologi Malaysia 34 (3) (2020): 78-93 ISSN-2289-8174 80 2018).

Uddin, N. B. (2010). Faktor Penentu Penyertaan Wanita Dalam Pasaran Buruh. *Persidangan Kebangsaan Ekonomi Malaysia ke V (PERKEM V), 1*, pp. 28-38. Port Dickson.

SMEs E-Commerce Functional Value and Brand Performance: The Role of Internal and External Stimuli

Masran Tamin*, Azaze-Azizi Abdul Adis

**Faculty of Business, Economics, and Accountancy
Universiti Malaysia Sabah**

*Corresponding Author: masrantamin@ums.edu.my

Abstract

The rapidly evolving digital landscape has positioned small and medium enterprises (SMEs) at the forefront of e-commerce growth. Shifting to online business has recently been identified as a strategic resource for SMEs' competitive advantage. Thus, e-commerce and brand performance are integral components of SMEs' online business strategies. This study adopts the S-O-R framework as the theoretical foundation to examine the impact of both external and internal Stimuli (i.e., relative advantage, compatibility, government support, and supplier pressure) that trigger SMEs cognitive and affective states, i.e., Organism (e-commerce functional value), and Response (brand performance) in SMEs online business. Survey data were gathered from 152 Malaysian SMEs online business. Data were analyzed using SmartPLS software. The study discovers the significant and insignificant relationships between relative advantage, compatibility, government support, supplier pressure, e-commerce functional value and brand performance. As e-commerce continues to redefine the SMEs online business landscape, this research offers valuable insights for SMEs seeking to leverage e-commerce effectively and enhance SMEs brand performance.

Keywords: Small and Medium Enterprises (SMEs), E-Commerce functional value, and Brand performance.

1. Introduction

The advancement of web technology and the evolution of Industry 4.0 offer enterprises novel opportunities to conduct research, communicate with customers, improve engagement, and market and sell products and services. These trends are expected to maintain their prominence in future business endeavors (Malesev and Cherry, 2021; Civelek et al., 2020). According to Setkute and Dibb (2022) the evolution of digital marketing has enhanced the ability of small and medium enterprises (SMEs) to engage with customers, provide information and ultimately, selling the products. In Malaysia, the emerging market of digital marketing is significant with e-commerce development. The e-commerce market in Malaysia has experienced significant growth, driven by factors such as increasing internet penetration, a growing number of digitally-savvy middle-class consumers, and the availability of customized payment options. Previously, there are numbers of researchers are exploring the rapid progress in digitization, social media, online marketing, and application-based marketing, along with the technological advancements stemming from this transformation across small, medium, and large enterprises (Lepkowska-White et al., 2019; Malik et al., 2020). However, other research gaps in the literature on e-commerce adoption need researchers' attention. Moreover, the Malaysian government has been proactive in supporting and nurturing the e-commerce industry, and the

industry has also benefited from government support, the increasing internet and smartphone penetration, the rising disposable income, and the growing demand for e-commerce logistics.

2. Literature Review

The adoption and continued use of new technologies, such as e-commerce, can present both opportunities and challenges for small and medium-sized enterprises (SMEs). Implementing e-commerce solutions often requires a significant upfront investment in technology, infrastructure, and staff training (Marcia, 2022). However, SMEs may lack the technical expertise needed to implement and manage e-commerce systems effectively. This can lead to challenges in system integration, data security, and software maintenance. Thus, the study in e-commerce can provide SMEs with benchmarks to measure their performance and guide them in adopting effective strategies.

The effective utilization of e-commerce functional activities can indeed contribute significantly to value creation and overall company growth, particularly in the context of building and strengthening a brand in the online business context (Ogbo et al., 2019). Engaging in e-commerce helps establish and strengthen the brand's online presence. Consistent branding across digital channels, including a well-designed website, social media, and other online touchpoints, contributes to brand recognition and loyalty. Past research has demonstrated a strong interest in investigating diverse facets of SMEs' adoption of online platforms (Mamorobela and Buckley, 2018; Awa et al., 2015). Nevertheless, there are additional gaps in the existing literature on the functional value of e-commerce that warrant the attention of researchers.

Previous research has extensively explored the behavior of consumers in the online space, only a limited number of studies have focused on understanding the perspectives of SMEs. However, there has been a noticeable gap in research when it comes to examining the perspectives of SMEs in the adoption of e-commerce. Hence, the majority of studies have not sufficiently considered the viewpoints, challenges, and decision-making processes of small businesses when it comes to embracing online commerce. To address this gap, Chouki et al., (2020) recognized the need to develop and test a conceptual model. The model is based on the Stimulus-Organism-Response (S-O-R) theory, which is a psychological framework used to understand how stimuli (factors influencing e-commerce adoption) are processed by organisms (SMEs e-commerce functional value), leading to certain responses (such as brand performance).

S-O-R Model

The framework being discussed provides a structured approach to studying how various factors, both internal and external, impact SMEs. SOR Model serves as a tool for researchers to systematically analyze and understand the dynamics influencing the decision-making processes of small businesses. The framework allows for the investigation of two types of stimuli: internal and external. For instance, internal stimuli are factors originating within the SME such as organizational culture, internal resources, and the knowledge and skills of the workforce. Meanwhile external stimuli are factors from the external environment that can influence the SME include market trends, competition, government support, and technological advancements.

The introduction of this model emphasizes the significance of considering external cues. Previous research highlights the importance of looking beyond internal factors and taking into account the broader business environment that SMEs operate in (Xu et al., 2021). This broader perspective is crucial for a more comprehensive understanding of how SMEs navigate challenges and make decisions related to their business practices. The S-O-R model can indeed be beneficial for businesses, particularly in the context of optimizing their online environments to meet customers' practical needs and expectations.

3. Methodology

The type of investigation in this study is correlation study using a cross-sectional survey design which aims the relationships between factors of independent variables and independent variable. The target population in this study comprises SMEs engaged in online business operations in Malaysia. For this study, a systematic random sampling design was employed to ensure a representative and unbiased selection of participants from the population. The sampling process begins by randomly selecting a starting point from the list of SMEs. This method ensures a representative and unbiased selection of participants, enhancing the generalizability of findings to the broader population of SMEs in online business in Malaysia. The determination of the total number of respondents for the study was established through the use of G*Power analysis, resulting in a determined sample size of 152 respondents. In addition, this study adopts a quantitative research approach to systematically analyze and quantify data related to SMEs engaged in online business in Malaysia. In this study, two sets of questionnaires, namely set 'A' in English and set 'B' in Malay, has been utilized for a comprehensive assessment. Thus, survey was conducted through both online and offline channels to ensure a diverse and inclusive participation.

4. Results

The data collected in this study was subjected to comprehensive analysis using statistical tools, specifically employing the SPSS. Additionally, structural equation modeling (SEM) was performed using SmartPLS 4 to assess the complex relationships and latent variables within the research framework.

Common Method Bias

Common Method Bias (CMB) refers to a potential systematic error that may arise in research studies when the variance in the measures is attributed to the method of data collection rather than the constructs the measures are intended to represent. The results of the full collinearity test indicated that all variance inflation factor (VIF) values of the variables were less than 3.3. Thus, statistical tests indicated that CMB is not an issue in the present study.

Measurement Model

Reliability and validity (convergent as well as discriminant) were assessed to evaluate the measurement model. The assessment of reliability and validity, encompassing both convergent and discriminant aspects, was conducted to rigorously evaluate the measurement model employed in the study. This comprehensive analysis aimed to ensure that the measurement instruments used in the research are not only internally consistent and reliable but also valid in measuring the intended constructs. Convergent validity was examined to ascertain the degree to which different indicators of the same construct converge, while discriminant validity analysis focused on establishing distinctions between different constructs, affirming the

soundness and accuracy of the measurement model. The composite reliability and Cronbach's alpha values were used to measure reliability. Table 1 shows the result of this study values was higher than the acceptable level of 0.7, signifying adequate reliability for each construct. Moreover, the average variance extracted (AVE) values are higher than 0.5, as suggesting for convergent validity.

Table 1: Reliability and validity

	Cronbach's alpha	Composite reliability	AVE
Relative Advantage	0.844	0.906	0.605
Compatbility	0.710	0.740	0.593
Government	0.772	0.907	0.594
Supplier	0.782	0.806	0.533
E-Commerce Functional Value	0.722	0.726	0.572
Brand Performance	0.762	0.773	0.561

Table 2 shows the result of The HTMT values where the upper diagonal of result table along with the square roots of the AVE in the diagonal and inter-construct correlation values in the lower diagonal. The HTMT values reported show in the slide that the HTMT ratios are lesser than the suggested threshold value of 0.9, illustrating the discriminant validity (Henseler et al., 2015).

Table 2: The Heterotrait-Monotrait (HTMT)

	BRAND PERFORMANCE	COMPATIBILITY	ECOMMERCE FUNCTIONAL VALUE	GOVERNMENT	RELATIVE ADVANTAGE	SUPPLIER
Brandperformance						
Compatibility	0.222					
Ecommerce Functional Value	0.413	0.241				
Government	0.415	0.167	0.361			
Relative Advantage	0.192	0.314	0.255	0.111		
Supplier	0.150	0.111	0.332	0.291	0.114	

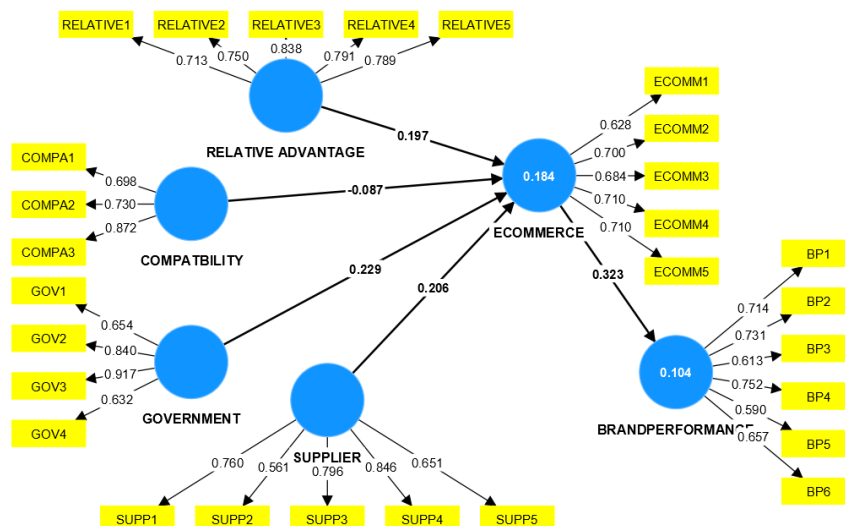


Figure 1: Path Model

The path model was applied to assess all the hypothesized relationships developed in this study. The R^2 values and the path coefficients were calculated to evaluate the path model. The variation in the criterion variables is explained by the R^2 values, while the statistical significance of the relationships is measured by the path coefficients. The outcomes of the path model are shown in Figure 1. Thus, the hypotheses H1, H3, H4, and H5 were supported, while H2 was not supported. The model explained the 10.4% variation in brand performance, and only 18.4% in e-commerce functional value through their respective R^2 values.

For the path model, one of the crucial evaluation matrices is the effect size (f^2). The f^2 indicates the contribution of the independent variable to the dependent variable. The f^2 values above 0.02 is small, 0.15 moderate and 0.35 is large (Hair et al., 2017). Table 3 shows the result f^2 values for significant relationships. Moderate f^2 value was found for the relationship between e-commerce functional value and brand performance (0.157). However, f^2 values were small for the relationships between e-commerce functional value for independent variable relative advantage (0.045), compatibility (0.029), government support (0.059), as well as supplier pressure (0.049).

Table 3: Effect size

	f^2
Compatibility -> Ecommerce functional value	0.029
Ecommerce functional value -> Brandperformance	0.157
Government -> Ecommerce functional value	0.059
Relative Advantage -> Ecommerce functional value	0.045
Supplier -> Ecommerce functional value	0.049

5. Discussion

This study provides empirical evidence to support the claims of an S-O-R framework that stimuli factors (Relative Advantage, Compatibility, Government Support and Supplier Pressure) influence the organisms (E-commerce functional value) and organisms impact the response (Brand performance). In addition, corroborating the findings of previous studies on technology adoption, this study results suggest that relative advantage enhance the functional value of E-commerce. Relative advantage enables cost-effective operations in various aspects of e-commerce, such as online marketing, payment processing, and inventory management. SMEs can leverage technology to reduce operational costs, making e-commerce more financially viable for them.

Considering the critical role of external environment this study hypothesized that these two external cues government support and supplier pressure would have a significant impact on the functional value of e-commerce among SMEs. Therefore, H3 and H4 related to external stimuli for government support and supplier pressure were accepted. This study implies that external stimuli on e-commerce enhance their functional value among the SMEs. Moreover, another set of important findings revealed that e-commerce functional value promote the performance of brand of smes. An effective e-commerce platform enhances the online presence of an sme's

brand. this increased visibility in the digital space can attract a larger audience, helping to build brand awareness and recognition.

6. Conclusion

This study are significant for various stakeholders, including SMEs. SMEs in Malaysia engaged in online business can leverage the insights gained from this study to inform strategic decision-making. Understanding the factors that influence their performance and adoption of e-commerce practices can guide businesses in optimizing their online environments. Moreover, the study contributes to the academic understanding of SMEs in the online business context. Researchers can build upon these findings by exploring related variables, expanding the geographical scope, or conducting longitudinal studies to track the evolving dynamics of SMEs in the digital era.

7. References

Awa, H.O., Baridam, D.M. and Nwibere, B.M. (2015). Demographic determinants of electronic commerce (EC) adoption by SMEs: a twist by location factor. *Journal of Enterprise Information Management*, Vol. 28, pp. 326-345.

Chouki, M., Talea, M., Okar, C. and Chroqui, R. (2020). Barriers to information technology adoption within small and medium enterprises: a systematic literature review. *International Journal of Innovation and Technology Management*, Vol. 17 No. 01, 2050007.

Civelek, M., Gajdka, K., Svetlik, J. and Vavrecka, V. (2020). Differences in the usage of online marketing and social media tools: evidence from Czech, Slovakian and Hungarian SMEs Equilibrium. *Quarterly Journal of Economics and Economic Policy*, Vol. 15 No. 3, pp. 537-563.

Hair, J.F., Hult, G.T., Ringle, C. and Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modelling PLS-SEM*, 2nd ed., Sage, Thousand Oaks.

Henseler, J., Ringle, C.M. and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135.

Lepkowska-White, E., Parsons, A. and Berg, W. (2019). Social media marketing management: an application to small restaurants in the US. *International Journal of Culture, Tourism and Hospitality Research*, Vol. 13 No. 3, pp. 321-345.

Malesev, S. and Cherry, M. (2021). Digital and social media marketing-growing market share for construction SMEs. *Construction Economics and Building*, Vol. 21 No. 1, pp. 65-82.

Malik, Q., Mehta, A.M., Abrar, R., Sajid, A. and Ahmad, T. (2020). Measuring SME's productivity using social media: role of entrepreneurship. *International Journal of Entrepreneurship*, Vol. 24 No. 3, pp. 1-14.

Mamorobela, S. and Buckley, S. (2018). Evaluating the effectiveness of social media on knowledge management systems for SMEs. *European Conference on Knowledge Management*, Academic Conferences International, pp. 1064-1072.

Marcia Mkansi. (2022). E-business adoption costs and strategies for retail micro businesses. *Electronic Commerce Research*, Springer, vol. 22(4), pages 1153-1193.

Ogbo A, Ugwu CC, Enemuo J, Ukpere WI. (2019). E-Commerce as a Strategy for Sustainable Value Creation among Selected Traditional Open Market Retailers in Enugu State, Nigeria. *Sustainability*, Vol 11, No. 16.

Setkute, J. and Dibb, S. (2022). Old boys' club: barriers to digital marketing in small B2B firms. *Industrial Marketing Management*, Vol. 102, pp. 266-279.

Xu, G., Wang, S. and Zhao, D. (2021). Transition to sustainable transport: understanding the antecedents of consumer's intention to adopt electric vehicles from the emotional research perspective. *Environmental Science and Pollution Research*, Vol. 28 No. 16, pp. 20362-20374.

Leadership Style on Job Satisfaction Moderated by Employee Commitment

Sharifah Norasykin Said Madeen^a, Syed Nordin^a, Sidah Idris^{b*}

^aFaculty of Business, Economics and Accountancy, University Malaysia Sabah, 88400 Kota Kinabalu, Sabah

s_norasykin@yahoo.com

^bFaculty of Business, Economics and Accountancy, University Malaysia Sabah, 88400 Kota Kinabalu, Sabah

syaidah@ums.edu.my

*Corresponding Author: syaidah@ums.edu.my

Abstract

Leadership is the process or ability of a person to lead, direct, and influence other people or a group of people in achieving a certain goal or vision. Leadership involves various aspects, including decision making, communication, problem solving, motivation, and developing a vision or direction for an organisation or group. The objective of this study is to evaluate the leadership style that can be adopted by a leader. This study will be conducted to examine the relationship between leadership style and job satisfaction for different groups of employees. This study will explore whether the effect of leadership style on job satisfaction is stronger for employees with high work commitment compared to those with low work commitment. The scope of this study is for individuals who work in service and real estate companies. At the beginning of this study, this article will use literature review to find the research gap in this field whether local or international. It is hoped that the results of the study in this writing will be able to provide evidence to the gaps in previous studies. This study will be carried out by providing analysis to individuals involved as department or company leaders. The significance of this study will be able to prove that the issue of leadership is a broad and important topic in aspects of life, and the understanding of what leadership is can vary according to the context and approach used in the organisation.

Keywords: Transformation, transactional, visionary, job satisfaction, work commitment

1. Introduction

In this era of the twenty-first century with companies infinitely emerging, they are constantly finding ways to differentiate themselves from each other. Furthermore, with the current issue of the global pandemic, that not only affects the healthcare system and industry, but greatly affects every other sectors such as, social, cultural, political and most importantly the economic sector (Kusni Ingsih et al., 2021). According to Kusni Ingsih et al. (2021), “several enterprises are significantly affected, and even several enterprises get bankruptcy”. To counter such issues many companies are striving to improve their performance through criterions such as different leadership styles, job satisfaction, and the moderating influence of employee commitment.

This paper aims to explore the indicators mentioned above through the use of literature review which involves an examination of various leadership styles, including transformational, transactional, and visionary leadership. Each of these leadership styles brings distinct qualities and approaches to leadership, which in turn have profound effects on the determination of employee commitment (Kelsey Dappa et al., 2019). These varieties of leadership styles play a significant role in shaping the overall work environment and the organisation’s performance (A. K. Purnomo & N. Novalia, 2019). Understanding how these styles impact job satisfaction and how employee commitment can influence this relationship is vital for creating effective leadership strategies and fostering a productive and satisfied workforce.

2. Literature review

2.1. Leadership

According to Nilima Gandhi (2022), “Leadership is a complex multi-faced phenomenon for organisations and researchers”. Bass (1990) had also quoted “Great leaders were important in the development of civilised societies”. Throughout centuries, the depth of leadership have been a pinnacle to a strong and firm company or organisation (Nilima Gandhi, 2022). “Let me define a leader. He must have vision and passion and not be afraid of any problem. Instead, he should know how to defeat it. Most importantly, he must work with integrity” (Kalam, 1999). The leadership philosophy that is implemented in any given organisation is determined by several factors such as the organisation's nature, it's sensitivity, proficiency in technology, and established culture (Kelsey Dappa et al., 2019). It is the capacity of a person to inspire, encourage, and facilitate the participation of others in enhancing the efficiency and prosperity of an organisation (A. K. Purnomo & N. Novalia, 2019).

2.2. Transformational leadership

The transformational theory is said to work in different ways in which depends on the type of organisation, though it revolves around motivating workers and instilling a sense of purpose in them, which improves employee performance inside organisations (Kelsey Dappa et al., 2019). “A proactive leadership is a characteristic of transformational leadership”, (Kusni Ingsih et al., 2021). According to Nilima Gandhi (2022) the transformational theory distinguishes itself from other modern theories by being more comprehensive, covering a larger portion of the field, offering a vision for the leader-follower relationship, and having different activities, procedures, etc. As stated by Bass (1985), who widened the theory from Downtown in 1937, a transformational leader “attempts to induce followers to reorder their needs by transcending self-interests and strive for higher-order needs”. In a modern and more simple term, transformational leadership is a proactive characteristic of a leader in an organisation (Kusni Ingsih et al., 2021). Its elements include having the ability to establish high moral standards, emphasises the value of having a common goal as well as the willingness to make sacrifices for the benefit of the organisation (Azizah et al., 2020). Furthermore, subordinates respect, adore, and trust a leader for this reason. This, in turn, establishes a connection between subordinates and a leader, making them feel gratified (Muppudathi & Krishnan, 2020). Consequently, transformational leadership plays a pivotal role in motivating and influencing employees shared interests, meeting organisational objectives and providing optimum standards of an organisation (Ayu Putri Aprileani et al., 2022).

2.3. Transactional leadership

According to Bass and Avolio (1994), transactional leadership assists subordinates in determining what is necessary to produce intended results such as lowered manufacturing costs, increased revenue and improved output quality. Another definition defined by Thilageswary Arumugam et al.(2019), “-comprising motivation and directing to achieving followers self-interest through rewards and punishment for the exchange”. Additionally, excerpted from it's name, transaction, showcases its approach which emphasises transaction between colleagues, followers and leaders (B. M. Bass & B. J. Avolio, 1994). Oriented by “the path-goal concept” as a framework, transactional leadership establishes roles of each subordinates by determining each individual's self-concept and self-esteem (Siswanto et al., 2020). Moreover, with prior agreement, the path-goal concept allows subordinates to have a sense of drive as they would be given bonuses once requirements are met, thus correlates with job satisfaction (A. C. Jayadi & S. Ekawati, 2023). With such hypotheses, organisations may aim for a long-term partnership with their subordinates while also anticipating reciprocation of concerns, that the engagement of subordinates or employees would dedicate themselves with the forming of “organisation-employee relationship” (Thilageswary Arumugam et al., 2019).

2.4. Visionary leadership

As stated by Robbins and Judge (2015), “visionary leadership is leadership to create and emphasise a vision that is realistic, trustworthy, and interesting about the future for an organisation that grows from the present and improves the present”. Social Exchange Theory states that visionary leadership is a positive leadership behaviour that is adept at articulating the organisational vision while also incorporating the individual visions of its employees (Hao Chen & Jiwen Song, 2021). In addition, Hao

Chen & Jiwen Song's stated that such theory allows the establishment of a common organisational vision that incorporates the interests of employees and effectively articulates towards employees thus, facilitates organisation's common vision to become ingrained in each employee's collective set of values. In line with Nilima Gandhi (2022), "Visionary leaders are risk-takers as they envision the future that not many can predict and are ready to take radical actions to adapt to the changing situation". Nilima states that this is because leaders have a great deal of responsibility and a sense of duty which carries repercussions of their actions direct or indirectly. Owning a great deal of vision in addition to excellent execution would continue to inspire and influence the generations of employees with abilities and resources that would impact an organisation greatly (Neneng Hayati, 2020). Additionally, visionary leadership affirms and endorses the leadership style of its employees, which can help them feel more secure in their jobs and encourage them to take on ambitious tasks and challenges with the objective to boost productivity and advance organisational development (Hao Chen & Jiwen Song, 2021).

2.5. Job satisfaction

Eliyana et al. (2019), had defined job satisfaction as evaluation of the worker's contentment with the job and its output. The influence of job satisfaction in work lifestyle not only affects employees, but the overall organisation's longevity and resilience as "it improves performance, reduce organisational member turnover, and reduce absenteeism" (A.K. Purnomo & N. Novalia, 2019). Retention of employees is higher when work satisfaction is high (Mwesigwa et al., 2020; Ruiz-Palomo et al., 2020). According to their cumulative experiences, there is a sense of duty or responsibility to contribute to their organisations. Furthermore, Kreitner and Kinicki (2012) defines job satisfaction as a form of response whether emotionally or affective form of expressions to different aspects of a job. In accordance to this definition, a person may be content with a part of aspect of their job but not entirely of other or remaining aspects (Haji Mustaqim, Sabri & Sumardin, 2020). Whether or not an employee is satisfied or dissatisfied with their job it shows through work behaviour such as diligence or carelessness. Every employee responds differently to varied leadership and motivational approaches, which in turn boosts organisational productivity and job satisfaction (Marina Zhuravskaya et al., 2020). Beyond that, Marina Zhuravskaya et al. (2020) added that a very clear indicator of the significance of job satisfaction in modern organisations is the new management framework, which emphasises that employees should be treated mainly as individuals with their own interests and aspirations.

2.6. Job commitment

Job commitment is an accomplishment metric that an organisation should emphasise on (Kusni Ingsih et al., 2021). Better organisational performance will be a result of increased organisational commitment (Irefin & Mechanic, 2014; Imamoglu et al., 2019). According to Eliyana Etl al. (2019), employees who identify specific attachments demonstrate organisational commitment. Further explained by Loan (2020), employees' emotional investment in the organisation and their overall work ethic are key indicators of organisational commitment. Job or organisational commitment is an active connection in which workers are prepared to sacrifice all to support the organisation in achieving its objectives and continuing to exist, as opposed to the passive loyalty of organisational employees (Yateno, 2020). A.K. Purnomo & N. Novalia (2019) suggested elements of organisational/job commitment which was based on Wibowo's research that references employee loyalty with commitment. These elements were identification, engagement and loyalty. Therefore, individuals who identify as an employee to an organisation, actively engage in its operations, and shows loyalty to it in the pursuit of its objectives are exhibiting organisational commitment (A. K. Purnomo & N. Novalia, 2019).

3. Methodology

A detailed review of relevant scientific literature is conducted in this study. Most of these 30 studies uses quantitative analysis in addition with Structural equation modeling (SEM), with the technique of partial least squares (PLS). Overall these analyses uses collective data which are obtained from their respective questionnaires. The variables of these studies revolves around different leadership styles mainly, transformational, transactional and visionary along with indicators, such as, job satisfaction, job commitment and performance.

Data generated from these questionnaire were equipped into equations that formulates into quantitative values such as percentages or significant values. These numerals were then compared to a constant or a scale that indicated a level of influence of a certain variable with an indicator. A table (Table 4.1) is formed to compare these studies and their findings as a previous literature analysis.

Table 4.1 summarises the previous studies that were incorporated into the conceptual analysis.

Table 4.1(a) Previous studies on leadership styles on job satisfaction, moderated by employee commitment

Study	Methodology	Variables	Countries	Data / Period	Findings
(A. Eliyana & S. M. Muzakki, 2019)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Work performance Work satisfaction Organizational commitment	Indonesia	Panel Data 1978-2018	Results of the study indicates that transformational leadership significantly impacts organizational commitment and job satisfaction.
(S. H. An et al., 2019)	Quantitative Analysis	Independent Leadership behaviors Dependent Job Satisfaction	Denmark	Panel Data 1938-2018	Evidence from the study proves that changes in leadership behaviors such as transformational leadership, verbal rewards and material rewards would improve and provide positive feedback in employee job satisfaction
(W. S. Chandrasekara, 2019)	Quantitative Analysis	Independent Transformational leadership Dependent Job performance Job satisfaction	Sri Lanka	Panel Data 1972-2015	Findings show that leaders should construct transformational leadership to boost employee satisfaction and job performance.
(J. T. Wong et al., 2022)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Job performance Employee engagement Affective organizational commitment	China	Panel Data 1981-2021	This study found that transformational leadership is exhibited by leaders in an organisation, and that this influences how employees perceive their responsibilities and work, which in turn leads to high-affective organizational commitment and job performance. It also found that employee engagement plays a critical mediating role in supporting both the leader and the employee outcome.

Study	Methodology	Variables	Countries	Data / Period	Findings
(Odunayo Salau et al., 2019)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Employee satisfaction Employee engagement	Nigeria	Panel Data 1995-2018	Analysis shows that transformative leadership is said to increase employee engagement and satisfaction by fostering a culture of constant intellectual stimulation and charisma.

Table 4.1(b) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(A. N. Abuzaid et al., 2019)	Quantitative Analysis	Independent Transformational leadership Dependent Effectiveness of strategic decision	Jordan	Panel Data 1976-2018	Results show that the efficiency of strategic decisions is improved by transformational leadership because it fosters an atmosphere and behaviour that are conducive to knowledge sharing and builds interpersonal trust among organisation members.
(Bastari et al., 2020)	Quantitative Analysis	Independent Transformational leadership Dependent Job motivation Job performance	Indonesia	Panel Data 1993-2015	With job motivation serving as the intervening variable, transformational leadership has a considerable beneficial impact on job performance. This suggests that the leader's strong support will be able to inspire staff to do better.
(M. Jensen et al., 2020)	Mixed method analysis	Independent CEO transformational leadership Dependent Work performance	United States United Kingdom	Panel Data 1984-2019	Study indicates that even after accounting for a number of control variables, such as the baseline performance of the business, the transformational leadership style of the CEO, as measured by inspiring motivation and intellectual stimulation, positively predicts the majority of firm performance indicators.

(M. M. Machali & S. Asrori, 2018)	Quantitative Analysis	Independent Transformational leadership Dependent Job Satisfaction	Indonesia	Panel Data 1995-2017	Job satisfaction among employees may be attained by leaders who possess the appropriate transformational style and offer task and relationship assistance to their team members. Considering the implications of a leader's trustworthiness on job satisfaction as well.
(W. H. Murphy et al., 2020)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Job performance	United States Canada	Panel Data 1975-2018	Sales people's attitudes are impacted by the transformational leadership of sales managers.

Table 4.1(c) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(Siswanto et al., 2020)	Quantitative Analysis and SEM	Independent Transformational leadership Transactional leadership Dependent Job satisfaction Employee performance	Indonesia	Panel Data 1985-2020	Overall theories were proven significant in relation to the variables with positive outcomes
(Anita Ramadani Rachmah et al., 2022)	Quantitative Analysis and SEM-PLS	Independent Transformational leadership Dependent Job satisfaction Organisational commitment	Indonesia	Panel Data 1990-2021	According to the study's findings, transformational leadership can boost job satisfaction, reduce workplace stress, and increase organisational commitment. Reducing workplace stress can increase organisational commitment because workers are more devoted to the organisation when they perceive that their stress levels are under control.
(Luu Tien Dung & Phan Van Hai, 2020)	SEM	Independent Transformational leadership Dependent Job satisfaction Organisational commitment	Vietnam	Panel Data 1943-2020	Transformational leadership has the potential to mitigate uncertainty and foster a positive attitude towards change among employees. This, in turn, may lead to increased performance, organisational commitment, and acceptance of change.

(M. Hanif & S. Endang, 2018)	SEM-PLS	Independent Transformational leadership Dependent Organisational justice Organisational commitment Job performance	Indonesia	Panel Data 1985-2017	Research has experimentally demonstrated that transformational leadership enhance employee performance; however, in contrast to previous research, this one does not substantially increase employee trust or commitment due to an array of factors that are at issue.
(Tedy Ardiansyah et al., 2022)	SEM	Independent Transformational leadership Dependent Self-efficacy Job satisfaction Organisational commitment Lecturer performance	Indonesia	Panel Data 1986-2022	Transformational leadership and job satisfaction have an absolute correlation and have significant impact on job satisfaction which also correlates to self-efficacy, organisational commitment and lecturer performance.

Table 4.1(d) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(Haji Mustaqim, Sabri & Sumardin, 2020)	Quantitative Analysis	Independent Transformational leadership Job satisfaction Dependent Organisational commitment	Indonesia	Panel Data 2007-2020	Results of the research describes that significant relationship is proven between transformational leadership and job satisfaction in addition to high level of job satisfaction results in high organisational commitment.
(Kusni Ingsih et al., 2021)	Mixed method analysis (Multiple linear regression using SPSS)	Independent Inspirational motivation Individualised consideration Idealised influence Intellectual stimulation Dependent Organisational commitment	Indonesia	Panel Data 1990-2021	The study's findings indicate that factors such as individualised consideration and inspiring motivation have a substantial beneficial impact on organisational commitment. In contrast, intellectual stimulation and idealised influence have little bearing on organisational dedication.

(Ayu Putri Aprileani et al., 2022)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Readiness for change Organisational commitment Job Satisfaction Work performance	Indonesia	Panel Data 1997-2022	According to findings, transformational leadership has a favourable impact on job satisfaction, preparedness for change, and organisational commitment. Transformational leadership, job satisfaction, and organisational commitment, on the other hand, have little effect on work performance as well as preparedness for change can act as an intervening mediator in the research.
(Kelsey Dappa et al., 2019)	Mixed method analysis	Independent Transformational leadership Dependent Employee satisfaction	Republic of Turkey	Panel Data 1978-2018	Research demonstrated that, via the mediating effects of organisational politics and organisational commitment, transformational leadership has a major impact on work satisfaction.

Table 4.1(e) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(Marina Zhuravskaya et al., 2020)	Mixed method analysis	Independent Job satisfaction Dependent Work performance Work safety	Poland	Panel Data 1959-2019	The findings indicate that employees' job satisfaction affects their workplace safety. A contented employee feels like they belong to the company, performs better at work, and takes on more responsibility. By analysing three parameters that were used to calculate the satisfaction index and consulting 20 statements that described their level of job satisfaction, the employees defined their level of job satisfaction.
(Sheila A. Boamah et al., 2018)	Quantitative Analysis and SEM	Independent Transformational leadership Dependent Job satisfaction Patient safety outcomes	Canada	Panel Data 1976-2017	Enhancing innovation inside the organisation is crucial for improving patient and nurse safety, and transformational leadership may help managers achieve this.

(Klaic et al., 2020)	Quantitative Analysis	Independent Transformational leadership Dependent Job satisfaction Work-related strain	Switzerland	Panel Data 1934-2020	Although transformational leadership has an effect on job satisfaction, strain at work is negatively correlated with it.
(Hira Khan et al., 2020)	Quantitative Analysis	Independent Transformational leadership Dependent Work performance Working burnout	Pakistan	Panel Data 1985-2020	The findings indicated a favourable and substantial association between transformative leadership and work performance. Nonetheless, there exists a marginal and indirect correlation between transformative leadership and social loafing and work-burnout.
(A.K. Purnomo & N. Novalia, 2019)	Quantitative Analysis (Multiple linear regression)	Independent Transformational leadership Dependent Job satisfaction Organisational commitment	Indonesia	Panel Data 2011-2018	The findings indicated that although job satisfaction had no effect on organisational commitment, transformational leadership characteristics had a linear and positive impact on organisational commitment.

Table 4.1(f) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(Sarinah Lumbantoruan et al., 2020)	Quantitative Analysis	Independent Transactional leadership Dependent Employee job satisfaction	Indonesia	Panel Data 2015-2018	Based on the findings of the data analysis and discussion that the researcher outlines, it was discovered that the transactional leadership style has an effect on workers' job satisfaction levels.
(Thilageswary Arumugam et al., 2019)	Quantitative Analysis	Independent Transactional leadership Transformational leadership Dependent Employee job satisfaction	Malaysia	Panel Data 1959-2016	According to the study's findings, employee work satisfaction was significantly positively connected with both transactional and transformational leadership.

(A. C. Jayadi & S. Ekawati, 2023)	Quantitative Analysis and SEM-PLS	Independent Transactional leadership Motivation Dependent Employee job satisfaction	Indonesia	Panel Data 2010-2021	The results showed that employee work satisfaction is positively and significantly impacted by both transactional leadership styles and motivation.
(Nilima Gandhi, 2022)	Quantitative Analysis	Independent Visionary leadership Dependent Job satisfaction	Germany	Historical data 1947-2021	The results demonstrated a clear relationship between visionary leadership and job satisfaction, with the mediators' commitment to the leader and their meaningfulness at work exhibiting a serial mediation effect.
(Neneng Hayati, 2020)	Quantitative Analysis and SEM	Independent Visionary leadership Talent management Employee engagement Employee motivation Dependent Job satisfaction	Indonesia	Panel Data 2008-2017	The following factors significantly affect job satisfaction: visionary leadership, talent management, employee engagement, and employee motivation all have a simultaneous influence on job satisfaction; additionally, job satisfaction has a significant impact on employee performance. Employee attachment and work motivation also significantly affect job satisfaction.

Table 4.1(g) Previous studies on leadership styles on job satisfaction, moderated by employee commitment (Continued...)

Study	Methodology	Variables	Countries	Data / Period	Findings
(Hao Chen & Jiwen Song, 2021)	Quantitative Analysis	Independent Visionary leadership Dependent Job satisfaction Employee's proactive behavior	China	Panel Data 1984-2018	Results prove that; Proactive employee behaviour is positively connected with visionary leadership. The relationship between visionary leadership and proactive employee behaviour is mediated by perceived organisational support. The relationship between workers' proactive behaviour and their perception of organisational support is moderated by job satisfaction. The mediating role of perceived organisational support between visionary leadership and proactive employee behaviour is moderated by job satisfaction; the greater the job satisfaction, the greater the mediating effect of perceived organisational support between visionary leadership and proactive employee behaviour.

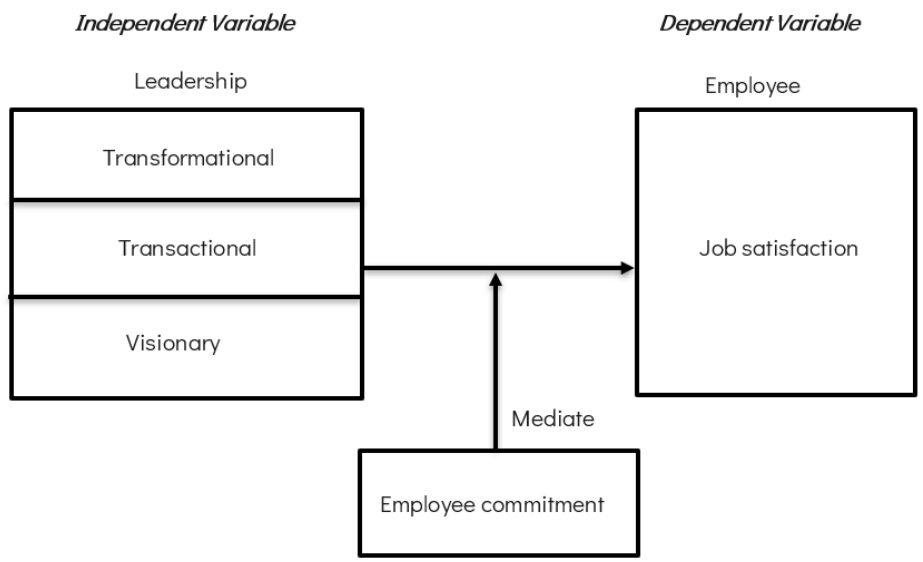


Diagram 4.1 Theoretical framework

4. Discussion

The main aim of this paper is to deduce the different leadership styles' influence on job satisfaction that is moderated by employee or organisational commitment. Leadership styles specifically, transformational, transactional and visionary all have equated different forms and definition that brings about different outcomes when applied into an organisation. Through in-depth literature review of significant data, several theories of the relationship of different leadership styles and how they affect an organisation. Excerpted from A. Eliyana & S. M. Muzakki, 2019; W. S. Chandrasekara, 2019; J. T. Wong et al., 2022 and of many more selected studies, their theories revolves around transformational leadership as their independent variable and job performance, satisfaction, and commitment as their indicators or dependent variable. Transformational leadership focuses on transforming current organisational flow into something different with the concept of constantly evolving. Their evidence proves that transformational leadership significantly impacts organisational commitment and performance as well as employee engagement plays a critical mediating role in supporting both the leader and the employee outcome.

Transactional leadership on the other hand, is a form of leadership that works on transactions with employees. When employees show excellent participation and commitment, they are rewarded with bonuses that were agreed upon prior. As studied by Siswanto et al., 2020; Sarinah Lumbantoruan et al., 2020; Thilageswary Arumugam et al., 2019; A. C. Jayadi & S. Ekawati, 2023, it was also discovered that transactional leadership indeed had significant role in job satisfaction and job commitment within an organisation.

Furthermore, incorporating visions that are applicable for current and future motivation of an organisation such as being realistic and empowering the interest of employees and consumers would also play a role in organisational flow. Through studies by Nilima Gandhi, 2022; Neneng Hayati, 2020; Hao Chen & Jiwen Song, 2021, their results prove that proactive employee behaviour is positively connected with visionary leadership and the relationship between visionary leadership and proactive employee behaviour is mediated by perceived organisational commitment. Moreover, the relationship between workers' proactive behaviour and their perception of organisational support is moderated by job satisfaction while moderated by job satisfaction, thus, the greater the job satisfaction, the greater the mediating effect of perceived organisational support between visionary leadership and proactive employee behaviour.

5. Conclusion

The results were validated by the study that used the broaden-and-build theory as its foundation. Numerous research on organisational behaviour emphasise the significance of work satisfaction. Given the current economy and conditions, where most sectors are impacted by ongoing competition and evolution, it is a crucial component that is especially pertinent (Nilima Gandhi, 2022). On top of that, "Continuous commitment is a form commitment where an employee still joins in the organisation for economic reason." (Kusni Ingsih et al., 2021). To ensure a high of both satisfaction and commitment in an organisation, there comes a leader that ensures it. According to Bass & Avolio, 1994, employee performance is encouraged by transformational leaders, which lowers employees' inclinations to leave. A visionary leader grants their people a great degree of autonomy (Bass, 1985). As referred from Rusdiyanto and Riani (2015), transactional leadership is the practise of rewarding or punishing staff members for performing their jobs.

In such era of globalisation, companies face intense competition as they strive to thrive in a dynamic and interconnected marketplace. To overcome these challenges, companies must adopt a proactive approach to continually evolve and improve. This evolution can be facilitated by the implementation of various leadership styles that focus on enhancing job commitment and job satisfaction among employees. Effective leadership styles such as transformational leadership, transactional leadership, and visionary leadership play a crucial role in this process. They inspire and

empower employees, fostering a sense of commitment and job satisfaction by aligning individual goals with the company's vision. By fostering a dynamic of continuous improvement and employee development, businesses can navigate the competitive landscape of globalisation, ensuring long-term success and sustainability.

6. Reference

- Abuzaid, A. N., Noor Al-Ma'aitah, Yazan Emnawer Al-Haraisa, & Khalaf Ibrahim Al-Tarawneh. (2019). Examining the Impact of Transformational Leadership on the Strategic Decision Effectiveness of Jordanian Microfinance Companies. *International Review of Management and Marketing*, 9(2). <https://doi.org/10.32479/irmm.7562>
- An, S.-H., Meier, K. J., Ladenburg, J., & Westergård-Nielsen, N. (2019). Leadership and job satisfaction: Addressing endogeneity with panel data from a field experiment. *Review of Public Personnel Administration*, 40(4), 589–612. <https://doi.org/10.1177/0734371x19839180>
- Aprileani, A. P., & Abadi, F. (2022). The Roles of Transformational Leadership on Employee's Job Satisfaction, Readiness for Change, and Organizational Commitment of Islamic Banking in Indonesia. *Indonesian Journal of Business Analytics (IJBA)*, 2(2). <https://doi.org/https://10.55927/ijba.v2i2.2228>
- Ardiansyah, T., Endryboeriswati, & Suhud, U. (2022). Organizational commitment in private universities requires transformational leadership reform to increase lecturer performance. *Journal of Positive School Psychology*, 6(2022).
- Arumugam, T., Rahman, A., Maideen, M., & Arumugam, S. (2019). Examining the effect of transactional and transformational leadership styles on employee satisfaction in conglomerate companies. *International Journal of Recent Technology and Engineering (IJRTE)*, 7(5s).
- Azizah, Y.N. & Rijal, Muhammad & Romainur, & Rohmah, U.N. & Pranajaya, Syatria & Ngiu, Z. & Mufid, Abdul & Purwanto, Agus & Mau, D.H.. (2020). Transformational or transactional leadership style: Which affects work satisfaction and performance of islamic university lecturers during COVID-19 pandemic?. *Systematic Reviews in Pharmacy*. 11. 577-588. 10.31838/srp.2020.7.82.
- Bass, B. M. (1985). *Leadership and Performance beyond Expectations*. Free Press; Collier Macmillan.
- Bass, B. M., & Avolio, B. J. (Eds.) (1994). *Improving organizational effectiveness through transformational leadership*. Thousand Oaks, CA: Sage Publications.
- Bastari, A., Eliyana, A., & Wijayanti, T. W. (2020). Effects of transformational leadership styles on job performance with Job Motivation as mediation: A study in a state-owned enterprise. *Management Science Letters*, 2883–2888. <https://doi.org/10.5267/j.msl.2020.4.019>
- Boamah, S. A., Spence Laschinger, H. K., Wong, C., & Clarke, S. (2018). Effect of transformational leadership on job satisfaction and patient safety outcomes. *Nursing Outlook*, 66(2), 180–189. <https://doi.org/10.1016/j.outlook.2017.10.004>
- Chandrasekara, W. (2019, July 7). (PDF) the effect of transformational leadership style on employees job ...
https://www.researchgate.net/publication/342898481_THE_EFFECT_OF_TRANSFORMATIONAL_LEADERSHIP_STYLE_ON_EMPLOYEES_JOB_SATISFACTION_AND_JOB_PERFORMANC_E_A_CASE_OF_APPAREL_MANUFACTURING_INDUSTRY_IN_SRI_LANKA

- Chen, H., & Song, J. (2021). VISIONARY LEADERSHIP'S EFFECT ON EMPLOYEES' PROACTIVE BEHAVIOR: A MODERATING AND MEDIATING MODEL. *Panyapiwat Journal*, 13(1).
- Dappa, K., Bhatti, F., & Aljarah, A. (2019). A study on the effect of transformational leadership on job satisfaction: The role of gender, perceived organizational politics and perceived organizational commitment. *Management Science Letters*, 823–834. <https://doi.org/10.5267/j.msl.2019.3.006>
- Dziuba, S. T., Ingaldi, M., & Zhuravskaya, M. (2020). Employees' job satisfaction and their work performance as elements influencing work safety. *System Safety: Human - Technical Facility - Environment*, 2(1), 18–25. <https://doi.org/10.2478/czoto-2020-0003>
- Eliyana, A., Ma'arif, S., & Muzakki. (2019). Job satisfaction and organizational commitment affect transformational leadership toward employee performance. *European Research on Management and Business Economics*, 25(3), 144–150. <https://doi.org/10.1016/j.iedeen.2019.05.001>
- Gandhi, N. (2022). Visionary Leadership and Job Satisfaction: An Empirical Investigation. *Publication Server of the University of Potsdam*. <https://doi.org/doi.org/10.25932/publishup-57269>
- Gao, R. (Chuang, Murphy, W. H., & Anderson, R. E. (2020). Transformational leadership effects on salespeople's attitudes, striving, and performance. *Journal of Business Research*, 110, 237–245. <https://doi.org/10.1016/j.jbusres.2020.01.023>
- Hayati, N. (2020). The Influence Of Visionary Leadership, Talent Management, Employee Engagement, And Employee Motivation To Job Satisfaction And Its Implications For Employee Performance All Divisions Of Bank Bjb Head Office. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, 9(03).
- Imamoglu, S. Z., Ince, H., Turkcan, H., & Atakay, B. (2019). The effect of organizational justice and organizational commitment on knowledge sharing and firm performance. *Procedia Computer Science*, 158, 899–906. <https://doi.org/10.1016/j.procs.2019.09.129>
- Ingsih, K., Suhana, S., & Ali, S. (2021). Transformational leadership style and organizational commitment in pandemic covid-19. *Contaduría y Administración*, 66(5), 300. <https://doi.org/10.22201/fca.24488410e.2021.3285>
- Irefin, P., & Mechanic, M. A. (2014) "Effect of employee commitment on organizational performance in Coca Cola Nigeria Limited Maiduguri, Borno state." *Journal of Humanities and Social Science* 19(3): 33-41.
- Jayadi, A. C., & Ekawati, S. (2023). The effect of motivation and transactional leadership style on employee job satisfaction at Cable Company in Indonesia. *International Journal of Application on Economics and Business*, 1(1), 628–634. <https://doi.org/10.24912/ijaeb.v1i1.628-634>
- Jensen, M., Potočník, K., & Chaudhry, S. (2020). A mixed-methods study of CEO Transformational Leadership and Firm Performance. *European Management Journal*, 38(6), 836–845. <https://doi.org/10.1016/j.emj.2020.05.004>
- Jiatong, W., Wang, Z., Alam, M., Murad, M., Gul, F., & Gill, S. A. (2022). The impact of transformational leadership on affective organizational commitment and Job Performance: The Mediating Role of Employee engagement. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.831060>
- Kalam, APJ Abdul. (1999) *Wings of Fire*. University Press (India) Pvt. Ltd. 3.

- Khan, H., Rehmat, M., Butt, T. H., Farooqi, S., & Asim, J. (2020). Impact of transformational leadership on work performance, Burnout and Social Loafing: A mediation model. *Future Business Journal*, 6(1). <https://doi.org/10.1186/s43093-020-00043-8>
- Klaic, & Anamarija. (2020). Productivity in scientific teams: the effects of transformational leadership, person–environment fit, and teamwork quality on performance and well-being in scientific teams. *Zurich Open Repository and Archive*. <https://doi.org/https://doi.org/10.5167/uzh-169101>
- Kreitner, R., & Kinicki, A. (2012). *Organizational Behavior*. New York: McGraw-Hill Education.
- Lumbantoruan, S., Kurniawan, L., Christi, C., & Sihombing, J. B. (2020). Impact of transactional leadership style on employee job satisfaction. *TAZKIYA: Journal of Psychology*, 8(1), 56–63. <https://doi.org/10.15408/tazkiya.v8i1.14664>
- Luu, D. T., & Phan, H. V. (2020). The effects of transformational leadership and job satisfaction on commitment to organisational change: A three-component model extension approach. *The South East Asian Journal of Management*, 14(1). <https://doi.org/10.21002/seam.v14i1.11585>
- Loan, L. T. M. (2020). The influence of organizational commitment on employees 'job performance: The mediating role of job satisfaction. *Management Science Letters*, 10(14), 3307- 3312. <http://dx.doi.org/10.5267/j.msl.2020.6.007>
- Mauludin, Hanif, & Sulistyorini, Endang. (2018). The influence of transformational leadership, Organizational Justice, trust and Organizational Commitment Toward Employees 'performance. *Russian Journal of Agricultural and Socio-Economic Sciences*, 82(10), 118–131. <https://doi.org/10.18551/rjoas.2018-10.13>
- Muslichah, M., & Asrori, S. (2018). The effect of transformational leadership style on job satisfaction with trust-in-leader as intervening variable. *Journal of Innovation in Business and Economics*, 2(02), 61. <https://doi.org/10.22219/jibe.v2i02.6580>
- Muppudathi, P., & Krishnan, V. R. (2020). Transformational Leadership and Follower's Perceived Group Cohesiveness: Mediating Role of Follower's Karma-yoga. *Business Perspectives and Research*, 2278533720966065.
- Mwesigwa, R., Tusiime, I., & Ssekiziyivu, B. (2020). Leadership styles, job satisfaction and organizational commitment among academic staff in public universities. *Journal of Management Development*, 39(2), 253–268. <https://doi.org/10.1108/JMD-02-2018-0055>
- Purnomo, A. K., & Novalia, N. (2019). The effects of transformational leadership and job satisfaction on Organizational Commitment. *Proceedings of the 1st International Conference on Economics, Business, Entrepreneurship, and Finance (ICEBEF 2018)*. <https://doi.org/10.2991/icebef-18.2019.94>
- Ramadani Rachmah, A., Sudiro, A., & Amanah Jiwa Juwita, H. (2022). The effect of transformational leadership on organizational commitment: Mediating role of Job Stress and job satisfaction. *International Journal of Research in Business and Social Science (2147- 4478)*, 11(8), 102–112. <https://doi.org/10.20525/ijrbs.v11i8.2134>
- Robbins, S., & Judge, T. A. (2015). *Organizational behavior*. Jakarta: Salemba Empat
- Rusdiyanto, W., & Riani, A. L. (2015). Impact of Transformational and Transactional Leadership on Job Satisfaction and Organizational Citizenship Behavior. *Economia Journal*, 11(2), 161- 168.
- Ruiz-Palomo, D., León-Gómez, A., & García-Lopera, F. (2020). Disentangling organizational commitment in hospitality industry: The roles of empowerment, enrichment, satisfaction and gender.

International Journal of Hospitality Management, 90(August), 102637.
<https://doi.org/10.1016/j.ijhm.2020.102637>

Sabri, Sumardin, H. M. (2021). Transformational leadership, job satisfaction and Organizational Commitment. *Psychology and Education Journal*, 58(1), 5254–5259.
<https://doi.org/10.17762/pae.v58i1.1779>

Salau, O., Oludayo, O., Falola, H., Olokundun, M., Ibidunni, S., & Atolagbe, T. (2018). Integrated datasets on Transformational Leadership Attributes and employee engagement: The moderating role of job satisfaction in the fast moving consumer goods (FMCG) industry. *Data in Brief*, 19, 2329–2335.
<https://doi.org/10.1016/j.dib.2018.06.032>

Siswanto, S., Masyhuri, M., Maksum, I., & Murdiansyah, I. (2020). The role of job satisfaction as a mediating variable on leadership styles to employee performance. *Jurnal Ekonomi Modernisasi*, 16(1), 54–65. <https://doi.org/10.21067/jem.v16i1.4796>

Yateno. (2020). *Perilaku Organisasional: Corporate Approach* (Cetakan Pe). UPP STIM YKPN. Yukl, G. (2015). *Leadership in Organizations*. Prentice-Hall International.