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IDENTIFYING THE KEY DETERMINANTS OF FIRM PRODUCTIVITY IN THE MANUFACTURING AND SERVICES SECTORS IN MALAYSIA

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ABSTRACT

This study investigates the key determinants of firm productivity within the manufacturing and services sectors in Malaysia, focusing on factors such as innovation, training, organizational structure, skilled labour, technology, and firm size. Utilising data from the 2015 Enterprise Survey by the World Bank, the study employs multiple regression and dominance analysis to identify the most influential variables. The results indicate that firm size, particularly large firms, plays a dominant role in enhancing productivity, followed by the geographical location of firms in East and East Coast Malaysia. Additionally, innovation, skilled workers, and a well-organized structure positively impact productivity, while training and technology adoption show a moderate influence. This research provides valuable insights for policymakers and business leaders seeking to improve productivity in Malaysian firms, contributing to the nation's competitiveness in the global market.

Keywords: Firm Productivity, innovation, manufacturing and services sectors, Malaysia

INTRODUCTION

In the context of globalization, Malaysia has experienced a significant surge in development and infrastructure growth. This advancement has simultaneously spurred the expansion of the industrial and manufacturing sectors nationwide. Nevertheless, the increased growth within these sectors has also intensified competition, thereby posing substantial challenges for business owners in sustaining their market presence. In response, firms need to enhance productivity to maintain competitiveness and ensure long-term sustainability. Productivity is defined as the relationship between the output generated by a production or service system and the input resources utilized. More precisely, productivity is the ratio between the goods and services produced (outputs) and the inputs, such as land, labour, capital, and management, employed in the production process. Thus, productivity fundamentally reflects the efficiency and effectiveness with which resources are utilized. The pursuit of higher productivity is a continuous endeavor among organizations and their employees, essential for achieving operational goals and maintaining relevance in the marketplace (Gillberth, 2020). Generally, an increase in output yields a corresponding increase in returns. However, despite numerous initiatives aimed at enhancing productivity, particularly within the manufacturing and service sectors, many firms continue to experience difficulties in achieving comprehensive performance improvements.

Therefore, improving productivity is crucial for ensuring firm survival in an increasingly competitive environment. One strategic approach involves identifying and analysing the key factors that influence productivity, ensuring that improvements align with the organizational mission and strategic objectives. At the macroeconomic level, firm-level productivity is a critical indicator of a nation's potential for sustainable economic growth and its ability to compete in the global economy. In Malaysia, although the government has implemented several policies such as the National Productivity Policy (NPD) and invested in technology and human capital, productivity growth remains moderate. According to the Department of Statistics Malaysia (2025), labour productivity in the fourth quarter of 2024 recorded only a 2.1% increase, a figure that remains modest when compared to neighbouring countries, such as Singapore and South Korea.

Several studies have highlighted the significance of internal factors in influencing firm productivity. Innovation, in particular, is frequently cited as a critical determinant. Innovation not only involves the creation of new products but also enhancements to production processes, management methods, and marketing strategies. Nevertheless, the Malaysia Productivity Corporation (2024) reported that the level of innovation among Malaysian firms remains low, largely due to limited investments in research and development (R&D) and insufficient collaboration between industry and research institutions. Technology adoption is another vital factor influencing productivity. Technologies associated with the Fourth Industrial Revolution (IR 4.0), such as automation, artificial intelligence (AI), and the Internet of Things (IoT), have the potential to significantly enhance production efficiency.

However, Khazanah Research Institute (2024) highlighted that many local firms, particularly small and medium-sized enterprises (SMEs), face challenges in adopting advanced technologies due to financial and human capital limitations. In addition, the availability of highly skilled labour is crucial in driving productivity improvements. Skilled workers not only operate advanced technologies effectively but also contribute significantly to innovation efforts. Nevertheless, Malaysia continues to face a shortage of skilled labour, particularly within the technical and digital domains. Organizational structure also plays an important role. A flexible and efficient structure facilitates effective communication, accelerates decision-making processes, and fosters a productive work culture. However, many Malaysian firms continue to adopt traditional hierarchical structures, which limit adaptability and hinder innovation.

In conclusion, enhancing firm productivity is essential for maintaining competitiveness in an increasingly dynamic economic environment. This study aims to examine the key determinants of firm productivity in Malaysia, with particular emphasis on innovation, training (Mamat, 2006), organizational management, the employment of skilled workers, and technology adoption (Akram, Lei, & Haider, 2016). This research distinguishes itself from previous studies by focusing on firm-level, rather than individual-level, productivity. The analysis utilizes data from the World Bank Enterprise Survey (2015), which provides comprehensive firm-level information and represents the most recent available dataset of its kind for Malaysia. While more recent macro-level data exists, comparable firm-level microdata remain limited, thereby justifying the use of this dataset.

LITERATURE REVIEW

Productivity is defined as the ratio of output to input and serves as a key measure of production efficiency by assessing the ability to generate a given level of output from a specified set of inputs. It functions as an important indicator of a firm's production efficiency, where output represents total production, while inputs encompass land, labour, capital, and management. A higher level of productivity indicates that a worker or producer can generate more output from the same quantity of inputs or achieve the same level of output with fewer resources. As asserted by David P. (2001), productivity constitutes a crucial element for national economic growth. Consequently, enterprises must prioritize the attainment of maximum productivity, as it plays a significant role in national development and broader economic progress (Ann et al., 2011).

In Malaysia, enhancing productivity has been a persistent challenge, particularly in efforts to strengthen global competitiveness and achieve developed nation status by 2020 (Ann et al., 2011). This underscores the importance of understanding the key factors that influence productivity, as such insights are essential for formulating effective strategies to improve profitability while ensuring optimal resource utilization without wastage. The subsequent discussion, therefore, focuses on several critical determinants of firm productivity. Malaysia has experienced significant industrial expansion, intensifying market competition and compelling businesses to enhance efficiency. In Malaysia, improving productivity remains a persistent challenge, particularly amid ongoing efforts to strengthen global competitiveness and achieve developed-nation status (Ann et al., 2011). Consequently, enterprises must prioritize maximum productivity to ensure optimal resource utilisation and support broader national economic progress (Ann et al., 2011).

At the microeconomic level, several internal challenges impede optimal productivity within Malaysian firms. A primary concern is the limited capacity for technological integration. Research highlights that the adoption of automation and information and communication technology (ICT) is vital for promoting innovation and facilitating productivity growth (Irny Suzila et al., 2013). However, local enterprises often struggle with this transition. This issue is further compounded by a shortage of highly skilled labour, which is a critical setback because skilled workers directly enhance a firm's innovation capabilities and enable the mastery of new technologies (Zainal, Riza & Mustafa, 2017).

Additionally, the internal organizational framework plays a pivotal role in a firm's success. Many businesses face inefficiencies due to ineffective management structures and the reliance on traditional hierarchies. Conversely, effective leadership and clear management levels are essential for proper task delegation, supervision, and employee motivation, which ultimately influence group performance and overall organizational productivity (Abdullah, Khairuddin & Halim, 2014). Therefore, addressing these structural and human capital limitations is essential for firms to maintain their competitiveness in a dynamic market.

This study is theoretically grounded in the Resource-Based View (RBV), which posits that a firm's unique configuration of internal resources and capabilities serves as the primary driver of sustained competitive advantage and overall productivity. According to the RBV framework developed by Wernerfelt (1984) and Barney et al. (2001), variations in resource endowments across firms lead to differences in operational performance and market positioning. In this study, the identified determinants of productivity, namely innovation, employee training, organizational structure, skilled labour, technology, and firm size, are conceptualized as strategic, firm-specific resources.

These resources, whether tangible or intangible, extend beyond mere operational inputs and instead represent critical strategic endowments. The adoption of advanced technologies, the continuous development of innovative capabilities, and the cultivation of highly skilled human capital collectively enhance a firm's capacity to improve production efficiency. When these resources are effectively coordinated within a flexible organizational structure, they enable firms to optimize production processes, respond adaptively to environmental changes, and sustain long term performance. Thus, the RBV provides a robust theoretical framework for explaining how the strategic integration of internal, firm level factors translates into superior productivity outcomes, particularly within the Malaysian manufacturing and services sectors.

Innovation

Innovation is widely recognized as a strategic approach for firms to remain competitive in the business environment (Hanaysha et al., 2022; Xia et al., 2012). It allows firms to maintain a stable position in the market (El Amine & Abderrezak, 2013), which is increasingly critical for survival in today's rapidly evolving and uncertain business landscapes (Lu & Shahrudin, 2024). Companies with innovative capabilities are more responsive to environmental changes, whereas firms lacking such capabilities are at risk of stagnation and may eventually exit the market (Yam et al., 2004). According to Reichert et al. (2011), innovation involves absorbing, adapting, and integrating technology into a firm's management routines, ultimately enhancing profitability.

Lawson and Samson (2001) define innovation capability as a company's ability to continuously transform ideas and knowledge into new products, processes, and systems that benefit the organization and its stakeholders, a perspective echoed by contemporary research emphasizing the need to continually reconfigure both tangible and intangible assets (Ruiz-Ortega et al., 2021). Atalay et al. (2013) further argue that innovation improves products and processes, promoting firm survival, rapid growth, and competitiveness. Kamal and Siti Aisyah (2020) emphasize the importance of nurturing innovative behaviours among employees to sustain competitiveness, as the lack of innovation can result in increased absenteeism, resignation tendencies, low morale, and service quality issues (Subramony & Holtom, 2012). Moreover, Zainal, Riza, and Zainol (2017) suggest that a firm's ability to innovate is influenced by its internal environment and resource capabilities.

The presence of internal resources is crucial for achieving competitive advantage and superior performance (Kamasak, 2015), with innovation capabilities often acting as the essential bridge that translates these internal competencies into a sustainable competitive advantage (Hwang et al., 2020). Differences in resource endowments among firms lead to diverse innovation outcomes, thus impacting their competitive positioning (Wernerfelt, 1984; Barney et al., 2001). Thus, fostering innovation is fundamental to enhancing firm productivity.

Training

Training is a systematic process through which organizations provide development opportunities to enhance the capabilities of new and existing employees. Poon (1994) defines training as an organized effort by organizations to facilitate the learning of work-related behaviours aimed at improving current and future employee performance. Similarly, Truelove (1995) views training as an initiative to increase employees' knowledge, skills, and behaviours pertinent to their work roles. Modern literature reinforces this, with Saputri et al. (2020) noting that continuous employee training is essential for personnel to acquire new, competitive skills that directly enhance their daily productivity and adaptability.

Training not only improves individual capabilities but also enhances organizational innovation and performance (Chong et al., 2011). Mamat (2006) notes that training programs aim to improve employee skills, knowledge, and job performance, thus contributing to organizational goals. According to G.A. Cole (2004), training addresses skill and knowledge gaps, aligning employee capabilities with organizational needs, an approach that Anwar and Abdullah (2021) confirm is highly effective in improving practical decision-making and specific task management. Kulkarni (2013) also emphasizes that training equips employees with relevant skills to improve work quality, while Tessin (1978) highlights training's role in enhancing productivity and behaviour modification. Furthermore, organizations that heavily invest in such targeted employee training consistently achieve higher profitability and better employee retention rates, maximizing the return on human capital (Asteris et al., 2022).

Furthermore, Barry and Crant (1994) stress that effective training programs result in observable improvements in employee performance, ultimately leading to higher firm productivity. Nahavandi and Malek Zadeh (1999) affirm that effective training initiatives contribute to achieving both individual and organizational objectives. Recent systematic reviews of organizational management echo these historical findings, concluding that training and development remain some of the most crucial tools for improving organizational efficiency and sustaining a competitive edge in fast-changing markets (Fegade & Sharma, 2023). Therefore, systematic training initiatives are essential to enhancing firm productivity.

Organizational Structure

Employees represent the cornerstone of any organization, and an effective organizational structure is critical to ensuring optimal productivity. A well-designed structure enhances operational efficiency and facilitates better task execution. Gillberth (2020) highlights that a competent organizational system improves workflow, communication, and alignment with organizational objectives. Organizational structure is formed through layers of management, each playing a crucial role in operational success. Clear management levels help avoid discipline issues, such as absenteeism, job abandonment, and low concentration at work (Suhaya & Siti Zubaidah, 2016). Leaders play an essential role in task delegation, supervision, and motivating employees, ultimately influencing group performance and organizational productivity (Abdullah, Khairuddin, & Halim, 2014).

Muna and Atasya (2013) find that higher levels of employee commitment and satisfaction within an organizational structure are positively associated with higher productivity. Thus, establishing a well-structured organization is fundamental to achieving superior productivity levels.

Skilled Workers

Skilled workers are vital assets to organizations, significantly influencing productivity outcomes. Gillberth (2020) asserts that organizational productivity is driven by employee productivity. Skilled labour enhances firm innovation capabilities, enabling mastery of new technologies (Zainal, Riza, & Mustafa, 2017). Rahim, Nurmahfuzah, and Badariah (2016) emphasize that skilled labour correlates with higher productivity levels and forms the foundation for company and national income growth. Nevertheless, the Federation of Malaysian Manufacturers (FMM) (2014) reports challenges in recruiting skilled workers, as employers are reluctant to lose their experienced employees. Thus, skilled employees are crucial for firms seeking to optimize production and maximize profitability.

Technology

Technological advancement has revolutionized production processes, making firms more efficient and competitive (Akram, Lei, & Haider, 2016). Technology enhances output quantity, saves production time, and reduces dependence on manual labour (Gillberth, 2020). The adoption of automation and Information and Communication Technology (ICT) further promotes innovation and competitiveness, facilitating productivity growth (Irny Suzila et al., 2013; Md. Nor Hayati & Mohd. Fazli, 2010). Mahanum Abd Aziz (2019) notes that Industry 4.0 technologies serve as catalysts toward achieving high productivity and transitioning into a high-income economy.

Education Level

Education significantly impacts life opportunities and economic conditions (Ross & Wu, 1996). Higher education levels correlate with reduced poverty risks and improved living standards (Lucas, 1972; Preston & Elo, 1996). Educational attainment is also linked to greater labour market success (Imazeki & Reschovsky, 2003). Becker (1964) and Mincer (1974) demonstrate that education has a direct relationship with worker productivity, ultimately contributing to national economic development. Thus, higher education, complemented by training, fosters the development of a skilled workforce, essential for firm productivity enhancement.

The literature reviewed underscores that productivity is a key indicator of a firm's efficiency and a critical contributor to national economic growth. Several internal factors have been identified as significant determinants of productivity, including innovation, training, organizational structure, skilled labour, technology, and education. Innovation enables firms to remain competitive, while training enhances employee capabilities. A well-structured organization supports effective operations, and skilled workers contribute to innovation and technological advancement.

The adoption of modern technologies improves production efficiency, and education builds the foundation for a competent workforce. Collectively, these factors demonstrate that productivity is influenced by a multifaceted set of interrelated elements. Firms must adopt a holistic approach that integrates these variables to achieve sustainable productivity gains. This review provides a strong theoretical basis for examining how such factors contribute to productivity in Malaysian firms, serving as the groundwork for the next stage of this study's empirical investigation.

The Conceptual Framework

Figure 1 presents the theoretical framework of this study, developed by the author based on previous research. It incorporates key variables identified in the literature and illustrates their relationships, consistent with prior studies.

Based on the resource-based view and the preceding literature review, this study systematically examines the primary determinants of firm productivity. Specifically, the research investigates how a firm's internal resources and capabilities, namely innovation, employee training, organizational structure, skilled labour, technology, and education, alongside structural characteristics like firm size and geographic location, influence its overall efficiency. To empirically test these relationships within the context of the Malaysian manufacturing and services sectors, the following hypotheses are proposed:

H1: There is a significant positive relationship between innovation and firm productivity.

H2: There is a significant positive relationship between employee training and firm productivity.

H3: There is a significant positive relationship between a well-designed organizational structure and firm productivity.

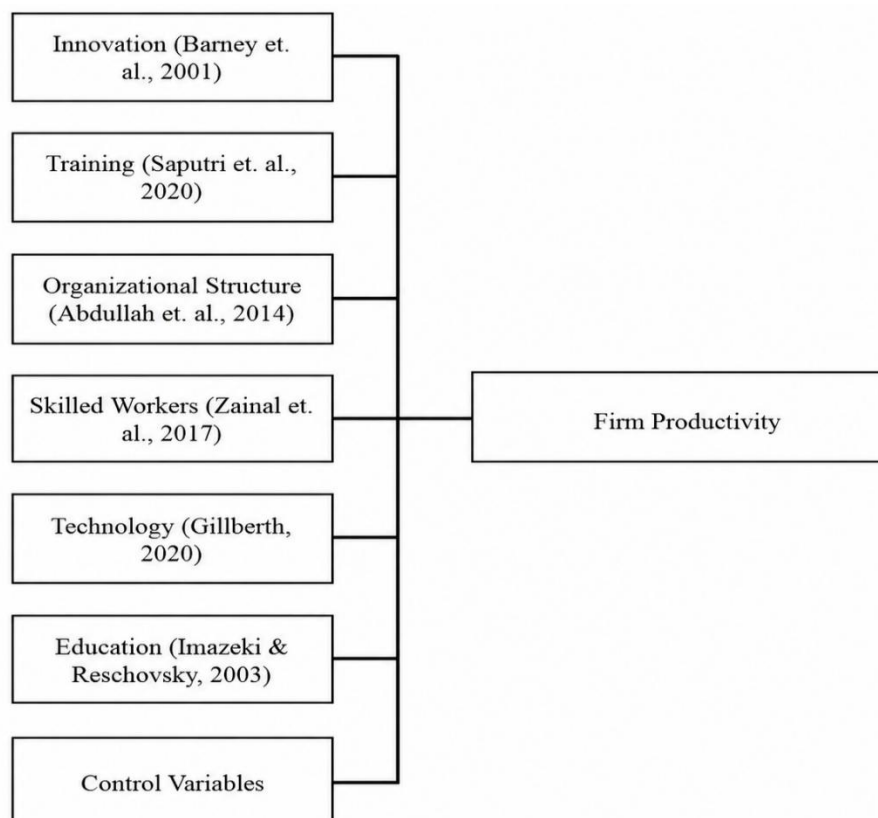
H4: There is a significant positive relationship between the employment of skilled workers and firm productivity.

H5: There is a significant positive relationship between technology adoption and firm productivity.

H6: There is a significant positive relationship between the education level of the workforce and firm productivity.

Figure 1

The Conceptual Framework



METHODOLOGY

This study utilizes data from the 2015 Enterprise Survey conducted by the World Bank. The 2015 Enterprise Survey (ES Malaysia) employs random sampling, with three levels of stratification: industry, firm size, and region. The industrial structure is divided into five manufacturing industries and two service industries, namely Food and Beverage, Apparel, Chemicals, Electronic Products, Other Manufacturing, Retail, and Other Services. In ES Malaysia, firm size is classified based on the number of employees: small (5 to 19 employees), medium (20 to 99 employees), and large (100 or more employees). A total of 1,000 firms across Malaysia were included in this study to address the research questions.

Multiple regression analysis

In this study, a multiple regression analysis will be performed using a mathematical equation that illustrates the relationship between the dependent variable and several independent variables. The analysis will be conducted based on the equation provided below.

$$Y_n = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + \beta_7 X_6 + CV \quad (1)$$

where;

Y – Dependent Variable (Firm Productivity)

β – Coefficient

X_1 - Innovation

X_2 - Training

X_3 - Organizational Structure

X_4 - Skilled Workers

X_5 – Technology

X_6 - Education

CV - Control variable

Variables

Following the methodology proposed by Francis et al. (2020), this study measures total factor productivity (TFP) utilizing the natural logarithm of total revenue as a proxy. Furthermore, the variables pertaining to training, organizational structure, innovation, technology, and firm size are operationalized as categorical data using dummy variables. In contrast, the variables representing skilled workers, educational attainment, and firm age are measured on a continuous scale utilizing their absolute values.

Dominance Analysis

In multiple regression analysis, this method examines the combined effects of all independent variables on the dependent variable. However, it is not suitable for measuring the individual effects of each independent variable on the dependent variable as reflected in R^2 . The dominance analysis method can determine the R^2 value for each independent variable in the model based on Shapley and Owen values (Huettner & Sunder, 2012). This method measures the relative importance of predictors, not causality. This method can also assess the impact of each independent variable on the dependent variable within the established model. One objective of this chapter is to identify the impact of labour, capital, material input, innovation, and training on productivity. To achieve this, dominance analysis will be used to determine the contribution of independent variables to productivity. Dominance analysis allows for the allocation and identification of

the influence of variables on firm productivity, and it can decompose the effects of innovation and training on productivity based on their contributions to R^2 .

Using this approach, the equation will be divided into two groups: innovation (Group 1) and training (Group 2). Let V represent all the independent variables and G denote the total number of groups. According to Huettner and Sunder (2012), for the distribution of R^2 , it should be systematically allocated across all regression variables (V). As a result, additional regression analyses for each combination of variables can be expressed as follows:

$$Wage_i = \beta_0 + \sum_{X_j \in V} \beta_j X_j + \varepsilon \quad (2)$$

Based on the equation provided above, j represents the number of combined variables in each regression analysis. Each regression analysis will produce or demonstrate its own strengths and advantages. This value is calculated using the function defined from the power set V to R . As a result, each combination of variables will be assigned its corresponding advantages (Huettner & Sunder, 2012).

The equation is structured as follows:

$$Y = (\beta_0 + \beta_i x_i)_{G1} + \dots + (\beta_t x_t)_{G2} + \dots + \varepsilon \quad (3)$$

Based on the equation, the OLS model consists of two groups, $G1$ and $G2$. Assume that $G1$ represents innovation and $G2$ represents training. This analysis will allow us to observe the impact of each group ($G1$ and $G2$) on the dependent variable based on R^2 . However, if the regression does not include any independent variables, but only an intercept, the independent variables will be assigned a value of zero. This value is assessed using game theory, as described by Huettner and Sunder (2012).

FINDINGS

Based on Table 1, the model consisting of 15 independent variables is significant in explaining the dependent variable (productivity). This is supported by the F-test value shown in the table above, which is $F2 = 0.000$. Additionally, the R^2 value is 0.1596, meaning that 15.96% of the variation in productivity is influenced by the independent variables in the model, while the remaining 84.04% is influenced by other factors. The regression analysis yields a low value of R^2 . This is standard and acceptable given that the study utilizes cross-sectional microdata from the 2015 Enterprise Survey, encompassing 1,000 distinct firms across five manufacturing industries and two service sectors. Given the inherent heterogeneity of modelling idiosyncratic management styles and varied operations at the micro-level, substantial variance is expected. Despite this, the overall model remains robust and highly significant, evidenced by an F-test value of 0.000. The model successfully identifies the directional impact of key determinants, revealing statistically significant positive relationships for critical variables such as small firm size ($p = 0.000$), medium firm size ($p = 0.029$), and the utilization of skilled workers ($p = 0.003$).

To determine the effect of these independent variables on the dependent variable, the p-values were examined. The p-value serves as a threshold to ensure it does not exceed the critical p-value of 0.10. The innovation variable is significant, as its p-value (0.085) is smaller than the critical p-value (0.10). According to the table above, the coefficient value for the innovation variable is 0.4274. This indicates that innovation implemented within the firm over the past three years will increase productivity by 42.74% in the current year. Next, the firm size variables for small and medium-sized firms are also significant, with p-values of 0.000 and 0.029, respectively. Small and medium-sized firms will see productivity differences

of 78.46% and 41.23%, respectively, compared to large firms. Additionally, the skilled workers variable is significant with a p-value of 0.003. The table shows that the coefficient for the skilled workers variable is 0.1158, indicating that using 1% more skilled workers will increase firm productivity by 1.16%.

There are also significant variables that lead to a decrease in firm productivity due to negative coefficient values. The firm's location in central Peninsular Malaysia (0.053), southern Peninsular Malaysia (0.000), and northern Peninsular Malaysia (0.015) has a significant negative effect on productivity by 49.53%, 88.97%, and 64.14%, respectively, compared to firms located in southern Peninsular Malaysia. This study found that firm size is the most dominant factor influencing firm productivity in Malaysia. Large firms contribute 0.2246 or 22.46% to overall productivity. This suggests that larger firms have greater capacity to invest in technology, better human resources, and larger production capacities. Large firms also benefit from economies of scale, which help reduce production costs and improve production efficiency. As a result, larger firms have a clear advantage in optimizing their operations, ultimately boosting overall productivity.

Table 1

Multiple regression analysis

Productivity	Coefficient	Robust Standard Error	T	P> T	95% Conf	Interval
Training	-0.1486	0.1829	-0.81	0.417	-0.5080	0.2108
Organizational Structure	0.2420	0.2139	1.13	0.259	-0.1784	0.6623
Innovation	0.4274	0.2474	1.73	0.083	-0.0390	0.9141
Skilled Workers	0.0114	0.0038	3.03	0.003	0.0041	0.0191
Technology	-0.2213	0.1806	-1.23	0.221	-0.3762	0.1336
Education	-0.0005	-0.0030	-0.18	0.857	-0.0064	0.0053
Small	0.7846	0.1940	4.04	0.000	0.4034	1.1659
Medium	0.4123	0.1877	2.20	0.029	0.0434	0.7813
Large	0					
Firm Age	-0.0217	0.0077	-2.81	0.005	-0.03684	-0.0065
Central	-0.4953	0.2549	-1.94	0.053	-0.9962	0.0056
South	-0.8897	0.2384	-3.37	0.000	-1.3583	-0.4211
North	-0.6414	0.2638	-2.43	0.015	-1.1599	-0.1229
East Coast	0					
East	0.1818	0.3037	0.60	0.550	-0.4152	0.7788

The second and third most dominant factors affecting firm productivity are the firm's location in East Malaysia and on the East Coast of Peninsular Malaysia. Firms in East Malaysia contribute 0.1516 or 15.16% to productivity, while those on the East Coast contribute 0.1291 or 12.91%. The location of a firm is crucial for improving production efficiency because firms situated in areas with better access to resources and markets can lower logistics and transportation costs. Furthermore, a strategically placed firm has the added benefit of quicker access to raw materials and can speed up production processes, thereby enhancing productivity.

The factors ranked fourth, fifth, and sixth are medium-sized firms, skilled workers, and firm age. These factors contribute 10.92%, 8.39%, and 7.00%, respectively, to productivity. Medium-sized firms offer greater flexibility in adjusting to market changes and customer demands. Moreover, firms employing skilled workers see increased production efficiency because these workers are faster and more effective in carrying out tasks. Skilled workers are also more likely to approach problem-solving creatively, leading to overall productivity improvements. Firm age also plays a role, as it reflects the firm's experience in managing production challenges and improving existing systems. Older firms typically have more experience, enabling them to run operations more efficiently and avoid costly mistakes.

Factors ranked from seventh to tenth that also positively affect firm productivity include small firm size, innovation, firms located in central Peninsular Malaysia, and firms in northern Peninsular Malaysia. Small firms benefit from management efficiency due to their dynamism and ability to adapt quickly to market changes. They can also adopt new technologies faster and optimize operations in a shorter time frame. Innovation is another significant factor because firms that innovate in products and processes can improve productivity by enhancing production technologies, refining products, and cutting costs. Firms in central and northern Peninsular Malaysia also enjoy logistical advantages, better market access, and more readily available resources, all of which can boost production efficiency.

Table 2

Dominance Analysis

Productivity	Dominant Statistic	Dominant Statistic Variance	Rank
Large	0.0639	0.2246	1
East	0.0431	0.1516	2
East Coast	0.0367	0.1291	3
Medium	0.0311	0.1092	4
Skilled Workers	0.0239	0.0839	5
Firm Age	0.0119	0.0700	6
Small	0.0186	0.0654	7
Innovation	0.0144	0.0506	8
Central	0.0124	0.0436	9
North	0.0062	0.0217	10
South	0.0055	0.0192	11
Organizational Structure	0.0051	0.0181	12
Education	0.0013	0.0046	13
Technology	0.0013	0.0044	14
Training	0.0011	0.0038	15

Finally, factors ranked eleventh to fifteenth include firms located in southern Malaysia, organizational structure, employee education level, technology, and training. Firms in southern Malaysia have a less significant impact on productivity compared to other factors. While firms in the south may have more limited access to some key resources, they can still optimize operations through effective management strategies. Organizational structure also plays a role in improving management efficiency and work processes. A more flexible and collaborative organizational structure can facilitate resource management and increase production efficiency. Employee education and training contribute to productivity, but their impact is more moderate compared to factors like firm size and location. Highly educated and skilled

workers are more efficient in performing tasks, but their effect on overall productivity is typically not as large as the impact of factors like firm size or innovation.

DISCUSSION

This study found a significant positive relationship between employee training and firm productivity. This result is supported by recent research by Ibrahim (2025), which found that employee training enhances technical and managerial skills, thereby improving operational efficiency. Employee training not only helps workers develop their technical skills but also boosts motivation and job satisfaction, positively impacting their productivity. According to Ibrahim (2025), well-trained employees tend to take initiative and solve problems more efficiently, thereby improving individual productivity and, consequently, the firm's overall productivity. This aligns with the study by Nahavandi and Malek Zadeh (1999), which highlights that investing in employee training is one of the most effective ways to improve productivity in both industrial and service sectors.

The study also found a significant relationship between organizational structure and firm productivity. This finding is consistent with research by Ružičić (2024), which shows that firms with more flexible and decentralized organizational structures are more efficient in decision-making. A clear and well-organized structure enhances cooperation between employees and management, which, in turn, improves the smoothness of operations and production efficiency. A structure that allows for smooth communication and quick decision-making enables firms to resolve problems more quickly and accelerate production processes. This makes a well-organized structure a crucial factor in boosting productivity within firms. The study by Muna and Atasya (2013) also confirms that a strong organizational structure not only improves employee job satisfaction but also encourages greater commitment to the company's goals.

Furthermore, there is a significant positive relationship between innovation and firm productivity. Research by Atalay et al. (2013) supports this finding, indicating that innovation in products and processes enhances efficiency and competitiveness. Firms that innovate can reduce production costs and improve product quality, thereby increasing profits. Research by Zhang, Wang, and Liu (2024) also confirms that adopting innovative technologies can accelerate production processes and improve firm management, thereby boosting productivity. In today's highly competitive business environment, firms that embrace continuous innovation are better positioned to survive and increase productivity, as they can adapt to market changes and customer needs more effectively.

The study revealed a significant link between skilled workers and firm productivity. According to Rahim et al. (2016), employee skills are crucial for enhancing a company's output. Workers with greater expertise and experience in specific fields can perform tasks more efficiently and accurately, thereby improving production efficiency and product quality. Skilled employees are also better equipped to detect issues and develop innovative solutions, minimizing downtime and increasing operational effectiveness. Similarly, Amin et al. (2023) found that investments in employee skills, particularly in technology and management, directly strengthen a firm's competitiveness in the global market. Thus, enhancing workforce skills not only raises productivity but also provides long-term strategic benefits to the organization.

The study further identified a positive relationship between small firm size and productivity in Malaysia. However, this outcome contrasts with Meiryani et al. (2020), who argue that larger firms generally achieve higher profitability and productivity. The discrepancy may be attributed to geographical factors, as smaller firms in Malaysia tend to be more agile in responding to market changes and more adept at adopting new technologies. They also often manage resources more effectively and maintain lower operational costs.

Consequently, small firms can sustain strong productivity through efficient management practices and a sharper focus on cost control.

Additionally, the study found that a firm's location, particularly those situated in East Malaysia and the East Coast of Peninsular Malaysia, significantly influences productivity. This aligns with Woharn et al. (2017), who emphasize that geographic positioning plays an important role in boosting production efficiency and profitability. Access to better infrastructure and resources reduces transportation expenses, accelerates production processes, and enhances overall productivity. Firms in such locations are also better positioned to secure raw materials, reach wider markets, and minimize logistics costs, all of which contribute to improved operational performance.

Lastly, the research highlighted that large firm size remains a key driver of higher productivity in Malaysia. Supporting this, Meiryani et al. (2020) note that bigger firms possess advantages in financial capacity, technological investments, workforce development, and innovation, which collectively enhance productivity levels. Furthermore, firms located in East Malaysia and the East Coast rank second and third, respectively, among the dominant factors affecting firm productivity. Strategic location choices provide better access to essential resources and markets, reduce operational expenses, and ultimately improve production efficiency.

CONCLUSION

The findings of this study underscore the significance of several key factors that substantially enhance firm productivity. Among these, innovation stands out as a critical driver. By adopting new technologies and streamlining business processes, firms can ensure their competitiveness and long-term growth in an increasingly competitive market. Innovative firms tend to improve both operational efficiency and product quality, thereby strengthening their competitive edge. Furthermore, skilled employees play an essential role in driving productivity. Well-trained workers with skills aligned with industry requirements can help firms achieve greater efficiency, reduce operational waste, and increase output. A workforce with the right skill set is a key asset, as it not only improves productivity but also enhances overall operational effectiveness.

While this study has several limitations, including the use of cross-sectional data from 2015 and the focus on selected sectors, these constraints have been explicitly acknowledged and carefully considered in the interpretation of the findings. Accordingly, the policy implications are presented with appropriate caution, particularly given the potential changes in the economic and regulatory environment over time. Despite these limitations, the findings offer valuable baseline structural insights into the key determinants of firm productivity in Malaysia. These insights remain relevant for understanding long-term patterns and relationships, rather than short-term fluctuations. This study, therefore, provides a useful foundation for future research, which may incorporate more recent data, broader sectoral coverage, and alternative methodological approaches to further enhance understanding of productivity dynamics across industries in Malaysia.

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Appendix 1

Variables	VIF	1/VIF
Training	1.22	0.821797
Organizational Structure	1.49	0.669098
Innovation	1.36	0.736583
Skilled Workers	1.70	0.589074
Technology	1.15	0.867765
Education	1.13	0.881869
Small	1.70	0.587556
Medium	1.60	0.62598
Firm Age	1.35	0.738097
Central	2.23	0.448401
South	1.44	0.692582
North	1.97	0.506731
Mean	1.53	

Note: VIF results show no multicollinearity problem. All VIF values are low (1.13 – 2.23)