

The Age-Resource Dynamic and Product Innovation Performance

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How to cite this paper: Bakar, L. J. A. (2025). The Age-Resource Dynamic and Product Innovation Performance. *Open Journal of Business and Management*, 13, 3648-3665.

<https://doi.org/10.4236/ojbm.2025.135196>

Received: April 6, 2025

Accepted: September 21, 2025

Published: September 24, 2025

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Abstract

This study focuses on small and medium enterprises (SMEs) in Malaysia's manufacturing and agro-based sectors, which are particularly vulnerable to resource constraints and environmental uncertainties. SMEs were selected based on their classification by SME Corporation Malaysia, which defines them as enterprises with fewer than 150 employees. The sampling frame was derived from SME Corporation Malaysia's online directory, ensuring accuracy and representativeness. A probability sampling approach, specifically proportionate stratified random sampling, was employed to select 362 manufacturing SMEs across Malaysia's 14 states. This study examines the role of tangible resources in predicting product innovation performance (PIP) in SMEs and the moderating effect of SME's age. Findings indicate that tangible resources are often less critical for innovation success in SMEs due to their dynamic and flexible operational environments. Unlike larger firms, SMEs rely more on intangible assets such as knowledge, skills, and organizational culture to drive innovation. Resource constraints further push SMEs to develop innovation strategies centred on human capital and technological expertise rather than physical and financial assets. However, firm age moderates this relationship, with older SMEs demonstrating a stronger capacity to leverage tangible resources for innovation. More mature firms benefit from established routines, financial stability, and deeper market insights, enhancing their ability to convert tangible resources into innovative outputs. In contrast, younger SMEs face challenges in optimizing tangible assets due to limited experience and funding. The originality of this study underscores the importance of dynamic capabilities and strategic resource utilization in fostering innovation within SMEs. Findings from this study contributed to a better understanding of SME dynamics and resource challenges in Malaysia's manufacturing and agro-based sectors.

Keywords

Small Medium Enterprise, Tangible Resources, Product Innovation Performance, Innovation, SME's Age

1. Introduction

In today's volatile and rapidly evolving business environment, product innovation performance (PIP) remains highly relevant due to three primary factors: intense global competition, increasingly fragmented and demanding markets, and the proliferation of diverse and rapidly changing technologies (Pisano, 2015; Crossan & Apaydin, 2017; Salisu & Bakar, 2019). Despite its importance, research on innovation management within SMEs has lagged similar studies focusing on larger organizations, which are predominantly conducted in advanced economies such as Germany, Japan, the United Kingdom, and the United States (OECD, 2018). Additionally, while globalization has broadened the relevance of emerging and developing economies, research utilizing data from smaller and transitioning economies remains limited. For instance, Malaysia a growing economic hub in Southeast Asia has received minimal scholarly attention regarding its most innovative sectors and their respective contributions to PIP (Kamal et al., 2021; Maziriri, 2020). In Malaysia, successful new products are essential for many small and medium-sized enterprises (SMEs), as product innovation is a critical strategy for adapting to changes in markets, technology, and competition (Ismail et al., 2019; Halim et al., 2020). Innovation is particularly vital for small firms, as they must continuously introduce new products, improve processes, adjust organizational structures, and explore new markets to remain competitive (Asad et al., 2021; Karim et al., 2022). This growing importance of innovation in SMEs has increasingly captured the attention of researchers and policymakers. The field of innovation management traces its origins to the 1930s with Joseph Schumpeter's seminal work, which emphasized the role of innovation in large firms. To thrive in a competitive environment, SMEs must align their investment in physical resources and equipment with efforts in employee training, skill development, work reorganization, and software upgrades. This integrated approach is essential for maximizing the potential of such investments in driving the development of new products (Kyndt & Baert, 2015; Ghobadian et al., 2020).

The availability and quality of tangible resources play a crucial role in successful innovation, as acquiring and maintaining these resources remains a critical concern for business owners aiming to sustain competitiveness and enhance organizational capabilities (Robson & Bennett, 2021). Firm characteristics, such as SME age, represent critical elements of the organizational context. Research continues to highlight a negative relationship between firm age and innovative behavior, as older firms often become more bureaucratic and less adaptable to innovation (Schneider et al., 2017). In contrast, intermediate-age firms demonstrate a higher likelihood of innovation, leveraging a balance between experience and agility (Coad et al., 2020). Younger firms tend to exhibit more growth trajectories due to their adaptability and entrepreneurial drive. Moreover, growth in turnover is positively linked to firm size, process innovation, product innovation, and organizational change (Del Giudice et al., 2019). Given these dynamics, the SME age is often viewed as a moderating factor in the relationship between SMEs' resources

and their PIP. However, the interplay between these variables remains underexplored, particularly in SMEs operating in dynamic environments, suggesting the need for further empirical investigation. This study aims to address these gaps by examining whether tangible resources significantly affect PIP, and did SME age moderate the relationship between resources and PIP.

2. Literature Review

2.1. Product Innovation Performance

An effective performance measurement system must encompass both financial and non-financial measures to provide a holistic view of organizational performance. Financial measures, such as profitability, sales, and asset utilization, are crucial for evaluating quantifiable outcomes. However, these often focus on short-term objectives and may overlook broader strategic goals (Franco-Santos & Otley, 2018). To address these limitations, researchers have emphasized the inclusion of non-financial metrics, which consider factors like innovation, customer satisfaction, and employee engagement (Kaplan & Norton, 2017). Non-financial measures have gained prominence due to challenges in obtaining sensitive financial data and their ability to assess strategic positioning relative to competitors (Gimenez-Espin et al., 2020). For instance, Alegre and colleagues' framework for non-financial performance measurement highlights dimensions such as efficiency and efficacy, capturing both the outcomes of innovation and the resources deployed (Alegre et al., 2018). Similarly, product innovation performance (PIP) reflects the effectiveness and efficiency of new product implementation, which can be measured objectively (through cost and time analyses) or subjectively (via surveys and qualitative insights) (Garcia & Calantone, 2016).

The breakdown of implementation efficiency into resource management and organizational practices further supports comprehensive performance measurement. Effective resource allocation, including financial resources and workflow optimization, alongside robust business planning, significantly enhances competitiveness (Ryan et al., 2021). Wernerfelt's resource-based view emphasizes that competitive advantage stems from attributes enhancing efficiency and strategic differentiation (Barney et al., 2019). Studies in manufacturing sectors also affirm that determinants such as product quality, lead time, and cost are critical for competitiveness, particularly in industries like chemicals, textiles, and food processing (Yegenoglu & Ulusoy, 2020). Measurement frameworks have increasingly focused on non-financial performance indicators like market share, innovation, and operational efficiency. This complements financial metrics such as profitability and sales growth, which remain essential benchmarks for performance evaluation (Taticchi et al., 2019). As firms integrate financial and non-financial metrics, they gain a more comprehensive understanding of organizational success, aligning with contemporary resource-based and strategic management paradigms.

2.2. Tangible Resources and Product Innovation Performance

Resources are broadly categorized as tangible and intangible assets, serving as critical drivers of entrepreneurial and organizational success. Tangible resources, such as capital, physical assets, and geographical location, are relatively straightforward to manage and protect due to their concrete nature (Gupta et al., 2020). Tangible resources, such as physical assets and financial capital, provide the necessary infrastructure and funding for research and development (R&D) activities, facilitating the creation and improvement of products. Additionally, tangible resources are often conceptualized as a homogenous construct in empirical research, which may oversimplify their nuanced influence on performance and innovation processes (PIP). This generalization neglects the potential heterogeneity among specific types of tangible resources, such as physical infrastructure, technological equipment, and financial capital which may exert differential impacts on organizational innovation outcomes. Recent studies have emphasized that treating tangible assets as a singular category can obscure important variations in their strategic value (Peteraf et al., 2022). For instance, investment in state-of-the-art machinery might directly facilitate product innovation, while financial capital primarily influences innovation indirectly by enabling R&D activities and human capital development (Afuah, 2020; Subramaniam & Youndt, 2021). Moreover, sector-specific demands mean that certain tangible resources play more pivotal roles in PIP than others, depending on industry context (García-Sánchez et al., 2023). Thus, a more granular approach is needed to disentangle the unique contributions of different tangible resources to organizational innovation performance.

On the other hand, the relationship between tangible resources and product innovation performance (PIP) has been extensively studied, with research indicating that tangible resources play a significant role in enhancing a firm's innovation capabilities. For instance, Silva et al. (2020) conducted a qualitative multi-case study exploring the influence of innovation on tangible and intangible resource allocation. Their findings suggest that effective management and allocation of tangible resources are crucial for fostering innovation within firms. They emphasize that the availability of physical assets and financial resources enables companies to invest in new technologies and processes, thereby enhancing product innovation performance. Similarly, a study by Lin and Wu (2010) assessed the relationship between firm resources and product innovation performance. The research indicates that tangible resources, when effectively utilized, contribute positively to product innovation. The study highlights that while intangible resources like knowledge and skills are important, the role of tangible resources remains significant in supporting innovative activities.

Furthermore, research by Lin and Wu (2014) examined the contribution of tangible and intangible resources, along with capabilities, on firm performance. Their findings reveal that tangible resources have a direct impact on a firm's ability to innovate, as they provide the essential means for developing new products and services. The study underscores the importance of a balanced allocation of both

tangible and intangible resources to achieve optimal innovation performance. In conclusion, the literature suggests a positive relationship between tangible resources and PIP. Effective allocation and management of tangible resources, such as physical assets and financial capital, are essential for fostering innovation and enhancing a firm's competitive advantage in the market.

2.3. SME Age as Moderator—The Resource-Based View Perspective

SME age is often studied as a moderator in the relationship between firm characteristics and performance outcomes. Older SMEs are typically assumed to benefit from greater experience, established networks, and refined operational processes, which may enhance performance (Huerger & Jaumandreu, 2004b). Conversely, younger SMEs may exhibit agility, innovation, and adaptability, which can be advantageous in dynamic environments (Autio et al., 2000). For example, Zahra et al. (2000) investigated how firm age moderates the relationship between corporate entrepreneurship and performance. Their findings indicate that younger firms benefit more from entrepreneurial initiatives than older firms, which may be constrained by established routines and inertia. Innovation capabilities are often influenced by the age of an SME. Younger firms are more likely to adopt disruptive innovations, driven by a lack of entrenched practices and a willingness to experiment (Levie & Autio, 2008). In contrast, older SMEs may rely on incremental innovations, leveraging accumulated knowledge and resources. The age of an SME has been found to moderate the relationship between resource capabilities and innovation outcomes (Coad et al., 2016).

The moderating role of SME age is also evident in studies examining entrepreneurial orientation (EO) and strategic decision-making. Anderson & Eshima (2013) found that the positive impact of EO on firm performance is stronger in younger firms due to their higher risk tolerance and less rigid structures. Older SMEs, while benefiting from stability, may face challenges in implementing entrepreneurial strategies due to their ingrained practices. The resource-based view (RBV) framework highlights how firm age can moderate the relationship between resources and competitive advantage. Older SMEs have had more time to accumulate and develop valuable resources, including reputation, brand equity, and customer loyalty (Barney, 1991). However, the rigidity of resources in older firms may hinder adaptability, making SME age a double-edged sword in dynamic markets. The external environment, including market turbulence and competitive intensity, interacts with SME age to influence performance and strategic outcomes. Older SMEs may be better equipped to withstand environmental shocks due to their resilience and established processes, while younger SMEs may excel in exploiting emerging opportunities (Stinchcombe, 1965).

Recent research underscores the importance of understanding how firm age influences innovation and internal organizational dynamics. Studies suggest that as firms mature, they often place less emphasis on learning processes, which nega-

tively affects their innovation performance (Coad et al., 2020). Mature firms are more prone to failure due to their reduced adaptability to environmental changes, whereas younger firms typically fail because of deficiencies in managerial expertise and financial management (Hansen & Hamilton, 2016). For younger firms, the critical challenge lies in survival and in building valuable resources and capabilities. These firms often face resource constraints, while mature firms grapple with organizational inertia, limiting their flexibility (Rasmussen et al., 2017). Younger firms also struggle with revenue generation due to start-up costs, and many fail when their resources are depleted. Conversely, mature firms face the challenge of strategic transformation, ensuring their resources and capabilities continue to deliver value as competitive landscapes evolve (Schneider et al., 2017). Additionally, aging firms often become more risk-averse, favoring less risky projects (Del Giudice et al., 2019). While some studies associate increased age with better performance due to accumulated experience and resource development, others suggest the opposite. For example, mature firms may benefit from value creation over time (Wirtz et al., 2016), but sales productivity and the introduction of new products often decline with age, as innovation becomes less prioritized (Coad, Holm, Krafft, & Quatraro, 2018). Firms with greater experience often achieve more efficient utilization of tangible resources, as they develop routines and processes that streamline repetitive tasks and allocate additional resources to support innovation and new product development (Gopalakrishnan et al., 2021). Nevertheless, supporting the resource-based view (RBV), Bakar and Ahmad (2010) emphasized that tangible and intangible firm resources are key determinants of innovation performance, particularly in process-intensive industries.

Theoretically, SME age is frequently examined as a moderating variable in the relationship between firm characteristics (such as resources, capabilities, and strategies) and performance outcomes. This is grounded in the organizational life cycle theory and the resource-based view (RBV). According to organizational life cycle theory, firms evolve through various stages; startup, growth, maturity, and possibly decline and their strategic behavior, structure, and resource needs tend to change as they progress through these stages (Lester et al., 2003). Firm age, therefore, reflects accumulated experience, learning, and resource development, which can influence how internal characteristics affect outcomes such as growth, profitability, or innovation. From RBV perspective, younger firms often lack the routines, legitimacy, and resource endowments that older firms possess (Barney, 1991; Newbert, 2007). As firms age, they tend to develop more complex routines, stronger networks, and greater institutional legitimacy (Zahra & George, 2002), which can enhance or moderate the impact of specific firm-level factors on performance. For example, while intangible assets such as knowledge and brand reputation may take time to develop, their effect on performance may be more pronounced in older firms due to greater absorptive capacity (Coad et al., 2016). In addition, recent empirical studies have continued to support this moderating role of SME age. For instance, Nguyen et al. (2023) found that the impact of digital

capability on SME performance was stronger in more mature firms, suggesting that age-related factors such as experience and resource accumulation play a significant role. Similarly, [Al-Shami et al. \(2022\)](#) demonstrated that firm age moderated the relationship between innovation capability and performance among Malaysian SMEs. Thus, SME age is not just a demographic variable but a theoretical lens that helps explain heterogeneity in firm behavior and outcomes, especially when examining how internal characteristics translate into performance across different stages of firm development.

2.4. Dynamic Capabilities Theory

Dynamic Capabilities Theory addressed how firms adapt and reconfigure resources to respond to changing environments ([Teece et al., 1997](#)). The theory underscores that the mere availability of tangible resources is insufficient for innovation; firms must also have the capability to deploy these resources effectively. For example, the ability to upgrade production technologies, integrate new materials, or adapt equipment for innovative purposes plays a crucial role in translating tangible resources into product innovation success ([Eisenhardt & Martin, 2000](#)). Dynamic capabilities provide a lens to understand why some firms outperform others in leveraging tangible resources for innovation, particularly in volatile industries. Dynamic capabilities are defined as the firm's ability to purposefully create, extend, or modify its resource base to address rapidly changing environments ([Teece et al., 1997](#)). The theory distinguishes between ordinary (operational) capabilities and dynamic capabilities, highlighting the latter as essential for sustained competitive advantage, particularly in industries where product innovation plays a crucial role ([Eisenhardt & Martin, 2000](#)).

Tangible resources, such as physical assets, technological infrastructure, and manufacturing facilities, are critical components of a firm's resource base. However, the effective deployment of these resources in product innovation depends on the firm's dynamic capabilities, including sensing opportunities, seizing them, and transforming resources to align with new market demands ([Teece, 2007](#)). Tangible resources provide the foundational inputs for product innovation, enabling firms to develop and commercialize new products. However, the mere possession of tangible resources does not guarantee innovation success. Dynamic capabilities mediate this relationship by ensuring that resources are effectively utilized, reconfigured, or combined with complementary assets to generate innovative outcomes ([Barreto, 2010](#)). For example, firms with advanced manufacturing equipment can leverage dynamic capabilities to adapt their production processes, enabling faster prototyping and greater flexibility in product design ([Ambrosini & Bowman, 2009](#)). Similarly, firms with well-developed technological infrastructure can enhance their innovation performance by leveraging these assets to support research and development (R&D) activities and knowledge integration ([Helfat et al., 2007](#)).

Dynamic capabilities also emphasize the orchestration of resources, a process

that involves aligning tangible resources with organizational strategies and market opportunities. [Sirmon et al. \(2011\)](#) argue that resource orchestration includes acquiring, bundling, and leveraging resources to achieve desired outcomes. In the context of product innovation, this involves integrating tangible resources with other assets, such as human capital and intellectual property, to drive innovation performance. For instance, firms that successfully bundle advanced production facilities with skilled R&D teams can create synergies that enhance the quality and speed of product innovation. Dynamic capabilities ensure that these synergies are not only identified but also exploited effectively in response to market demands ([Augier & Teece, 2009](#)). In conclusion, Dynamic capabilities theory provides a robust framework for understanding how tangible resources contribute to product innovation performance. By emphasizing the processes of sensing, seizing, and transforming, the theory underscores the importance of leveraging and re-configuring resources to achieve competitive advantage. Future research could explore how specific types of tangible resources interact with dynamic capabilities in various industrial and cultural contexts

3. Methodology

3.1. Hypothesis Development and Theoretical Framework

The theoretical framework as shown in [Figure 1](#) below builds upon and modifies the models proposed by [Ferreira and Azevedo \(2007\)](#), [Galbreath \(2002\)](#), and [Huergo and Jaumandreu \(2004a\)](#). This study extends prior research by incorporating product innovation performance (PIP) as the dependent variable, emphasizing the role of tangible resources within SMEs. The framework highlights how these resources impact PIP differently depending on the age of the SME. The subsequent figure and hypothesis development delineate these relationships, providing insights into the resource-based view within the SME context.

H1: Increased tangible resources lead to a higher PIP.

H2: Tangible resources have a stronger impact on PIP as SME age increases.

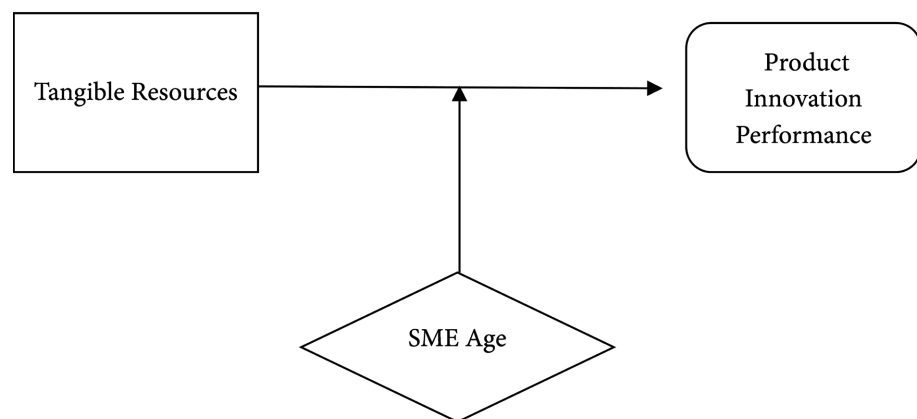


Figure 1. Model of relationship between tangible resources and product innovation performance, moderated by SME age.

3.2. Population and Sampling

The target population for this study comprises SMEs in Malaysia classified within the manufacturing and agro-based sectors. SMEs were selected due to their heightened vulnerability to internal and external environmental forces compared to larger firms, particularly in terms of resource access, financial capital, and entrepreneurial traits (Zakaria et al., 2023). SMEs in Malaysia are defined as enterprises with fewer than 150 employees, aligning with the current definitions established by the SME Corporation Malaysia (SME Corp Malaysia, 2022).

The sampling frame for this study is based on the SME directory provided by the SME Corporation Malaysia through its online information portal. This directory, which is regularly updated, includes a comprehensive listing of SMEs categorized by state and business sector, ensuring accuracy and eliminating duplication. As of the most recent update, there are approximately 18,000 SMEs listed, including over 6000 in the manufacturing and agro-based sectors (SME Corp Malaysia, 2022). This database offers a reliable and structured resource for identifying elements of the target population relevant to this research. The determination of sample size in this study follows contemporary guidelines, building on Krejcie and Morgan's (1970) and Roscoe's (1975) principles. These guidelines suggest that sample sizes larger than 30 and fewer than 500 are generally appropriate for most research contexts (Yusoff et al., 2023). The unit of analysis for this study is the enterprise, with the business owner serving as the primary respondent to represent their organization. All variables are measured and analyzed at the organizational level.

A sample of 362 manufacturing SMEs in Malaysia was selected using the probability sampling method, specifically proportionate stratified random sampling. This approach stratifies the SMEs based on the distribution of manufacturing enterprises across Malaysia's 14 states, ensuring representativeness (Chong et al., 2023). Proportionate stratified random sampling involves identifying subgroups, calculating the proportion of the population within each subgroup, and randomly selecting individual samples so the sample proportions align with the population distribution. This method ensures that all elements of the population are considered, giving each element an equal probability of selection, thereby enhancing the representativeness and validity of the findings (Ali et al., 2023).

4. Result

Reliability analysis of the tangible resources scale confirmed high internal consistency, with Cronbach's Alpha values of 0.895 for tangible resources, as shown in **Table 1** below. These coefficients are considered strong and align with previous studies, which report Cronbach's Alpha values between 0.7 and 0.9 for resource-related constructs (Martínez-Román & Romero, 2022; Dabić et al., 2023).

Multiple regression analysis has been applied to SME resources and PIP as in **Table 2** below. Multiple regressions are a statistical technique that allows a researcher to specify the nature of the relation between one dependent variable and

two or more independent variables and estimate the coefficients of the linear equation. The present study is interested in predicting the contribution of tangible resources towards PIP.

Table 1. Summary of factor analysis result for tangible resources.

Tangible Resources Items	Factor Loadings
Location of buildings	0.916
Buildings	0.880
Physical structure	0.872
Financial capital	0.924
Financial investment	0.838
Cash from operation	0.779
Kaiser-Meyer-Olkin	0.710
Bartlett's Test of Sphericity	408.225
<i>df.</i>	21
Sig.	0.000
Eigenvalues	3.495
% of variance	49.9%
Cumulative variance	72.5%
α	0.895

Note: Factor loadings over 0.50 appear in bold.

Table 2. Summary of multiple regression analysis for product innovation performance and SME resources (N = 108).

Variable	B	SE B	β	Sig
Tangible resources	0.105	0.088	0.102	0.233
R square			0.438	
Adjusted R square			0.416	
Sig. F change			0.000	
Durbin Watson			1.765	
F value			20.063**	

** $p < 0.01$, * $p < 0.05$.

Based on the findings above, tangible resources seem to be unrelated to PIP. This would seem to indicate that the contribution of tangible resources is not an important factor in predicting PIP. Thus, H1 is rejected. Hierarchical regression analysis is used in this research to compute the significance of each added variable (or set of variables) to the explanation reflected in R-square. This hierarchical procedure is an alternative to comparing betas for the purpose of assessing the importance of the independents as in the following **Table 3**.

Table 3. Summary of hierarchical regression analysis for tangible resources, PIP and SME's Age (N = 108).

Variable	Model 1				Model 2				Model 3			
	B	SE B	β	Sig	B	SE B	β	Sig	B	SE B	β	Sig
Physical resources	0.105	0.88	0.102	0.059	0.93	0.88	0.091	0.051	-0.429	0.244	-0.429	0.282
young					-0.234	0.160	-0.126	0.448	-0.757	0.790	0.757	0.662
intermediate					0.176	0.231	0.074	0.863	0.315	1.703	0.315	0.484
mature					-0.35	0.203	-0.018	0.882	0.507	1.384	0.507	0.682
Dummies												
Young \times Physical									-0.366	0.213	0.599	0.134
Mature \times Physical									1.242	0.220	1.242	0.004
Intermediate \times Physical									0.442	0.286	0.442	0.285
R square		0.438				0.453				0.591		
Adjusted R square		0.416				0.415				0.503		
R square change		0.438				0.015				0.138		
Sig. F change		0.000				0.428				0.008		
Durbin Watson										1.729		
F value		20.063				11.842				6.690*		

* $p < 0.05$.

Model 3 shows that the F-ratio is 6.690, which is very unlikely to happen by chance ($p < 0.05$). Result also shows that only mature SMEs were a significant predictor. Thus, SME age has moderated the relationship between tangible resources and PIP (H2 accepted). The result has been summarized as follows:

Adjusted R-square = 0.503; $F(103) = 6.690, p < 0.05$. The significant variables are:

Predictor Variable	Beta	p
Tangible resources in mature SMEs' scores	1.242	$p = 0.004$

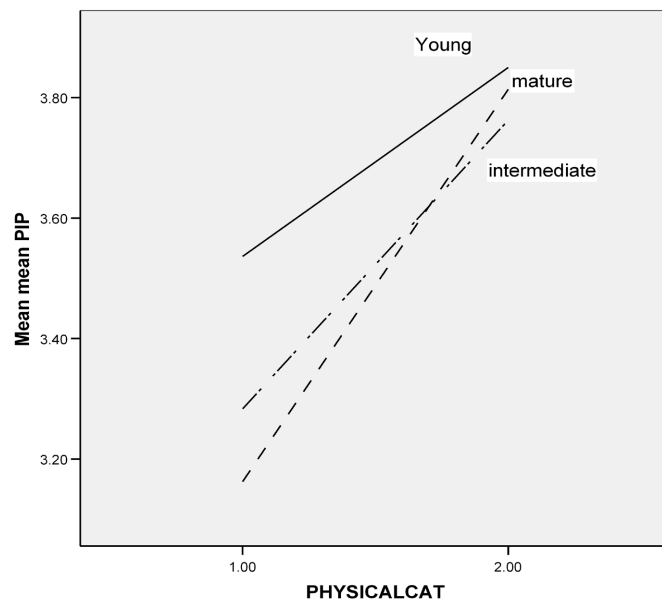


Figure 2. Moderation graph for tangible resources, age and PIP.

The interaction term for both predictor variables can be explained by plotting the moderation graph as follows (see **Figure 2**).

The significant interaction term tells us that the association between tangible resources and PIP is significantly different between the groups of young, intermediate and mature SMEs. The graph shows that mature SMEs yield a significant strong positive correlation compared with other groups. Overall, the findings show that only mature SMEs moderate the relationship between tangible resources and PIP which supported H2.

5. Limitation and Suggestion for Future Research

This study is conducted within the context of a specific national setting (Malaysia), which may limit the generalizability of its findings to other emerging or developed economies. While this localized focus allows for a more in-depth understanding of the phenomenon within its unique socio-economic and regulatory environment, caution should be exercised in extending the results to different national or regional contexts. Future research could replicate this study across diverse settings to enhance comparative understanding and broader applicability. The other limitation of this study is that the analysis may be considered somewhat superficial, as it does not delve deeply into the interaction between intangible and tangible resources across different ages of SMEs. While the study provides a general overview of resource utilization, it falls short in capturing the complex dynamics that may evolve as SMEs mature. This oversight limits the understanding of how these resource types influence each other over time and across different stages of business development. Future research could address this gap by adopting a longitudinal approach or incorporating more detailed case studies to examine how the interplay between tangible and intangible resources changes with SME age. Such studies could offer deeper insights into resource-based strategies that are more effective at different life cycle stages of SMEs.

6. Conclusion

Results showed that the contribution of tangible resources is often deemed less critical in predicting product innovation performance (PIP) in small and medium enterprises (SMEs). The situation occurs due to, SMEs often operating in dynamic environments where flexibility and agility are more critical for innovation than the scale or abundance of tangible resources. Unlike larger firms, SMEs can adapt quickly to changes and rely on their ability to reconfigure resources effectively. Studies show that intangible assets, such as knowledge, skills, and innovative culture, often play a more significant role in driving innovation performance (**Wang & Ahmed, 2007**). Moreover, SMEs typically face resource constraints and are accustomed to operating with limited physical and financial resources. As a result, their innovative strategies are often built around leveraging intangible assets, such as human capital, relationships, and technological expertise, rather than relying heavily on tangible resources (**Barney, 1991**). Intangible resources, such as intel-

lectual property, organizational culture, and customer relationships, are widely recognized as stronger predictors of innovation success. These resources enable SMEs to generate unique ideas and differentiate themselves in the market. For instance, Teece (2007) highlights those dynamic capabilities, including innovation-related skills and processes, are more critical to sustainable competitive advantage than tangible assets.

In knowledge-intensive or technology-driven industries, the emphasis is often on intangible resources like research and development (R&D), creativity, and expertise. Tangible resources may only provide the infrastructure, while the actual innovation output depends on the SME's ability to utilize knowledge and foster collaboration (Grant, 1996). In industries with rapid technological advancements, the value of tangible resources can diminish quickly. For SMEs, keeping up with technological trends and fostering an innovative mindset often outweighs the advantages of having abundant physical or financial assets (Hoffman et al., 1998). By focusing on these intangible and dynamic aspects, SMEs often compensate for their lack of tangible resources, making the latter less significant in predicting their product innovation performance. However, the age of the SME can significantly moderate this relationship, either enhancing or diminishing the impact of tangible resources on PIP. Findings showed that SME age reflects the maturity and experience of a firm, often influencing its resource utilization and strategic decisions. Older SMEs tend to have more established routines, deeper market insights, and a stronger ability to leverage tangible resources effectively. Conversely, younger SMEs might lack the experience and networks to maximize the potential of their resources. For example, Rauch et al. (2009) argue that as firms mature, they develop better mechanisms for deploying their tangible resources in innovative ways. This development can enhance the efficiency and effectiveness of physical and financial resources in driving innovation.

Older SMEs often have well-maintained infrastructure and equipment, which can be leveraged for innovative activities. They may also have more reliable supply chains and production systems, making it easier to adapt physical resources to innovative needs. In contrast, younger SMEs may struggle to optimize their physical resources due to limited experience and economies of scale (Terziovski, 2010). Older SMEs typically enjoy greater financial stability and access to external funding due to their established reputation and track record. This financial advantage allows them to invest more confidently in R&D and innovation-related activities, thereby enhancing PIP (Zahra & George, 2002). Younger SMEs, on the other hand, may face financial constraints that limit their ability to capitalize on their tangible resources. Research shows that SME age acts as a critical contingency factor in the resource-based (RBV) framework. Older SMEs tend to demonstrate a stronger positive relationship between tangible resources and PIP compared to younger ones. For instance, Wang and Ahmed (2007) found that firm age positively moderates the link between resource allocation and innovation performance, as older firms have a greater capacity to transform resources into innova-

tive outputs. In conclusion, the moderating role of SME age suggests that the effectiveness of tangible resources in driving PIP is not uniform across all SMEs. Managers of younger SMEs should focus on developing capabilities and networks that enable them to better utilize their tangible resources, while older SMEs should leverage their maturity and experience to maximize innovative outcomes.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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