



Implementing Open Innovation Practices in SMEs: The Role of Market and Institutional Collaboration

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ABSTRACT

Objective. Small and medium-sized enterprises (SMEs) constitute a vital component of economic development, yet their capacity to generate innovation increasingly depends on access to external knowledge and collaborative networks. This study examines the extent to which market-based and institution-based open innovation practices contribute to innovation outcomes among SMEs.

Research Methods. A quantitative research design was employed using a purposive sampling approach. Data were collected from 151 SMEs that met the study criteria and subsequently analyzed through multiple linear regression to assess the relationships among the investigated variables.

Results. The findings reveal that both market-oriented and institution-oriented open innovation practices are positively associated with SME innovation outcomes. Market actors serve as an important source of strategic insights, enabling firms to identify emerging customer needs, competitive developments, and opportunities for product enhancement. Institutional engagement, in contrast, strengthens firms' innovative capacity through knowledge transfer, capability-building initiatives, and access to supporting facilities and resources.

Conclusions. The assessment of open innovation practices was guided by the innovation activity framework proposed in the *Oslo Manual 2018*. The results underline the importance of leveraging external knowledge channels to enhance innovation performance within SMEs. Given the limited empirical evidence addressing the relationship between open innovation practices and innovation outcomes in the Indonesian SME context, particularly in Yogyakarta, this study offers an initial contribution to the growing body of open innovation research in emerging economies.

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1. INTRODUCTION

Open innovation has evolved into a prominent paradigm that emphasizes the purposeful integration of knowledge flows across organizational boundaries to stimulate innovation and expand market opportunities (Pedota & Piscitello, 2022). Rather than relying exclusively on

internally generated ideas, firms increasingly engage with external actors to access complementary resources, expertise, and technological insights. Such interactions foster creativity, accelerate the exploration of alternative solutions, and facilitate the development of novel products and processes that contribute to the competitiveness and performance of small and medium-sized enterprises (SMEs) (Singh et al., 2019).

The growing relevance of open innovation stems from its ability to connect organizations with diverse knowledge networks involved in the co-creation and dissemination of innovation. Through these interactions, firms gain access to managerial insights, technological expertise, and market intelligence that may not be available internally. External feedback mechanisms further enrich strategic decision-making by providing a broader perspective for evaluating opportunities and responding to environmental changes (Cheng & Shiu, 2021). Nevertheless, the adoption and effectiveness of open innovation practices remain uneven across regions and industries. Evidence from the Asia-Pacific region indicates that the outcomes generated by open innovation initiatives vary considerably, reflecting differences in organizational capabilities, collaborative arrangements, and the complexity of innovation processes (Wikhamn & Styhre, 2022).

In Indonesia, the acceleration of digital transformation, intensified by the disruptions associated with the COVID-19 pandemic, exposed substantial weaknesses among organizations that continued to depend on outdated technologies and conventional business models. These conditions highlighted the necessity for more adaptive and collaborative innovation approaches capable of responding to rapidly changing market environments (Sarwar et al., 2023). Consequently, open innovation has become an increasingly relevant strategic option for firms seeking to enhance agility, adaptability, and customer responsiveness within highly competitive markets. This challenge is particularly evident among SMEs, which frequently encounter resource constraints that limit their capacity to independently develop technological capabilities and market-oriented innovations. Under such circumstances, open innovation provides an alternative pathway for overcoming technological and market-related barriers through external collaboration (Annamalah et al., 2025).

A central feature of open innovation practices is the involvement of external partners, particularly market actors and institutional stakeholders. Markets represent dynamic arenas in which firms exchange products and services while simultaneously obtaining valuable information regarding customer preferences, competitor behavior, and emerging business opportunities. Beyond their transactional function, markets can influence industrial development and shape economic activities through various mechanisms of coordination and control (Rui Hou, 2020). In this regard, innovation efforts alone may not guarantee superior organizational performance unless they are accompanied by strong market engagement capable of translating innovative outputs into tangible economic benefits (Gok & Peker, 2016).

Institutional actors constitute another important source of support within open innovation ecosystems. Collaboration between business organizations and governmental or public institutions can strengthen firms' innovative capacity through training programs, policy support, infrastructure provision, and capability development initiatives. For SMEs, whose competitiveness often depends on limited internal resources, institutional involvement plays a critical role in enhancing managerial competencies, strengthening governance structures, and facilitating access to broader collaborative networks (Bianchi et al., 2021). Furthermore, sustained interaction among stakeholders contributes to the accumulation of social capital, promotes collective learning, and enables the generation of collaborative knowledge that ultimately supports business performance and long-term competitiveness (Aisjah et al., 2023).

The Role and Challenges of SMEs within the Open Innovation Landscape

SMEs constitute a cornerstone of Indonesia's economic structure, accounting for more than 60 percent of national gross domestic product (GDP) while generating employment opportunities

for approximately 97 percent of the workforce through more than 64 million business entities (Kementerian Koordinator Bidang Perekonomian & Republik Indonesia, 2025). Despite their substantial economic contribution and pervasive presence across productive sectors, many SMEs continue to experience difficulties in keeping pace with global competitors in terms of technological adoption and innovation capabilities (Asian Development Bank, 2022).

As competitive environments become increasingly shaped by digital transformation, the ability to integrate digital technologies has shifted from a growth option to a business necessity. Nevertheless, a considerable number of SMEs remain dependent on conventional operational routines and labor-intensive processes, limiting their capacity to scale, innovate, and participate effectively in international markets. These constraints are often compounded by concerns regarding intellectual property protection, restricted access to collaborative networks, and insufficient internal expertise required to manage innovation activities (Ragazou et al., 2022). Such limitations reduce the ability of SMEs to identify, acquire, and exploit external knowledge resources that are essential for sustaining innovation and long-term competitiveness.

The situation is further complicated by the limited scholarly attention devoted to open innovation adoption among SMEs in the Asia-Pacific region. Existing studies have yet to provide a comprehensive understanding of how open innovation practices are implemented within SMEs and how such practices shape managerial strategies and innovation-related outcomes (Perez-Orozco et al., 2024). This gap is particularly relevant in Indonesia, where strengthening SME competitiveness remains a national development priority. In line with the Indonesian government's commitment to fostering SME upgrading and business transformation, a deeper understanding of open innovation practices has become increasingly important.

Recent evaluations conducted by the Regional Representative Council of the Republic of Indonesia identified several structural issues that continue to constrain SME development (Dewan Perwakilan Daerah Republik Indonesia, 2024). These challenges include sustaining SME participation within digital ecosystems to promote financial inclusion, enhancing productive capabilities and product quality to improve international competitiveness, expanding access to financing mechanisms, and increasing awareness of global environmental pressures through the adoption of sustainable and environmentally responsible business practices. Collectively, these challenges underscore the necessity for SMEs to establish stronger external linkages and embrace more collaborative innovation approaches capable of facilitating access to knowledge, resources, and strategic opportunities beyond organizational boundaries.

Table 1. Number of SMEs in Yogyakarta

Year	Number of SMEs (Units)
2022	342,924
2023	342,586
2024	345,980
2025	347,744
2026*	347,800 (provisional)

Source : (Yogyakarta Regional Agency for Development Planning, Research, and Innovation, 2026)

As presented in Table 1, the number of SMEs operating in Yogyakarta has remained consistently high, reflecting the sector's substantial contribution to regional economic activity. Approximately 98.2 percent of Yogyakarta's economy is supported by SME-related activities, highlighting the sector's pivotal role not only in value creation but also in employment generation. Given its labor-intensive nature, the SME sector has become an important mechanism for mitigating unemployment and supporting inclusive economic development within the region. Maintaining the competitiveness of SMEs, however, requires more than numerical growth. Sustained development depends on the ability of firms to access external knowledge, strengthen market connections, and continuously upgrade their capabilities.

Collaborative marketing initiatives, capacity-building programs, and knowledge-sharing activities can stimulate the emergence of product, process, and organizational innovations. These efforts are particularly important for SMEs that often operate under resource constraints and therefore rely on external support mechanisms to expand their innovation capacity.

The involvement of public institutions is especially relevant in facilitating such transformation. Recognizing the strategic importance of SMEs, the Yogyakarta government has introduced various programs and events designed to strengthen entrepreneurial ecosystems and broaden market opportunities. The region has earned recognition as a “festival city,” where tourism-oriented events function not only as cultural attractions but also as platforms through which SMEs can showcase products, expand market reach, and integrate into local tourism value chains. These initiatives create opportunities for interaction among business actors, government agencies, and other external stakeholders, thereby fostering a collaborative environment conducive to innovation and business development (Dinas Perindustrian Koperasi dan UKM Yogyakarta, 2026).

From an open innovation perspective, such interactions represent valuable channels through which firms gain access to external knowledge, market intelligence, and complementary resources. The growing integration of digital technologies within interconnected innovation ecosystems is expected to further enhance these collaborative processes. As innovation activities increasingly transcend organizational and geographical boundaries, digitally enabled ecosystems may facilitate broader partnerships and support the development of transformative solutions capable of strengthening SME competitiveness and stimulating sustainable economic growth (Alfaro-Urquiola et al., 2025).

2. LITERATURE STUDY

Open Innovation (OI)

OI has emerged as a dominant framework for understanding how organizations generate and exploit innovation through interactions that extend beyond organizational boundaries. The concept emphasizes collaborative value creation, knowledge exchange, and joint problem-solving among multiple actors, positioning external knowledge as a strategic complement to internal capabilities (Chesbrough & Bogers, 2014). Within this perspective, innovation is no longer viewed as an activity confined to a firm's internal research and development functions but rather as a process that integrates diverse sources of expertise, technologies, and market insights originating from external networks.

Despite its growing prominence, the implementation of OI presents distinct challenges for SMEs. Compared with larger firms, SMEs often operate under financial and organizational constraints that limit their ability to invest in extensive innovation activities. Consequently, many SMEs rely on collaborative relationships with customers, suppliers, communities, and other ecosystem participants to access resources and knowledge that would otherwise remain unavailable (Bashir et al., 2023). Such collaborative arrangements enable firms to compensate for internal resource limitations while simultaneously responding to changing market demands.

The evolution of OI has expanded its scope far beyond traditional technology acquisition and research collaboration. Contemporary interpretations of OI encompass a wide range of activities, including co-development initiatives, knowledge sharing, external problem-solving, and strategic partnerships. However, the increasing complexity associated with these practices has generated concerns among SMEs, many of which perceive open innovation as difficult to implement due to organizational disruptions, managerial complexity, and capability requirements (Isensee et al., 2020). As a result, the adoption of OI remains uneven across firms and industries.

A defining characteristic of OI is the creation of permeable organizational boundaries that facilitate the movement of knowledge, technologies, and other strategic resources between organizations. This approach contrasts with the traditional closed innovation model, where

innovation activities are largely dependent on internally generated resources and capabilities (Silva & Borsato, 2017). By embracing more open and collaborative arrangements, firms can gain access to specialized expertise, accelerate technological adoption, and leverage external innovation assets through mechanisms such as licensing, partnerships, and joint development projects.

The benefits associated with OI extend beyond innovation efficiency. Previous studies suggest that organizations engaging in open innovation can reduce product development cycles, improve access to emerging technologies, and acquire specialized competencies that enhance competitive positioning (Stevenson et al., 2024). Furthermore, OI creates opportunities for firms to strengthen organizational resilience, overcome commercialization barriers, and expand access to investment networks. For SMEs operating in developing economies, these advantages may contribute not only to firm-level performance but also to broader economic development through increased investment attraction and business growth.

The effectiveness of OI implementation is strongly influenced by internal organizational conditions. Leadership commitment, absorptive capacity, and organizational culture have been identified as critical enablers that determine the extent to which firms can recognize, assimilate, and utilize external knowledge. In particular, managerial relationships and integrative organizational cultures play an important role in facilitating collaboration and encouraging the successful adoption of open innovation practices (Le & Lei, 2019).

Innovation in SME Development

Innovation has become a critical determinant of organizational sustainability and competitive advantage in increasingly dynamic and globalized markets. Firms are expected not only to respond to environmental changes but also to continuously generate new value through the development of products, services, processes, and business models that address evolving customer needs (Mo & Zhang, 2025). In its broadest sense, innovation refers to the introduction, adaptation, or enhancement of existing products, processes, or organizational resources in ways that create additional value and improve organizational outcomes (Rofaida et al., 2019).

The strategic importance of innovation has gained widespread recognition among business organizations. According to a survey conducted by the Boston Consulting Group, approximately 79 percent of firms identify innovation as one of their top three strategic priorities (Boston Consulting Group, 2021). This emphasis is particularly relevant for SMEs, which frequently operate in highly competitive environments characterized by rapid technological change and resource limitations. Evidence suggests that many SMEs have increasingly incorporated innovation into their business activities as a means of sustaining growth and strengthening competitiveness (Avi & Srivastava, 2023). Continuous innovation is therefore viewed as a necessity rather than an option, as conventional approaches often prove insufficient for addressing emerging business challenges and market uncertainties (Kustina et al., 2025).

From a strategic perspective, innovation enables firms to differentiate themselves from competitors, respond more effectively to market shifts, and develop distinctive value propositions that enhance their market position (Farida & Setiawan, 2022). Entrepreneurs increasingly engage in innovation across multiple dimensions of business activity, including product development, service enhancement, and process improvement, in order to remain aligned with changing customer expectations and industry trends (Fernandez, 2023; Radicic & Petković, 2023). As a result, innovation has been consistently associated with business expansion, organizational resilience, and improved performance outcomes.

Prior empirical studies provide substantial evidence regarding the positive contribution of innovation to business development. Research has demonstrated that higher levels of

innovation are associated with stronger business growth and improved organizational performance (Riañ et al., 2021). Similar findings indicate that innovation contributes positively to SME development and overall business advancement (Diana, 2022; Iqnatia & Pangestuti, 2019; Pranowo et al., 2020). Conversely, declining innovation activities may constrain organizational growth and weaken competitive performance over time (Park et al., 2019).

Beyond its direct influence on performance, innovation also functions as an important mechanism through which strategic capabilities are translated into tangible business outcomes. Previous studies have shown that innovation mediates the relationship between market orientation and marketing performance, suggesting that firms derive greater value from market knowledge when such knowledge is transformed into innovative offerings (Lin et al., 2020). Similarly, innovation has been found to strengthen the effectiveness of marketing strategies and contribute to SME development, profitability, and long-term value creation (Arcuri et al., 2023; Braunerhjelm & Thulin, 2023; Mustofa & Anisa, 2022; Scaliza et al., 2022). These findings reinforce the view that innovation serves not merely as an organizational outcome but also as a strategic capability that shapes broader business performance.

Recent scholarship further suggests that understanding innovation within SMEs requires perspectives that extend beyond conventional innovation models. The innovation process in SMEs is often embedded within unique organizational contexts, resource configurations, and collaborative relationships that differ substantially from those observed in large corporations. Consequently, innovation in SMEs should be examined through frameworks capable of capturing these contextual characteristics and the diverse pathways through which innovation emerges (G. Silva et al., 2021).

The conceptual framework of this study is adapted from the model developed by Expósito et al. (2019), which examined the effects of open innovation practices on innovation outcomes among Spanish SMEs. The original framework incorporated two dimensions of open innovation practices—market-based and institution-based open innovation—as independent variables, innovation outcomes as the dependent variable, and firm age as a moderating variable. However, the present study excludes firm age from the research model. Evidence from Expósito et al. (2019) indicates that the inclusion of firm age attenuated the direct effects of both market-based and institution-based open innovation practices on innovation outcomes. Moreover, previous studies have reported a negative association between firm age and innovation performance, suggesting that organizational maturity may alter or constrain innovation dynamics (Balasubramanian & Lee, 2007; Bianchini et al., 2015). Accordingly, this study focuses on the direct relationship between open innovation practices and innovation outcomes among SMEs. Based on these considerations, the conceptual framework is proposed as follows.

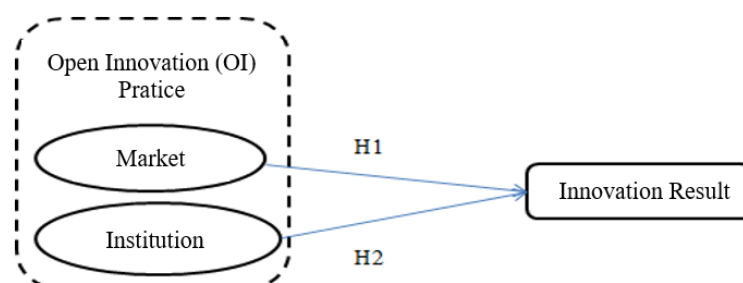


Figure 1. Logical Framework

3. RESEARCH METHOD

This inquiry adopted a quantitative orientation grounded in a descriptive research design to capture empirical manifestations of open innovation practices within SMEs. Such an approach enables the systematic portrayal of observable organizational patterns and facilitates the

identification of relational tendencies among the constructs under consideration (Syahrizal & Jailani, 2017). Rather than pursuing causal experimentation, the study seeks to delineate the characteristics and interactions associated with innovation-related activities as they occur within the SME environment (Putra et al., 2025).

The analytical framework encompasses two exogenous constructs—market-based open innovation practices and institution-based open innovation practices—alongside innovation outcomes as the endogenous construct. The framework was specified to ascertain whether engagement with market actors and institutional counterparts serves as a conduit through which SMEs cultivate and materialize innovative outputs. By emphasizing external knowledge sourcing and collaborative exchanges, the model offers a lens for evaluating how distinct dimensions of open innovation contribute to innovation attainment within SME settings.

Operational Definitions and Variable Measurement

Innovation outcomes represent tangible manifestations of innovation activities derived from ideation, experimentation, development, and knowledge application that generate economic and social value (Undang-Undang Republik Indonesia, 2019). In the present study, innovation outcomes were operationalized using a dummy-scale measurement based on four dimensions of innovation. The first dimension, product innovation, captures the introduction of newly developed goods or services as well as substantial modifications to existing offerings, including improvements in components, materials, and functional attributes. The second dimension, process innovation, reflects the adoption or refinement of production techniques, operational procedures, logistics systems, equipment, and software applications intended to enhance organizational efficiency. The third dimension, organizational innovation, refers to the deployment of novel managerial arrangements, governance mechanisms, or organizational practices implemented within internal or interorganizational settings. The fourth dimension, marketing innovation, encompasses the application of new marketing approaches involving product design, packaging, promotional activities, pricing strategies, and market communication practices.

Market-based open innovation practices were conceptualized as external interactions through which firms acquire commercially relevant knowledge and information from actors operating within the marketplace. Rather than merely serving as arenas of exchange, markets constitute channels through which organizations gain exposure to opportunities, competitive signals, and evolving customer requirements (Hadi & Hastuti, 2011). Consistent with the framework proposed by the Organisation for Economic Co-operation and Development Statistical Office of the European Communities (2005), this construct was measured using a dummy scale encompassing five sources of external collaboration: suppliers, customers, competitors, consultants, and private research and development organizations.

Institution-based open innovation practices refer to collaborative engagements established between firms and formal knowledge-producing entities that facilitate learning, capability enhancement, and knowledge diffusion. Institutional arrangements embody structured patterns of collective action that persist over time and contribute to the achievement of societal and organizational objectives (Robbins & Sayuti, 2006). Following the measurement framework of the Organisation for Economic Co-operation and Development Statistical Office of the European Communities (2005), institution-based open innovation practices were assessed using three indicators: educational institutions, government-funded research organizations, and non-profit research institutions. Each indicator was recorded using a dummy-scale format.

The study employed purposive sampling to ensure the inclusion of respondents possessing characteristics aligned with the research objectives. This sampling strategy allows the deliberate selection of observational units based on predetermined criteria rather than random inclusion (Lenaini, 2021). The sampling frame comprised SMEs operating in Yogyakarta that had

successfully secured intellectual property rights (IPRs). Applying these criteria resulted in a final sample of 151 SMEs.

Table 2. Sample Selection Procedure

Criteria	N
SMEs in Yogyakarta holding registered intellectual property rights (IPRs)	287
Less:	
Non-participating firms during the survey period	(109)
Firms no longer in operation	(24)
Outlier observations	(3)
Final usable sample	151

Source: data processed (2026)

As summarized in Table 2, the final dataset comprised 151 valid observations, consisting of 130 small enterprises and 21 medium-sized enterprises. Primary data were elicited directly from SME representatives through a structured survey administered via an online questionnaire. The survey link was disseminated through WhatsApp and targeted SMEs located in Yogyakarta that possessed registered intellectual property rights (IPRs). The questionnaire was addressed to SME managers because of their central role in strategic deliberations and organizational decision-making processes. Previous studies suggest that managerial actors exert substantial influence over organizational direction and resource allocation (Van Gils, 2005); (Gulamhussen et al., 2012). Moreover, managers are directly involved in shaping the routines, practices, and strategic orientations that underpin firm-level activities and innovation-related initiatives (O'Regan et al., 2007).

Prior to hypothesis testing, the measurement instrument underwent validity and reliability assessments to ascertain the robustness and consistency of the collected information (Raswan & Ridlo, 2025). Subsequently, the proposed relationships among the constructs were estimated using multiple linear regression analysis. The empirical model was specified as follows: *Innovation Outcomes* = α + *Market Open Innovation* + *Institutional Open Innovation*. The model was formulated to evaluate the extent to which market-oriented and institution-oriented open innovation practices contribute to the generation of innovation outcomes among SMEs.

4. RESULT AND DISCUSSION

The empirical dataset comprised 151 SMEs located in Yogyakarta that had secured registered IPRs. From an initial pool of 287 firms, several records were excluded due to business inactivity and the absence of survey participation. Such attrition is likely linked to discrepancies between administrative records and the current operational status of firms. Building upon this dataset, the subsequent analyses elucidate the extent to which market-linked and institution-linked open innovation practices are associated with innovation realization among SMEs.

4.1 Data Description

4.1.1 Validity and Reliability Assessment

The validity assessment was undertaken by contrasting the obtained item-correlation coefficients with the critical correlation threshold. At a significance level of 5 percent and a sample size of 151 observations, the critical value was established at 0.159.

Table 3. Validity Test Results

Item	r-calculated	r-critical	Conclusion
P1	0.851	0.159	Valid
P2	0.894	0.159	Valid

P3	0.866	0.159	Valid
P4	0.860	0.159	Valid
P5	0.848	0.159	Valid
K1	0.915	0.159	Valid
K2	0.960	0.159	Valid
K3	0.915	0.159	Valid
IP1	0.238	0.159	Valid
IP2	0.285	0.159	Valid
IP3	0.175	0.159	Valid
IS1	0.461	0.159	Valid
IS2	0.567	0.159	Valid
IS3	0.651	0.159	Valid
IO1	0.697	0.159	Valid
IO2	0.498	0.159	Valid
IO3	0.595	0.159	Valid
IN1	0.442	0.159	Valid
IN2	0.621	0.159	Valid
IN3	0.568	0.159	Valid
IN4	0.548	0.159	Valid

Notes: P = Market-Based Open Innovation Practices; K = Institution-Based Open Innovation Practices; IP = Product Innovation; IS = Process Innovation; IO = Organizational Innovation; IN = Marketing Innovation.

Source: Processed primary data (2021).

Table 4. Reliability Test Results

No.	Variable	Cronbach's Alpha	Conclusion
1	Market-Based Open Innovation Practices	0.914	Reliable
2	Institution-Based Open Innovation Practices	0.918	Reliable
3	Innovation Outcomes	0.737	Reliable

Source: Processed primary data (2021)

As displayed in **Table 3**, all measurement indicators surpassed the prescribed benchmark, indicating their adequacy in capturing the intended constructs. Furthermore, the reliability assessment reported in **Table 4** yielded Cronbach's Alpha coefficients exceeding the minimum acceptable threshold across all constructs. Taken together, these outcomes substantiate the psychometric soundness of the measurement instrument and support its use in subsequent empirical analyses.

Table 5. Descriptive Statistics

Variable	Minimum	Maximum	Mean	Standard Deviation
Market-Based Open Innovation Practices	0	5	4.22	1.570
Institution-Based Open Innovation Practices	0	3	2.73	0.799
Innovation Outcomes	2	13	7.66	2.993

Source: Processed primary data (2021)

As shown in **Table 5**, market-based open innovation practices recorded a mean score of 4.22, approaching the upper limit of the measurement scale. This pattern suggests that SMEs in Yogyakarta maintain intensive interactions with market actors as a source of innovation-related

knowledge. Among the evaluated indicators, the item associated with consultants as a source of information emerged as the most salient. This finding implies that external advisory expertise constitutes an important channel through which SMEs acquire insights, identify opportunities, and strengthen their innovation activities.

Institution-based open innovation practices generated an average score of 2.73 out of a maximum attainable value of 3. The distribution of responses indicates a substantial degree of engagement between SMEs and institutional actors. In particular, government-funded research organizations and non-profit research institutions appeared to represent the most influential sources of external knowledge. Such evidence highlights the relevance of institutional linkages in facilitating access to technical expertise, research-based information, and innovation-supporting resources that may not be readily available within the firm.

Innovation outcomes exhibited a mean score of 7.66 across thirteen measurement indicators. The strongest manifestation of innovation was associated with the adoption of new managerial and operational arrangements, including supply chain management systems and quality management practices. This observation suggests that innovation among SMEs is not confined to products and services alone but also extends to organizational routines and managerial processes. The ability to reconfigure internal systems may therefore constitute an important mechanism through which SMEs enhance innovation realization and strengthen their competitive positioning.

4.2 Hypothesis Testing

4.2.1 Partial Effect Test

Table 7. Results of the Partial Significance Test

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	3.462	0.841	–	4.114	0.000
Market-Based Open Innovation Practices	0.421	0.167	0.221	2.530	0.012
Institution-Based Open Innovation Practices	0.888	0.327	0.237	2.716	0.007

Source: Processed primary data (2021)

4.2.2 Simultaneous Effect Test

Table 8. Results of the Simultaneous Significance Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	212.334	2	106.167	13.887	0.000

Source: Processed primary data (2021)

The explanatory capacity of the model, reflected by an R^2 value of 15.8 percent, indicates that market-based and institution-based open innovation practices jointly account for a modest yet meaningful proportion of the variation in innovation outcomes. The remaining 84.2 percent is likely attributable to other organizational, environmental, and strategic factors that were not incorporated into the present specification. The simultaneous significance assessment reported in Table 8 yielded an F-statistic significance level of 0.000, substantially below the accepted significance threshold. This outcome signifies that the two dimensions of open innovation collectively exhibit a statistically meaningful association with innovation outcomes. Such evidence suggests that SMEs engaging in broader external collaboration tend to display stronger innovation realization than firms relying predominantly on internally generated resources.

The regression estimates further reinforce this interpretation. The positive intercept and coefficient values indicate that open innovation practices function as a mechanism through which SMEs mobilize external knowledge and convert it into innovation-related outputs. These findings lend empirical support to the proposition advanced by (Expósito & Sanchis-Llopis, 2019), who argued that external collaboration constitutes an important catalyst for strengthening

innovation performance among SMEs. Comparable conclusions have also been reported by (Cheng & Huizingh, 2014; Hartono & Kusumawardhani, 2018; IEEE 6th International Conference on Management of Innovation and Technology (ICMIT), 2012), all of whom documented a positive linkage between open innovation engagement and innovation outcomes.

From a theoretical standpoint, organizations embracing open innovation are generally better positioned to recognize, assimilate, and exploit knowledge originating from external sources (Chesbrough, 2003). The present findings corroborate this argument, demonstrating that both dimensions of open innovation contribute positively to innovation outcomes among SMEs in Yogyakarta. Consequently, the two proposed hypotheses received empirical support. The first hypothesis posited that market-based open innovation practices positively influence innovation outcomes. Statistical evidence supports this proposition. The descriptive findings reveal that affirmative responses dominated all five indicators associated with market-oriented collaboration, suggesting that SMEs actively utilize information originating from marketplace actors. Such a pattern underscores the strategic role of markets not merely as arenas of exchange but as repositories of commercially valuable intelligence capable of guiding innovation-related decisions. Contemporary perspectives increasingly conceptualize markets as socio-economic systems where transactions, relationships, and information flows intersect to shape organizational behaviour (Heller, 2024).

The positive effect identified in this study aligns with the argument that market-oriented open innovation serves as a critical conduit for acquiring knowledge relevant to innovation activities (Lichtenthaler, 2011). Through interactions with suppliers, SMEs gain access to information concerning materials, components, and production alternatives. Engagement with customers provides insight into evolving preferences, unmet needs, and consumption patterns. Competitors offer signals regarding industry trajectories and emerging market practices, while consultants contribute specialized expertise that may otherwise remain inaccessible to smaller firms. Collectively, these information channels enrich the knowledge base of SMEs and facilitate the generation of innovative products, processes, organizational arrangements, and marketing initiatives (Amer et al., 2016).

The second hypothesis proposed that institution-based open innovation practices positively influence innovation outcomes, and the empirical results likewise support this assertion. Responses to the institutional collaboration indicators were overwhelmingly affirmative, indicating that interactions with educational institutions and research organizations constitute a common feature among the sampled SMEs. This finding highlights the strategic value of institutional partnerships as vehicles for accessing scientific knowledge, technical expertise, and developmental resources that may exceed the internal capacities of individual firms.

Institutional arrangements provide structured mechanisms through which uncertainty can be reduced and collective resources can be mobilized more effectively (Relawan, 2014). In the Indonesian context, research and development activities undertaken by universities and research institutions have long been recognized as important contributors to innovation advancement (Peraturan Presiden Republik Indonesia, 2005). The innovation process itself frequently involves lengthy cycles encompassing ideation, experimentation, feasibility assessment, and refinement before a commercially viable outcome can be achieved (Surminah, 2013). Consequently, collaboration with research institutions and higher education organizations offers SMEs opportunities to access specialized competencies and technological insights without bearing the full burden of internal research investment.

The comparatively larger regression coefficient associated with institution-based open innovation practices suggests that institutional collaboration exerts a stronger contribution to innovation outcomes than market-based collaboration within the observed context. This result implies that the provision of research-based knowledge, technological guidance, and developmental support from institutional actors represents a particularly influential source of

innovation capability for SMEs in Yogyakarta. Through such collaborations, firms are better equipped to expand their knowledge reservoirs, strengthen absorptive capacity, and translate external expertise into innovation outcomes with economic and organizational value.

5. CONCLUSION

The findings of this study illuminate the pivotal role of open innovation practices in shaping innovation outcomes among SMEs in Yogyakarta. Both market-based and institution-based dimensions of open innovation exhibited statistically meaningful associations with innovation outcomes, indicating that external collaboration constitutes an important avenue through which SMEs can strengthen their innovative capacity. These findings reinforce the notion that innovation is not generated solely through internal organizational resources but is increasingly contingent upon access to external knowledge, expertise, and collaborative networks.

Market-based open innovation emerged as a valuable mechanism for capturing commercially relevant intelligence originating from suppliers, customers, competitors, and professional consultants. Such interactions enable SMEs to identify emerging opportunities, respond to evolving market expectations, and refine innovation-related initiatives. Simultaneously, institution-based open innovation demonstrated a substantial contribution through linkages with educational institutions and research organizations, which provide access to scientific knowledge, technological expertise, and developmental resources capable of enhancing innovation realization.

Taken together, the results suggest that cultivating external knowledge linkages represents a viable pathway for SMEs seeking to strengthen product, process, organizational, and marketing innovation. The study therefore underscores the importance of fostering collaborative ecosystems in which market actors, research institutions, and SMEs interact as co-creators of innovation. Within the context of Yogyakarta, such collaborative arrangements may serve as a foundation for sustaining SME competitiveness and supporting broader regional economic development.

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