

## Effectiveness of Open Innovation Strategies on Technological Innovation in Micro and Small Furniture Manufacturing Enterprises (MSFMEs) in Tanzania

Yohana Sesabo

Department of Business Management, Mbeya University of Science and Technology,  
P.O Box 131, Mbeya, Tanzania

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### ABSTRACT

Although open innovation is widely regarded as a less resource-demanding approach to innovation for small enterprises, few studies have comprehensively assessed the effects of all three open innovation strategies within a single industry. This gap, together with the inconsistent and largely high-tech, developed-country evidence base, calls for context-specific studies of the approach in developing countries. This study assessed the effectiveness of the three open innovation strategies (inbound, outbound, and coupled) in fostering technological innovation in the low-tech furniture-manufacturing industry in Tanzania. A quota sample of 213 micro and small furniture-manufacturing enterprises (MSFMEs) in Arusha, Dar es Salaam, and Mbeya was surveyed. Using regression analysis performed in SmartPLS through its PROCESS path-analysis module, the study finds that only outbound open innovation significantly promotes technological innovation among MSFMEs in Tanzania. This differential effect underscores the need for MSFMEs to develop internal capabilities, such as absorptive capacity, as preconditions for enacting open innovation strategies effectively and to prioritise outbound open innovation as the most effective strategy for fostering technological innovation.

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\*Corresponding author's e-mail address: [yohana.sesabo@must.ac.tz](mailto:yohana.sesabo@must.ac.tz) (Sesabo, Y.)

## 1.0 Introduction

Micro and small enterprises (MSEs) are of considerable relevance to policy and research because of their prevalence and economic contribution worldwide. Such businesses account for up to 90% of all firms and contribute 70% of employment and 50% of gross domestic product (GDP) globally (International Council for Small Businesses [ICSB], 2024). In Tanzania, MSEs constitute up to 95% of businesses, employ about 23.4% of the population, and contribute 35% of the country's GDP (United Nations [UN], 2022).

Despite the importance of MSEs, most of them endure poor performance. In Tanzania, for example, more than 60% of MSEs do not survive beyond five years after initiation (UN, 2022). Particularly for Micro and Small Furniture Manufacturing Enterprises (MSFMEs), technological inadequacy is among the major factors behind their poor performance, limiting scale of production and cost and quality of product (Guadagno *et al.*, 2019; Msamula *et al.*, 2016; Mwangike, 2024).

Many factors can improve MSE performance. Schumpeter (1934) and Drucker (1985) were among the early scholars to promote innovation as its critical driver. Because innovations are unique, they create and capture market value, earn premium prices, and deter replication to secure long-lasting profits. They also help firms respond to environmental changes (Teece, 2017). Furthermore, innovation increases the effectiveness and efficiency of business processes and product variety, improving quality, sales, and profit (Bogetoft *et al.*, 2024; Broughel & Thierer, 2019; Were, 2024). Subsequently, innovation enhances economic development (Albina & Kriselda, 2024; My Thi Thi & Phu Do, 2024; Nihal *et al.*, 2023). Hence, enacting strategies that improve innovation is critical for all forms of businesses, including MSEs.

Research and development (R&D) and professional human-capital strategies for innovation remain limited in MSEs owing to inadequate financial resources (Meijer *et al.*, 2019; Mugogo & Midala, 2020). Instead, scholars have proposed open innovation as a less resource-demanding approach that enables MSEs to leverage external innovation resources (Krause *et*

*al.*, 2020; Vanhaverbeke, 2017). The central thesis of open innovation is that opening the firm's boundaries lets innovation ideas flow both into and out of it, thereby improving its innovation (Chesbrough, 2003; Gassmann & Enkel, 2004). This flow occurs through three open innovation strategies: inbound open innovation (outside-in processes), outbound open innovation (inside-out processes), and coupled open innovation (Enkel *et al.*, 2009; West & Bogers, 2016).

Inbound open innovation involves purchasing technologies and scientific services and searching for ideas from external parties such as customers, competitors, suppliers, and universities (Mazzola *et al.*, 2016; Teplov, 2018). Coupled open innovation covers structured alliances, co-patents, joint ventures, and consortia (Hinteregger *et al.*, 2018). It also includes simpler knowledge-sharing cooperation between the firm and external partners such as customers, suppliers, competitors, and universities (Organisation for Economic Co-operation and Development [OECD], 2018). Outbound open innovation involves commercialising technology, free revealing, out-licensing, divesting, spinning off, and participating in standardisation (Mazzola *et al.*, 2016; Teplov, 2018).

Research on the effect of open innovation strategies on innovation performance has produced inconsistent findings (Casprini *et al.*, 2019; Filiou, 2020; Hinteregger *et al.*, 2018; Radicic & Alkaraan, 2024). Differences in context and the extent of strategy adoption partly contribute to these inconsistencies. Context, and the type of industry in particular, exerts a significant influence on the effect of open innovation on innovation performance (D'Ambrosio *et al.*, 2017). MSEs adopt inbound open innovation most frequently because it is simpler to manage than coupled and outbound open innovation (Kobarg *et al.*, 2019; Ovuakporie *et al.*, 2021; Roper *et al.*, 2017). These mixed results underscore the need to understand the effect of each open innovation strategy on specific forms of innovation in a particular context before adopting it.

However, prior studies (Chabbouh & Boujelbene, 2023; Rabie *et al.*, 2024; Santoso *et al.*, 2020) have rarely examined and compared how each of the three strategies affects technological innovation. Moreover, most of these studies did not address

low-tech industries such as furniture manufacturing in low-income countries. It therefore remains unclear which open innovation strategy is more effective than the others in fostering technological innovation in a context such as furniture manufacturing. This knowledge is vital for guiding managers, policymakers, and support agencies in prioritising open innovation strategies to enhance technological innovation. From an open innovation perspective, inbound open innovation channels external innovation ideas into the firm, thereby enhancing product and process innovation (Hinteregger *et al.*, 2018; Roper *et al.*, 2017). Purchasing new machinery, for example, contributes directly to the stock of innovation within the purchasing firm. Coupled open innovation, in turn, promotes knowledge sharing that compensates for a firm's knowledge deficiencies and improves its innovation (Mazzola *et al.*, 2016; OECD, 2018; Roper *et al.*, 2017). Collaborating partners may, for instance, introduce new products and production technologies that add to or improve the firm's existing products and processes. As for outbound open innovation, it generates external feedback and supports external commercialisation, both of which enhance technological innovation (Filiou, 2020; Moreira *et al.*, 2016; Verreyne *et al.*, 2020). Exhibitions, for example, attract customer purchases that stimulate greater production of the exhibited technology, which in turn improves technological innovation performance. The study therefore proposes the following hypotheses:

- H1:** Inbound open innovation has a statistically significant positive effect on technology innovation.
- H2:** Coupled open innovation has a statistically significant positive effect on technology innovation.
- H3:** Outbound open innovation has a statistically significant positive effect on technology innovation.

To test the foregoing hypotheses, the present study was conducted among MSFMEs in Tanzania. Furniture manufacturing accounts for 6% of all manufacturing jobs in Tanzania (Guadagno *et al.*, 2019). Studies seeking to improve MSFME performance therefore carry considerable practical and policy relevance for industrial development and job creation. As noted earlier, studies in Tanzania (Osoro *et al.*, 2020;

Sesabo *et al.*, 2024) have not assessed the effectiveness of all three open innovation strategies in furniture manufacturing. It thus remains unclear which strategy is most effective in fostering technological innovation in MSFMEs. The few studies conducted elsewhere (Ovuakporie *et al.*, 2021; Rabie *et al.*, 2024; Yulianto & Supriono, 2023) are based largely on high-tech industries and on economies more advanced than Tanzania's.

## 2.0 Materials and Methods

### 2.1 Ethics Statement

This study followed all national procedures for data collection. These included obtaining approval from regional administrative offices, district administrative offices, and district executive directors across all study regions. The study also observed all relevant research-ethics requirements, including respondents' rights to confidentiality and to free and informed consent to participate.

### 2.2 Sample and Sampling Procedure

A total of 213 furniture-manufacturing MSEs were surveyed in 2021 in Tanzania's major cities of Dar es Salaam, Arusha, and Mbeya. Understanding the effectiveness of the open innovation strategies required estimating their effect on technological innovation. A survey design is well suited to this aim, as it permits collecting a large body of quantitative data to test hypotheses about cause-and-effect relationships (Saunders *et al.*, 2009).

The survey employed a rigorous quota-sampling procedure. A quota was defined as a ward, comprising streets within walking distance of one another whose MSFMEs frequently observe each other's work. In each city, information from the business-licensing office was used to group wards by their number of licensed MSFMEs: fewer than 5, between 5 and 10, and more than 10. These groups corresponded to low, medium, and high concentrations of MSFMEs (including unlicensed firms) in the respective wards.

One ward in every three was selected for inclusion of its MSFMEs, namely the ward with the highest number of licensed MSFMEs within each group. Selected wards in the three groups contributed 3, 6, and 9 MSFMEs to the sample, respectively.

Inclusion followed the criteria of one top, one average, and one least-productive maker of distinctive furniture who also owned modern production machinery. The researcher liaised with the ward executive officers in their respective wards to identify the MSFMEs that met the inclusion criterion. This criterion ensured variability in levels of technological innovation within the selected sample and, in addition, helped ensure sample representativeness (Maxwell, 2004). Properly conducted quota sampling yields samples comparable in quality to those obtained through stratified random sampling (Saunders *et al.*, 2009).

After data cleaning, the quota-sampling procedure yielded 213 usable questionnaires. Of the sampled MSFMEs, 23%, 21%, and 56% were located in Arusha, Mbeya, and Dar es Salaam, respectively, mirroring their relative concentration across these cities (NBS, 2018). The sample represented a high response rate of 84.5%; rates of 70% or above are regarded as acceptable in social science research involving managers (Saunders *et al.*, 2009). The sample of 213 MSFMEs is adequate for the regression analysis conducted in this study. With five predictors, it comfortably exceeds the minimum needed to detect medium effects at conventional power levels, and samples of around 200 cases are regarded as sufficient for the path-analysis procedure employed (Hair *et al.*, 2017).

### *2.3 Data Collection and Measurement*

The data were collected using a questionnaire that adapted measurement items from previous studies in order to enhance reliability and validity. Following the OECD (2018), managers of the MSFMEs rated their agreement on whether their firm had achieved technological innovation over the preceding three years relative to earlier years. Responses were recorded on a five-point Likert scale ranging from strongly disagree to strongly agree. Five of the items captured product innovation, namely the production of items with substantially different specifications, functions, materials and components, design techniques, and quality of manufactured components and materials. The remaining four items captured process innovation, comprising production machinery and equipment with improved or new functional features (ease of handling, reduced

effort, and automation), enhanced capacity (speed, volume, and shape, at lower cost), and production-quality certification. Objective indicators such as sales of innovative products, R&D expenditure, and patent counts measure innovation output only indirectly and are poorly recorded in small firms in developing countries (OECD, 2018).

The questionnaire strategies were items for the open innovation adapted from Flor *et al.* (2017), Hinteregger *et al.* (2018), and Laursen and Salter (2006). Managers of the MSFMEs were asked to rate how frequently they used each item on a five-point Likert scale ranging from never used (0) to always used (5). The scores for the items in each strategy were summed to capture usage depth. This differs from a dichotomous used (1)/not used (0) count of items, which would capture only breadth. Nine inbound open innovation items covered the sourcing of ideas from social media, customers, competitors, suppliers, consultants and commercial laboratories, technology centres, universities, conferences and technical publications, and professional associations. Eight coupled open innovation items covered the sharing of ideas with customers, competitors, suppliers, universities, technology centres, consultants, commercial laboratories, professional associations, and strategic-alliance partners. Four outbound open innovation items were covered: the use of production machinery to manufacture competitors' furniture components, the granting of distribution rights to other firms, free disclosure, and participation in standardisation.

Finally, the questionnaire included firm size and firm export as control variables, drawn from prior open innovation studies (Caputo *et al.*, 2016; D'Ambrosio *et al.*, 2017). Firm size was measured as the natural logarithm of the number of employees, reducing extreme variability and the influence of outliers (Caputo *et al.*, 2016). Firm export was measured on an ordinal scale comprising none, less than half, and more than half of sales originating from international markets (adapted from D'Ambrosio *et al.*, 2017).

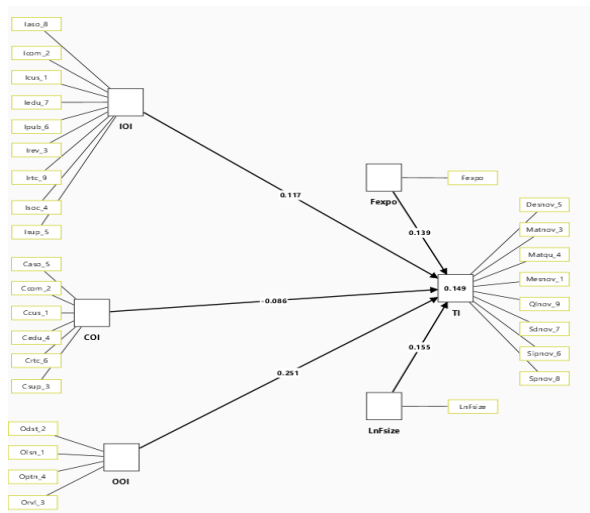
### *2.4 Statistical Analysis*

This study employed regression analysis, which determines the unique contribution of each independent variable to the dependent variable while controlling for the others (Hair *et al.*, 2010).

Because each construct was measured with multiple indicator items, the regression was implemented as a path analysis using the PROCESS module in SmartPLS 4.1.09, as depicted in Figure 1. For each multi-item construct, the software generated a single manifest variable by computing an equally weighted composite score (the arithmetic mean of its items). This score then served as the variable entered into the regression. Path coefficients were estimated using the recommended bootstrapping procedure with 5,000 subsamples (Hair *et al.*, 2017). Their statistical significance was evaluated against 95% confidence intervals, as recommended for social science research (Saunders *et al.*, 2009). One-tailed tests were used because all hypotheses were directional, being specified in the positive direction only.

values ( $p > .05$ ) indicate that the variance of the residuals remains constant across the predicted values. The test results were not statistically significant (LM = 6.706,  $p = .243$ ;  $F = 1.346$ ,  $p = .246$ ), confirming that the assumption of homoscedasticity was met (Gujarati & Porter, 2009). Linearity was assessed through residual diagnostics and examination of the relationships specified in the model to detect any evidence of non-linearity among the independent variables, control variables, and dependent variable. Lastly, collinearity was checked using a maximum variance inflation factor (VIF) threshold of 5 (Hair *et al.*, 2017). Adjusted  $R^2$  was used to assess model fit. Adjusted  $R^2$  scores of 0.02, 0.13, and 0.26 indicate that independent variables explain a small, medium, and large effect on the dependent variable, respectively (Hair *et al.*, 2022).

Figure 1  
SmartPLS Regression Analysis Model



### 3.0 Results

Prior to estimating the regression model, the assumptions underlying the path analysis were examined, and the results are summarised in Table 1. The Durbin–Watson statistic was 1.641, falling within the conventional 1.50–2.50 band and indicating that the residuals were independent (Hair *et al.*, 2022). Homoscedasticity was supported by the Breusch–Pagan test: neither the Lagrange multiplier statistic nor the F-test was significant (LM = 6.706,  $p = .243$ ;  $F = 1.346$ ,  $p = .246$ ), so the null hypothesis of constant error variance could not be rejected and the variance of the residuals was treated as constant across the predicted values. Examination of the residual plots revealed no systematic non-linear pattern, confirming that the relationships between the independent variables, the control variables, and technological innovation (TI) were adequately linear. Collectively, these diagnostics indicate that the data satisfied the assumptions required for the subsequent analysis.

Prior to hypothesis testing, the assumptions of multiple regression were examined. Independence of errors was assessed using the Durbin–Watson statistic (Hair *et al.*, 2022). Homoscedasticity was assessed using the Breusch–Pagan test, where non-significant  $p$ -

Table 1  
Results of Regression Assumption Tests

Assumption	Diagnostic Test	Acceptance Criterion	Obtained Value	Conclusion
Independence of errors	Durbin-Watson Statistic	1.50-2.50	1.641	Met
Homoscedasticity	Breusch-Pagan			
	LM Test	$p > .05$	LM = 6.706, $p = .243$	Met
	F Test	$p > .05$	$F = 1.346$ , $p = .246$	Met
Linearity	Residual	No systematic residual pattern	No evidence of nonlinearity	Met

Table 2 reports the discriminant validity and collinearity diagnostics. No construct returned a variance inflation factor (VIF) above the threshold of 5, confirming the absence of problematic collinearity among the predictors (Hair *et al.*, 2017). In addition, none of the inter-construct correlations (the off-diagonal, non-bolded values in Table 2) exceeded the outer loadings of the

indicators of the respective constructs, and the largest correlation observed was 0.654, well below the level at which discriminant validity would be threatened. Taken together, these results indicate that each construct is empirically distinct and that the predictors do not overlap to a degree that would bias the estimated path coefficients.

Table 2  
*Collinearity Test*

Variables	1	2	3	4	5	6
1. Coupled open innovation	<b>2.072</b>					
2. Firm export	0.140	<b>1.224</b>				
3. Firm size	0.305	0.136	<b>1.124</b>			
4. Inbound open innovation	0.654	0.273	0.284	<b>1.890</b>		
5. Innovation performance	0.196	0.196	0.278	0.252		
6. Outbound open innovation	0.560	0.254	0.413	0.469	0.348	<b>1.687</b>

**Notes:** VIF (Variance Inflation Factor) values for each variable are shown in bold

Consistent with the independence diagnostic reported above, the Durbin–Watson statistic of 1.641 also confirmed the absence of first-order autocorrelation among the residuals, as it lay within the acceptable range of 1.50–2.50. Taken

together, the diagnostics for linearity, homoscedasticity, collinearity, and autocorrelation establish that the data were suitable for estimating the regression model specified in Figure 1.

Table 3  
*Regression Analysis Results (SmartPLS PROCESS Path Analysis)*

	Original Sample (O)	P Values (p<0.05)	Bootstrap Coefficients		Effect Size (f <sup>2</sup> )
			2.5%	97.5%	
<b>Predictors</b>					
Coupled open innovation	0.003	-0.086	0.435	-0.304	0.125
Inbound open innovation	0.006	0.117	0.258	-0.088	0.323
Outbound open innovation	0.043	0.251*	0.002	0.097	0.416
<b>Control variables</b>					
Firm export	0.139	0.192	-0.023	0.377	0.007
Firm size	0.155	0.022*	0.020	0.284	0.022
R <sup>2</sup>	0.149				
Adjusted R <sup>2</sup>	0.129				
DW test	1.641				

**Notes:** \*Imply significant beta coefficient results where P value is less or equal to 0.05

Having established that the data met the assumptions of the analysis, the regression model in Figure 1 was estimated using the PROCESS path-analysis routine in SmartPLS. The results are presented in Table 3. The model explained a meaningful share of the variance in technological innovation (adjusted R<sup>2</sup> = 0.129). Following the benchmarks of Hair *et al.* (2022), an adjusted R<sup>2</sup> of this magnitude denotes a medium effect, indicating that the open innovation strategies and control variables jointly account for a practically relevant portion of the variation in technological innovation among the sampled enterprises.

The estimated path coefficients are reported in Table 3. Among the control variables, firm size

exerted a positive and statistically significant effect on technological innovation ( $\beta = 0.155$ ,  $p < .05$ ), indicating that larger enterprises achieve higher levels of technological innovation, whereas the effect of firm export was positive but not significant ( $\beta = 0.139$ ,  $p > .05$ ). Turning to the hypothesised relationships, the depth of coupled open innovation had a negative and non-significant effect on technological innovation ( $\beta = -0.086$ ,  $p > .05$ ); hypothesis H2, which predicted a significant positive effect of coupled open innovation, is therefore rejected. Likewise, the depth of inbound open innovation showed a positive but non-significant effect ( $\beta = 0.117$ ,  $p > .05$ ), so hypothesis H1 is not supported. By

contrast, the depth of outbound open innovation had a positive and statistically significant effect on technological innovation ( $\beta = 0.251$ ,  $p < .05$ ), with the largest effect size among the predictors ( $f^2 = 0.043$ ); hypothesis H3 is thus supported. In sum, of the three open innovation strategies examined, only outbound open innovation significantly enhanced technological innovation in the sampled MSFMEs.

#### **4.0 Discussion of Results**

The evidence on how open innovation strategies shape innovation performance remains inconclusive and fragmented. This is largely because most studies do not examine the three strategies jointly within a single empirical setting. As a result, findings obtained in one industry cannot be assumed to transfer to another, and the evidence base for low-tech industries in developing African economies is especially thin. The present study addressed this gap by assessing the comparative effectiveness of inbound, coupled, and outbound open innovation in fostering technological innovation among MSFMEs in Tanzania. Three findings stand out and are discussed in turn: the non-significant effect of inbound open innovation, the non-significant (and negative) effect of coupled open innovation, and the significant positive effect of outbound open innovation. Read together, these results qualify the open innovation thesis by showing that its benefits are strategy-specific and contingent on the internal capabilities of the adopting firm.

Contrary to the central prediction of open innovation theory, deepening the external search for innovation ideas (inbound open innovation depth) did not significantly improve technological innovation. Deepening cooperation with external partners (coupled with open innovation depth) likewise failed to enhance technological innovation and was, at best, weakly negative. Only outbound open innovation depth produced a significant positive effect. Each additional unit of technology revealed or transferred to external parties was associated with a measurable gain in technological innovation. These results support H3 while leading to the rejection of H1 and H2, suggesting that, in a low-tech MSFME context,

the value of openness lies less in absorbing or co-developing external knowledge than in actively revealing and commercialising the firm's own technology.

The non-significant effect of inbound open innovation is consistent with a substantial body of prior work. Chiang and Hung (2010), Garriga *et al.* (2013), and Flor *et al.* (2017) similarly report that the depth of external knowledge search does not, on its own, translate into significant gains in product or process innovation. Filiou (2020) and Laursen and Salter (2006) extend this picture by documenting, respectively, an inverted U-shaped and a negative relationship between search depth and innovation outcomes. Both imply that intensive external search can eventually depress rather than raise innovation performance. The non-significant effect of coupled open innovation likewise echoes Greco *et al.* (2016), who found no significant association between collaboration depth and radical product innovation, and aligns with Filiou (2020), who reported a negative effect of coupled openness on innovation performance. Diverse industries and economies contribute to these studies. Their convergence with the present findings strengthens confidence that the limited returns of inbound and coupled openness are not artefacts of the Tanzanian setting alone.

A plausible explanation for the limited effect of inbound open innovation lies in the scarcity of certain internal capabilities. Absorptive capacity and dynamic capabilities enable firms to convert external ideas into innovation. Absorptive capacity is the mechanism through which externally sourced knowledge, such as images of novel furniture encountered on social media or advice obtained from consultants, is recognised, assimilated, and applied to commercial ends (Francis & Chakravarty, 2025). Where this capacity is weak, two failures follow. Firms struggle to translate promising external ideas into manufacturable products, and they risk being overwhelmed by an undifferentiated inflow of ideas, making it difficult to select the most valuable ones. MSFMEs typically operate with limited technical staff and few formal routines for screening and integrating knowledge. For them, deeper external search may therefore expand the pool of available ideas without expanding the

firm's ability to exploit them, leaving technological innovation largely unchanged.

The limited relational capabilities of MSFMEs contribute to the negative, albeit non-significant, effect of coupled open innovation. Deepening collaboration raises the costs of coordinating and governing inter-firm relationships. It also heightens exposure to opportunism, knowledge leakage, and conflict, each of which can erode rather than augment innovation output (Kobarg *et al.*, 2019). Small furniture manufacturers typically lack formal mechanisms for partner selection, contracting, and dispute resolution. For them, the managerial burden and appropriation risk of intensive collaboration may outweigh its intended knowledge benefits, which is consistent with the slightly negative coefficient observed in this study.

The non-significant effects of inbound and coupled open innovation observed in this study contrast with Hinteregger *et al.* (2018) and Yulianto and Supriono (2023), both of whom reported significant positive effects of these strategies on innovation performance. This divergence is most likely explained by differences in how innovation and openness are operationalised. Hinteregger *et al.* (2018) bundled organisational innovation along with process innovation. MSFMEs can adopt organisational changes informally and at low costs, such as new work routines, modalities, and staffing arrangements. Therefore, a composite measure may register gains that are easier to achieve than the resource-intensive product and process innovation assessed in the present study. Yulianto and Supriono (2023), for their part, collapsed the three strategies into a single broad open innovation construct rather than distinguishing among them. Aggregation of this kind can mask offsetting effects. It allows an effective strategy such as outbound openness to conceal the limited contribution of inbound and coupled openness, producing an apparently positive overall effect. By estimating each strategy separately, the present study isolates these heterogeneous effects and offers a more precise account of where the returns to openness actually arise.

The significant positive effect of outbound open innovation on technological innovation concurs with Leitão *et al.* (2020), who reported that

outbound practices significantly enhance both product and process innovation. A mechanism consistent with this result is that revealing and commercialising a firm's innovative products and processes attracts customers to purchase or commission them, often accompanied by requests for modification (Sesabo *et al.*, 2023). Such orders stimulate increased production of the revealed technology, while the modification feedback prompts incremental refinements to the underlying products and processes. In this way, outbound openness creates a demand-driven feedback loop, in which external commercialisation directly fuels further technological innovation. This interpretation fits the relatively informal, market-facing character of MSFME operations.

The positive effect of outbound open innovation nonetheless diverges from Caputo *et al.* (2016) and Filiou (2020), who found that outbound openness depressed innovation performance. In those studies, intensive revealing and out-licensing presupposed heavy upstream investment in R&D and patents, the cost of which eroded the net benefits of innovation. This contrast is again best understood as a measurement difference. Caputo *et al.* (2016) and Filiou (2020) captured outbound openness through revenue-to-patent and R&D-investment ratios that internalise the cost of generating and protecting technology. The present study, by contrast, relied on managers' perceptions of realised product and process innovations, which did not incorporate these costs (OECD, 2018). For MSFMEs, outbound activities such as free disclosure and informal commercialisation rarely rest on formal R&D or patenting. A perceptual measure therefore reflects the operative reality of these firms more faithfully than cost-laden financial ratios, helping to reconcile the opposing findings.

## 5.0 Conclusion

This study assessed the effectiveness of inbound, coupled, and outbound open innovation in fostering technological innovation among micro and small furniture manufacturing enterprises in Tanzania. The evidence yields a clear and differentiated conclusion. Of the three strategies,

only outbound open innovation significantly improves technological innovation in this low-tech, low-income setting, while inbound and coupled open innovation do not. The study therefore partly affirms the relevance of open innovation for small enterprises, but only when openness transforms into revealing and commercialising the firm's own technology. The broader theoretical contribution demonstrates that resource-constrained firms cannot apply the open innovation thesis wholesale. Rather, the returns to each strategy are contingent on complementary internal capabilities and on absorptive and relational capacities in particular that MSFMEs frequently lack. Open innovation theory in such contexts is thus best deployed in conjunction with capability-based perspectives that specify the conditions under which external knowledge can be absorbed, co-developed, or exploited for innovation.

## **6.0 Recommendations**

The findings carry concrete implications for practice and policy. First, managers of MSFMEs that seek to raise their technological innovation should prioritise outbound open innovation, the only strategy shown in this study, as it is significantly effective. They can do so by systematically revealing and commercialising their products and processes through exhibitions, demonstrations, and direct engagements with customers. Second, the limited returns to inbound and coupled openness trace to weak internal capabilities rather than to any inherent shortcoming of these strategies. Policymakers, business development agencies, and trainers should therefore invest in building the absorptive and relational capacities of MSFMEs. These are the capacity to identify, assimilate, and apply external knowledge and the capacity to select, govern, and sustain collaborative relationships. Targeted capability-building programmes of this kind are a precondition for MSFMEs to derive value from inbound and coupled open innovation in future. They should accompany, rather than displace, the immediate emphasis on outbound activity. Notwithstanding these contributions, the study has limitations that open productive avenues for

future research. First, it relied on managers' subjective assessments of their firms' technological innovation. These do not capture the costs of executing the open innovation strategies or the revenue generated from technology sales. Future research could complement these measures with objective indicators and a fuller cost-benefit analysis of each strategy. Second, the study examined technological (product and process) innovation only. Replicating the analysis with marketing and organisational innovation outcomes would establish whether the strategy-specific pattern observed in the current study generalises across innovation types. Third, the focus on furniture manufacturing, while affording analytical depth, limits generalisability; extending the study to other low-tech industries such as the manufacture of wearing apparel would test the robustness of the findings. Fourth, the study did not directly measure the internal capabilities, especially absorptive and relational capacities, that were theorised to condition the effectiveness of the strategies. Incorporating these capabilities as moderators or mediators represents the most promising extension of this work. It would allow future research to test directly the capability-contingent account of open innovation advanced in the current study.

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## **9.0 References**

Albina, K., & Kriselda, S. (2024). Impact of innovation on economic growth in Balkan countries. *Agora International Journal of Economical Sciences*, 18 (1). 65–73. <https://doi.org/10.15837/aijes.v18i1.671>

- Bogetoft, P., Kroman, L., Smilgins, A., & Sørensen, A. (2024). Innovation strategies and firm performance. *Journal of Productivity Analysis*, 62, 175-196. <https://doi.org/10.1007/s11123-024-00727-1>
- Broughel, J., & Thierer, A. (2019). Technological innovation and economic growth: A brief report on the evidence. Mercatus Research Center, George Mason University.
- Caputo, M., Lamberti, E., Cammarano, A., & Michelino, F. (2016). Exploring the impact of open innovation on firm performances. *Management Decision*, 54(7), 1788-1812.
- Casprini, E., Pucci, T., Kaufmann, R. H., & Zanni, L. (2019). Inbound, outbound, or coupled open innovation? When being a family firm leads to higher innovativeness? In 19th EURAM Conference: Exploring the future of management (pp. 1-24). <https://hdl.handle.net/11365/1084095>
- Chabbouh, H., & Boujelbene, Y. (2023). Open innovation, dynamic organisational capacities, and innovation performance in SMEs: Empirical evidence in Tunisian manufacturing industry. *The International Journal of Entrepreneurship and Innovation*, 24(3), 178-190. <https://doi.org/10.1177/14657503211066014>
- Chiang, Y. H., & Hung, K. P. (2010). Exploring open search strategies and perceived innovation performance from the perspective of inter-organizational knowledge flows. *R & D Management*, 40(3), 292-299. <https://doi.org/10.1111/j.1467-9310.2010.00588.x>
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.
- Cohen, J. (1988). *Statistical power analysis for behavioral sciences* [2<sup>nd</sup> ed.]. Lawrence Erlbaum Associates.
- D'Ambrosio, A., Gabriele, R., Schiavone, F., & Villasalero, M. (2017). The role of openness in explaining innovation performance in a regional context. *Journal of Technology Transfer*, 42, 389-408. <https://doi.org/10.1007/s10961-016-9501-8>
- Enkel, E., Gassmann, O., & Chesbrough, O. (2009). Open R & D and open innovation: Exploring the phenomenon. *R & D Management*, 39(4), 311-316. <https://doi.org/10.1111/j.1467-9310.2009.00570.x>
- Drucker, F. P. (1985). *Innovation and Entrepreneurship: Practice and Principles*. HarperCollins Publishers.
- Filiou, D. (2020). A new perspective on open innovation: Established and new technology firms in UK biopharmaceuticals. *R&D Management*, 51(1), 73-86.
- Flor, L. M., Cooper, Y. S., & Oltra, J. M. (2017). External knowledge search, absorptive capacity, and radical innovation in high-technology firms. *European Management Journal*, 36(2), 183-194. <http://dx.doi.org/10.1016/j.emj.2017.08.003>
- Francis, J., & Chakravarty, D. (2025). Business Consulting and SME Performance: Unravelling the Role of Absorptive Capacity. *Journal of Small Business Strategy*, 35(2), 35-51.
- Garriga, H., von Krogh, G., & Spaeth, S. (2013). How constraints and knowledge impact open innovation. *Strategic Management Journal*, 34(9), 1134-1144. <https://doi.org/10.1002/smj.2049>
- Gassmann, O. & Enkel, E. (2004). Towards a Theory of Open Innovation: Three Core Process Archetypes. Proceedings of the R&D Management Conference (RADMA), Lisbon, Portugal, July 6-9, 2004.
- Greco, M., M. Grimaldi, & Cricelli, L. (2016). An analysis of the open innovation effect on firm performance. *European Management Innovation*, 34, 501-516. <http://dx.doi.org/10.1016/j.emj.2016.02.008>
- Guadagno, F., Wangwe, W., Delera, M., de Castro, R.B.A. (2019). Horticulture and wood and furniture industries in Tanzania: performance, challenges, and potential policy approaches. <https://www.theigc.org/site/default/files/2019/11/Guadagno-et-al-2019-final-paper.pdf> [Accessed 25 May, 2026]
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill.
- Hair, F. J., Tomas, G., Hult, M., Ringle, M. C., & Anderson, E.R. (2010). *Multivariate Data Analysis* (7th ed). Pearson Prentice Hall.

- Hair, F. J., Black, C. W., Babin, J. B., & Sarstedt, M. (2017). *A primer on Partial Least Square Structural Equation Modeling [PLS-SEM] (2nd ed)*. Sage.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.)*. Sage.
- Hinteregger, C., Durst, S., Temel, S., & Yesilay, B. R. (2018). The impact of openness on innovation in SMEs. *International Journal of Innovation Management*, 23 (01). <https://doi.org/10.1142/S1363919619500038>
- International Council for Small Businesses [ICSB] (2024). ICSB annual global micro-small and medium sized enterprises report. Available at <https://www.un.org/sites/un2.un.org/files/globalmsmesreport2024.pdf> [Accessed 15 May. 2026].
- Kobarg, S., Stumpf-Wollersheim, J., & Welpel, I. (2019). More is not always better: Effects of collaboration breadth and depth on radical and incremental innovation performance at the project level. *Research Policy*, 48, 1–10. <https://doi.org/10.1016/j.respol.2018.07.014>
- Krause, S., Kailer, N., Dorfer, J., & Paula, J. (2020). Open innovation in (young) SMEs. *The International Journal of Entrepreneurship and Innovation*, 21(1), 47-59. <https://doi.org/10.1177/0008125619885150>
- Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, 27, 131–150. <https://doi.org/10.1002/smj.507>
- Leitão, J., Pereira, D., & de Brito, S. (2020). Inbound and outbound practices of open innovation and eco-innovation: Contrasting bioeconomy and non-bioeconomy firms. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(145). <https://doi.org/10.3390/joitmc6040145>
- Maxwell, A. J. (2004). Using Qualitative Methods for Causal Explanation. *Field Methods*, 16(3), 243–264.
- Mazzola, E., Bruccoleri, M., & Perrone, G. (2016). Open innovation and firms' performance: State of the art and empirical evidences from the biopharmaceutical industry. *International Journal of Technology Management*, 70(2/3), 109–134.
- Meijer, L. L. J., Huijben, J. C. C. M., van Boxstael, A., and Romme, A.G.L. (2019). Barriers and drivers for technology commercialization by SMEs in the Dutch sustainable energy sector. *Renewable and Sustainable Energy Reviews*, 112, 114–126.
- Moreira, P. G. F., Torkomian, V. L. A., & Soares, C. C. J. T. (2016). Exploration and firm's innovation performance-How does this relationship work? *Review of Business Management*, 18(61), 392-415. <https://doi.org/10.7819/rbgn.v18i61.2635>
- Msamula, J., Vanhaverbeke, W., & Petro, H. (2016). Rural entrepreneurship in Tanzania: Why are micro and small enterprises not creating value in furniture manufacturing industry? *Transnational Corporations Review*, 8(4), 250–264.
- Mugogo, M. & Midala, S. A. (2020). Barriers to SME innovation for performance: Evidence from Zimbabwe. *International Journal of Education and Research*, 8(11), 45–58.
- Mwagike, L. (2024). Challenges facing small scale furniture industries in Dar es Salaam region, Tanzania. *Journal of Business Management*, 8(1), 54-65. <https://doi.org/10.61538/pajbm.v8il.1495>
- My Thi Thi, D., & Phu Do, T. T. (2024). The interrelationships between economic growth and innovation: International evidence. *Journal of Applied Economics*, 27 (1). <https://doi.org/10.1080/15140326.2024.2332975>
- National Bureau of Statistics [NBS]. (2018). Annual Survey of Industrial Production 2015 and 2016: Summary report. <https://www.nbs.go.tz/uploads/statistics/documents/en-1705493816-asip-2015-and-2016-summary-report.pdf> [Accessed 12 March. 2023]
- Nihal, G., Mounia, C., Hussain, M., Humayun, S., Perveen, N., Yousaf, N. R., & Akhtar, S. (2023). Impact of innovation on the economic growth of G8 countries analysis over 1996–2020. *International Journal of Professional Business Review*, 8(5).

- <https://doi.org/10.26668/businessreview/2023.v8i5.1403>
- Organisation for Economic Cooperation and Development [OECD] (2018). Oslo Manual 2018 on guidelines for collecting, reporting and using data on innovation (4th Edition): The measurement of scientific, technological and innovation activities. OECD Publishing.
- Osoro, O., Vermeulen, P., Knobens, J., & Kahyarara, G. (2020). Effect of knowledge sources on firm-level innovation in Tanzania. In A. Egbetokun., R. Atta-Ankomah., O. Jegede., & E. Lorenz (Ed.), *Firm level innovation in Africa: Overcoming Limits and Constraints*. <https://doi.org/10.4324/9780429470028>
- Ovuakporie, D.O., Pillai, G.K., Wang, C., & Wei, Y. (2021). Differential moderating effects of strategic and operational reconfiguration on the relationship between open innovation practices and innovation performance. *Research Policy*, 50, 1–17. <https://doi.org/10.1016/j.respol.2020.104146>
- Rabie, N., Moustafa, A., & Al Ghaithi, F. (2024). Organisational practices' role in managing open innovation and business performance. *Administrative Sciences*, 14(87). <https://doi.org/10.3390/admsci14050087>
- Radicic, D., & Alkaraan, F. (2024). Relative effectiveness of open innovation strategies in single and complex SME innovators. *Technology Analysis & Strategic Management*, 36(9), 2113–2126. <https://doi.org/10.1080/09557325.2022.2130042>
- Roper, S., Love, H. J., & Bonner, K. (2017). Firms' knowledge search and local knowledge externalities in innovation performance. *Research Policy*, 46, 43–56. <https://dx.doi.org/10.1016/j.respol.2016.10.004>
- Santoso, A. S., Prijadi, R., & Balqiah, T. E. (2020). How open innovation strategy and effectuation within platform ecosystem can foster innovation performance: Evidence from digital multi-sided platform startups. *Journal of Small Business Strategy*, 30(3), 102–126.
- Schumpeter, J. A. (1934). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.
- Sesabo, Y. J., Kato, M. P., & Chao, J. E. (2023). Innovation in micro and small businesses: how inbound open innovation and dynamic capabilities. *International Journal of Innovation*, 11(1). <https://doi.org/10.5585/2023.22945>
- Sesabo, Y., Kato, M., & Chao, E. (2024). Coupled open innovation and dynamic capabilities: Their effect on low-tech micro and small firms' innovation. *Small Business International Review*, 7(2). <https://doi.org/10.26784/sbir.v7i2.613>
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students (5th ed)*. Pearson Education Ltd.
- Teece, D. J. (2017). Towards a capability theory of innovating firms: Implications for management and policy. *Cambridge Journal of Economics*, 41, 693–720.
- Teplov, R. (2018). A Holistic Approach to Measuring Open Innovation: Contribution to Theory Development. PhD Thesis, Lappeenranta University of Technology: Lappeenranta.
- United Nations [UN] (2022). United nations' sustainable development cooperation framework 2022–2027: The United Republic of Tanzania. [https://www.tanzania.un.org/sites/default/files/2022-2027\(small\)pdf](https://www.tanzania.un.org/sites/default/files/2022-2027(small)pdf)
- Vanhaverbeke, W. (2017). *Managing Open Innovation in SMEs*. Cambridge University Press.
- Verreyne, M., Oliveira, T. R., Steen, J., Indulska, M., & Ford, A. J. (2020). What motivates 'free' revealing? Measuring outbound non-pecuniary openness, innovation types, and expectations of future profit growth. *Scientometrics*, 124, 271–301. <https://doi.org/10.1007/s11192-020-03434-4>
- Were, J. N. (2024). Evaluating technology capability in strategy implementation and firm performance of the furniture manufacturing sector in Kenya. *Technology Audit and Production Reserves*, 4(78), 16–24. <https://doi.org/10.15587/2706-5448.2024.310175>

- West, J., & Bogers, M. (2016). Open innovation: Current status and research opportunities. *Innovation*, 19(1), 1–8. <https://dx.doi.org/10.1080/14479338.2016.1258995>
- Yulianto, E., & Supriono (2023). Effect of open innovation on firm performance through types of innovation: Evidence from SMEs in Malang City, East Java, Indonesia. *Cogent Business and Management*, 10(3), 1–23. <https://doi.org/10.1080/23311975.2023.2262671>