

Effect of Entrepreneurial Competencies on Performance of Manufacturing Small and Medium Enterprises in Nairobi County Kenya

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Accepted: 8 August 2026 | Published: 9 October 2026

Abstract

Small and Medium Enterprises (SMEs) are central to employment creation, industrial development, innovation, and economic growth in Kenya. Despite their significant contribution to the national economy, many SMEs continue to experience low productivity, limited competitiveness, weak innovation, and high business failure rates. Entrepreneurial competencies have increasingly been recognized as critical capabilities that enable entrepreneurs to identify opportunities, mobilize resources, make strategic decisions, and sustain competitive advantage. This study examined the effect of entrepreneurial competencies on performance of manufacturing SMEs in Nairobi County, Kenya. Entrepreneurial competencies were operationalized through opportunity identification, networking, leadership and organizational learning, while SME performance was constructed from four ordered business outcomes: innovation rate, sales turnover, market share and profitability. The study was anchored on the Knowledge-Based View. A descriptive research design employed a quantitative approach that provided a comprehensive analysis of the relationships under study. The target population comprised 590 manufacturing SMEs in Nairobi County drawn from four sectors: food and beverage processing, cosmetics and detergents, leather and leather goods, and metal fabrication. Primary data were collected from 202 manufacturing SMEs using structured questionnaires administered to SME owners and managers. Data were analyzed using descriptive statistics, Pearson correlation analysis, and multiple linear regression. Entrepreneurial competencies were positively associated with SME performance ($r = .418$, $p < .001$) and significantly predicted performance in the simple regression model ($B = .444$, standardized $\beta = .418$, $R^2 = .175$, $F(1, 200) = 42.43$, $p < .001$). When the four competency dimensions were entered simultaneously, the model remained significant ($R^2 = .187$, adjusted $R^2 = .170$, $F(4, 197) = 11.32$, $p < .001$). Organizational learning was the strongest unique predictor ($\beta = .240$, $p = .003$), followed by opportunity identification ($\beta = .184$, $p = .013$); networking and leadership were positively correlated with performance but did not retain significant unique effects in the joint model. The findings extend the Knowledge-Based View by showing that the performance value of entrepreneurial knowledge in manufacturing SMEs depends particularly on the organizational conversion of experience and information into learning routines, alongside the ability to recognize viable opportunities. The study recommends that enterprise-development policy and managerial practice move beyond generic entrepreneurship training toward competency architectures centred on organizational learning, systematic opportunity discovery, strategic networking and leadership practices that support knowledge application.

Keywords: Entrepreneurial Competencies; Opportunity Identification; Networking; Leadership; Organizational Learning; SME Performance; Knowledge-Based View;

1. Introduction

Small and Medium Enterprises (SMEs) occupy a central position in debates on employment creation, industrialization, innovation and inclusive growth, but their contribution depends on their

capacity to survive, adapt and improve performance in environments characterized by resource constraints, changing consumer preferences, technological shifts and intense competition. These pressures are particularly consequential for manufacturing SMEs. Unlike many low-asset service activities, manufacturing requires the coordination of production knowledge, quality requirements, equipment, inputs, labour, customer information and market access. The owner-manager is therefore not only an entrepreneur who discovers opportunities; in many SMEs, the same individual also performs a substantial share of the strategic, networking, learning and leadership functions through which resources are converted into business outcomes.

Kenya provides a useful setting for examining these processes. Manufacturing remains an important component of the country's productive economy, and national economic reporting continues to treat manufacturing as a distinct sector of strategic importance Kenya National Bureau of Statistics [1]. Within the sector, SMEs participate in diverse value chains, including food processing, cosmetics, leather products and metal fabrication. Their competitive conditions differ, but they share a common managerial challenge: limited resources must be deployed intelligently enough to identify opportunities, access knowledge and markets, organize people and continually improve products and processes. These requirements place entrepreneurial competencies at the center of firm-level performance.

Entrepreneurial competencies refer to integrated knowledge, skills, motives, attitudes and behaviours that enable entrepreneurs to perform the tasks required to establish, manage and grow a venture. The competency perspective is valuable because it shifts attention away from static demographic characteristics and broad personality traits toward capabilities that can be developed, applied and embedded in organizational practice. Man et al. [2] positioned entrepreneurial competencies as a key link between the owner-manager and SME competitiveness. Subsequent empirical work has shown that different competency configurations are associated with performance, innovation and resilience, although the relative importance of specific dimensions varies across contexts [3], [4], [5].

Recent evidence has strengthened the case for examining entrepreneurial competencies in manufacturing SMEs. Al Koliby et al. [6] found that entrepreneurial competencies were positively related to innovation and sustainable performance in manufacturing SMEs, while Al Koliby et al. [7] found that entrepreneurial competencies positively influenced both knowledge management and sustainable performance. These studies are important because they move beyond the idea that competence merely reflects the personal quality of the entrepreneur; they suggest that competencies matter because they shape how knowledge is acquired, organized and applied within the firm. However, much of this recent evidence comes from Asian settings, and there remains a need for context-specific evidence from African manufacturing SMEs.

African research generally supports a positive entrepreneurial competency–performance relationship, but it also shows that the competency mix matters. Ibidunni et al. [3], studying informal SMEs in Nigeria, reported that organizing, conceptual, learning, strategic, opportunity and risk-taking competencies were important for innovative performance. Kisubi et al. [4], using data from 314 Ugandan SMEs, established a positive and significant effect of entrepreneurial competencies on SME performance and found that firm capabilities partially mediated this relationship. More recent Nigerian studies also report positive performance effects for strategic, organizational, opportunity, networking and other entrepreneurial competencies [8], [9]. These findings suggest broad relevance but do not resolve which competencies are most consequential in manufacturing settings.

Evidence from Kenya is growing but remains fragmented across regions, enterprise types and competency specifications. Ali et al. [10] found that networking capabilities and entrepreneurial

competencies were important to SME performance in Kenya's North Rift region. Oraya and Maina [11] reported positive relationships between management skills, risk taking, creativity, opportunity seeking and organizational performance among micro and small enterprises in Machakos County. These studies confirm the relevance of entrepreneurial capability in Kenya, but they do not specifically isolate a four-dimensional competency architecture comprising opportunity identification, networking, leadership and organizational learning among manufacturing SMEs, nor do they compare the unique contribution of these dimensions to a multidimensional performance index.

This distinction matters theoretically and practically. If all entrepreneurial competencies are treated as interchangeable, enterprise-support programmes may offer broad training packages without identifying the capabilities most closely associated with firm outcomes. Manufacturing SMEs may require a different hierarchy of competencies from retail or service firms because production environments depend heavily on continuous improvement, technical adaptation, coordination and the interpretation of market and process information. Organizational learning may therefore be especially important, while opportunity identification may help firms detect changes in demand, technology and market niches. Networking can provide access to suppliers, customers, finance and technical institutions, and leadership can coordinate employees and implementation. The empirical question is not simply whether entrepreneurial competencies matter, but which dimensions retain explanatory power when considered together.

The present paper addresses this question using the final data set of 202 manufacturing SMEs in Nairobi County. It makes three contributions. First, it provides contemporary evidence from an African manufacturing context and uses a multidimensional measure of SME performance combining innovation rate, sales turnover, market share and profitability. Second, it disaggregates entrepreneurial competencies into opportunity identification, networking, leadership and organizational learning and compares their unique effects. Third, it uses the Knowledge-Based View (KBV) to explain entrepreneurial competencies as micro-foundations through which individual and collective knowledge is translated into organizational action and performance. The paper asks: To what extent do entrepreneurial competencies influence manufacturing SME performance, and which competency dimensions make the strongest unique contribution?

The remainder of the paper proceeds as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes the methodology. Section 4 presents the results, and Section 5 discusses their interpretation in relation to prior studies. Section 6 addresses contributions and implications. Section 7 presents limitations and future research, and Section 8 concludes the paper.

2. Literature Review and Hypotheses Development

2.1 Entrepreneurial Competencies as Firm-Level Capabilities

The entrepreneurial competency perspective emerged from the recognition that SME performance cannot be adequately explained by resources or environmental conditions alone. In owner-managed firms, the entrepreneur frequently determines how resources are perceived, acquired, combined and deployed. Man et al. [2] conceptualized entrepreneurial competencies as higher-level characteristics encompassing knowledge, skills and personality-related attributes that influence the entrepreneur's ability to perform entrepreneurial tasks. This view is especially relevant to SMEs because the boundary between the individual entrepreneur and the business is often thin: managerial judgement, external relationships, opportunity interpretation and internal coordination are strongly shaped by the owner-manager relationship.

Competencies differ from isolated skills because they represent patterned capacities to act effectively across situations. An entrepreneur may possess technical knowledge yet lack the

opportunity competency required to connect that knowledge to unmet demand. A well-networked owner may access information but fail to translate it into performance if organizational learning is weak. Leadership may mobilize employees, but without credible opportunities or learning routines, effort may not generate sustainable gains. Entrepreneurial competency should therefore be understood as an architecture of complementary capabilities rather than a single personal attribute.

Empirical studies increasingly support this multidimensional view. Sakib et al. [5] found that organizing and leading, learning, relationship and commitment competencies significantly influenced SME performance in Bangladesh, although strategic and opportunity competencies were not significant in their model. Kisubi et al. [4] found a positive overall effect of entrepreneurial competencies among Ugandan SMEs, while Ibidunni et al. [3] highlighted learning, opportunity, organizing and strategic competencies as important for innovative performance in Nigerian informal SMEs. The variation across studies suggests that competency effects are contingent on sector, institutional setting, measurement and the performance outcome examined.

2.2 Knowledge-Based View and Entrepreneurial Competencies

The Knowledge-Based View provides the theoretical foundation for the study. Grant [12] conceptualized the firm as an institution for integrating specialized knowledge and argued that organizational capability depends fundamentally on the application and coordination of knowledge. The KBV is particularly useful for understanding SMEs because knowledge is often concentrated in a relatively small number of individuals, especially founders and owner-managers. In such firms, the performance challenge is not only possessing information or experience; it is converting knowledge into coordinated decisions and routines.

Entrepreneurial competencies can be interpreted as micro-foundations of this conversion process. Opportunity identification enables the firm to interpret market, technological and customer information as potential economic opportunities. Networking extends the firm's knowledge boundaries by creating channels to customers, suppliers, financiers, universities, research organizations and peer firms. Leadership supports knowledge application by establishing direction, coordinating employees and motivating implementation. Organizational learning embeds knowledge beyond the individual entrepreneur through routines that encourage reflection, experimentation, employee development, shared purpose and openness to change.

This interpretation extends a narrow view of knowledge as a stock of information. From a KBV perspective, knowledge generates value only when the firm can integrate and apply it. Entrepreneurial competencies therefore provide behavioural and organizational mechanisms linking knowledge to performance. In manufacturing SMEs, this linkage can manifest in improved product or process innovation, better market positioning, higher sales turnover and improved profitability. The central theoretical expectation is consequently that stronger entrepreneurial competencies should be associated with better SME performance.

2.3 Opportunity Identification and SME Performance

Opportunity identification concerns the entrepreneur's capacity to notice, interpret, evaluate and act on emerging possibilities. It includes alertness to changes in customer needs, active market-information search, monitoring of competitors, exploration of new markets and evaluation of the viability of potential opportunities. Opportunity identification is fundamental to entrepreneurship because performance ultimately depends on directing resources toward activities for which customers are willing to pay.

For manufacturing SMEs, opportunity identification can involve detecting demand for a new product variant, recognizing a gap created by import substitution, responding to regulatory or quality

changes, adapting a technology to local needs, identifying an under-served market segment, or using customer feedback to improve a product. These opportunities are not self-executing. They require judgement about feasibility, timing and resource commitment. Firms with stronger opportunity-identification competency should therefore be better positioned to allocate scarce resources toward commercially promising activities.

Evidence is generally supportive, although not uniform. Ibidunni et al. [3] identified opportunity competency among the competencies relevant to innovative performance in informal SMEs. Akintayo et al. [8] reported a positive relationship between opportunity competency and SME performance in Nigeria. Oraya and Maina [11] similarly found a positive relationship between opportunity seeking and micro and small enterprise (MSE) performance in Kenya. Conversely, Sakib et al. [5] found that opportunity competency was not significant in their Bangladesh model, illustrating that the effect may depend on context and on how opportunities are converted into organizational action. On balance, the theoretical and empirical evidence supports a positive relationship.

H0a: Opportunity-identification competency has no effect on manufacturing SME performance.

2.4 Networking Competency and SME Performance

Networking competency refers to the ability to initiate, develop and maintain relationships that provide access to information, resources, legitimacy and market opportunities. SMEs typically operate with limited internal resources and can partly compensate through external relationships. Networks may provide customer referrals, supplier information, credit, technical expertise, regulatory knowledge, partnerships and access to new markets.

The value of networking is especially apparent in manufacturing, where firms depend on input suppliers, distributors, standards bodies, equipment providers, technical experts and institutional partners. A network can reduce search costs and uncertainty, but the performance value of networking depends on the entrepreneur's ability to cultivate relevant ties and convert them into useful resources. Ali et al. [10] found that networking capabilities significantly affected SME performance in Kenya and that entrepreneurial competencies played an important mediating role. Labo et al. [9] likewise reported a positive influence of networking competency on SME performance in Nigeria. These findings suggest that networking is an important component of the entrepreneurial capability bundle.

H0b: Networking competency has no effect on manufacturing SME performance.

2.5 Leadership Competency and SME Performance

Leadership competency captures the entrepreneur's ability to provide direction, communicate expectations, motivate employees, encourage teamwork, delegate responsibility and maintain a performance orientation. In SMEs, leadership is particularly consequential because formal management systems are often less developed than in large firms. Employees may rely directly on the owner-manager for priorities, problem solving, conflict resolution and interpretation of strategic change.

Manufacturing requires coordinated execution. Quality, production schedules, safety, customer specifications and process improvement depend on collective action rather than individual entrepreneurial insight alone. Leadership competency can therefore influence the extent to which opportunities and knowledge are translated into implementation. Sakib et al. [5] found that organizing and leading competency significantly influenced SME performance. The broader competency literature similarly treats leadership and organizing as mechanisms through which entrepreneurial intent becomes firm-level action.

H0c: Leadership competency has no effect on manufacturing SME performance.

2.6 Organizational Learning and SME Performance

Organizational learning is the competency through which firms create routines for acquiring insight from experience, questioning outdated assumptions, developing employees, sharing direction and responding constructively to change. It is distinct from the individual entrepreneur's personal learning because it concerns whether learning becomes embedded in organizational practices. Sinkula et al. [13] linked learning orientation to market-information generation, dissemination and changes in organizational behaviour, providing an important foundation for understanding how learning affects strategic adaptation.

In manufacturing SMEs, organizational learning can arise from production failures, customer complaints, supplier interactions, employee suggestions, competitor observation, quality audits and experimentation with new methods. Firms that treat such information as a basis for systematic improvement can update routines and avoid repeating errors. Learning also supports adaptation to new technologies and standards. This is highly consistent with the KBV because it converts dispersed knowledge into organizational capability.

Recent evidence supports the importance of learning-related mechanisms. Sakib et al. [5] found learning competency to have a meaningful effect on SME performance. Ibidunni et al. [3] identified learning competency as important for innovative performance. Al Koliby et al. [6] further showed that entrepreneurial competencies can enhance sustainable performance through innovation, while Al Koliby et al. [7] demonstrated a positive link between entrepreneurial competencies and knowledge management in manufacturing SMEs. These studies imply that the ability to institutionalize learning may be especially important where performance depends on continual adaptation.

H0d: Organizational-learning competency has no effect on manufacturing SME performance.

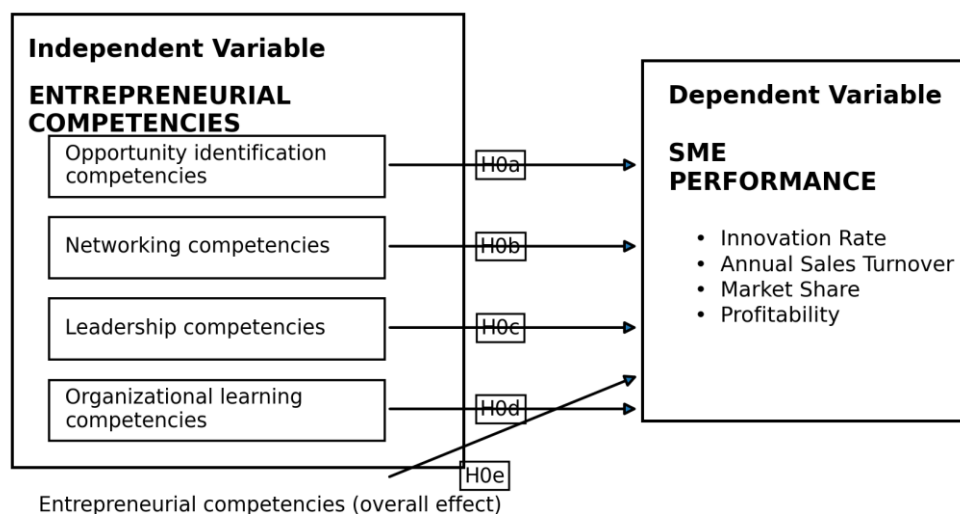
2.7 Overall Entrepreneurial Competencies and SME Performance

The four dimensions are expected to operate as a broader entrepreneurial competency system. Opportunity identification directs attention toward economically promising possibilities; networking expands access to external knowledge and resources; leadership coordinates action; and organizational learning updates the firm's knowledge base and routines. At the aggregate level, SMEs with stronger competency profiles should be better able to combine knowledge and resources and consequently achieve stronger innovation, market and financial outcomes.

This expectation is supported by cross-country evidence. Kisubi et al. [4] found a significant positive effect of entrepreneurial competencies on Ugandan SME performance. Al Koliby et al. [6] found that entrepreneurial competencies positively affected sustainable performance in manufacturing SMEs, while Al Koliby et al. [7] similarly found positive effects on sustainable performance and knowledge management. In Kenya, Ali et al. [10] showed that entrepreneurial competencies are part of the mechanism linking networking capabilities to SME performance. The aggregate hypothesis is therefore:

H0e: Entrepreneurial competencies have no effect on manufacturing SME performance.

Figure 1 summarizes the conceptual framework and hypothesized relationships.



Source: Authors' conceptual framework

Figure 1. Conceptual Framework

3. Materials and Methods

3.1 Research Design and Study Context

The study adopted a descriptive research design. The empirical context was manufacturing SMEs in Nairobi County, Kenya, drawn from four sub sectors: food and beverage processing, cosmetics and detergents, leather and leather goods, and metal fabrication. The broader study population comprised 590 manufacturing SMEs across these strata registered with Kenya Association of Manufacturers. Stratified random sampling was used to obtain the intended sample of 238 SMEs. The article uses the final cleaned dataset containing 202 complete SME responses. The achieved distribution was 82 food and beverage enterprises (40.6%), 44 cosmetics and detergents enterprises (21.8%), 40 leather and leather-goods enterprises (19.8%), and 36 metal-fabrication enterprises (17.8%).

The unit of analysis was the SME, and the questionnaire targeted respondents sufficiently familiar with the enterprise's entrepreneurial practices and performance. A structured questionnaire was used because the constructs required consistent measurement across a heterogeneous group of manufacturing firms. The present paper focuses only on entrepreneurial competencies and SME performance, although the wider research programme also measured absorptive capacity and intellectual property assets.

3.2 Measurement of Entrepreneurial Competencies

Entrepreneurial competencies were operationalized through four dimensions: opportunity identification, networking, leadership and organizational learning. Opportunity identification was measured with six items covering alertness to emerging opportunities, market-information search, monitoring consumer behaviour and competitors, exploration of new markets and evaluation of potential opportunities. Networking was measured with five items covering creation of business contacts, strategic relationships with firms and institutions, use of networks for growth and market access, and maintenance of stakeholder relationships. Leadership was measured with six items covering performance orientation, teamwork, motivation, communication, delegation and direction. Organizational learning was measured with ten items addressing commitment to learning, employee

development, continuous improvement, shared purpose, learning from experience, open-mindedness and positive orientation toward change. Responses used a five-point agreement scale.

Composite scores were computed as the mean of the items for each dimension. The overall entrepreneurial-competency score was then computed as the mean of the four dimensional composites. In the final $N = 202$ dataset, internal consistency was strong for the overall entrepreneurial competency scale (Cronbach's $\alpha = .907$). The dimension-level alpha coefficients were .808 for opportunity identification, .634 for networking, .848 for leadership and .867 for organizational learning. The networking coefficient is below the conventional .70 benchmark and is therefore treated as a measurement limitation; however, the scale was retained because the items represented theoretically relevant aspects of networking and the article reports the limitation transparently rather than altering the final instrument post hoc.

3.3 Measurement of SME Performance

SME performance was operationalized as a composite of four ordered performance indicators: innovation rate, sales turnover, market share and profitability. The four indicators were coded in ascending performance categories and averaged to create the SME Performance Index. This approach reflects the multidimensional nature of SME performance and avoids reducing performance to a single financial measure. In the final sample, the mean performance index was 2.536 (standard deviation (SD) = .557). Because the index is constructed from ordered categories, Pearson correlation and ordinary least squares regression are reported for comparability with the main analytical framework, while Spearman correlation is used as a robustness check for the bivariate relationship.

The performance construction is interpreted as an index of ordered business outcomes rather than a continuous accounting measure. Category-based measures provide useful comparative information but do not have the precision of audited financial statements. The study therefore avoids causal language and interprets regression coefficients as associations consistent with the hypothesized relationship. Averaging assigns equal numerical weight to the four indicators and assumes approximately equal distances between successive category codes. The indicators have different possible ranges, so their maximum contributions to the index are not identical. The index is therefore a pragmatic summary of coded outcomes, and comparisons of means across indicators require caution.

3.4 Data Analysis

Analysis comprised descriptive statistics, Pearson correlations and a Spearman robustness check, an aggregate simple regression, four separate dimensional simple regressions, and a joint multiple regression. Each separate model estimated one competency's association with the SME Performance Index without controlling for the other dimensions. The joint model estimated unique associations after controlling for the other competencies. The separate models used 202 complete observations and ordinary least squares with an intercept; two-sided coefficient tests were conducted, and a 95% confidence interval (CI) was calculated for each coefficient.

Let SMEP denote the SME Performance Index and EC the overall entrepreneurial-competency composite. The aggregate simple regression model is specified in Equation (1).

$$SMEP_i = \beta_0 + \beta_1 EC_i + \varepsilon_i \quad (1)$$

For the dimensional models, OI denotes opportunity identification, NET networking, LEAD leadership, and OL organizational learning. The four separate simple regression models are specified in Equations (2)–(5).

$$SMEP_i = \beta_0 + \beta_1 OI_i + \varepsilon_i \quad (2)$$

$$SMEP_i = \beta_0 + \beta_1 NET_i + \varepsilon_i \quad (3)$$

$$SMEP_i = \beta_0 + \beta_1 LEAD_i + \varepsilon_i \quad (4)$$

$$SMEP_i = \beta_0 + \beta_1 OL_i + \varepsilon_i \quad (5)$$

The joint dimensional model is specified in Equation (6).

$$SMEP_i = \beta_0 + \beta_1 OI_i + \beta_2 NET_i + \beta_3 LEAD_i + \beta_4 OL_i + \varepsilon_i \quad (6)$$

Here, β_0 is the intercept, β_1 – β_4 are regression coefficients, and ε_i is the error term for observation i . Parameters are estimated separately in each simple model; the repeated β_0 and β_1 symbols do not imply identical coefficients across models.

Standardized coefficients are reported for comparison of the relative strength of the four dimensions. Statistical significance was evaluated at the 5% level.

4. Results

4.1 Sample Distribution and Descriptive Statistics

All 202 cases in the final cleaned data set had complete values for the entrepreneurial-competency composites and the SME Performance Index. Food and beverage processing represented the largest share of the sample, followed by cosmetics and detergents, leather and leather goods and metal fabrication. This distribution provides representation across manufacturing activities that differ in technology, product cycles and market structure. Table 1 presents the distribution of respondents by manufacturing subsector.

Table 1. Distribution of respondents by manufacturing sub sector.

Sector	N	%
Food & Beverages	82	40.6
Cosmetics & Detergents	44	21.8
Leather & Leather Goods	40	19.8
Metal Fabrication	36	17.8
Total	202	100.0

Source: Research Data (2026)

The mean entrepreneurial-competency scores were generally high. Leadership recorded the highest mean ($M = 4.177$, $SD = .735$), followed by opportunity identification ($M = 4.050$, $SD = .705$), networking ($M = 4.025$, $SD = .610$) and organizational learning ($M = 3.917$, $SD = .660$). The aggregate entrepreneurial-competency mean was 4.042. These values indicate that respondents generally perceived the four competencies to be present in their firms, although the subsequent regression results demonstrate that a high mean does not necessarily imply a strong unique relationship with performance. Table 2 summarizes the descriptive statistics and reliability estimates.

Table 2. Distribution, Descriptive Statistics and Reliability of Entrepreneurial Competencies (N = 202)

Construct	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)	Mean	SD	Cronbach's α
Opportunity identification	4 (2.0%)	4 (2.0%)	17 (8.4%)	94 (46.5%)	83 (41.1%)	4.050	.705	.808
Networking	2 (1.0%)	7 (3.5%)	20 (9.9%)	102 (50.5%)	71 (35.1%)	4.025	.610	.634
Leadership	2 (1.0%)	7 (3.5%)	16 (7.9%)	70 (34.7%)	107 (53.0%)	4.177	.735	.848
Organizational learning	1 (0.5%)	9 (4.5%)	27 (13.4%)	96 (47.5%)	69 (34.2%)	3.917	.660	.867
Entrepreneurial competencies (overall)	—	—	—	—	—	4.042	.525	.907
SME Performance Index	—	—	—	—	—	2.536	.557	—

Source: Research Data (2026)

Note. $N = 202$. For each entrepreneurial competency dimension, respondents were classified according to their composite mean score across the items measuring that construct: 1.00–1.80 = Strongly Disagree; 1.81–2.60 = Disagree; 2.61–3.40 = Neutral; 3.41–4.20 = Agree; and 4.21–5.00 = Strongly Agree. Mean = composite mean; SD = standard deviation; α = Cronbach's alpha. The SME Performance Index is measured on a different composite scale and is therefore not classified using the entrepreneurial-competency Likert categories. The results demonstrate generally high levels of entrepreneurial competencies among manufacturing SMEs. Leadership recorded the highest mean ($M = 4.177$, $SD = .735$), with 107 respondents (53.0%) classified as Strongly Agree and 70 (34.7%) as Agree. This means that 87.6% of respondents reported high or very high leadership competency. Leadership also demonstrated good internal consistency ($\alpha = .848$).

Opportunity identification similarly recorded a high mean ($M = 4.050$, $SD = .705$), with 94 respondents (46.5%) classified as Agree and 83 (41.1%) as Strongly Agree. Thus, 87.6% of respondents reported positive levels of opportunity-identification competency. The construct demonstrated good reliability ($\alpha = .808$).

Networking recorded a high mean ($M = 4.025$, $SD = .610$), with 102 respondents (50.5%) classified as Agree and 71 (35.1%) as Strongly Agree. Overall, 85.6% of respondents were therefore within the positive categories. However, networking recorded the lowest reliability coefficient ($\alpha = .634$) among the four dimensions, suggesting comparatively weaker internal consistency and warranting cautious interpretation relative to the other constructs.

Organizational learning recorded the lowest mean among the four dimensions ($M = 3.917$, $SD = .660$), although it remained within the high range. A total of 96 respondents (47.5%) were classified as Agree and 69 (34.2%) as Strongly Agree, representing 81.7% of respondents. Organizational learning nevertheless demonstrated the highest dimension-level reliability ($\alpha = .867$).

Overall, entrepreneurial competencies recorded a composite mean of 4.042 and demonstrated excellent internal consistency ($\alpha = .907$). Taken together, the results indicate that the sampled manufacturing SMEs exhibited strong entrepreneurial competencies, with leadership emerging as the highest-rated dimension and organizational learning as the comparatively lowest-rated dimension.

4.2 Correlation Analysis

Entrepreneurial competencies were positively and significantly associated with SME performance ($r = .418$, $p < .001$). The non-parametric robustness check produced a similar result (Spearman's $\rho = .432$, $p < .001$), increasing confidence that the relationship was not an artefact of treating the ordered performance index as fully continuous. Each competency dimension also showed a positive and significant bivariate correlation with performance. Organizational learning had the strongest bivariate association ($r = .366$, $p < .001$), followed by opportunity identification ($r = .321$, $p < .001$), leadership ($r = .310$, $p < .001$) and networking ($r = .301$, $p < .001$). Table 3 reports the bivariate relationships with SME performance.

Table 3. Bivariate relationships with SME performance (N = 202)

Predictor	Pearson r with SME performance	p
Opportunity identification	.321	< .001
Networking	.301	< .001
Leadership	.310	< .001
Organizational learning	.366	< .001
Entrepreneurial competencies (overall)	.418	< .001

4.3 Overall Effect of Entrepreneurial Competencies on SME Performance

The simple regression model was statistically significant, $F(1, 200) = 42.43$, $p < .001$, and explained 17.5% of the variance in the SME Performance Index ($R^2 = .175$; adjusted $R^2 = .171$). The unstandardised coefficient for entrepreneurial competencies was $B = .444$ (standard error (SE) = .068), $t = 6.51$, $p < .001$, 95% CI [.309, .578]. The standardised coefficient was $\beta = .418$. Thus, higher entrepreneurial-competency scores were associated with higher SME performance. The null hypothesis H_0e was therefore rejected; overall entrepreneurial competencies were positively and significantly associated with the SME Performance Index. Table 4 summarizes the aggregate simple-regression model.

Table 4. Simple regression: entrepreneurial competencies predicting SME performance.

Model statistic	Value
R	.418
R^2	.175
Adjusted R^2	.171
$F(1, 200)$	42.43
p	< .001
B for entrepreneurial competencies	.444
SE	.068
Standardized β	.418
t	6.51
95% CI	[.309, .578]

Source: Research Data (2026)

The unstandardized coefficient ($B = .444$) indicates that a one-unit increase in overall entrepreneurial competencies was associated with an average increase of .444 units in the SME Performance Index. The standardized coefficient was $\beta = .418$.

4.4 Separate Simple Regressions of Competency Dimensions

All four competencies were positively and significantly associated with SME performance when estimated separately (Table 5). Organizational learning explained 13.4% of performance variance, followed by opportunity identification (10.3%), leadership (9.6%) and networking (9.1%). All slope tests had $p < .001$, and all 95% confidence intervals excluded zero. The null hypotheses H_{0a} – H_{0d} were therefore rejected in the separate models. Their explained variances overlap and should not be summed.

Table 5. Separate simple regressions predicting SME performance (N = 202)

Predictor	Constant	B	SE	β	t	95% CI for B
Opportunity identification	1.508	.254	.053	.321	4.792	[.149, .358]
Networking	1.428	.275	.062	.301	4.467	[.154, .397]
Leadership	1.555	.235	.051	.310	4.607	[.134, .335]
Organizational learning	1.324	.309	.056	.366	5.568	[.200, .419]

Source: Research Data (2026)

Note. Each row represents a separate model. All $p < .001$; coefficient-test $df = 200$. Model R^2 / adjusted R^2 / $F(1, 200)$: opportunity identification, .103 / .098 / 22.961; networking, .091 / .086 / 19.954; leadership, .096 / .091 / 21.229; organizational learning, .134 / .130 / 31.003. B is the unstandardized slope; SE is its standard error; β is the standardized slope. Confidence intervals refer to B .

4.5 Relative Contribution of the Four Competency Dimensions

The four-dimensional regression model was also statistically significant, $F(4, 197) = 11.32$, $p < .001$. The model explained 18.7% of the variance in SME performance ($R^2 = .187$; adjusted $R^2 = .170$). Organizational learning emerged as the strongest unique predictor ($B = .203$, $\beta = .240$, $t = 3.00$, $p = .003$), followed by opportunity identification ($B = .145$, $\beta = .184$, $t = 2.51$, $p = .013$). Networking had a positive but nonsignificant unique effect ($B = .086$, $\beta = .094$, $p = .262$), and leadership likewise had a small positive but nonsignificant unique effect ($B = .029$, $\beta = .038$, $p = .678$).

Based on the joint multiple regression, the null hypotheses for opportunity identification ($H0a$) and organizational learning ($H0d$) were rejected, as both dimensions retained statistically significant positive coefficients in the joint model. The null hypotheses for networking ($H0b$) and leadership ($H0c$) failed to be rejected because their coefficients were nonsignificant after controlling for the other competency dimensions. These findings indicate that networking and leadership are associated with SME performance individually, but the joint model did not establish significant additional associations beyond those captured by the other competencies. Failure to reject their null hypotheses in the joint model does not establish that networking and leadership have no relationship with performance.

These results require a nuanced interpretation. Networking and leadership were each positively and significantly related to performance at the bivariate level, but their unique effects became nonsignificant after accounting for opportunity identification and organizational learning. The evidence therefore does not support the claim that all four dimensions independently predict performance. Instead, it suggests overlap among the competencies and identifies organizational learning and opportunity identification as the dimensions with significant incremental explanatory power in the joint model. Table 6 presents the joint multiple-regression estimates.

Table 6. Multiple regression of competency dimensions on SME performance ($N = 202$; $R^2 = .187$)

Predictor	B	SE	Standardized β	t	p	95% CI for B
Opportunity identification	.145	.058	.184	2.51	.013	[.031, .259]
Networking	.086	.076	.094	1.13	.262	[-.064, .236]
Leadership	.029	.069	.038	.42	.678	[-.107, .164]
Organizational learning	.203	.068	.240	3.00	.003	[.069, .336]

Source: Research Data (2026)

5. Discussion

5.1 Entrepreneurial Competencies and Performance of Manufacturing SMEs

The study established a positive and statistically significant relationship between entrepreneurial competencies and the performance of manufacturing SMEs in Nairobi County. Entrepreneurial competencies were positively correlated with SME performance ($r = .418$, $p < .001$), while the regression results showed that the aggregate entrepreneurial competency construct explained 17.5% of the variance in SME performance. The finding indicates that differences in the opportunity-identification, networking, leadership and organizational-learning capabilities of manufacturing SMEs are associated with meaningful differences in their innovation, sales turnover, market share and profitability outcomes.

The positive relationship can be understood in the context of the resource and managerial constraints under which manufacturing SMEs operate. Unlike larger firms, where strategic planning, market intelligence, human-resource development, innovation and operational management may be distributed across specialized departments, these functions are often concentrated in the owner-manager and a relatively small management team in SMEs. The competencies of the entrepreneur may consequently have a comparatively direct influence on how information is interpreted, resources are deployed, employees are coordinated and emerging market opportunities are exploited. Entrepreneurial competencies therefore represent more than individual attributes; they constitute mechanisms through which scarce organizational resources and knowledge are mobilized toward productive outcomes.

This interpretation is consistent with the KBV, which regards knowledge integration and application as important foundations of organizational capability according to Grant [12]. From this perspective, possessing knowledge is not sufficient to improve firm performance. Knowledge must be interpreted and converted into decisions, routines and commercially productive activities. Entrepreneurial competencies provide mechanisms for this conversion. Opportunity identification enables entrepreneurs to recognize the commercial relevance of market and technological information; networking expands access to external knowledge and resources; leadership facilitates coordination and implementation; and organizational learning enables accumulated experience and information to become embedded in organizational practices.

The findings are broadly consistent with Kisubi et al. [4], who established a positive relationship between entrepreneurial competencies and SME performance in Uganda. They also support Al Koliby et al. [6], who found that entrepreneurial competencies positively influenced sustainable performance among manufacturing SMEs, and Al Koliby et al. [7], who demonstrated positive relationships between entrepreneurial competencies, knowledge management and sustainable performance. Collectively, these studies indicate that entrepreneurial competencies contribute to performance partly through the entrepreneur's capacity to mobilize, organize and apply knowledge and other firm resources.

The findings also correspond with Kenyan evidence. Ali et al. [10] demonstrated the importance of entrepreneurial competencies in the relationship between networking capabilities and SME performance in the North Rift region, while Oraya and Maina [11] reported positive relationships between several entrepreneurial competencies and organizational performance among micro and small enterprises in Machakos County. The present study extends this evidence by focusing specifically on manufacturing SMEs in Nairobi County and by measuring performance through four dimensions; innovation rate, sales turnover, market share and profitability. The consistency of the overall relationship across these studies suggests that entrepreneurial competencies remain relevant across different SME contexts, although the relative importance of individual competencies may vary according to sector, institutional environment, measurement approach and model specification.

The explanatory power of the aggregate model should nevertheless be interpreted carefully. Entrepreneurial competencies accounted for 17.5% of the observed variance in SME performance, meaning that a substantial proportion of performance variation is associated with factors outside the present model. SME performance is likely to reflect multiple organizational and environmental conditions, including access to finance, technological capability, market conditions, firm characteristics and other strategic capabilities. The present findings should therefore not be interpreted as suggesting that entrepreneurial competencies alone determine performance. Rather, they demonstrate that entrepreneurial competencies constitute one statistically significant component within a broader configuration of factors influencing manufacturing SME outcomes.

5.2 Why Organizational Learning Emerged as the Strongest Unique Predictor

The most distinctive finding of the study is that organizational learning emerged as the strongest unique predictor of SME performance when all four entrepreneurial competency dimensions were considered simultaneously ($\beta = .240$, $p = .003$). This result is particularly noteworthy because leadership recorded the highest descriptive mean, whereas organizational learning produced the strongest unique relationship with performance. The distinction demonstrates that the prevalence of a competency within firms is not necessarily equivalent to its explanatory importance. A competency may be highly developed or widely reported across firms but contribute relatively little to explaining differences between higher- and lower-performing SMEs.

One explanation for the strength of organizational learning is that it provides the mechanism through which individual knowledge becomes organizational knowledge. Entrepreneurs may personally possess considerable market, technical and managerial knowledge, but such knowledge has limited organizational value if it remains concentrated in the owner-manager. Organizational learning enables knowledge generated through experience, customer interactions, employee insights, production activities and market information to be shared, retained and incorporated into organizational routines. It therefore reduces excessive dependence on the entrepreneur as the sole repository of knowledge and increases the firm's capacity to repeatedly apply what has been learned.

This mechanism is particularly relevant to manufacturing SMEs. Manufacturing generates continuous information from production processes, equipment performance, product quality, customer complaints, supplier interactions, regulatory requirements and experimentation. Such information does not automatically improve performance. Its value depends on whether the enterprise can interpret it, learn from successes and failures, and translate the lessons into changes in products, processes and organizational practices. Firms that systematically learn from production failures, customer feedback and market responses may be better able to reduce repeated errors, improve quality, modify products and respond to changing market requirements. Organizational learning therefore provides a bridge between experience and subsequent organizational action.

The finding supports Sinkula et al. [13], who emphasized the role of learning orientation in information generation, dissemination and behavioural change. It is also consistent with Ibidunni et al. [3], who identified learning competency as important for innovative performance among SMEs, and Sakib et al. [5], who found learning competency to influence SME performance. Similarly, Al Koliby et al. [7] demonstrated that entrepreneurial competencies positively influence knowledge management and sustainable performance. These findings collectively suggest that the value of entrepreneurial competency may depend partly on the firm's capacity to capture and institutionalize knowledge.

The present study extends this literature by showing that organizational learning remains significant even when opportunity identification, networking and leadership are considered simultaneously. This is important because it moves the discussion beyond whether learning is associated with performance to whether it contributes additional explanatory value relative to other entrepreneurial competencies. The results suggest that organizational learning performs such a role among the manufacturing SMEs studied.

From the KBV perspective, this provides an important theoretical insight. Grant [12] emphasizes that competitive value arises not merely from possessing specialized knowledge but from the firm's ability to integrate and apply that knowledge. The present results suggest that organizational learning may constitute one of the micro-foundations through which this integration occurs in SMEs. Entrepreneurial knowledge initially located at the individual level can become organizationally productive when it is shared, interpreted, incorporated into routines and repeatedly applied. The pathway suggested by the findings can therefore be conceptualized as one in which entrepreneur-level

knowledge is converted through organizational learning into organizational routines and adaptive behaviour that are subsequently associated with performance outcomes.

5.3 Why Opportunity Identification Retains a Significant Unique Effect

Opportunity identification was the second entrepreneurial competency that retained a statistically significant unique relationship with SME performance in the joint model ($\beta = .184$, $p = .013$). Its significance after controlling for networking, leadership and organizational learning indicates that the ability to identify and evaluate viable opportunities contributes information about SME performance that is not fully captured by the other competency dimensions.

A plausible explanation is that opportunity identification performs a distinct strategic function. Whereas organizational learning improves how firms interpret experience and adapt their routines, opportunity identification determines where entrepreneurial attention and scarce resources are directed. Manufacturing SMEs operate with limited financial, technological and managerial resources and therefore cannot pursue every potential market opportunity. Their performance partly depends on recognizing which changes in customer demand, technology, competition and market structure represent commercially viable opportunities and distinguishing these from possibilities that may not justify resource commitment.

The significance of opportunity identification may also reflect the nature of innovation and market adaptation among manufacturing SMEs. Opportunities do not necessarily arise from radical technological innovation. They may emerge from modifications to existing products, changes in packaging, identification of underserved customer segments, customized production, new distribution arrangements or adaptation of existing technologies to local market requirements. The capacity to recognize such possibilities enables SMEs to align their capabilities with changing market demand and may consequently influence innovation, sales, market share and profitability.

The result is consistent with Akintayo et al. [8], who reported a positive relationship between opportunity competency and SME performance in Nigeria, and with Oraya and Maina [11], who found opportunity seeking to be positively associated with the performance of micro and small enterprises in Kenya. It also corresponds with Ibidunni et al. [3], who identified opportunity competency among the capabilities associated with innovative performance.

However, the finding differs from Sakib et al. [5], who reported that opportunity competency did not significantly influence SME performance in their model. This divergence should not necessarily be interpreted as contradictory evidence. The contribution of individual entrepreneurial competencies may vary according to the economic context, sector composition, measurement of competency, performance indicators and the combination of variables included in the empirical model. Opportunity identification may be particularly consequential where SMEs operate in heterogeneous or changing markets in which firms must continually identify emerging customer requirements and commercially viable niches. Differences between studies may therefore reflect contextual and methodological conditions rather than a universally stronger or weaker role for opportunity competency.

The combined significance of opportunity identification and organizational learning provides a further insight. Opportunity identification directs entrepreneurial attention toward potentially valuable possibilities, whereas organizational learning improves the firm's capacity to interpret information, adjust routines and respond to those possibilities. The two competencies can therefore be understood as performing related but distinct functions: opportunity identification concerns recognizing where value might be created, while organizational learning concerns strengthening the organizational capacity to adapt knowledge and experience in pursuit of such value.

5.4 Why Networking and Leadership Lose Significance in the Joint Model

Networking and leadership were positively associated with SME performance in the separate regressions ($\beta = .301$ and $.310$, respectively; both $p < .001$), but neither retained a statistically significant unique coefficient in the joint model. This distinction indicates that each competency carries performance-related information when examined alone, but the study did not identify an additional association after controlling for the other competencies. Nonsignificance does not demonstrate that either competency is unimportant.

Networking may provide access to customers, suppliers, finance, technical institutions and external knowledge, while opportunity identification and organizational learning help translate these resources into decisions and routines. This offers a possible reconciliation with Ali et al. [10] and Labo et al. [9], who reported positive networking relationships. The present separate-model finding agrees with that direction. Its nonsignificant joint coefficient may reflect shared explanatory information, although measurement error associated with the networking scale's reliability ($\alpha = .634$) also warrants caution.

Leadership may support performance by establishing direction, coordinating implementation, encouraging knowledge sharing and enabling learning from production problems. Its functions may therefore overlap with organizational learning. The difference from Sakib et al. [5], who found a significant organizing-and-leading relationship, may reflect measurement, sector composition, national context or model specification. These enabling pathways are plausible interpretations rather than demonstrated mediation effects.

The methodological implication is that separate regressions estimate an association that includes information shared with other competencies, whereas a joint model estimates each predictor's unique association conditional on the others. Organizational learning and opportunity identification met the latter significance criterion in this sample. The results support an interconnected competency perspective without establishing the causal sequence among its components.

5.5 Comparison with Previous Studies and Explanation of Convergent and Divergent Findings

The separate regressions show positive associations for all four competencies, while the joint model identifies significant unique coefficients only for opportunity identification and organizational learning. Differences from earlier studies may reflect national context, sector composition, measurement and model specification, as discussed above. The proposed enabling roles of networking and leadership remain interpretations; indirect pathways were not tested.

The findings converge with evidence of a positive aggregate entrepreneurial competency–performance relationship in Uganda [4], Malaysia [6], [7] and Kenya [10], [11]. At the dimensional level, organizational learning agrees with Ibidunni et al. [3] and Sakib et al. [5]. Opportunity identification agrees with Akintayo et al. [8], Oraya and Maina [11] and Ibidunni et al. [3], but differs from Sakib et al. [5]. Networking's nonsignificant unique coefficient differs from the positive relationships reported by Ali et al. [10] and Labo et al. [9], while leadership differs from the organizing-and-leading result reported by Sakib et al. [5].

These differences may reflect national and institutional conditions, sector composition, measurement and model specification. Manufacturing requires production coordination, quality management and continuous improvement, potentially increasing the relevance of organizational learning. Studies also differ in their competency measures and whether performance is defined through financial, innovative, sustainable or subjective outcomes. Importantly, a significant bivariate relationship is not equivalent to a significant unique coefficient in a joint model. These explanations are plausible interpretations rather than mechanisms directly tested in this study.

The contribution is therefore a differentiated account of the competency bundle. Organizational learning and opportunity identification retained significant unique associations with the composite performance index. Networking and leadership may provide complementary access and coordination functions, but the present analysis does not establish indirect pathways. This pattern is consistent with the Knowledge-Based View: knowledge may become performance-relevant through capabilities that identify its commercial value and embed it in organizational practice.

6. Contributions and Implications

6.1 Theoretical Contribution

The first theoretical contribution is to the Knowledge-Based View. Grant [12] emphasizes knowledge integration and application as central functions of the firm. The present study shows that entrepreneurial competencies can be conceptualized as micro-foundations of those functions in SMEs. Opportunity identification interprets information as economic possibility; networking expands access to external knowledge and resources; leadership coordinates implementation; and organizational learning embeds knowledge into routines. The significant aggregate relationship supports the proposition that the performance value of knowledge depends on the capabilities through which it is mobilized.

The second theoretical contribution concerns the distinction between entrepreneur-level and organization-level competency. Organizational learning was the strongest unique predictor, suggesting that knowledge becomes more valuable when it is institutionalized beyond the entrepreneur. This refines competency theory by showing that the most performance-relevant competency may be the one that converts individual experience into collective organizational learning. In owner-managed SMEs, this conversion is crucial because excessive concentration of knowledge in the founder can constrain scalability and adaptation.

Third, the findings demonstrate the importance of modelling competencies jointly. All four dimensions were positively associated with performance, but only organizational learning and opportunity identification retained significant unique effects. Theoretical models should therefore distinguish between competencies that correlate with performance and competencies that provide incremental explanatory power. This helps avoid treating entrepreneurial competency as a list in which every dimension is assumed to contribute equally.

6.2 Managerial Implications

For SME owners and managers, the findings imply that competency development should be deliberate rather than generic. The strongest priority is to build organizational learning routines. Managers can institutionalize regular reviews of customer feedback, production problems, quality failures and successful innovations; encourage employee suggestions; document useful process knowledge; cross-train staff; and create simple mechanisms for sharing lessons across functions. The aim is to reduce dependence on tacit knowledge held by one person and make learning part of normal operations.

Opportunity identification should form the second priority. SMEs should establish systematic market-scanning practices rather than depend solely on intuition. This can include structured customer conversations, competitor monitoring, participation in trade events, analysis of supplier information, tracking regulatory and technological changes, and periodic review of under-served market segments. Opportunity evaluation should also consider technical feasibility, resource requirements and expected market value before significant investment.

Networking and leadership should not be neglected simply because their unique regression coefficients were nonsignificant. Networks remain channels through which information, markets and resources become accessible, while leadership provides the coordination required to act. The results instead suggest that networking and leadership may be most valuable when connected to learning and opportunity processes. Managers should therefore ask not only how many relationships they have or how strongly they lead, but whether those relationships generate useful knowledge and whether leadership turns learning into action.

6.3 Policy Implications for Kenya

The findings have implications for enterprise-development and industrial policy. Entrepreneurship support often concentrates on start-up procedures, bookkeeping, finance and generic business planning. These are useful, but the evidence suggests that manufacturing SME performance also depends on higher-order entrepreneurial competencies. Public agencies, industry associations, research and technology organizations, universities, Technical and Vocational Education and Training (TVET) institutions, incubators and business-development providers should incorporate competency diagnostics into SME support programmes.

Training should place particular emphasis on organizational learning and opportunity identification. For manufacturing SMEs, this can be integrated with technology extension, quality management, productivity improvement, standards compliance, digital adoption and commercialization support. A learning-oriented programme would help firms interpret technical and market information and establish routines for continuous improvement. Opportunity-oriented support would help SMEs connect those capabilities to new products, markets and customer needs.

Networking policy should also move beyond convening events. The objective should be purposeful connectivity: linking SMEs to suppliers, anchor firms, research institutions, financiers, export-support agencies, standards bodies and technology providers in ways that generate usable knowledge and commercial opportunities. Leadership development can then support implementation within the enterprise. The policy implication is an integrated competency architecture rather than isolated short courses.

7. Limitations and Future Research

The findings of this study should be interpreted in light of several methodological and contextual limitations. These limitations do not invalidate the observed relationships, but they define the boundaries within which the findings can be interpreted and provide directions for extending research on entrepreneurial competencies and SME performance.

7.1 Descriptive Research Design and Temporal Ordering

First, the study employed a descriptive research design in which entrepreneurial competencies and SME performance were examined within the same study period. Consequently, although the results demonstrate statistically significant associations between entrepreneurial competencies and SME performance, they do not establish temporal or causal ordering. Higher levels of entrepreneurial competency may contribute to improved SME performance, but reverse relationships are also plausible. Better-performing firms may, for example, have greater resources and opportunities to invest in employee development, organizational learning, networking and other competency-enhancing activities.

This limitation was addressed in the interpretation of the findings by treating the regression coefficients as evidence of statistical association consistent with the hypothesized relationships rather than definitive evidence of causation. Future studies should employ longitudinal designs in which

entrepreneurial competencies and SME performance are measured at different points in time. Such designs would allow researchers to determine whether changes in entrepreneurial competencies precede subsequent changes in innovation, market and financial performance and would provide stronger evidence regarding the direction of the relationship.

7.2 Geographical and Sectoral Scope

Second, the study was geographically concentrated in Nairobi County and focused on manufacturing SMEs in four sub-sectors: food and beverage processing, cosmetics and detergents, leather and leather goods, and metal fabrication. Nairobi provides an important setting for manufacturing SME research, but its market conditions, infrastructure, access to institutions, business networks and concentration of support services may differ from those prevailing in other parts of Kenya. The findings should therefore not be generalized automatically to all Kenyan SMEs, particularly those operating in rural counties or in non-manufacturing sectors.

The use of four manufacturing sub-sectors nevertheless provided some heterogeneity within the sample and allowed entrepreneurial competencies to be examined across firms facing different production and market conditions. Future research should replicate the study across other counties and economic sectors to establish the extent to which the observed competency performance relationships are context-specific or generalizable. Comparative studies could also examine whether the relative importance of organizational learning, opportunity identification, networking and leadership varies across manufacturing sub-sectors, regions and stages of enterprise development.

7.3 Measurement of SME Performance

Third, SME performance was measured using a composite index constructed from four ordered business outcomes: innovation rate, sales turnover, market share and profitability. This multidimensional approach was adopted to avoid defining SME performance solely in financial terms and to recognize that enterprise performance incorporates innovation, market and financial outcomes. However, the indicators were measured as ordered categories rather than continuous audited financial or operational measures. The resulting index therefore captures relative levels of business performance rather than precise changes in monetary or quantitative outcomes.

This measurement characteristic has implications for the interpretation of the regression coefficients because the composite index does not have the same precision as audited sales, profitability, market-share or innovation data. To assess the robustness of the aggregate relationship, the study complemented Pearson correlation with Spearman's rank correlation, which produced a similar positive and statistically significant relationship. Nevertheless, future studies should combine perceptual or category-based measures with independently verified longitudinal indicators such as annual sales growth, profitability ratios, market-share changes, number of new products introduced, productivity measures and other objective performance records.

Future research could also examine the four performance dimensions separately. The use of a composite index is appropriate for assessing overall SME performance, but it may conceal differences in how particular entrepreneurial competencies relate to individual outcomes. Organizational learning, for example, may have a different relationship with innovation from its relationship with profitability, while opportunity identification may relate differently to market expansion, sales growth or innovation. Disaggregating the performance construct would provide a more granular understanding of the mechanisms through which entrepreneurial competencies are associated with different dimensions of SME performance.

7.4 Reliance on Questionnaire Based and Respondent Reported Information

Fourth, the study relied on questionnaire-based information provided by respondents who were sufficiently familiar with their firms' entrepreneurial practices and performance. This approach enabled consistent measurement across the 202 manufacturing SMEs, but respondent-reported data may be subject to recall error, perceptual bias and socially desirable responses. Respondents may, for instance, evaluate their firm's entrepreneurial competencies more favourably or categorize performance differently from what might be observed through independently verified organizational records.

Furthermore, obtaining information on both entrepreneurial competencies and business outcomes through the same survey process creates the possibility of common-method effects. This means that part of the observed association could reflect similarities in respondents' perceptions or response tendencies rather than differences in the underlying constructs alone. The findings should therefore be interpreted as relationships based primarily on respondent-reported organizational information rather than as relationships independently verified through multiple data sources.

Future studies could strengthen measurement through multi-source research designs. Entrepreneurial competency assessments could be obtained from owner-managers and employees, while performance measures could be drawn from financial statements, production records, customer data, innovation records or other independently verifiable sources. Combining quantitative surveys with interviews, case studies and observational evidence could also provide greater insight into how entrepreneurial competencies are enacted within manufacturing firms.

7.5 Explanatory Scope of the Model and Omitted Capabilities

Fifth, entrepreneurial competencies explained 17.5% of the variance in the aggregate SME Performance Index, while the four-dimensional model explained 18.7%. These results demonstrate a statistically meaningful relationship, but they also show that a substantial proportion of variation in SME performance lies outside the entrepreneurial competency variables examined in this article. Manufacturing SME performance is inherently multidimensional and may also be associated with access to finance, technology, innovation capability, market conditions, digital capability, human capital, firm age and size, regulatory conditions and other organizational resources and capabilities.

The present study deliberately focused on entrepreneurial competencies in order to examine both their aggregate relationship with performance and the unique contribution of opportunity identification, networking, leadership and organizational learning. This focused specification makes it possible to identify differences within the entrepreneurial competency architecture, but it should not be interpreted as a comprehensive model of all determinants of SME performance.

Future studies should therefore examine entrepreneurial competencies within broader capability configurations. Of particular interest would be models incorporating absorptive capacity, innovation capability, intellectual property assets and management, digital capability, access to finance and external environmental conditions. Such models could establish whether entrepreneurial competencies exert direct effects on performance or whether some of their influence operates through complementary organizational capabilities.

8. Conclusion

This study found a positive and significant association between entrepreneurial competencies and the performance of manufacturing SMEs in Nairobi County, Kenya. The aggregate model explained 17.5% of the variance in the SME Performance Index, while the joint dimensional model explained 18.7%. Organizational learning was the strongest unique predictor, followed by opportunity

identification. Networking and leadership were positively correlated with performance but did not retain statistically significant unique coefficients in the joint model.

The findings are consistent with the Knowledge-Based View and suggest that enterprise support should prioritize continuous organizational learning and systematic opportunity identification, supported by networking and leadership practices. These conclusions concern associations with a composite performance index; the cross-sectional design does not establish causation or the proposed mechanisms. Entrepreneurial competencies form one component of the wider organizational and environmental conditions associated with SME performance.

Acknowledgment

The lead author gratefully acknowledges Dr. Pamela Mreji, Dr. Hezron Osano, and Prof. Evans Vidija Sagwa for their scholarly guidance and valuable contributions to the research. Appreciation is extended to the Technical University of Kenya (TU-K), the School of Graduate and Advanced Studies (SGAS), the Faculty of Social Sciences and Technology (FSST), and the TU-K Ethics Review Committee for their academic, administrative, and ethical support. The authors also acknowledge the National Commission for Science, Technology and Innovation (NACOSTI) for research authorization and the Kenya Association of Manufacturers (KAM) for facilitating access to the study population. Special appreciation goes to the SME owners and managers who participated in the study, as well as the research assistants and data analysts who supported data collection and analysis. The authors further acknowledge the Kenya Industrial Research and Development Institute (KIRDI) and colleagues in Industrial Linkages, Policy and Intellectual Property (ILPIP) for their institutional support and encouragement.

Declarations

Ethics approval and consent to participate

The study received ethical approval from the Technical University of Kenya (TU-K) Ethics Review Committee and the required research authorization from the National Commission for Science, Technology and Innovation (NACOSTI). Participation was voluntary, and informed consent was obtained from all participants prior to data collection.

Consent for publication

Not applicable. The manuscript does not contain identifiable personal information requiring specific consent for publication.

Funding

This research received no external funding.

Competing interests

The authors declare that they have no competing interests.

Author contributions

All authors contributed to the conception and design of the study, interpretation of the findings, review and revision of the manuscript, and approval of the final version for publication. All authors agree to be accountable for the content of the work.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to applicable ethical and confidentiality requirements.

Code availability

Not applicable. No custom software or research code was developed for this study.

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