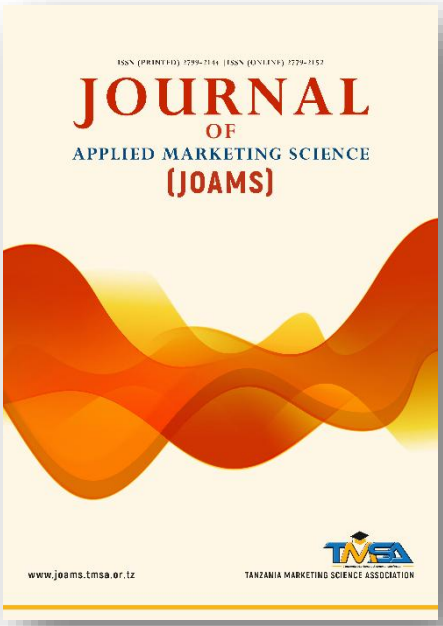


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DRIVERS OF SMEs CLUTER COMPETITIVENESS

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DRIVERS OF SMEs CLUTER COMPETITIVENESS

- ***Emmanuel Chao, Nashwat Hamis, Lwako Lubida and Marry Mushi***

Abstract

*This study investigates the **drivers of cluster competitiveness** among Small and Medium Enterprises (SMEs) in Tanzania, with a focus on how collaborative, innovative, environmental, and social dimensions contribute to sustainable competitiveness. A mixed-methods research design was adopted, integrating both qualitative and quantitative approaches to capture the complexity of SME cluster dynamics. Qualitative insights were obtained through in-depth interviews with key stakeholders in entrepreneurship hubs and cluster-supporting institutions, while quantitative data were collected via structured surveys administered to a sample of 178 SME respondents. The findings reveal that **cluster collaboration, cluster innovation, cluster environmental sustainability, and cluster social sustainability** all exert a significant positive influence on SME cluster competitiveness. Collaboration was found to enhance knowledge sharing, trust, and collective efficiency; innovation stimulated technological upgrading and adaptive capacity; environmental sustainability improved efficiency, resilience, and market attractiveness; while social sustainability reinforced trust, inclusivity, and reputational capital. Collectively, these drivers demonstrate that SME competitiveness within clusters extends beyond individual firm capabilities to the systemic advantages generated through cooperation, innovation, and sustainability practices. The study contributes to cluster theory and SME development discourse by highlighting the multidimensional factors that foster long-term competitiveness and provides policy implications for strengthening cluster ecosystems in developing economies.*

INTRODUCTION

Small and Medium Enterprises (SMEs) constitute the backbone of most economies worldwide, particularly in developing regions where they contribute significantly to employment creation, poverty reduction, and industrial diversification (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2011; OECD, 2017). Increasingly, these enterprises are organizing into clusters—geographically proximate groups of interconnected firms, suppliers, and support institutions—which enhance their collective competitiveness by enabling cooperation, specialization, and joint access to resources (Porter, 1998; Schmitz & Nadvi, 1999). Cluster competitiveness has therefore become an important concept in regional and industrial development studies, as clusters provide SMEs with the ability to exploit economies of scale, innovate more efficiently, and integrate into global value chains (Kaplinsky, 2001; Humphrey & Schmitz, 2002).

The competitiveness of SME clusters is shaped by multiple drivers, with collaboration, innovation, and environmental sustainability emerging as

particularly critical. Cluster collaboration allows firms to develop trust-based relationships that facilitate knowledge sharing, joint problem solving, and access to domestic and international markets (Freeman, 1984; Giuliani, 2007). Collaboration not only reduces transaction costs but also enhances the bargaining power of small firms in negotiating with larger players and government institutions (Nadvi, 1995).

Cluster innovation is another vital driver. The dynamic interaction among firms within clusters encourages learning and knowledge spillovers, fostering technological upgrading and continuous product and process improvements (Lundvall, 1992; Asheim, 2007). Through innovation, SMEs can increase their productivity and adapt to the rapidly changing global market environment, thus ensuring sustained competitiveness (OECD, 2010).

In addition, environmental sustainability has emerged as a contemporary determinant of competitiveness. With growing global awareness of climate change and sustainable development, clusters that integrate eco-friendly practices, renewable energy use, and sustainable production processes gain reputational advantages and long-term viability (FAO, 2017; Dangelico & Pujari, 2010). Environmentally sustainable practices not only reduce ecological footprints but also appeal to socially conscious consumers and investors, making them a strategic asset in enhancing competitiveness.

Taken together, these drivers underscore that the competitiveness of SME clusters cannot be understood solely at the level of individual firms but must be analyzed in terms of relational dynamics, innovation systems, and environmental commitments. This paper therefore seeks to examine how collaboration, innovation, and environmental sustainability act as the core drivers of SME cluster competitiveness, offering insights for policymakers, cluster managers, and entrepreneurs seeking to strengthen SMEs' contributions to sustainable economic growth.

Theoretical Perspectives

Cluster Theory and Competitive Advantage

Porter's Cluster Theory emphasizes that spatially concentrated groups of interconnected firms, suppliers, and institutions can enhance competitiveness and productivity through simultaneous collaboration, competition, and innovation (Porter, 1998; 2000). Within such clusters, SMEs benefit from shared resources, access to specialized labor, and opportunities to develop niche markets. From a sustainability perspective, the framework highlights that clusters foster innovation-driven growth, shifting competitive advantage away from resource dependence toward knowledge creation and technological advancement (Becattini, 2004).

The intellectual origins of cluster theory can be traced to Alfred Marshall's concept of *industrial districts*, which underlined the advantages of geographic proximity in mobilizing skilled labor, specialized suppliers, and industry-specific know-how (Marshall, 1920). Building on this foundation, Porter (1998) underscored the dual role of competition, which compels firms to innovate, and collaboration, which facilitates cost-sharing, knowledge diffusion, and joint market initiatives.

Clusters generate competitive advantages that are more durable than those of isolated firms because they are embedded in networks, relationships, and local infrastructure that cannot be easily replicated elsewhere (Becattini, 2004).

Over time, these embedded advantages create reputational capital, attracting investors, buyers, and skilled workers, thereby reinforcing their strategic position. For SMEs in particular, cluster participation can be transformative, enabling them to overcome resource constraints, expand their market presence, and strengthen innovation capacity. In doing so, clusters allow smaller firms to compete effectively with larger corporations while maintaining flexibility in responding to market dynamics.

Cluster theory also carries important implications for public policy and regional development. Governments and development agencies frequently leverage the model by investing in infrastructure, vocational training, and networking platforms aimed at enhancing cluster competitiveness (OECD, 2019). For SMEs, understanding cluster dynamics provides a strategic lens for aligning with both the collaborative opportunities and the competitive pressures present in their industrial environments.

Industrial District Theory and Localized Development

The Industrial District Theory, first articulated by Marshall (1920) and further advanced by Becattini (1990; 2004), highlights how firms embedded within specific localities benefit from dense networks of trust, shared cultural norms, and cooperative behavior. These socio-economic dynamics foster *collective efficiency*, enabling firms to enhance competitiveness by combining local external economies with deliberate forms of joint action (Schmitz & Nadvi, 1999). This embeddedness ensures that economic value circulates within local communities, strengthens regional supply chains, and builds resilience to external shocks and volatility (Giuliani, Pietrobelli, & Rabellotti, 2005).

Unlike a simple aggregation of firms, an industrial district constitutes a socio-economic entity where enterprises and local communities coexist within defined boundaries, often bound by shared production traditions and skills (Becattini, 1990; 2004). Marshall (1920) noted that such environments produce external economies of scale through concentrated skilled labor, specialized suppliers, and informal knowledge exchange. Becattini later emphasized the role of cultural norms and trust in supporting collaborative relationships.

Industrial districts also enhance localized development by reinforcing supply chains, shortening delivery times, and lowering transaction costs, thereby improving the flexibility and resilience of local economies (Giuliani et al., 2005). From a sustainability standpoint, these districts retain wealth within local communities, support skill development, and enable SMEs to withstand shocks by relying on mutual support networks (Nadvi, 1995). Participation within such systems gives SMEs easier access to value chains, encourages innovation, and lowers entry barriers for entrepreneurs (Bell & Albu, 1999). Policymakers have therefore adopted the industrial district model to guide investments in infrastructure, promote cluster governance, and preserve local identity while enabling technological upgrading for global competitiveness (OECD, 2019).

Role in Economic Sustainability

The contribution of SME clusters to economic sustainability is widely recognized, with multiple theoretical perspectives connecting collective enterprise activity to long-term economic, social, and environmental outcomes. From the sustainable development perspective, economic sustainability implies steady growth, inclusive employment, and responsible resource use (Brundtland

Commission, 1987). Cluster Theory (Porter, 1998; 2000) suggests that geographically concentrated firms benefit from knowledge spillovers, specialization, and productivity gains that bolster resilience and competitiveness. The Industrial District perspective adds a socio-cultural dimension, showing how embedded trust and cooperation strengthen local supply chains and retain wealth within communities (Becattini, 2004; Schmitz & Nadvi, 1999).

The Resource-Based View (RBV) (Barney, 1991) further explains how clusters enable SMEs to collectively access valuable, rare, inimitable, and non-substitutable (VRIN) resources such as skilled labor, advanced technologies, and market intelligence (Maskell & Malmberg, 2007). This pooling of resources not only reduces costs but also encourages environmentally sustainable practices, including shared waste management and renewable energy adoption (UNIDO, 2013). In parallel, the Knowledge Spillover Theory of Entrepreneurship (KSTE) demonstrates that proximity within clusters facilitates the transfer of tacit knowledge, driving innovation and adaptability in dynamic environments (Audretsch & Feldman, 1996; Bell & Albu, 1999).

Together, these perspectives underscore that SME clusters provide both immediate competitiveness and long-term sustainability. They enable inclusive growth, expand employment opportunities, and promote skill development while aligning economic activities with environmental goals (Nadvi & Barrientos, 2004; World Bank, 2020). Joint initiatives such as clean technology adoption, recycling programs, and certification schemes further reinforce the triple bottom line of economic, social, and environmental performance (OECD, 2019). However, as McCormick (1999) cautions, clusters must be supported by effective governance and policy frameworks to ensure that competitiveness translates into broad-based, sustainable development benefits.

Resource-Based View and Knowledge Spillovers

According to the Resource-Based View, firms achieve long-term advantage through access to VRIN resources (Barney, 1991). For SMEs in clusters, resource pooling makes otherwise inaccessible assets—such as specialized knowledge, skilled labor, and advanced infrastructure—available to all members, enhancing efficiency and sustainability (Maskell & Malmberg, 2007). Shared facilities also reduce costs and enable eco-friendly practices, such as joint waste management and renewable energy integration (UNIDO, 2013).

Similarly, the Knowledge Spillover Theory of Entrepreneurship highlights how spatial concentration fosters informal knowledge diffusion, accelerating innovation and entrepreneurship (Audretsch & Feldman, 1996). In clusters, SMEs benefit from frequent interactions with suppliers, customers, and research institutions, which facilitate the rapid adoption of technologies and diversification of products (Bell & Albu, 1999). These dynamics enable SMEs to meet environmental standards and market shifts more effectively.

Sustainable Development Perspective

From a sustainable development perspective, clusters contribute to economic systems that meet current needs without compromising future generations' opportunities (Brundtland Commission, 1987). They foster inclusive growth by creating employment, reducing inequality, and encouraging environmentally conscious production methods (World Bank, 2020). Their proximity-based structures also allow for joint sustainability initiatives such as energy efficiency programs, sustainable sourcing, and green certifications (OECD, 2019). This

alignment with the triple bottom line makes clusters central to advancing long-term economic, social, and environmental sustainability.

HYPOTHESIS DEVELOPMENT

Role of Collaboration on SMEs cluster competitiveness

Collaboration within clusters is widely recognized as a key mechanism through which SMEs enhance their competitiveness. Unlike large corporations, SMEs often face resource constraints, limited bargaining power, and difficulties in accessing markets. Cluster collaboration mitigates these challenges by enabling firms to share resources, exchange knowledge, and engage in joint activities that would otherwise be unattainable individually (Schmitz & Nadvi, 1999). Through such cooperative arrangements, SMEs benefit from collective efficiency, which strengthens their ability to reduce costs, improve product quality, and access wider markets.

Collaboration also fosters knowledge spillovers and learning processes. When SMEs interact with suppliers, competitors, research institutions, and support organizations, they gain access to new technologies, business practices, and industry trends (Giuliani, 2007). These interactions enhance firms' capacity to innovate and adapt to market changes, a critical factor for maintaining competitiveness in dynamic environments. Moreover, trust-based collaboration within clusters reduces transaction costs and encourages joint problem-solving, leading to more resilient and agile business ecosystems (Nadvi, 1995).

Empirical studies have shown that collaborative networks within clusters improve SMEs' ability to internationalize by connecting them to global value chains (Humphrey & Schmitz, 2002). By pooling resources for marketing, logistics, and certification, SMEs can achieve economies of scale and meet international standards, thereby enhancing their competitive edge. From a strategic perspective, collaboration transforms clusters into systems of *co-opetition*, where firms simultaneously compete and cooperate, driving innovation and collective upgrading (Porter, 1998).

Therefore, the positive impact of collaboration on SME cluster competitiveness lies in its ability to (1) overcome individual firm limitations, (2) enhance knowledge diffusion and innovation, (3) reduce costs and risks, and (4) strengthen collective positioning in domestic and global markets. These dynamics illustrate why collaborative practices are not merely complementary but central to building sustainable competitiveness in SME clusters. Thus;

H1: SMEs cluster collaboration has a positive impact on cluster competitiveness

The role of cluster innovation on SMEs cluster competitiveness

Innovation within clusters acts as a catalyst for collaboration by creating opportunities and incentives for firms to work together. In dynamic markets, individual SMEs often lack the financial, technological, and human resources needed to innovate independently. The cluster environment provides a platform where innovation becomes a collective process, encouraging firms to pool resources, share risks, and jointly experiment with new ideas (Asheim & Isaksen, 2002). Thus, the pursuit of innovation fosters stronger inter-firm linkages and collaborative arrangements.

Knowledge spillovers, a hallmark of innovative clusters, stimulate collaboration by ensuring that new ideas, technologies, and practices flow across firms. When one

firm adopts a novel production technique or develops a new product, others in the cluster often adapt and refine these innovations, creating a cycle of mutual learning and interdependence (Audretsch & Feldman, 1996). This interactive process requires continuous dialogue, trust, and cooperation, which in turn deepens collaborative relationships among cluster members (Giuliani, 2007).

Furthermore, innovation challenges such as digitalization, sustainability, and global competitiveness are often too complex for SMEs to tackle alone. Collaborative research and development projects, joint training initiatives, and collective problem-solving become necessary responses (OECD, 2019). In this way, innovation pressures encourage SMEs to build alliances with peers, universities, research institutions, and government agencies, thereby strengthening the collaborative fabric of the cluster (Lundvall, 1992).

Finally, innovation-oriented collaboration enhances the legitimacy and attractiveness of clusters to external stakeholders such as investors, buyers, and policymakers. By working together on innovative solutions, cluster members build reputational capital that benefits all participants. This collective recognition further incentivizes SMEs to collaborate rather than compete in isolation (Porter, 1998).

H2: Cluster innovation has a positive impact on cluster competitiveness

Role of Environmental sustainability on SME cluster competitiveness

Environmental sustainability has increasingly become a cornerstone of competitiveness for SMEs operating in clusters. As global markets shift toward greener production and consumption patterns, firms that integrate sustainable practices gain access to new opportunities, strengthen their reputation, and ensure long-term resilience (Dangelico & Pujari, 2010). For SMEs, which often face challenges of limited resources and global visibility, embedding environmental sustainability within cluster operations provides both differentiation and competitive advantage.

First, adopting sustainable practices within clusters allows SMEs to reduce costs and increase efficiency. Shared investments in clean technologies, energy-efficient production systems, and waste management facilities lower individual firm expenses while enhancing productivity (Porter & van der Linde, 1995). Collective environmental initiatives also create economies of scale, making it feasible for SMEs to meet environmental regulations and international standards that would be unattainable independently (OECD, 2019).

Second, environmental sustainability strengthens the market positioning of clusters. Increasingly, consumers and business partners favor firms with green certifications and eco-friendly products. Clusters that align with sustainability principles not only attract environmentally conscious customers but also appeal to socially responsible investors and development agencies, thereby expanding market reach and financial opportunities (Chen, Lai, & Wen, 2006).

Third, sustainability fosters innovation, which is a vital driver of competitiveness. The demand for environmentally friendly products and processes stimulates SMEs to explore new materials, renewable energy use, and circular economy practices. Such green innovation enhances product quality, opens niche markets, and builds reputational capital for the entire cluster (Dangelico, 2016).

Finally, sustainability practices reinforce resilience and long-term viability. By reducing dependence on finite resources,

minimizing ecological risks, and aligning with global climate policies, clusters ensure continuity and stability in volatile environments (FAO, 2017). This resilience becomes a competitive strength, especially for SMEs vulnerable to external shocks. Thus;

H3: Environmental sustainability has a positive impact on SME cluster competitiveness

Role of Social sustainability on SME cluster competitiveness

Social sustainability within clusters—anchored in trust, social networks, equity, and inclusiveness—plays a vital role in shaping SME competitiveness. Unlike purely economic or technological factors, social sustainability emphasizes the human and relational dimensions of cluster development, which are central to the long-term success of SMEs.

First, social sustainability strengthens trust and cooperation among cluster members. Dense social networks and shared cultural norms foster collaboration, reduce transaction costs, and facilitate knowledge sharing (Schmitz & Nadvi, 1999). In an environment where SMEs often lack formal contracts or legal safeguards, social trust becomes the basis for reliable business exchanges, joint ventures, and resource sharing, thereby directly enhancing competitiveness (Becattini, 2004).

Second, socially sustainable clusters enhance human capital development. By investing in local skills training, education, and fair labor practices, clusters create a more skilled, motivated, and loyal workforce (Nadvi, 1995). Access to skilled labor allows SMEs to improve productivity, innovate more effectively, and maintain higher product quality, which strengthens their market position.

Third, cluster social sustainability improves inclusivity and equity. Clusters that support women, youth, and marginalized groups expand participation in economic activities, broadening the entrepreneurial base and fostering diverse sources of innovation (UNIDO, 2013). Such inclusivity not only drives social legitimacy but also strengthens the adaptability of the cluster in responding to diverse market demands.

Fourth, social sustainability contributes to community embeddedness and reputation. SMEs embedded in socially responsible clusters often reinvest profits locally, contribute to community development, and uphold ethical standards. This embeddedness enhances the reputation of the cluster, attracting investors, buyers, and skilled workers (Giuliani, Pietrobelli, & Rabellotti, 2005). Over time, reputational capital becomes a competitive asset that is difficult for external competitors to replicate.

Finally, socially sustainable clusters exhibit greater resilience. Strong social bonds and mutual support networks allow firms to withstand external shocks—such as economic downturns, pandemics, or supply chain disruptions—by providing collective safety nets and adaptive strategies (Nadvi & Barrientos, 2004). This resilience ensures continuity of business operations and sustained competitiveness.

H4: Social sustainability has a positive impact on SME cluster competitiveness

Methodology

Study Context

This research was carried out in Tanzania, focusing on the Morogoro and Iringa regions, both of which are distinguished by their strong cluster activity and potential for

industrial agglomeration. These regions are known for vibrant SME communities and the institutional support provided by agencies such as the Small Industries Development Organization (SIDO) (Mulas et al., 2017). The study population consisted of members belonging to officially recognized clusters in these areas, identified through formal records and institutional networks established by organizations supporting cluster development. Given the absence of comprehensive databases on startups—attributable to the sector's rapid evolution—participants were located with the assistance of *champion connectors*. As highlighted by Olomi et al. (2014), these connectors are instrumental in linking researchers with diverse stakeholders and in enhancing data reliability through their established networks.

Study Design

A mixed-methods research design was adopted, combining qualitative and quantitative strategies to capture a more holistic understanding of the research problem. This approach reflects an emerging consensus on the effectiveness of integrating methods when examining complex social and entrepreneurial systems (Creswell & Creswell, 2018). In particular, a case study design was applied to examine incubator dynamics within the SME ecosystem, while surveys were employed to collect quantitative data from startups, given the lack of comprehensive cluster databases. This dual strategy provided both rich qualitative insights and broader quantitative patterns, thereby enabling a deeper analysis of the role of SME clusters in promoting industrial development.

Data Collection and Sampling

The study's data collection proceeded in two distinct phases. The first phase comprised qualitative interviews designed to investigate innovation trends within Tanzania's SME ecosystem, with a focus on stakeholders engaged in entrepreneurship hubs and labs. These in-depth interviews were critical in uncovering contextual challenges and opportunities, consistent with the exploratory sequential design framework proposed by Myers and Oetzel (2003). Insights from these interviews informed the creation of a structured questionnaire, which was refined and validated through a pilot test involving a small group of stakeholders.

In the second phase, structured surveys were administered directly to SME representatives using the validated questionnaire, ensuring the consideration of local contextual factors. Data analysis incorporated both qualitative and quantitative approaches: thematic analysis was carried out using NVivo, while statistical analysis was conducted using SPSS and Excel (Saunders et al., 2003). Reliability and validity were reinforced through test-retest procedures and correlation analyses, thereby strengthening the credibility and robustness of the study's findings.

Measurements

The questionnaire was developed by adopting and modifying measurement scales from past studies related to SMEs and clusters. However, minor modifications were made to ensure the scales fit the context and methodological issues surrounding the current study. All variables were captured by using 5-point Likert scales from 1 (strongly agree) to 5 (strongly disagree) (Likert et al., 1934; Likert et al., 1993). Economic sustainability was measured by using five factors which were adopted from Falebita, Koul & Taylor (2024), Tong et al. (2023) and Lee (2009). Knowledge spillover was measured by two items which were adopted from Sölvell, Lindqvist & Ketels

(2003), Dahl & Pedersen (2004) and Morrison (2009). Cluster innovation was measured by two factors which were adopted from Giuliani, Pietrobelli, & Rabellotti, (2005) and Morrison (2009). Cluster collaboration was measured by two factors which were adopted from Schmitz, (1995) and Schmitz & Nadvi (1999). The table below provide the detailed information about measurements.

RESULTS AND DISCUSSION

Assessment of the measurements

The table below indicates that factor loadings were>0.3, indicating good convergent validity, and the value of the Cronbach Alpha Coefficient (α) for all variables was>0.5, which implies good internal reliability and consistency of the construct (Kline, 2005; Tabachnick and Fibell, 2007; Pallant, 2000). The composite reliability (CR) is>0.6 for all variables, and hence the instruments were reliable (Reynaldo and Santos, 1999; Tavakol and Dennick, 2011). The average variance extracted (AVE) is>0.5 for all variables, indicating convergent validity in the data (Bagozzi and Yi, 1988). Similarly, as presented in the correlation table , the value of the square root of AVE was greater than the correlations between the factor and other factors, and therefore discriminant validity was achieved. Overall, this means that each variable is much more related to its own measures than other variables (Fornell and Larcker, 1981).

Table 1: Measurement Model Analysis

VARIABLE	ITEMS	LOADINGS	ALPHA	CR	AVE
ECOSUST	▪ Profit has grown because of clusterization	0.64	0.8	0.85	0.5(0.71)
	▪ There is an increase in investment due to clusterization	0.71			
	▪ The cluster have attracted the number of customers	0.71			
	▪ The players in our cluster are continually increasing	0.73			
	▪ Business activities are rapidly increasing in our cluster	0.73			
	▪ Our enterprise has benefited from knowledge sharing within the cluster	0.63			

CLSI	▪ Our enterprise has improved its product features as a result of being part of the cluster,	0.86	0.5	0.8	0.6(0.77)
	▪ Our enterprise has implemented processes (production,delivery process ets) due to collaboration within the cluster	0.72			
CC	▪ Our enterprise has adopted new technologies resulting from involvement in the cluster,	0.85	0.69	0.89	0.61(0.78)
	▪ Being part of the cluster has improved our enterprise access to the domestic and international markets,	0.81			
	▪ The cost effeciency of our enterprise has increased due to operating under our cluster	0.69			
CCLB	▪ Our cluster is essential effective between our enterprise and other cluster members,	0.73	0.5	0.81	0.66 (0.81)
	▪ Our cluster has the potential for partnership among enterprises	0.72			
CSSUST	▪ Profit has grown because of clusterization	.636			
	▪ There is an increase in investment due to clusterization	.711	0.5	0.85	0.790
	▪ The cluster have attracted the number of customers	.709			

	▪ The players in our cluster are continually increasing	.730			
	▪ Business activities are rapidly increasing in our cluster	.725			
	▪ Our income has increased by being in the cluster	.680			

Table 2: Correlation Table

	1	2	3	4	5	6
CCLB	**0.81**					
CLSI	.216**	**0.77**				
CKS	.297**	.135	**0.77**			
CC	.516**	.492**	.236**	**0.78**		
ECOSUST	.487**	.498**	.340**	.655**	**0.71**	
CSSUST	.600**	.396**	.430**	.620**	.723**	**0.73**
MEAN	4.1712	4.1050	4.2265	3.8225	4.0569	4.06
SD	0.93	0.44	0.400	0.64	0.49	0.49

**. Correlation is significant at the 0.01 level (2-tailed), N=178

Table 3: Results From Regression Analysis

Regression Results

Independent Variables	B	T
(Constant)	-.25	-.699
CCLB	.12	2.53**
CLSI	.37	4.32**
ENVSUST	.22	2.67**
CSSUST	.29	3.13**
	R^2 Adj= .49	
	F (4, 174) = 43.14	
	P<.001	

Dependent Variable: Cluster Competitiveness

Table 4: Collinearity Diagnosis

	COLLINEARITY STATISTICS	
VARIABLE	**TOLERANCE**	**VIF**
CCLB	.58	1.731
CLSI	.82	1.222
ENVSUST	.44	2.265
CSSUST	.44	2.269

Hypothesis1 suggested a positive impact of cluster collaboration has a positive impact on cluster competitiveness. The results from the Table above show Cluster collaboration has a positive and statistically significant impact on cluster competitiveness (b=0.12, t=2.58, p<0.001).This indicate that collaboration amount SMEs within the cluster, enhance the competitiveness of the SME clusters.

Hypothesis 2 suggested a positive impact of cluster innovation on cluster competitiveness. The results from the Table above show Cluster innovation has a positive and statistically significant impact on cluster competitiveness (b=0.37, t=4.32, p<0.001). This indicate that the innovation of SMEs within the cluster enhance the competitiveness of the SME clusters.

Hypothesis 3 suggested a positive impact of Environmental sustainability on cluster competitiveness. The results from the table above show environmental sustainability has a positive and statistically significant impact on cluster competitiveness (b=0.22, t=2.67, p<0.001). This indicate that the environmental sustainability enhances the competitiveness of SME clusters.

Hypothesis 4 suggested a positive impact of social sustainability on the cluster competitiveness. The results from the table above show that social sustainability has a positive and statistically significant impact on cluster competitiveness (b=0.29, t=3.13, p<0.001). This indicates that social sustainability influences the competitiveness of a SME clusters.

Discussion

The results of this study confirm that cluster collaboration, cluster innovation, environmental sustainability, and social sustainability exert a positive impact on SME cluster competitiveness. These findings reinforce and extend existing cluster and competitiveness theories, while providing important insights for the Tanzanian context and similar developing economies.

Cluster collaboration emerged as a significant driver of competitiveness. This aligns with Schmitz and Nadvi's (1999) notion of *collective efficiency*, which highlights how SMEs benefit from cooperation in overcoming resource limitations and expanding market access. In the Tanzanian case, collaboration enabled firms to build trust, share knowledge, and jointly respond to market opportunities. These findings echo Giuliani (2007), who demonstrated that collaboration enhances both innovation and learning within clusters, while also validating Porter's (1998) argument that co-location encourages both cooperation and competition, thereby improving cluster performance.

Cluster innovation was also confirmed as a central determinant of competitiveness. The results highlight that SMEs operating within innovative clusters are better positioned to adapt to dynamic market

demands and technological change. This supports the Knowledge Spillover Theory of Entrepreneurship (Audretsch & Feldman, 1996), which posits that geographical proximity fosters the transfer of tacit knowledge, stimulating innovation. In the Tanzanian clusters studied, innovation often took the form of incremental improvements to products and processes, reflecting the context of resource-constrained SMEs. Nevertheless, even modest innovations were shown to strengthen competitiveness by enhancing efficiency and differentiating products in local and regional markets.

Environmental sustainability was found to positively influence cluster competitiveness, supporting Porter and van der Linde's (1995) "innovation offset" hypothesis, which argues that environmentally friendly practices can simultaneously reduce costs and open new market opportunities. In the SME context, sustainability practices—such as shared waste management, energy efficiency initiatives, and green product certification—were not only beneficial for compliance with emerging regulations but also created reputational advantages. These results are consistent with Dangelico and Pujari (2010), who found that environmentally sustainable practices enhance firm competitiveness by driving green innovation and improving market appeal.

Similarly, social sustainability demonstrated a strong effect on competitiveness. Clusters embedded in social networks of trust, inclusivity, and cooperation were more resilient and capable of sustaining long-term growth. This is in line with Becattini's (2004) reinterpretation of Marshall's industrial districts, where socio-cultural ties underpin economic success. In the Tanzanian clusters, social sustainability manifested in inclusivity of women and youth, equitable participation, and local reinvestment of resources, which collectively strengthened reputational capital and market legitimacy. These findings also resonate with Nadvi and Barrientos (2004), who argue that social dimensions of clusters are critical in linking SMEs to global value chains through socially responsible practices.

Taken together, these findings suggest that SME cluster competitiveness cannot be explained solely by economic or technological factors but is deeply intertwined with collaboration, innovation, and sustainability—both environmental and social. By confirming the positive effects of these drivers, the study contributes to extending cluster theory toward a multidimensional framework that integrates economic, social, and environmental dimensions of competitiveness. This multidimensionality is especially relevant for developing economies like Tanzania, where clusters play a pivotal role in balancing growth, inclusivity, and sustainability.

Conclusion

This study set out to examine the drivers of SME cluster competitiveness in Tanzania, using a mixed-methods design with data collected from 178 respondents. The findings demonstrate that cluster collaboration, innovation, environmental sustainability, and social sustainability all play a significant role in enhancing the competitiveness of SMEs. Together, these drivers illustrate that competitiveness is not confined to firm-level strategies but is deeply rooted in collective cluster dynamics. By fostering cooperation, stimulating innovation, embedding sustainability, and strengthening social cohesion, clusters create an ecosystem that enables SMEs to compete effectively in both domestic and international markets.

Theoretical Implications

The study contributes to the literature on cluster theory and SME competitiveness by integrating collaboration, innovation, environmental sustainability, and social sustainability into a single framework. It extends Porter's (1998) cluster theory by emphasizing sustainability as a critical dimension of competitiveness in developing economies. It also enriches Industrial District Theory (Marshall, 1920; Becattini, 2004) by showing how social embeddedness and environmental responsibility contribute to long-term resilience. Furthermore, the findings align with the Resource-Based View (Barney, 1991) and Knowledge Spillover Theory (Audretsch & Feldman, 1996), suggesting that collective resources and knowledge flows within clusters can be leveraged to achieve sustained competitive advantage.

Practical Implications

For policymakers, the results highlight the importance of supporting cluster-based development strategies that promote collaboration, encourage innovation, and incentivize environmentally and socially sustainable practices. Investments in cluster infrastructure, innovation hubs, green technologies, and inclusive training programs can amplify SME competitiveness. For practitioners and cluster managers, the findings underscore the need to foster trust-based relationships, joint problem-solving, and knowledge-sharing platforms within clusters. SMEs can enhance their market positioning by embracing sustainability-oriented practices and collaborating on certification, branding, and export initiatives.

Limitations

This study is not without limitations. First, the research was limited to two regions in Tanzania—Morogoro and Iringa—restricting the generalizability of the findings to other regions or countries. Second, the cross-sectional design captures relationships at a single point in time, limiting insights into long-term causal dynamics. Third, while mixed methods provided depth and breadth, the study relied heavily on self-reported data, which may be subject to bias. Finally, the sample size of 178, while adequate, may not fully capture the heterogeneity of all SMEs across different sectors.

Implications for Future Studies

Future research could expand the geographical scope to include additional regions or conduct cross-country comparative studies to test the robustness of these findings. Longitudinal studies are recommended to explore how collaboration, innovation, and sustainability practices influence competitiveness over time. Further, sector-specific investigations could identify whether certain industries benefit more from particular drivers. Future studies might also incorporate objective performance indicators—such as sales growth, export volumes, or environmental audits—alongside self-reported measures, to strengthen validity. Finally, exploring the mediating or moderating roles of institutional support, digitalization, and policy frameworks would provide deeper insights into how SME cluster competitiveness evolves in dynamic environments.

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