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Strategies for Overcoming Product Certification Challenges Faced by Food Manufacturing Small and Medium Enterprises in Tanzania

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ABSTRACT

Small and Medium-sized Enterprises (SMEs) in Tanzania face significant regulatory challenges within bureaucratic, costly, and centralized environments. These challenges contribute to an increase in unregistered enterprises and substandard products in the market. This study aimed to address the challenges SMEs encounter in obtaining product certification to improve their product quality and market competitiveness. A mixed-methods approach was employed, combining qualitative and quantitative research through surveys, interviews, and document analysis, with respondents from the Tanzania Bureau of Standards (TBS), Small Industries Development Organization (SIDO), and SMEs in the food manufacturing sector. Data analysis was conducted using SPSS and JASP. Findings revealed that SMEs face challenges impacting market access (21.4%), product quality (23.6%), safety (19.9%), and competitiveness (18.8%). Confirmatory Factor Analysis (CFA) identified key latent variables influencing these factors, including market access ($\lambda = 0.5$), product quality ($\lambda = 0.7$), safety ($\lambda = 0.4$), and competitiveness ($\lambda = 0.6$). Additionally, the Delphi technique was employed to validate the findings, involving 10 knowledgeable and experienced respondents in the product certification process. To mitigate challenges hindering product certification among SMEs, several strategies are proposed, including improving certification information dissemination through user-friendly, multilingual online platforms, offering technical expertise, advocating for technology subsidies, and providing financial support through government certification grants.

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INTRODUCTION

Small and Medium Enterprises (SMEs) play a vital role globally in fostering economic growth, generating employment, and alleviating poverty. In both developed and developing economies, SMEs are essential for innovation and competitiveness in local and global markets. They serve as engines of economic development, contributing between 30 and 40% of national Gross Domestic Product (GDP) and over 50% of

jobs across various sectors (OECD, 2022; World Bank, 2019). The food manufacturing sector is a crucial part of these enterprises, holding significant potential for growth and export. However, the ability of SMEs to fully capitalize on this potential is hindered by regulatory challenges, particularly in obtaining certification standards necessary for market readiness (World Economic Forum, 2020, OECD, 2017).

In Tanzania, SMEs face similar challenges. Although certification is critical for ensuring product quality and safety as well as accessibility to domestic and international markets, it remains a daunting task for many SMEs. This limitation restricts their capacity to comply with the stringent standards required by regulatory bodies (Lwesya, 2021; Madatta & Chen, 2020)

The significance of product certification cannot be overstated, as it influences consumer trust and market competitiveness. In Tanzania, certification of products from SMEs, particularly in the food manufacturing sector, is often constrained by factors such as small enterprise size, limited financial resources, lack of technical expertise, high compliance costs, bureaucratic hurdles, unreliable infrastructure, insufficient training, and limited access to information (Mkenda & Rand, 2020; World Bank Group, 2016). These constraints prevent a significant proportion of Tanzanian SMEs from obtaining the necessary certification, thereby limiting their market reach and competitiveness (Lwesya, 2021; Madatta & Chen, 2020).

Beyond financial and procedural barriers, Tanzanian SMEs also face broader economic challenges (Madatta & Chen, 2020). Intense competition from cheap imports, coupled with a challenging regulatory environment, further complicates their situation. The government of Tanzania, through initiatives led by the Tanzania Bureau of Standards (TBS) and the Small Industries Development Organization (SIDO), has made efforts to address these issues by providing educational programs and workshops to support SMEs in the certification process (Kadete, 2014). Despite these initiatives, the success rate of SMEs in obtaining certification remains low. For instance, while 50 to 70% of SMEs have participated in TBS and SIDO training programs, only 20 to 30% have successfully achieved product certification (Africa, 2022; Chipman & Silver, 2016). This underscores the need for more targeted strategies to overcome existing barriers.

In addition to domestic certification challenges, many SMEs in Tanzania struggle to meet international marketing standards, which require compliance with multiple regulatory frameworks, including International Organization for Standardization (ISO) standards and Hazard Analysis Critical Control Point (HACCP). Without adequate strategies, these enterprises will remain confined to local markets, missing the potential for international trade and economic expansion.

This study aimed to investigate the challenges facing food manufacturing SMEs in Tanzania in obtaining product certification and to develop practical strategies to address these obstacles. By analyzing the root causes of these challenges and identifying potential solutions, the study sought to enhance SMEs' ability to comply with certification requirements, thereby improving their market access, product quality, safety, and overall competitiveness. Furthermore, the research integrated insights from recent literature to ensure a comprehensive and updated perspective on these challenges. The findings provide valuable insights for policymakers, regulators, and SME stakeholders, contributing to the development of a more supportive business environment.

MATERIALS AND METHODS

Research Design

This study employed a descriptive research design to systematically explore the obstacles faced by SMEs in obtaining product certification in Tanzania. A descriptive approach was selected over other research designs because it allows for an in-depth assessment of real-world challenges without influencing the variables being studied. Unlike experimental or correlational designs, which test causal relationships, this approach provides a comprehensive snapshot of the existing situation, aiding in the identification of key barriers and influencing factors. To enhance the robustness of findings, a mixed-methods approach was applied, integrating both qualitative and quantitative research methods (Doyle *et al.*, 2020). The qualitative component focused on understanding the experiences and perceptions of SME owners and certification authorities regarding the certification process. The quantitative aspect facilitated statistical analysis of the prevalence and effects of these challenges.

Research Area

The research was conducted in Dar es Salaam, targeting food manufacturing SMEs registered with SIDO and staff members from TBS.

Study Population and Sample

The study targeted SME owners, both certified and non-certified, engaged in training or registration with SIDO, as well as personnel from TBS who provided professional insights on challenges and solutions.

Data Collection

A mixed-methods approach was used, combining quantitative and qualitative data collection methods, including surveys, interviews, and document analysis. Surveys gathered quantitative data on challenges, certification success rates, and their effects on market access, product quality, and competitiveness. In-depth interviews with key stakeholders from TBS, SIDO representatives, and SMEs, provided qualitative insights. Additionally, relevant documents and publications were analyzed for context and background information.

Sampling and Sampling Technique

A random sampling technique was used to select the respondents, with a sample size calculated using Mensah's (2014) formula for an unknown population:

$$n = \frac{(Z^2 * p * q)}{e^2} \quad (1)$$

where n is the required sample size, Z is the critical value (1.96 for a 95% confidence level), p is the estimated proportion (0.5), q equals $1-p$, and e is the margin of error (0.11). This yielded a sample size of 80. This formula was used because the number of SMEs pursuing certification fluctuates due to new entries, deregistration, and varying certification stages, making the population unknown. Purposive sampling was used for experts from TBS and SIDO to provide specialized insights and validate alternative sampling methods. In addition, cluster sampling was applied due to the dispersed nature of the SME population in Dar es Salaam. Questionnaires were distributed to both SME owners and employees, as detailed in Table 1.

Table 1: Sample Size Distribution

S/N	Key informants	Population distribution	Sample size	%
1	TBS staff	100	20	25
2	SMEs	120	45	56.25
3	SIDO staff	80	15	18.75
Total		300	80	100

Research Approach

This study employed a variety of methods to ensure accuracy in data collection. A pre-test of the questionnaire was conducted to refine the instrument before full data collection. The study also utilized inter-rater reliability and Cronbach's alpha to measure the consistency of responses across different observers and assess the internal consistency of study variables. These steps were integrated into the research design to enhance the robustness of the findings.

Types of Data and Methods of Data Collection

The study utilized both primary and secondary data. Primary data were collected directly from workers in the food manufacturing sector using structured questionnaires and semi-structured interviews. These methods provided detailed insights into the specific challenges encountered during the product certification process and the impact of certification on product quality. Secondary data were sourced from existing research studies, reports, academic publications, and official documents. This included information on the various challenges SMEs faced when seeking product certification, the effects of these challenges on market access and product quality, and potential solutions proposed in prior research.

Reliability and Validity of the Data

To ensure data reliability and validity, the study conducted a pretest to refine the questionnaire. Inter-rater reliability analysis was performed to assess the consistency of estimates across different observers. Additionally, Cronbach's alpha was used to determine the internal consistency of the study variables, ensuring that the results accurately reflected the relationships among variables and enhancing the credibility of the findings.

Data Processing and Analysis

Data processing and analysis involved several steps. Initially, data were collected through surveys and document analysis. The collected data were reviewed and cleaned to eliminate inconsistencies and errors, then coded and categorized based on variables and themes to facilitate analysis. Various statistical techniques and qualitative methods, including descriptive statistics, confirmatory factor analysis (CFA), content analysis, and thematic analysis, were employed. Factor analysis Equations 2 and 3 were used to understand underlying dimensions and relationships.

Market Access:

$$MA=\lambda_1\times x+\lambda_2\times y+\lambda_3\times z+\lambda_4\times w+\lambda_5\times v+\lambda_6\times u+\lambda_7\times s+\lambda_8\times t+\varepsilon_1 \quad (2)$$

where MA is Market Access, x is Regulatory Awareness, y is Language Awareness, z is Technical Understanding, w is Financial Understanding, v is Technological Understanding, u is Product Quality Understanding, s is Management Commitment, t is Material Availability and ε_1 is error term.

Product Quality:

$$\text{Product Quality (PQ)} = (\lambda_6 \times \text{Product Quality Understanding}) + (\lambda_3 \times \text{Technical understanding}) + (\lambda_5\times\text{Technological Understanding}) + (\lambda_9\times\text{Limited access to certification information}) + \varepsilon_2 \quad (3)$$

Product Safety:

$$\text{Product safety (PS)} = (\lambda_3 \times \text{Technical Understanding}) + (\lambda_9\times\text{Product Awareness and Understanding}) + \varepsilon_3 \quad (4)$$

Competitiveness:

$$\text{Competitiveness (C)} = (\lambda_4 \times \text{Financial Understanding}) + (\lambda_5 \times\text{Technological Understanding}) + (\lambda_7 \times \text{Management Commitment}) + \varepsilon_4 \quad (5)$$

From Equations (2) to (5), λ_1 to λ_8 are the factor loadings representing the strength of the relationship between latent and observed variables, while ε_1 to ε_4 denote the

error terms, which represent unobserved influences on the manifest variables.

Statistical Software

Data analysis for this study utilized IBM SPSS Statistics version 26, JASP version 0.17.1, and Microsoft Excel. SPSS and JASP were used for detailed factor analyses, including CFA, while Microsoft Excel supported basic and preliminary exploratory data analysis. These software tools collectively facilitated a thorough examination of the underlying dimensions and patterns within the data, aligning with the objectives of the study and research questions.

Ethical Considerations

The study followed ethical guidelines to protect the rights of participants and maintain research integrity. Confidentiality and privacy were strictly maintained, with data anonymized and securely stored. The researchers used respectful and culturally sensitive methods to ensure fair distribution of benefits and burdens.

RESULTS AND DISCUSSION

General Information of the Respondents

Gender Distribution

The results showed that out of 96 respondents, 59 were female and 37 were male, indicating a higher representation of females. This gender imbalance suggests that female perspectives disproportionately influenced the survey outcomes.

Age Distribution

Majority of participants fell within the 25-44 age range, with the largest groups being 25-34 and 35-44 years old. This suggests that the certification challenges may be more relevant to this demographic. The lower representation of the 18-24 and 65+ age groups highlight potential areas for growth. Targeted strategies such as outreach initiatives and tailored communication methods could help engage these underrepresented segments. The age distribution influences how certification information is accessed and utilized, emphasizing the need for digital tools and modern outreach techniques.

Educational Background of Respondents

The educational background of the respondents revealed a diverse range of educational range, with the majority holding a bachelor's degree, followed by master's degree holders. This indicates that higher educated individuals are more likely to engage in certification related discussions, possibly due to greater access to information. The lower participation of high school graduates and PhD holders may introduce some limitations in perspectives. Future surveys could ensure broader educational representation to capture more varied insights.

Current Role Affiliation of Respondents

Figure 1 shows that employees constituted the largest group, followed by self-employed individuals. This suggests that certification concerns were more prominent among employees working in structured organizations. The relatively lower participation of students and retirees' points to a potential gap in engagement, which could be addressed through targeted awareness campaigns.

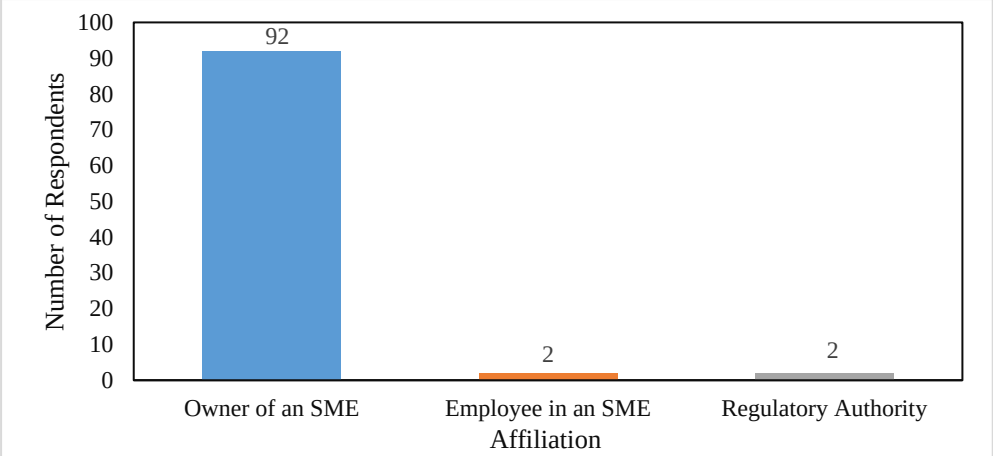

Figure 1: Current role affiliations of the participants.

Role Affiliation and Educational Background

Figure 2 presents the correlations between educational background and professional roles. Higher intensity areas in the heatmap indicate common patterns, such as bachelor's and master's degree holder's predominantly occupying employment roles. This visualization provides a deeper understanding of how education influences professional opportunities, offering insights into skill gaps and workforce trends.

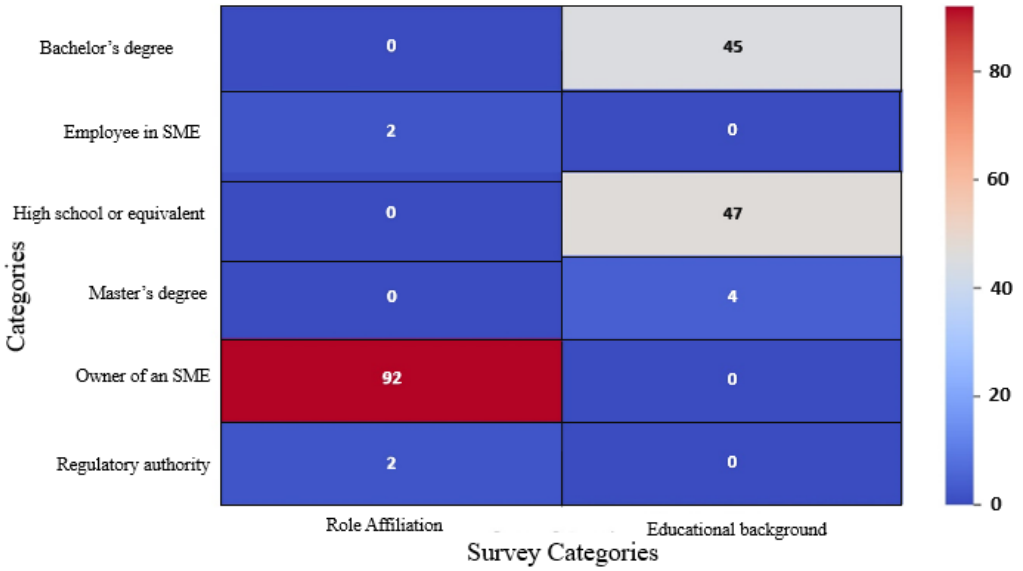

Figure 2: Current role affiliation and educational background.

Product Certification Status

Among the surveyed products, 44.8% were certified, while 54.2% were uncertified. This highlights a critical gap in product certification, possibly due to limited resources, lack of awareness, or regulatory challenges. Addressing this issue requires improving access to certification services, raising awareness about certification benefits and providing targeted support for SMEs. These efforts could improve product quality and market competitiveness for uncertified businesses.

Duration of Product Certification

Figure 3 shows insights into the duration of product certifications among respondents with certified products. The results showed that the majority of respondents (47.92%) did not specify the duration of their product

certifications. Among those who specified the duration, 31.25% reported that the certification process lasted for less than a year. A small proportion (1.04%) had certifications extending beyond ten years, and most certifications lasted between 1 to 5 years. Notably, majority of the respondents with uncertified products reported a certification duration of less than one year, suggesting either new product development or limited resources to obtain certification.

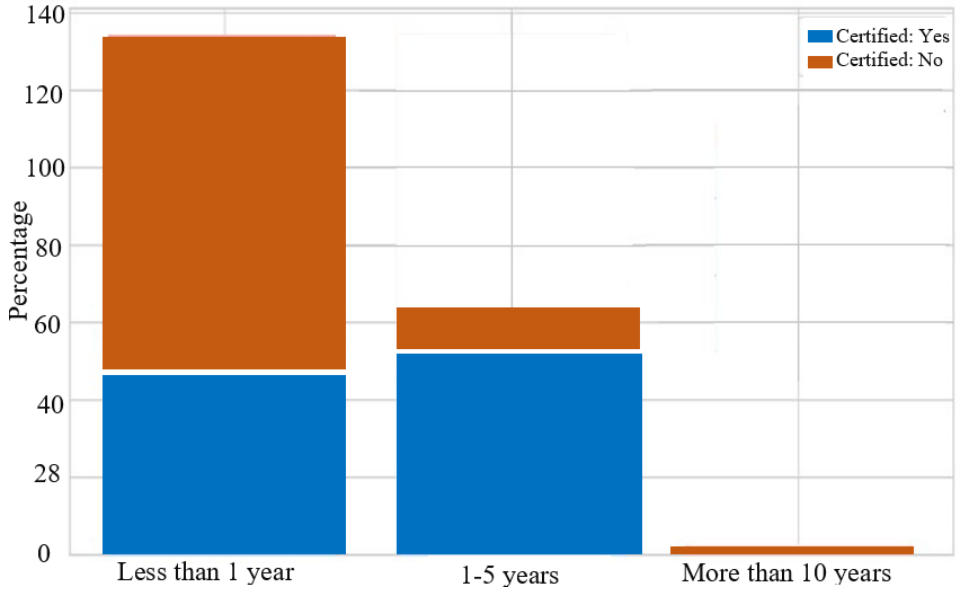

Figure 3: The duration of product certification among respondents.

SMEs Challenges in Product Certification

The study identified several challenges related to product certification, with limited access to certification emerging as the most significant, with the highest mean score of 4.365 (Figure 4). This indicates that SMEs face substantial barriers in obtaining product certifications. Technical expertise followed closely with a mean score of 4.333, suggesting that although SMEs have a certain level of technical competence, they still struggle with the certification process. Awareness and understanding of the certification process also received a high mean score of 4.188, suggesting that SMEs are generally familiar with the requirements but face challenges in achieving certification.

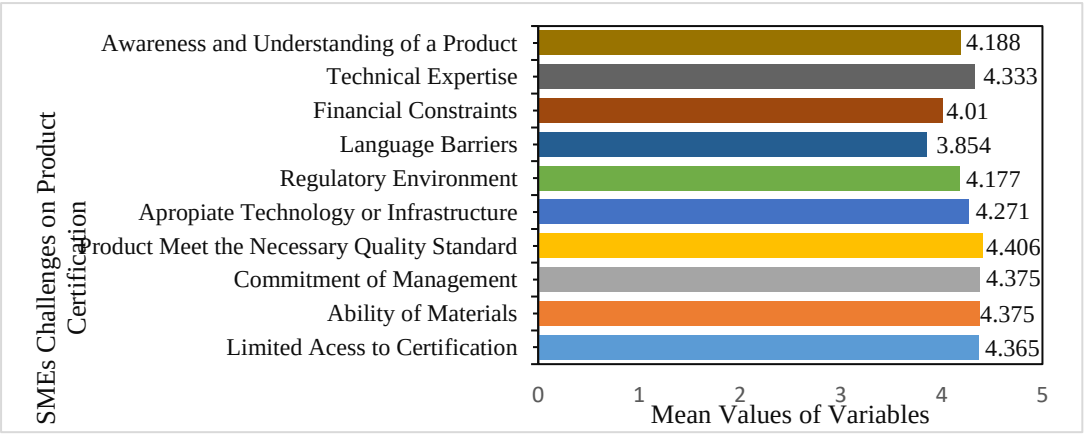

Figure 4: SMEs Challenges on product certification.

SMEs Challenges Affecting Global Market Access, Product Quality, and Competitiveness

The results in Figure 5 shows that market access was the primary challenge, with a mean score of 3.73. This suggests that SMEs face significant difficulties in entering and competing in the market. Product quality was another concern, with a mean score of 3.63, slightly lower than market access, but still an important issue for SMEs. Product safety and competitiveness were also highlighted as major challenges, with mean scores of 3.85 and 3.92, respectively. These scores suggest that SMEs face obstacles in ensuring product safety while striving to maintain competitiveness in the local and international markets.

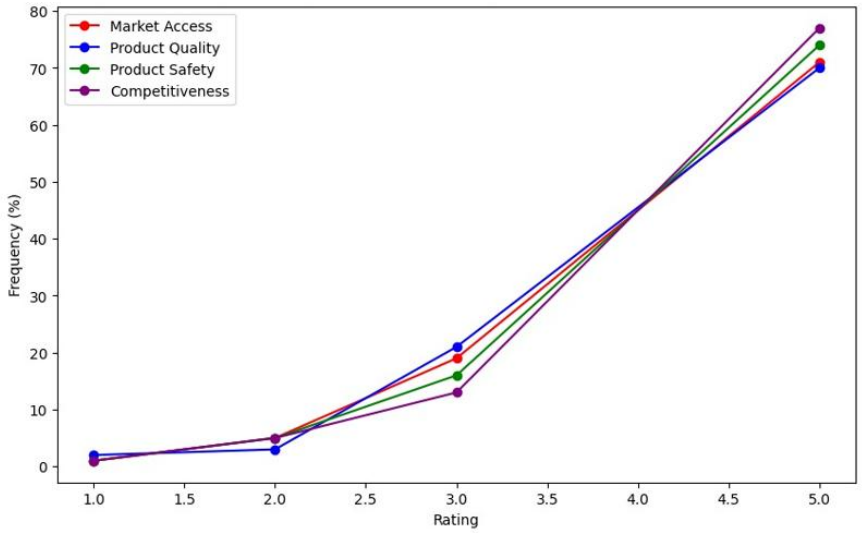

Figure 5: Effect of product certification on market access, product quality, and competitiveness.

Confirmatory Factor Analysis
Model fit and Chi-square test results

The Chi-square test results shown in Table 2 demonstrate a significant improvement when comparing the baseline model to the factor model. The baseline model showed a Chi-square value of 802.37 with 45 degrees of freedom, while the factor model showed a significantly lower Chi-square value of 143.65 with 35 degrees of freedom and a p-value of 4.11×10^{-15}. This reduction indicates a better fit for the factor model, suggesting that the hypothesized factor structure accurately represented the data. The degrees of freedom also highlighted the factor model's parsimony, supporting the validity of the measurement model.

Table 2: Chi-square Test Results

Model	X^2	df	p
Baseline model	802.37	45	
Factor model	143.65	35	4.11×10^{-15}

Note. The estimator is ML

R-Squared (R^2)

The R-squared values represent the proportion of variance in the observed variables that is explained by the latent constructs (Table 3). Key findings revealed that the regulatory environment, technology, and product quality constructs exhibited the highest explanatory power, with R^2 values exceeding 0.75. This suggests that their observed variables strongly represented these constructs. In contrast, constructs such as financial constraints and language barriers showed lower R^2 values (around 0.30), indicating that other factors may influence these constructs beyond the observed variables.

Table 3: The R-squared Values for the Constructs

Factor	R^2
Awareness and Understanding of the Product	0.46
SMEs have the Technical Expertise required to navigate	0.67
Financial Constraints significantly hinder SMEs	0.30
Language Barriers pose a significant challenge for SMEs	0.30
The Regulatory Environment in Tanzania is conducive	0.75
Whether SMEs have appropriate Technology or Infrastructure	0.77
Whether product meets the necessary Quality Standards for SMEs	0.77
Whether Management is ready or committed to motivate	0.55
Whether appropriate Raw Materials are used and available	0.69
Limited Access to Certification Information or Information Barriers	0.68

Parameter estimates

The factor loadings for each construct reflected their relationship with the observed variables, with higher values, indicating stronger relationships (Table 4). Technical expertise, regulatory environment, technology, and product quality all demonstrated strong relationships with their observed variables, with loadings around 1.04. In contrast, constructs such as financial constraints and language barriers showed moderate relationships (loadings between 0.52 and 0.53), yet they still maintained statistical significance.

Table 4: Factor Loadings and 95% Confidence Intervals for Indicators of Certification Challenges Impacting SMEs

Factor	Indicator	Estimate	Std. Error	z-value	p	Lower	Upper	Std. Est. (lv)
Effect of Certification Challenges on SMEs	Awareness and Understanding of the Product	0.62	0.08	7.41	1.24×10^{-13}	0.45	0.78	0.62
	SMEs have the technical expertise required to navigate	0.94	0.10	9.67	0.00	0.75	1.13	0.94
	financial constraints significantly hinder SMEs	0.52	0.09	5.63	1.82×10^{-8}	0.34	0.70	0.52
	Language barriers pose a significant challenge for SMEs	0.53	0.09	5.65	1.59×10^{-8}	0.34	0.71	0.53
	The regulatory environment in Tanzania is conducive	0.94	0.09	10.55	0.00	0.77	1.12	0.94
	Whether SMEs have appropriate technology or infrastructure	1.04	0.10	10.76	0.00	0.85	1.23	1.04
	Whether product meets the necessary quality standards for SMEs	0.88	0.08	10.77	0.00	0.72	1.04	0.88

Factor	Indicator	Estimate	Std. Error	z-value	p	Lower	Upper	Std. Est. (lv)
	Whether management is ready or committed to motivate	0.74	0.09	8.37	0.00	0.56	0.91	0.74
	Whether appropriate raw materials are used and available	0.87	0.09	9.94	0.00	0.70	1.04	0.87
	Limited access to certification information or information barriers	0.84	0.09	9.77	0.00	0.67	1.01	0.84

The factor loadings for Technology and Regulatory Environment highlighted their critical role in shaping the impact of certification challenges on SMEs. Therefore, investments in these areas are vital for SMEs to overcome certification hurdles and succeed in the market.

Factor Variance

The factor variance analysis indicated the degree of variability in the latent construct "Effect of Certification Challenges on SMEs", with an estimate of 1.00, suggesting no variability in the latent factor (Table 5).

Table 5: Factor Variances and 95% Confidence Intervals for the Effect of Certification Challenges on SMEs

Factor variances						
				95% Confidence Interval		
Factor	Estimate	Std. Error	z-value	p		Std. Est. (lv)
				Lower	Upper	
Effect of Certification Challenges on SMEs	1.00	0.00	-	1.00	1.00	1.00

Effect of Certification Challenges on SMEs

The estimated factor variance for the latent construct "Effect of Certification Challenges on SMEs" was fixed at 1.00 to facilitate model identification in CFA. This standard practice ensured consistency in parameter estimation, with a confidence interval of [1.00, 1.00] and a standard error of 0.00, confirming that there was no variability. The standardized estimate remained at 1.00, simplifying its interpretation.

Fixing the variance at 1.00 allowed for the unique estimation of parameters, eliminating issues of indeterminacy. This approach ensured that factor loadings were interpretable relative to the standard and strengthened the robustness of the model.

The residual variances represented the proportion of unexplained variance in the observed variables. For example, the unexplained variance in awareness and understanding was 38%, with a standard error of 0.07, a z-value of 5.43, and a p-value of 5.60×10^{-8}. In technical expertise, 12% remained unexplained (SE = 0.05, z = 2.40, p = 0.02). Financial constraints and language barriers showed high unexplained variances at 73% (SE = 0.08, z = 9.13, p = 1.00×10^{-19}) and 70% (SE = 0.08, z = 8.75, p = 2.00×10^{-18}), respectively. Regulatory environment and technology, as well as product quality, each exhibited 21% unexplained variance (SE = 0.06, z = 3.50, p = 0.00). Management commitment exhibited 70% unexplained variance (SE =

0.08, z = 8.75, p = 2.00×10^{-18}), while availability of materials and limited access to certification information showed 31 and 32% unexplained variances, respectively (SE = 0.07, z = 4.43, p = 9.00×10^{-6}; SE = 0.07, z = 4.57, p = 5.00×10^{-6}) (Figure 6).

Model plot

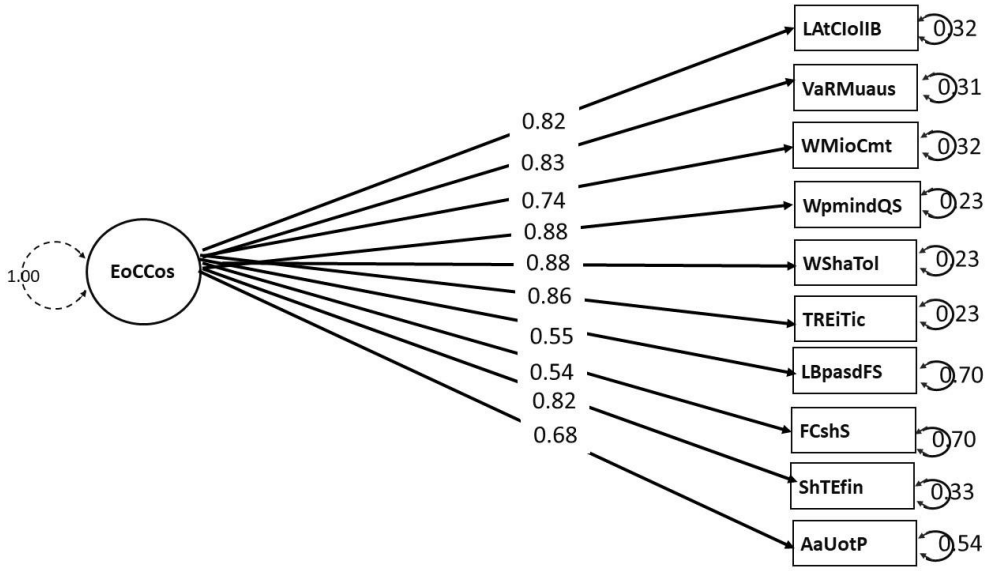

Figure 6: Model plot with loading factors or weight factors.

Table 6 defines abbreviations used in the model plot, ensuring clarity on key aspects of certification challenges. The key factors include regulatory environment, financial constraints, language barriers, and management commitment.

Table 6: Abbreviations Used in the Model Plot

Short Name	Full Description
EoCCoS	Effect of Certification Challenges on SMEs
AaUotP	Awareness and Understanding of the Product
ShTEfin	SMEs have the Technical Expertise required to navigate
FCshS	Financial Constraints significantly hinder SMEs
LBpasdFS	Language Barriers pose a significant challenge for SMEs
TREiTic	The Regulatory Environment in Tanzania is conducive
WShaTol	Whether SMEs have appropriate Technology or Infrastructure
WpmindQS	Whether product meets the necessary Quality Standards for SMEs
WMioCmt	Whether Management is ready or committed to motivate
VaRMuaus	Whether appropriate Raw Materials are used and available
LAtCIolIB	Limited Access to Certification Information or Information Barriers

Manifest variables are defined by Equations 2 to 5. These Equations demonstrate how various factors contribute to the overall certification challenges faced by SMEs. Each manifest variable in the model was associated with specific latent factors that explain the challenges businesses face in achieving certification. For example, market access was positively influenced by several key factors. The regulatory environment played a significant role with a coefficient of 0.89, indicating a strong positive relationship. Additionally, language barriers contributed to market access with a coefficient of 0.56, demonstrating a moderate positive impact. Technical expertise also influenced the market access, with a coefficient of 0.80,

reflecting a robust positive effect. These relationships suggest that improvements in these areas could facilitate greater market access for SMEs, thereby reducing certification challenges.

The Chi-square test indicates that the factor model fitted significantly better than the baseline model, with a reduced Chi-square value of 143.65 (p-value $4.11x10^{-15}$), indicating a better representation of the data. The R-squared values for regulatory environment, technology, and product quality (0.75, 0.77, and 0.77 respectively) showed that these factors explain the most variance in the observed variables. The parameter estimates underscored the significance of constructs such as regulatory environment, technology, and product quality in explaining the variance in SMEs' certification challenges.

Strategy Validation Methods

The CFA model demonstrated a significantly better fit than the baseline model, confirming that the hypothesized factor structure aligns well with the data. The parameter estimates revealed significant relationships between the latent factors and their respective indicators, which strengthened the validity of the measurement model. Additionally, the factor variances were estimated with high accuracy, providing further evidence of the model's robustness. The R-squared values reinforced that regulatory environment, technology, and product quality have the highest explanatory power, confirming that these constructs are well-represented by their observed variables.

Solutions to SMEs Product Certification Challenges

The examination of solutions to streamline product certification for SMEs revealed several key insights, as shown in Figure 7. Certification support centers and "Industry Collaboration" were identified as the most effective solutions, both receiving the highest average score of 11.6%, underscoring their importance in addressing the challenges SMEs face. These solutions also showed strong support, with frequencies at rating 5 reaching 11.6%, further emphasizing their critical role in improving the product certification process for SMEs. Other solutions such as "Simplify Certification Procedures," "Provide Financial Support," and "Public Awareness Campaigns" also garnered significant support, with high frequencies at rating 5, affirming their relevance and importance to respondents.

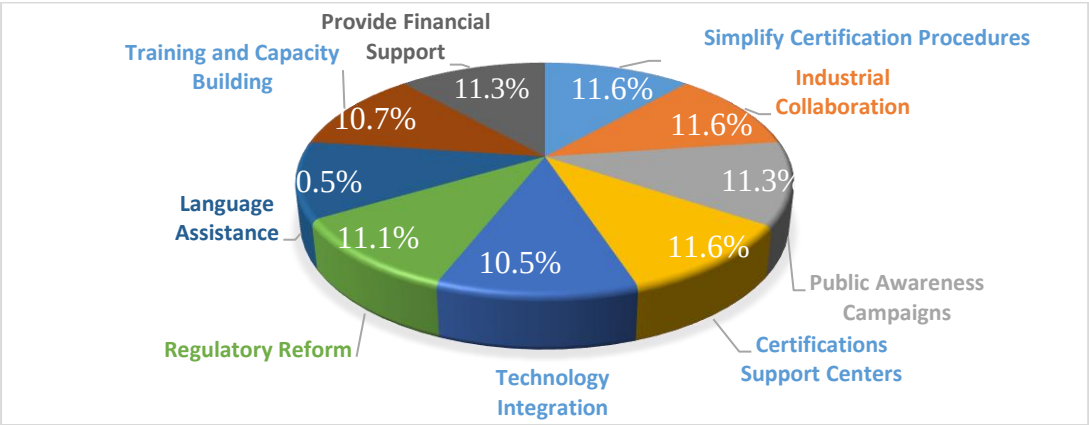

Figure 7: Solutions to SMEs product certification challenges.

Results Based on Systematic Interview Questions

In assessing the challenges encountered by SMEs pursuing product certification as indicated in Figure 8, it was found that the most prevalent issues included complex and time-consuming certification procedures (26.7%), and difficulties in meeting specific technical expertise standards (18.8%). Other notable

challenges were limited financial resources for certification fees (23.3%), language barriers during the certification process (16.8%), and lack of awareness about certification requirements (14.4%).

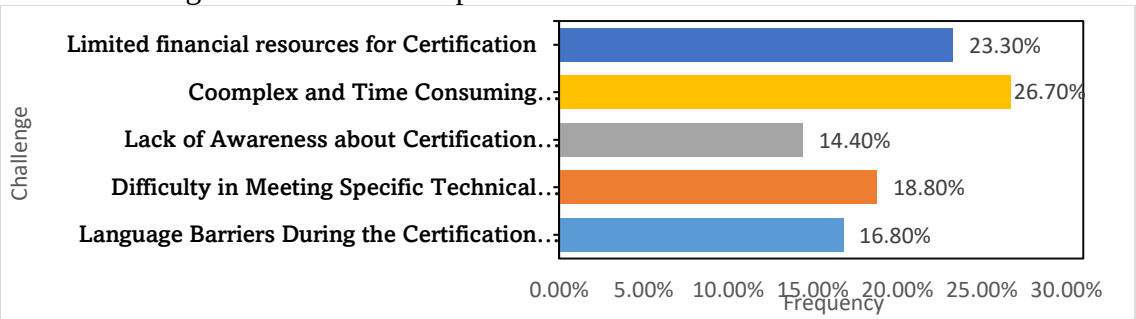

Figure 8: Challenges encountered by SMEs in obtaining product certification.

The Effect of Product Certification Challenges on SMEs Businesses

The results in Figure 9 show that enhanced product quality was the most significant positive outcome, with an increase of 21.4%. However, the negative impact of certification costs on market access was notably pronounced, with a reduction of 23.6%. Other effects included improved product safety, which contributed to better market acceptance (19.9%), a competitive disadvantage in global markets (18.2%), and challenges in meeting regulatory requirements that negatively affected sales (16.8%). Instances where SMEs faced significant hurdles in obtaining product certifications are shown in Figure 10. This included inability to afford certification testing for new product features (18.0%), delays caused by language miscommunication with certification bodies (22.0%), technical challenges in meeting evolving certification standards (26.7%), financial constraints preventing simultaneous certification of multiple products (14.7%), and regulatory changes causing uncertainties in certification processes (18.7%).

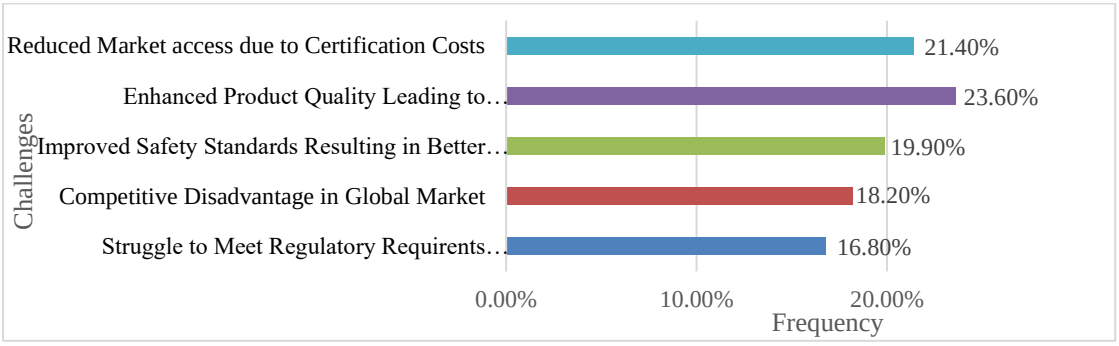

Figure 9: The effect of product certification challenges on SMEs businesses.

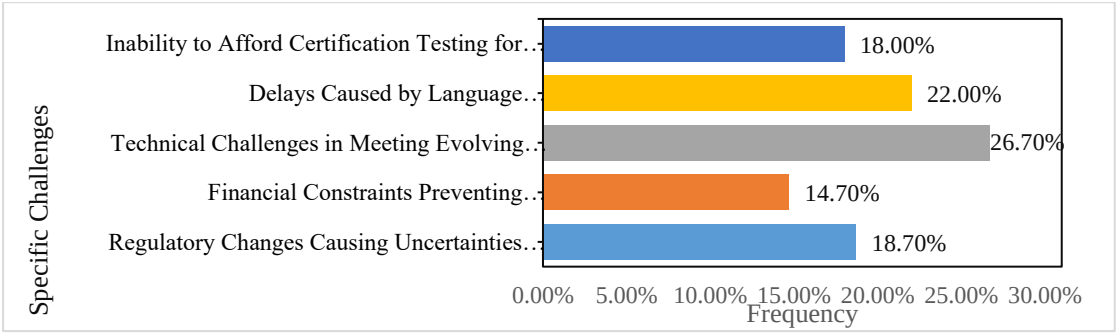

Figure 10: Identifying specific challenges.

The participants provided actionable recommendations and potential solutions to mitigate the identified challenges in the product certification process for SMEs as indicated in Figure 11. Common recommendations included establishing government-sponsored certification grants for SMEs (21.5%), providing accessible and multilingual certification guidance (22.6%), developing online platforms for simplified certification processes (18.7%), fostering industry collaboration to share certification costs and knowledge (17.5%) and introducing financial incentives to meet high product safety (20.2%).

When prioritizing potential solutions (Figure 12), participants identified government-sponsored certification grants as the top priority, with 40.6%. The rationale behind this prioritization is the immediate financial relief offered to SMEs, which facilitates broader compliance. Alternative solutions included industry collaboration for shared certification costs (33.9%) and the counterpoint of simplified online platforms (25.5%). The rationale for industry collaboration is a collective effort to reduce the financial burden on individual SMEs.

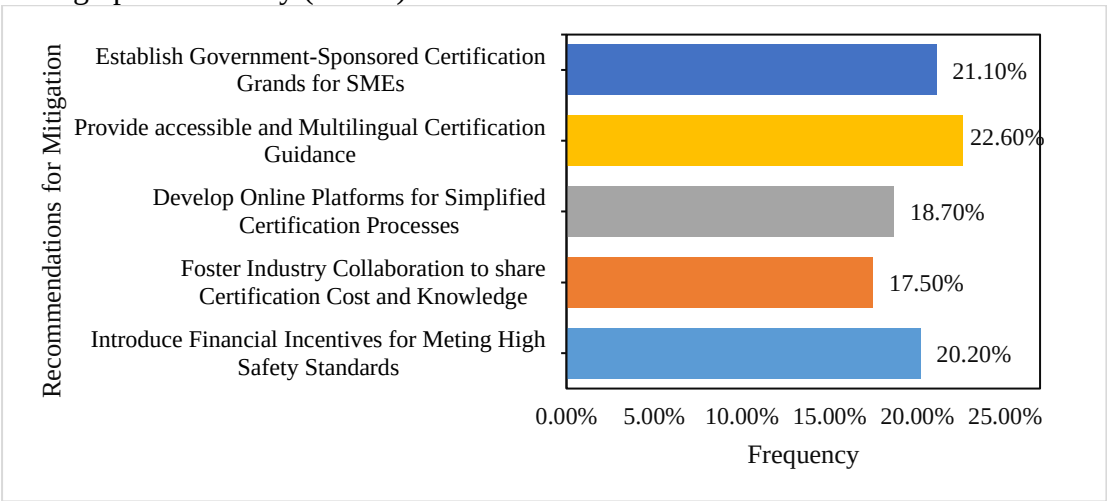

Figure 11: Recommendations for mitigation of identified challenge.

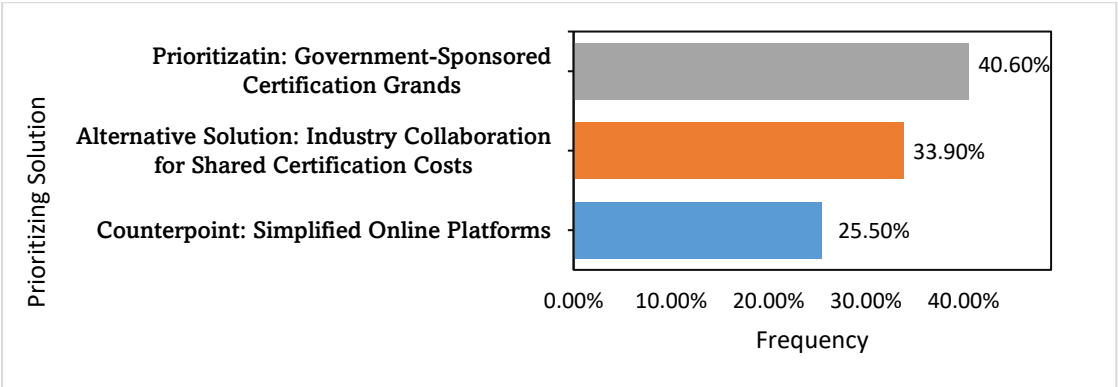

Figure 12: Prioritizing Solutions for identified challenges.

General Information of the Respondents

The survey results highlighted a diverse group of participants, with 38.5% male and 61.5% female, reflecting a similar gender gap in SME ownership in Tanzania. The majority of respondents (72.9%) were aged 25-44 years, with the largest group (35.4%) falling within the 25-34 age range. Most respondents were SME owners (95.8%), followed by employees and regulatory authorities (2.1% each). Over half (54.2%) had obtained product certification, though the certification duration was unclear for 57.3% of respondents. This highlights the

need for further exploration into certification timelines, with studies showing varying experiences of product certification (Surangi, 2022).

SMEs Challenges When Seeking Product Certification

Despite technical expertise and awareness of certification processes, SMEs face significant challenges in accessing certification services. To address these barriers, enhancing the accessibility of certification services, streamlining procedures, and fostering collaboration with regulatory bodies like TBS is crucial. Such initiatives would improve compliance with quality standards and promote the growth of SMEs in Tanzania (Kazimoto, 2014; Tomec, 2024).

SMEs Challenges Affecting Global Market Access, Product Quality, and Competitiveness

The findings emphasized that challenges significantly affect various factors, particularly competitiveness in domestic and international markets. Respondents showed a widespread agreement on these challenges, with competitiveness exhibiting the highest scores. Studies support the view that international market orientation and domestic competition enhance SMEs' technological and marketing capabilities, thereby improving export performance (Prasanna *et al*., 2019). The findings also mirrored global challenges faced by SMEs, such as those experienced during the COVID-19 pandemic (Erdiaw-Kwasie *et al*., 2023).

The chi-square test comparing baseline and factor models indicated a significant improvement in the factor model, with a highly significant chi-square value (140.411, df = 34, $p < .001$), suggesting better performance than the baseline model. Significant relationships were found between latent factors like "Awareness and Understanding" and "Technology," with strong positive covariance between these factors (0.963, $p < 0.001$). Various factors, including technical expertise, management commitment, and regulatory support, were found to positively affect market access, with the technical factor having the strongest effect (coefficient = 0.663).

The product quality was primarily influenced by the product quality factor, indicating that improvements in this latent factor would enhance the observed product quality. Safety was positively affected by technical factors, with a coefficient of 0.663 indicating a strong relationship between technical expertise and product safety (Maghfiroh & Indrarini, 2023). Competitiveness was positively influenced by financial, technological, and management factors, underscoring the importance of these elements in enhancing SME competitiveness.

The study revealed consensus among experts on the importance of providing certification support centers and fostering industry collaboration. These measures would help address the challenges SMEs face in obtaining product certifications. The findings emphasized the need for tailored interventions to create a more accessible and effective certification environment for SMEs (Suakanto *et al*., 2022). The results showed that SMEs face significant challenges in meeting certification requirements, with complex procedures and technical standards as major obstacles. These challenges impact both product quality and market access, underlining the need for financial support, streamlined processes, and collaborative efforts to facilitate the certification process.

Strategies for Streamlining the Product Certification

Interviews with regulatory experts and SMEs, along with a Delphi approach, were used to develop strategies for streamlining the certification process. The Delphi method, which involves obtaining expert consensus, was used to refine the strategies after three rounds of expert feedback. A panel of 10 experts from TBS, SIDO, and

SMEs helped shape the final recommendations, emphasizing the need for a more efficient and supportive certification process for SMEs.

CONCLUSION

This study investigated the challenges faced by food manufacturing SMEs in Tanzania in obtaining product certification, focusing on their implications for market competitiveness and product quality. Key barriers identified include limited access to certification information, inadequate technical expertise, and constraints related to technology, regulatory frameworks, and language. The confirmatory factor analysis underscored the critical influence of "Awareness and Understanding" and "Technology" on SMEs' ability to attain certification.

To address these issues, the study recommends several strategic interventions. These include enhancing the dissemination of certification information through user-friendly, multilingual platforms; strengthening technical capacity via training programs and industry partnerships; and facilitating technology adoption to streamline the certification process. Additional strategies involve simplifying regulatory procedures, offering financial incentives such as government-sponsored certification grants, and fostering public-private collaborations to support shared certification infrastructure. Public awareness campaigns and the development of centralized, digital certification platforms are also proposed to ease the access and improve efficiency.

The findings have significant implications for policy, practice, and future research. For practitioners, there is a clear need for actionable support mechanisms such as a mobile application providing multilingual certification guidelines, real-time updates, and process-tracking features. Regulatory bodies could further assist SMEs through outreach programs like workshops, advisory sessions, and dedicated help desks for certification-related inquiries. From a policy standpoint, reducing procedural complexity and introducing targeted financial support can alleviate the certification burden for SMEs. Moreover, fostering collaboration among government institutions, industry associations, and academic bodies may cultivate a more enabling regulatory environment.

For researchers, future studies should explore the long-term effects of digital certification tools, assess the impact of targeted capacity-building initiatives, and investigate certification barriers unique to specific sectors. Expanding sample sizes and employing longitudinal research designs will enhance the generalizability and depth of insights into the evolving certification landscape for Tanzanian SMEs.

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