Effect of Process Innovation on the Performance of Women-owned Food Processing Micro and Small Enterprises in Tanzania

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Abstract: This study examined the effect of process innovation on the performance of women-led food processing Micro and Small Enterprises (MSEs) in Tanzania. The study also explores the mediating role of innovative performance in explaining the relationship between process innovation and performance, using the cross-sectional research design. The study used a structured questionnaire to collect data from 297 participants from four regions. Data was analyzed with the help of the Smart PLS version 3.0 Software, using the Structural equation Modelling (SEM). Based on the findings, the study concluded that the performance of women entrepreneurs is associated with process innovation. However, the mediation effect of innovative performance was non-existent. The study therefore recommended that women need to use modern technology to enhance the performance in their micro and small business enterprises.

Keyword: Process innovation; women-owned enterprises; performance; structural equation modelling.

Introduction

Innovation has become the fundamental instrument of business performance to enter new markets, increase market share and create competitive advantage (Mozumdar et al., 2020); Waweru, 2022; Gunday et al., 2011). Along with enhancing sustainable competitive advantage in enterprises, studies on innovation have significantly grown over the world over the last ten years (Mivehch, 2019; Agarwal, 2019; Lipovka, 2021). This is due to the significant role played in enhancing economic growth and creating opportunities for entering new markets (Kijkasiwat & Phuensane, 2020; Mwaifyusi & Dau, 2023). It has become a new way to generate greater profits for enterprises particularly women-owned Micro and Small enterprises.

In the twenty-first century, more attention is given to the subject of women's entrepreneurship through creating micro and small enterprises (Alene, 2020; Meressa, 2020). Extensive evidence globally and in Sub-Saharan Africa (SSA) indicates that the performance of women-owned micro and small

enterprises plays a pivotal role in the development of a country and the well-being of societies by creating jobs, wealth and innovations (Kimosop et al. 2016; Agarwal, 2019; Mozumdar et al., 2020; Xie et al., 2019; Lipovka et al., 2021; Huang et al., 2022). Despite this, the performance of women-owned MSEs remains a concern, although women's entrepreneurship has gained popularity with a growing number to run businesses. For instance, the US Statistics suggest a rapid increase in the number of women starting new ventures. i.e. women represent 38% of all business (Nair, 2020; Awoke, 2019).

In Tanzania, it is estimated that women entrepreneurs account for 43% of all entrepreneurs (Nkwabi, 2019; Tundui & Tundui, 2020). Despite the increase of women-owned enterprises, these enterprises are facing challenges including access to finance, training, technology, market and network and cultural factors. Several studies have recommended that process innovation has turned into a hot technique to overcome the difficulties they encounter while struggling to achieve sustainable competitive advantage in global competition (OECD Manual, 2018; Alene, 2020; Nair, 2020).

Process Innovation includes an improvement of production and marketing processes (Anwar, 2018; Kamberidou, 2020) involving the changes in input materials and improvement of production equipment and processing technologies (Dwibedi, 2015; Mehta et al., 2021). OECD Manual (2018) defines process innovation as the introduction of digital technologies, such as new production machines, the use of computers and smartphones in business processes and the introduction of ICT knowledge for the production and marketing of new products (Isa et al., 2021; Gunday et al., 2011; Mendoza-Silva 2021). Komunte, (2015) pointed out the use of digital technology as one of the process innovations that facilitates social media application for online business.

Digital technologies have changed entrepreneurial functions, communication and business working practices (Bhat, 2019; Suseno and Abbott, 2021). Ismail and Idris (2006) pointed out that digital technologies have become the game changer for women who are facing big barriers to accessing and owning technologies. New technologies in entrepreneurship offer huge potential to increase economic opportunities, particularly from mobile phones and computers, which facilitate access to local, regional and global markets (Mozumdar et al., 2020; Kamberidou, 2020). In this post-modern era, digital technologies are an important tool in the development of women to provide the opportunities in production and marketing of products.

Despite the growing interest in process innovation studies in academia and industrial research, studies that link process innovation and performance particularly for women-owned micro and small enterprises are limited, especially in developing countries like Tanzania (Ljundggren et al., 2010; Bhat, 2019). Women entrepreneurs are at the forefront of the country's economic development by creating small and micro enterprises (Mivehch, 2019) but much of the existing research has examined large manufacturing firms that are mostly owned by men with less focus on women (Mehta et al., 2021; Hee et al., 2019; Linan et al., 2020). Thus, this study examined the effect of process innovation on women-owned food processing MSEs' performance in Tanzania.

Literature Review

This section reviews the literature on process innovation with a particular focus on women's entrepreneurship. The section explains the theory that guided the study. It also presents the empirical part, which explains the synthesis of previous studies and the hypothesis development. The last section illustrates the conceptual framework.

Theoretical Foundation

This study used the Schumpeter's innovation theory, which suggests that innovation helps the entrepreneurship and business development by introducing new processes of production and marketing with which consumers are not yet familiar (Schumpeter, 1934). This theory states that businesses can generate prospects for new returns with their innovations to fill the gaps in the marketplace (Upadhyay & Rawal, 2018). Schumpeter made a clear distinction between who entrepreneurs should be and why they must be called innovators. One of the most common ideas in Schumpeter's writings was the role of innovation (new combinations) and entrepreneurship in economic growth. Hence, according to Schumpeter, process innovation helps economic development through entrepreneurship and business development by developing new methods to penetrate new markets. Then, women-owned MSEs

must actively seek out new production and marketing processes and understand the rules by which to play the innovation games to survive. Hence, the purpose of innovation is to provide women-led MSEs with a leg up on the competition in the marketplace. The relevance of this theory to this study is its linkage of innovation and new process development since it addresses crucial questions about how women-owned MSEs can take advantage of innovation practices to gain sustainable competitive advantage in the ever-changing marketplace.

Process Innovation and Performance

Various studies in developed countries have linked process innovation and firm performance (Gunday et al., 2011; Rosli and Sidek, 2013; Hee et al., 2019; Trauth, 2006). These studies found a positive relationship between process innovation and enterprise performance. Mwaifyusi and Dau (2023) and Linton (2019) in their study of small and medium-sized manufacturing firms found that process innovation is positively related to firm performance. Similarly, Rosli and Sidek (2013), in their study on the influence of innovation on the performance of manufacturing Small and Medium Enterprises in Malaysia revealed a positive relationship between process innovation and firm performance. A study conducted by Mohamad and Sidek (2013) used hierarchical regression analysis to examine 284 SMEs in Malaysia's food and age-based industries and to examine how innovation affects their success. This study found that process innovation has a substantial effect on company success.

Moreover, Karabulut (2015) reported a positive and substantial effect on enterprise performance due to the introduction of new business processes. A similar conclusion was established by Benjo and Mwasiaji (2023), who used Analysis of Variance to determine innovation practices in women-owned small and medium business enterprises in Bomet, Kenya. The study found that process improvements were significantly related to improved company performance. Their results were supported by the fact that process innovation leads to higher levels of organizational performance. Based on the literature review, the study constructed the first hypothesis as stated below:

H1 Process innovation has a significant effect on the performance of women owned micro and small business enterprises

The Mediating Role of Innovative Performance

Previous studies indicate that innovative performance is one of the most important aspects of innovation capability, with continuous efforts for improvements, renewals and learning from rapid changes as a result of innovation (Gunday et al., 2011; Gundry et al., 2014; Choi et al., 2010; Lipovka et al., 2021). A study conducted by Isa et al. (2021) showed that organizations can cope with environmental challenges by positively integrating technical and management adjustments into their organizational structures to improve the level of achievement of their objectives. Consequently, innovations are made to meet production and marketing strategies, such as higher improvement in product quality, increase in market share, reduction in production cost, creation of new markets and increase in production flexibility (Shouyu, 2017).

Innovative performance exerts positive effects on firms' production (increased quality, time for production, increased quantity and technical know-how), market (sales increase, higher promotion) and financial performance (profit increase, return on sales and customer satisfaction) in the long term (Gunday et al., 2011). Innovative performance is first associated with the non-financial aspects of corporate performance, such as increased customer satisfaction or production speed, which leads to higher financial returns (Gunday et al., 2014). In brief, once innovative performance improves, production and marketing performance will also improve, and through their mediation, financial performance will start to improve.

The elements of production and operational performance, such as speed, flexibility, quality and cost efficiency are highly related to innovative performance, according to past literature (Gunday et al., 2014; Xie et al., 2019). Besides the quality and speed features, Mendoza-Silva (2021) suggested that innovative performance is also related to the two other elements of production performance: flexibility and cost efficiency. Success in revitalization efforts, particularly in management mechanisms, production processes and improved products contribute to the distribution of knowledge and the efficiency of coordination within the organization, which is essential for operational flexibility and decreased related costs. Therefore, we can argue that production performance, which is a combination of achievements in performance indicators, such as speed, quality, flexibility and cost efficiency, is positively affected by innovative

performance. Based on these arguments, the study constructed the second hypothesis as stated below:

H2: Innovative performance mediates the relationship between process innovation and women-owned food processing micro and small business enterprises.

Drawing from Schumpeter's innovation theory and the empirical review, the conceptual framework of this study is presented in Figure 1:
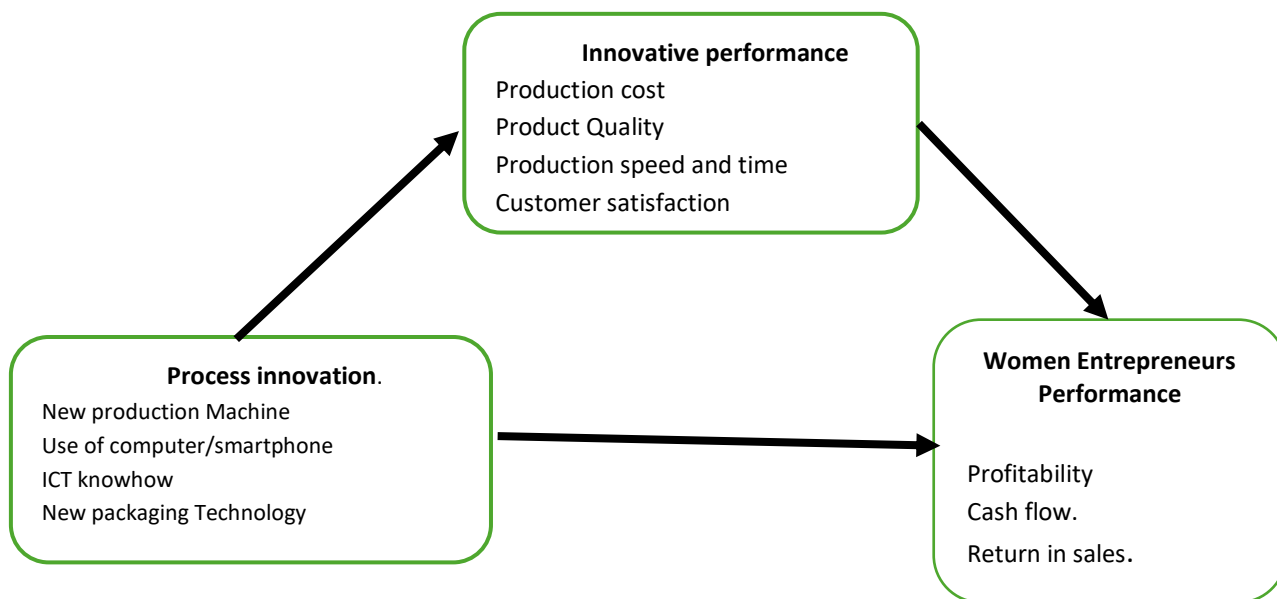

Figure 1: Conceptual framework

Methodology
Design
This study adopted a cross-sectional survey design, using both qualitative and quantitative data at one point in time.

Population and Sampling
The study was conducted in four purposively selected SIDO regional offices; Dar es Salaam, Arusha, Morogoro and Dodoma. The selected regions have many women-led food-processing MSEs; hence, they are likely to innovate to improve performance. Using a stratified sampling technique, 297 women-led food-processing MSEs were selected from Dar es Salaam (98), Arusha (96), Morogoro (55) and Dodoma (48). The population was grouped into strata based on the kinds of food products processed such as honey, nuts, flour, meat and fish, food spices, snacks, fruits and juice, edible seed oil and milk products. Then, samples were randomly selected from each stratum.

Instruments and Analysis
Data was collected through a structured questionnaire. Data analysis took place through the Smart PLS Version 3 Software. Prior, a measurement model was conducted for quality checks for the validity and reliability of data by performing data modifications in the PLS Algorithm. Then, the structural model was conducted to test the hypothesis by running the Bootstrap method of bias correction to measure the relationships between process innovation and women led MSEs performance.

Validity and Reliability
The Validity and reliability was measured by factor loading, Cronbach's alpha and the average variance extracted of the constructs.

Ethical considerations
Confidentiality and privacy were taken care of. The research team and respondents agreed that the respondents' characteristics would remain anonymous. Data was protected from wrong use and only the research team would have access to the data.

Results and Discussion
Model Formation
The effect of Process innovation on the performance of women entrepreneurs through innovative was established using the Path Mediation Analysis. According to Memon et al. (2018) and Ramayah et al. (2022), structural equation modelling

is a good model to explain the direct and indirect effects of constructs. This helped to establish possible direct and indirect effects of process innovation on the performance of women entrepreneurs through innovative performance. The model is summarized as:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots\ldots\ldots + \beta n X n + \varepsilon$

$WEP = \beta_0 + \beta_1 IP + \varepsilon$	(i)
$IP = \beta_0 + \beta_1 PRI + \varepsilon_2$	(ii)
$IP = \beta_0 IP + \beta_1 PRI + \varepsilon IP$	(iii)
$WEP = \beta_0 WEP + \beta_1 MRI + \beta_1 IP + \varepsilon WEP$	(iv)

Where,
WEP= Latent endogenous variable (Performance of women entrepreneurs)
IP= Latent endogenous Variable (Innovative performance)
MKI= Latent exogenous variable (Process innovation)
β_0=intercept
β_1-β_n= Coefficients of determination for independent variables
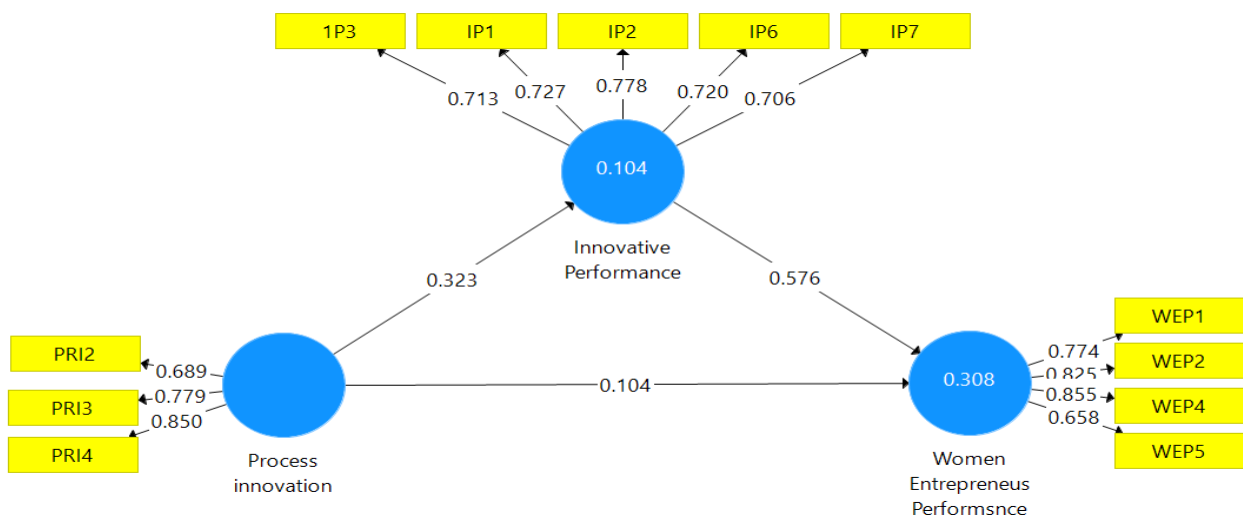ε= Error term

Figure 2: Measurement Model Results

Measurement Model Assessment
The study conducted a measurement model by running the PLS Algorithm in the Smart PLS Software. The measurement model examines the quality criteria of the data set, covering the validity and reliability of the data as suggested by Hair et al. (2017) and Hair and Alamer (2022) through factor loading, Cronbach's alpha and average variance extracted. The results of the structural model test are presented in Figure 2 parallel with Table 2.

Process Innovation
In terms of process innovation, the results of validity and reliability show that after omitting one indicator because its factor loadings was less than 0.7, all the modified factor loadings were higher than the threshold level (≥ 0.7). Furthermore, Cronbach's alpha coefficient for Process Innovation was 0.701, which is above the threshold level, indicating that

the measurement terms had a good relationship and the validity was decent. Additionally, the result indicates that the Average Variance Extracted is greater than 5 (0.602), indicating that an average construct explains over 50% of the variance of its items of the latent variables, as indicated in Table 1.

Innovation Performance
Regarding innovative performance, the results of the validity and reliability of its indicators show that all the modified factor loadings are higher than the threshold level (≥ 0.7). The study omitted four indicators because their factor loadings were <0.7. Furthermore, Cronbach's Alpha Coefficient of is 0.810, which is above the threshold level, indicates that the measurement terms had a good relationship and the validity was decent. Additionally, the result indicates that the Average Variance Extracted is greater than 5 (0.512),

indicating that an average construct explains over 50% of the variance of its items of the latent variables, as indicated in Table 1. Consequently, the modified indicators are valid and reliable for measuring innovative performance.

Table 1: Cross loading, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted

Latent variables	Indicators	Factor loadings	Cronbach's Alpha	Average Variance Extracted	Explanation
Process innovation	PRI2	0.689			Valid and reliable
	PRI3	0.779	0.701	0.602	
	PRI4	0.850			
Innovative performance	IP1	0.727			
	IP2	0.778			
	IP3	0.713	0.810	0.512	Valid and reliable
	IP6	0.720			
	IP7	0.706			
Women entrepreneurs performance	WEP1	0.774			Valid and reliable
	WEP2	0.825	0.786	0.611	
	WEP4	0.855			
	WEP5	0.700			

Cross-loading ≤ 0.7; Cronbach Alpha ≤ 0.7; AVE < 0.5; Composite Reliability ≤ 0.7; PR= Process Innovation; IP= Innovative Performance; WEP= Women Entreprenuer Performance.

Table 2: Correlation coefficients results (Fornell-Larcker Criterion)

Latent Variables	Innovative Performance	Process innovation	Women Entrepreneurs Performance
Innovative Performance	**0.729**		
Process innovation	0.323*	**0.775**	
Women Entrepreneurs Performance	0.550*	0.104*	**0.782**

**p < 0.01; *p < 0.05 (Two-tailed test). Bold numbers are the square root of the AVE of each construct. Off diagonals are Pearson correlation of constructs.

Women Entrepreneurs Performance

The result shows that all the modified factor loadings are higher than the threshold level (>0.7) including $WEP_1=0.774$, $WEP_2=0.825$, $WEP_4=0.855$ and $WEP_5=0.700$. The study dropped one indicator (WEP3=0.639) because its factor loadings were (<0.5) and not significant, as it did not have any effect on the latent variable. Furthermore, Cronbach's alpha coefficient of is 0.786, which is above the threshold level, indicating that the measurement terms had a good relationship and the validity was decent. Additionally, the result indicates that the Average Variance Extracted is greater than 5 (0.611), indicating that an average construct explains over 50% of the variance of its items of the latent variables, as indicated in Table 1. Consequently, the modified indicators are valid and reliable.

Correlation Analysis

A discriminant validity test was performed to determine whether there was an intercorrelation between exogenous and endogenous variables. It should be noted that the correlation between exogenous variables explains a linear relationship of endogenous variables in the path model (Hair et al., 2017). Fornell and Larcker's criterion was used, which suggests that the square root of AVE should be higher than inter-construct correlations. The results in Table 2 indicate that innovative performance is positively correlated with process innovation (r=0.323 p=0.01) and women entrepreneurs' performance (r=0.550, p=0.01). Process innovation is significantly correlated with performance (r=0.104 p=0.01).

Structural Model Assessment

A structural model assessment was conducted to measure the relationship between the study's constructs and their statistical significance. Bootstrapping was performed in Smart PLS V.3 to examine the final results, including the path coefficients and mediation effects in Figure 3.
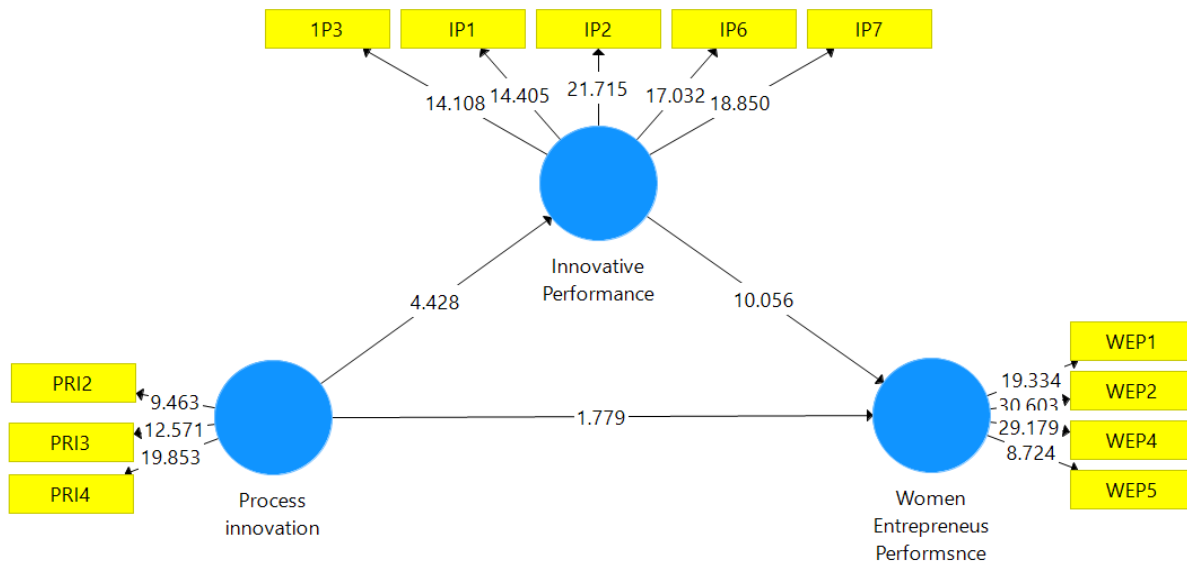
Figure 3: Structural Model

Table 3: Path coefficient analysis results. (Mean, STDEV, T-Values, P-Values)

	Original Sample (β)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
IP -> WEP	0.576	0.581	0.057	10.056	**0.000**
PRI -> IP	0.323	0.328	0.073	4.428	**0.000**
PRI -> WEP	-0.083	-0.084	0.046	1.779	**0.076**

Relationships are significant at p≤0.000, t≥=1.96, confidence level p=0.05, two-tailed test.   Note: P=Probability value, β=better coefficients, PRI=Process Innovation, IP=Innovative performance, WEP=Women entrepreneurs' performance.

Table 4: Hypothesis Test Results

	Path relationship	Original Sample (β)	Sample Mean (M)	Standard Deviation (STDEV)	T Value	P Value	Decision
H₁	PRI -> WEP	-0.153	-0.148	0.059	2.584	0.010	*H₁; Supported*
H₂	PRI ->IP -> WEP	0.035	0.039	0.030	1.148	0.251	*H₂; Not Supported*

Relationships are significant at p≤0.001, t≥=1.96, confidence level p=0.05, two-tailed test   Note: P=Probability value, β=better coefficients, PDI=Process innovation, IP=Innovative performance, WEP=Women entrepreneurs' performance

Path Coefficients

Path coefficient analysis was used to examine the significance of the direct relationships of latent variables in the model. For the path to be significant, this study generated 300 resamples and 95% confidence intervals at t value> 1.96 (Bollen & Pearl, 2013; Memon et al., 2018). A confidence interval at p=000 indicates a significant relationship. The results of the path coefficients reveal that innovation performance has a significant effect on women entrepreneurs' performance (β=0.576, t=10.056, p=0.000). Process innovation has a significant effect on innovative performance (β=0.323, t=4.428, p=0.000).

Hypothesis Testing

Mediation analysis in Table 4 was performed to assess the effect of process innovation on women entrepreneurs' performance and the mediating effect of innovative performance on the linkage between process innovation and the performance of women entrepreneurs by running the PLS bootstrapping.

Effect of Process Innovation on Performance

The results in Table 4 show that process innovation has a significant effect on the performance of women entrepreneurs in the food processing industry (β=0.153) t=2.584, p=0.010. Hence, **H1**, which stated that process innovation has a

significant effect on the performance of women owned MSEs in the food processing industry, is accepted. This implies that performance of women entrepreneurs is associated with process innovation. Hence the use of new and improved processing machines, computers and smartphones improve the performance. These results are consistent with studies of Muthama et al. (2013) who found that the use of digital technologies in entrepreneurship improves the performance of women entrepreneurs' performance.

Mediation of Innovative Performance
The effect of process innovation on women entrepreneurs' performance with the intervention of innovative performance was found to be not significant ($\beta=0.035$, t=1.148, p=0.251). Therefore, H2, which stated that, Innovative performance mediates the relationship between process innovation and women-owned food processing MSEs performance is rejected since the relationship between process innovation and women entrepreneurs' performance does not pass through innovative performance. The study is different from that of Gunday et al. (2011), which found that innovative performance mediates the relationship between process innovation and enterprise performance.

Conclusions and Recommendations
Based on the findings, the study concludes that the performance of women entrepreneurs is associated with process innovation, which yields positive outcomes by improving the performance. Therefore, the use of modern technology is essential in improving the performance of women's micro and small business enterprises. However, the mediation effect of innovative performance was non-existent. This implies that for the enterprises to realize potential benefits, they need to use digital technologies to affect innovative performance. The study therefore recommends that women need to use modern technology to enhance the performance in their micro and small business enterprises.

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