Effects of Innovation on Business Performance: Empirical Evidence from Manufacturing Firms in Tanzania

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Abstract

Regardless of its relevance for business performance, the influence of innovation on the performance of manufacturing firms in Tanzania is not well documented. Thus, this study aimed to examine the effects of innovation on business performance of manufacturing firms in Tanzania. The study used cross-sectional design and quantitative approach. Copies of a structured questionnaire were administered to 420 participants from 28 manufacturing companies in Dar es Salaam and Coast Regions. An impressive response rate of 93.1% was achieved. Data were tested for reliability using Cronbach's alpha coefficient. Tests for normality, multicollinearity and autocorrelation were conducted, and the results showed the data were reliable, normally distributed, free of multicollinearity and autocorrelation problems. Descriptive and multiple regression statistical techniques were employed. The results suggested that a significant positive effect existed between performance of manufacturing firms and product innovation (B=0.705, p=0.001), process innovation (B=0.640, p=0.000) and marketing innovation (B=.818, p=0.000). The obvious implication to industry is that innovation is important to business success of the manufacturing companies, thus the governments should motivate firms to innovate continuously by giving incentives to invest in R&D. Past studies linking innovation and performance have focused on financial measures of performance. The major contribution of the current study is to use non-financial measures of performance such as business growth and responsiveness to change.

Keywords: *Innovation, Manufacturing Firms, Business Performance*

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1.0 Introduction

In recent years, increased attention has focused on business performance in developed countries (Karabulut, 2015; Zhang et al., 2020), and empirical evidence suggests that performance of manufacturing companies is related to innovation (Emodi et al., 2017). Innovation is inevitable to firms wanting to enter new markets, expand market share, attain a competitive edge and increase performance (Aksoy, 2017; Adam, 2020; Al-Kalouti et al., 2020), especially in this age of technological changes and international competition that comes with it (Marzi et al., 2017; Moldner et al., 2020).

Innovation can be in the form of changes made by the company to existing methods (Nieves & Diaz-Meneses, 2016), or establishing new procedures related to provision of goods (Nataya & Sutanto, 2018). Innovation can also be in the form of product, process and marketing operations (Rosli & Sidek, 2013; Karabulut, 2015). Product innovation involves significant improvements to existing products (Thongsri & Chang, 2019; Gachigo et al., 2019) whilst process innovation is an improvement in production and delivery methods in order to drive down unit cost of production (Hee et al., 2019). Marketing innovation is identification of a niche in the market that will boost company sales (Udriyah et al., 2019). In brief, innovation is seeking solutions to current and future customer needs (Moreira et al., 2012; Suhag et al., 2017). Presence of stiff competition requires manufacturing firms to review their competitive position in the market (Moldner et al., 2020) and hence firms must constantly innovate. This explains why innovation has occupied a centre stage in the literature in the last two decades.

In spite of this growing interest, studies that link performance with innovation in the manufacturing sector are scant, especially in the African continent (Otieno & Omwanza, 2018). Literature is rich in studies that relate innovation with performance in developed countries (Al-Kalouti et al., 2020). However, with the exception of Latip (2012), most past studies (Gunday et al., 2011; Karabulut, 2015; Emodi et al., 2017; Hee et al., 2019; Chen et al., 2020) that have linked innovation and performance have focused on financial rather than other equally important measures of performance such as business growth and responsiveness to change. The current study attempts to fill in this gap. Specifically, this study seeks to examine the effect of product, process and marketing innovation on business performance of manufacturing firms, measured by business growth and responsiveness to change.

This study was guided by the resource based theory. This is a managerial framework used to determine the strategic resources a firm can exploit to achieve sustainable competitive advantage (Lee et al., 2019). Latip (2012) asserts that innovation as intangible assert can help to increase achieve sustainable competitive advantage and increase business performance. Innovation in terms of product, process and marketing plays a significant role to foster business performance (Spescha & Woerter, 2019). Latip (2012) defined business performance as the outcome of firm’s ability to innovate while researchers such as Maemunah (2019); Lee et al. (2019) defined business performance as the attainment of internal and external objectives of the company including its growth. Latip (2012) divided business performance into two dimensions namely, business growth and responsiveness to change. Business growth refers to expansion of business operations and their outcomes (Spescha & Woerter, 2019), measured through the level of competitiveness, business resilience, business expansion and increase in number customers. Responsiveness to change is described as the ability of the firm to respond to changes to its immediate environment which is measured through flexibility, product development review, receptiveness to transformation, and fulfilling customer needs (Latip, 2012).

In the literature, innovation is divided into three major components namely, product, process and marketing innovations (Rosli & Sidek, 2013; Karabulut, 2015). Typical product innovation can take various forms such as introduction of completely new quality products (Emodi et al., 2017; Nataya & Sutanto, 2018; Xie et al., 2019) or making substantial improvements to existing product design (Chuah et al., 2016; Nieves & Diaz-Meneses, 2016) in order to meet evolving customer needs and increase market share (Wang & Chen, 2020). Product innovation is essential to business performance because it plays a significant role to attract new customers by promising superior products, expanding market segments of the company and increasing product lines (Aksoy, 2017; Ramadani et al., 2019). The constructs of product innovations are new model of product, new raw material, new product and product development (Homburg et al., 2015; Karabulut, 2015; Awwad & Akroush, 2016). In the current study, product innovation is defined as introducing a product or product features for which no comparable product exists in the market in which the product is sold.

Process innovation is an improvement in manufacturing processes (Barasa et al., 2019; Sari et al., 2019; Anwar et al., 2020) which involve changes of input materials (i.e., material substitution or modifications of input ratios), or improvement in production equipment, process control technologies, or process settings (Onufrey & Bergek, 2020). Nguyen & Harrison (2019); O'Brien (2020); Tian & Wang (2020) described process innovation as a number of heterogeneous activities such as introduction of equipment, new management practices, and changes in the production process which may lead to adopting new manufacturing methods (Hee et al., 2019). The constructs of process innovation involves new production procedures, earlier production process, record keeping and new manufacturing methods (Karabulut, 2015; Hee et al., 2019). Drawing from past literature on the subject, the current study defines process innovation as implementation of new or improvements to existing production techniques including upgrading of equipment and production organization.

Finally, marketing innovation is a process of identifying and developing a mix of target markets, while searching for the best way to serve those markets (Aksoy, 2017; Ramadani et al., 2019; Turulja & Bajgoric, 2020). It can involve using different pricing and promotional techniques (Chuah et al., 2016; Moreira et al., 2012), especially to companies wanting to enter and exploit new markets (Correia et al., 2019). The constructs of marketing innovation are new packaging, change in price, new promotion method and new sales techniques (Karabulut, 2015; Chuah et al., 2016; Correia et al., 2019). Based on varying definitions, in the current study, marketing innovation is defined as application of different and more efficient techniques in promoting products through changes in packaging, branding, promotion, and pricing strategy.

Drawing from the resource-based theory and literature, the conceptual framework of the current study is presented below:

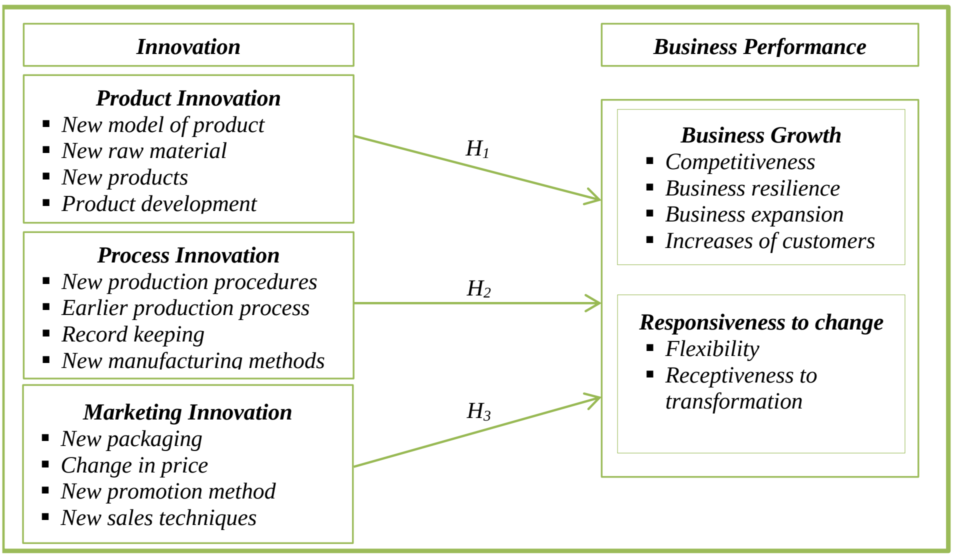

Figure 1: Conceptual Framework

Hypotheses
Given the above research model, the current study sought to test the following hypotheses:

H_1: Product innovation is positively related to business performance
H_2: Process innovation is positively related to business performance
H_3: Marketing innovation is positively related to business performance

The rest of the paper is structured as follows: Section 2 describes the methodology used to collect and analyse the data while section 3 presents the findings and discussion. Section 4 provides conclusions, and implications to industry and policy.

2.0 Methodology
The study was conducted in Dar es Salaam and Coast Regions. The areas were purposively selected because they had the highest industrial density in Tanzania (Wangwe et al., 2014). The study employed cross-sectional research design whereby data were collected at a single point of time. Cross-sectional research design was used because it allows collection of data from a larger sample for inferential analysis. Thus, quantitative research approach was used because the study aimed to establish the effect of product, process and marketing innovation on business performance.

The sample size was determined using Stevens (1996) formula. Random sampling procedure was used to select a representative sample of manufacturing companies. A sample of 420 employees was randomly chosen. The sample was drawn across the organization, i.e., 5 people each from Management, Supervisors and Operational staff; making 15 participants from each manufacturing company. A structured questionnaire was administered to 420 participants from 28 manufacturing companies in Dar es Salaam and Coast Regions. Using Wiseman & Billington (1984) formula, a response rate of 93.1% was attained (391 respondents) and was considered very high in view of the benchmark of 35% set by Freise & Seuring (2015). Considering internal non-responses, in the end 375 questionnaire copies were usable.

The constructs used in this study (product innovation, process innovation, marketing innovation and business performance) are latent variables that cannot be observed directly. Data for this study were based on modification of research instruments from studies by Latip (2012); Karabulut (2015); Correia et al., (2019). All questions used in this study were measured by 5 points Likert scale. Product innovation was measured by using four metrics namely, new model of product (5 items), new raw material (4 items), new product (4 items) and product development (5 items). The first was adopted from Homburg et al., (2015) while the last three were adopted from earlier studies by Karabulut (2015); Awwad & Akroush (2016); Emodi et al., (2017); Nataya & Sutanto (2018). In total, 18 items were used to measure product innovation.

Process innovation was measured by four constructs adopted from Karabulut (2015); Hee et al., (2019). These are: new production procedures (4 items), earlier production process (4 items), record keeping (5 items), and new manufacturing methods (4 items). In all, 17 items were used to measure process innovation. Finally, marketing innovation was measured by 16 items namely, new packaging (4 items), change in price (4 items), new promotion method (4 items) and new sales techniques (4 items). These were taken from studies by Karabulut (2015); Chuah et al., (2016); Moreira et al., (2012); Correia et al., (2019). All in all, 51 items were used to measure independent variables. A total of 24 items were adopted from Latip (2012) and were used to measure the dependent variable namely, business performance. These are: competitiveness (4 items), business resilience (4 items), business expansion (4 items), increases of customers (4 items), flexibility (4 items) and receptiveness to transformation (4 items).

The data that were collected were analysed descriptively by computing descriptive statistics and inferentially by multiple linear regression analysis. Descriptive statistics were used to describe the basic features of the data. Multiple linear regression was used to test the hypothesis and establishing the effect of product, process and marketing innovation on business performance of manufacturing companies. The analysis of data was aided by Statistical Package for Social Scientists (SPSS) version 23. Prior to the analysis, checks for reliability, autocorrelation, normality, multi-collinearity, and homoscedasticity were conducted. Thus, the study used the following multiple regression equations:

$$BP = f(Pi, Pri, Mi) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (i)$$

Where BP = Business performance, Pi = Product innovation; Pri = Process innovation and Mi = Marketing innovation.

This relationship can also be represented by the following empirical equation:

$$BP = \beta_0 + \beta_1 Pi + \beta_2 Pri + \beta_3 Mi + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (ii)$$

The following equation was established because Pi, Pri and Mi are composites:

$$BP = \beta_0 + \beta_1 Nmp + \beta_2 Nrm + \beta_3 Np + \beta_4 Pd + \beta_5 Npp + \beta_6 Epp + \beta_7 Rc + \beta_8 Nmm + \beta_9 Npa + \beta_{10} Cp + \beta_{11} Npm + \beta_{12} Nst + \varepsilon_i \ldots\ldots\ldots\ldots\ldots (iii)$$

Where: Nmp = New model of product, Nrm = New raw material, Np = New products, Pd = Product development, Npp = New production procedures, Epp = Earlier production process, Rc = Record keeping, Nmm = New manufacturing methods, Npa = New packaging, Cp = Change in price, Npm = New promotion method, and Nst = New sales techniques.

3.0 Results and Discussion

Multivariate Outliers Check

Before making inferential analysis, it is important to detect the existence of outliers in the dataset to avoid rendering the results inaccurate and unreliable (Hesamian & Akbari, 2020). The current study employed Mahalanobis Distance to check for outliers. Except for one variable, all others had no outlier values. This problem was addressed by replacing the outlier with a mean value as suggested by Kamboj & Gupta (2020).

Normality Test

Data were tested for normality using Kolmogorov Smirnov and Shapiro–Wilk statistic whose findings are reported in Table 1. All values for dependent and independent variables were higher than 0.05 implying the normality assumption was met (Hair et al., 2017).

Table 1: Tests of Normality

Variables	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Business Performance	.153	375	.072	.992	375	.003
Product Innovation	.159	375	.083	.991	375	.001
Process Innovation	.270	375	.217	.979	375	.000
Marketing Innovation	.269	375	.163	.989	375	.000

a. Lilliefors Significance Correction

Test for Linearity Assumption

Linearity assumption test was carried out using Normal p-p plot. This was followed by correlation analysis between business performance and product innovation ($r = 0.758$, $p < 0.01$), and process innovation ($r = 0.629$, $p < 0.01$), and marketing innovation ($r = 0.774$, $p < 0.01$). The results confirmed the linearity assumption had not been violated (Pallant, 2016).

Multicollinearity

One of the assumptions of linear regression model is the absence of multicollinearity among predictor variables included in the model. In chapter 10 of his book, Gujarati (1988) explains in detail how to detect and deal with multicollinearity. Existence of multicollinearity is a serious problem in regression analysis. This can be detected by three different techniques namely, (1) a bivariate correlation analysis among predictor variables (2) calculation of Variance Inflation Factors-VIFs) and (3) inspection of the eigensystem of the independent variables. In this study, VIF was used whose results are presented in Table 2 below.

Table 2: Tests of Multicollinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	Product Innovation	.638	1.567
	Process Innovation	.739	1.354
	Marketing Innovation	.779	1.283

a. Dependent Variable: Business Performance

According to Pallant (2016), if the tolerance values are less than 0.2, and VIF values are above 5, multicollinearity is at work. Clearly, the results in Table 2 show that multicollinearity was not a problem in the current study.

Autocorrelation

Durbin-Watson test was employed to check existence of autocorrelation as recommended by previous studies such as Mmasi & Mwaifyusi (2021); Chatterjee & Price (1977). The results in Table 3 show that there is no statistically significant autocorrelation in this study.

Table 3: Model Summary for Durbin-Watson

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.816[a]	.667	.641	0.00621	1.880

a. Predictors: (Constant), Marketing Innovation, Product Innovation, Process Innovation
b. Dependent Variable: Business Performance

Validity and Reliability Test

Content Validity was ensured through comprehensive literature review on both, dependent and independent variables as suggested by Halek et al., (2017). The questionnaire was reviewed by three renowned academicians in Tanzania whose comments were incorporated in the final research instrument. Construct Validity was achieved through examining the correlation coefficient among the variables making innovation scale as recommended by Raven et al., (2008). The construct has two main elements namely, convergent validity and discriminant validity (Subramanian & Gopalakrishna 2001). Convergent Validity was measured by using factor loadings through Confirmatory Factor Analysis - CFA (Santor et al., 2011).

Appendix 1 shows that factor loadings for all variables are greater than 0.5, thereby passing the threshold set by Hair et al., (2010). Moreover, the correlation between the three constructs of innovation range from 0.79 to 0.89 (Significance < 0.01). This strong correlation between the three constructs is a further confirmation of presence of convergent validity (Raven et al., 2008). Discriminant Validity was examined by using Average Variance Extracted (AVE). Subramanian and Gopalakrishna (2001) proposed that to achieve discriminant validity, AVE values should be greater than the squared correlation coefficient, as is the case in the current study.

Reliability test was conducted by using Cronbach's alpha which is a commonly used measure of reliability (Novick & Lewis 1967; Nunnally 1978; Churchill 1979). A Cronbach's alpha value of higher than 0.7 indicate internal consistency of the measures employed (Peter & Churchill 1986 p. 7; Hair et al., 2017). The results in Appendix 1 show that the alpha values for all independent variables are higher than the threshold.

Results from Factor Analysis

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of sphericity must be conducted in order to establish the fitness of the data for factor analysis (Zulkepli et al., 2017). The results in Appendix 1 show the KMO value is 0.746 which suggests that the data was fit for EFA (Kaiser 1974). In addition, the results of Bartlett's test for sphericity was highly significant ($p \leq 0.001$); giving more credence for using factor analysis.

Homoscedasticity Test

A final test was made to determine if all observations are normally distributed. Homoscedasticity occurs when one or more variables in the model violate this condition. Our data set failed homoscedasticity test in both Breusch Pagan ($\chi^2 = 17.41$, $\rho < 0.002$) and Koenker ($\chi^2 = 8.63$, $\rho = 0.02$) as all ρ values were less than 0.05. This problem was fixed with the help of Ahmad Daryanto's plug-in for SPSS for creating heteroscedasticity robust standard errors as suggested by Berenguer-Rico &Wilms (2020).

Testing of Hypotheses

To recap, this study sought to test the following hypotheses:

- H_1: Product innovation is positively related to business performance
- H_2: Process innovation is positively related to business performance
- H_3: Marketing innovation is positively related to business performance

These were tested collectively using inferential statistical techniques whose results are reported below.

Correlation Analysis

The results in Table 4 show performance is strongly linked with innovation. These results are consistent with previous studies by Otieno & Omwanza, (2018); Al-Kalouti et al., (2020); Baporikar & Shikokola (2020).

Table 4: Descriptive Statistics, Reliabilities and Correlation

Variable	N	Mean	S.D	1	2	3	4
Product Innovation	375	41.05	5.79	**0.83**			
Process Innovation	375	38.67	5.72	373**	**0.89**		
Marketing Innovation	375	35.99	4.87	390**	412**	**0.79**	
Business Performance	375	39.42	5.48	.758**	.629**	.774**	**.836**

*p < .05; **p < .01 (2-tailed)

Multiple Regression Analysis

Multiple regression was used to examine the ability of the three independent variables namely, product, process and marketing innovations to predict business performance in the manufacturing companies.

Table 5: Regression Analysis of Innovation and Business Performance

Variable	B	SE (b)§	B	T	P
Constant	19.412			7.131	.000
Product Innovation	.705	.149	.312	3.197	.001
Process Innovation	.640	.125	.376	3.502	.000
Marketing Innovation	.818	.228	.305	3.049	.000

R^2 = .667%, F-statistic=189.187, p < .001. §heteroscedasticity-robust standard errors

Results in Table 5 show a coefficient of determination (R^2) of 0.667, with an F-statistic of 189.187 (p value = 0.000). This implies that 66.7% of business performance in the manufacturing companies was explained by product, process and marketing innovation. These results are consistent with results of previous studies by Awwad & Akroush (2016); Nataya & Sutanto (2018); Ramadani et al., (2019), Wang & Chen (2020); Xie et al., (2019).

A closer look at Table 5 shows that product innovation had a significant and positive effect on business performance of manufacturing companies in Tanzania (B=0.705, p=0.001). This implies that product innovation help to increase the business performance of the manufacturing companies. This is consistence to findings of a study by Awwad and Akroush (2016) who found that product innovation plays significant contribution to increase the business performance. The results are also in line with results of studies by Nataya and Sutanto (2018); Ramadani et al., (2019); Wang and Chen, (2020) who revealed that product innovation has positive effect on business performance.

Moreover, the study found that process innovation has significant and positive effect on business performance of the manufacturing companies in Tanzania (B=0.640, p=0.000). This result implies that process innovation contributes to increasing business performance of the manufacturing companies in the Tanzanian context. The results support the notion that process innovation in manufacturing companies plays a vital role to increase business performance as reported by Adam et al. (2020). This relates to findings reported by previous studies such as ones by Anwar et al. (2020); O'Brien (2020); and Tian and Wang (2020) who affirm that process innovation tends to introduce modern technical principles, approaches and production modes which aim to produce new products or improved the existing products and increase the production efficiency of existing products.

Furthermore, the study found that marketing innovation is the single most important factor in explaining business performance of the manufacturing companies in Tanzania (B=0.818, p=0.000). The results imply that marketing innovation play essential role to increase the business performance of the manufacturing companies. These results are surprising partly because they are at variance with findings of previous studies by Karabulut (2015), Rosli & Sidek (2013); Emodi et al. (2017) and they defy logic. Conventional wisdom would suggest product innovation should have been the most important factor to account for company performance because they are difficult or at least take a long time to imitate. In addition, product innovation leads to production of good quality products which in turn will improve company performance through customer satisfaction and loyalty.

4.0 Conclusion and Recommendations

In conclusion, this study has found that innovation in all its forms namely product, process and marketing innovation has a positive effect on business performance of manufacturing firms in Tanzania. The general pattern of multiple regression is consistent with hypothesized relationships. More importantly, this study has demonstrated that marketing innovation and product innovation are the most important factors to good performance in manufacturing firms in Tanzania.

The study recommends that the management of manufacturing companies should invest in innovation as it helps increase the business performance of the manufacturing companies. The management should invest in product, process and marketing innovation which are revealed to be vital for the performance of the manufacturing companies.

The government should motivate manufacturing companies to put much effort on innovation because it helps the manufacturing companies increase performance. The sector is important for Tanzania's economy as it creates more jobs which may lead to more taxes. Motivation from the government can be in different forms including tax allowance on expenditure in R&D.

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APPENDICES

Appendix 1: Factor Analysis

Indicators	Loading	Cronbach's α	AVE
Product Innovation		.892	.789
New Specification	.584		
Updated Features	.576		
New Product Design	.602		
Fewer Defects	.569		
Different Products	.547		
New Source Raw Material	.632		
New Kinds of Raw Material	.588		
Additional Raw Material	.689		
Another Supplier	.615		
Modified Products	.539		
Customer Needs	.629		
Distinctive Features	.652		
Distinctive Specifications	.746		
Process Innovation		.875	.712
Successful in the Marketplace	.730		
Attracted New Customers	.699		
Increases Sales Volume	.712		
Relationships with Suppliers	.635		
Customers' Expectation	.733		
New Production Activities	.691		
New Production Techniques	.678		
New Production Process	.677		
New Production Method	.548		
Required Time	.726		
Modern Manufacturing Plants	.637		
Fast Manufacturing Plants	.692		
Fulfil Customers' Orders	.707		
Records of Time	.570		
Records of the Quantity	.589		
Records of Raw Material	.674		
Records of Cost	.686		
Records of Labour Force	.651		
Updated Manufacturing Methods	.643		
Improve Manufacturing Plants	.663		
Change Manufacturing Approaches	.746		
Marketing Innovation		.826	.831
Change Technology	.692		
New Packaging Design	.674		
Packaging Quality	.735		
Packaging Cost	.680		

Packaging Size	.669		
Increased Number of Customer	.609		
Increased Sales Volume	.669		
Increased Production	.676		
Customers' Needs	.626		
New Promotion Technique	.719		
Aware of Product	.655		
Increased Sales	.678		
Increased Market Share	.758		
New Sales Method	.673		
Additional Sales Opportunities	.775		
Sales Target	.756		
Satisfy Customer	.685		
Business Performance		.781	.769
Outperform Competitors	.571		
Quality Products	.636		
Number of Customers	.544		
Market Share	.691		
Maintain Business Operations	.552		
Adapt to Changing Environment	.578		
Demonstrate Progress	.675		
Increase Business Operations	.668		
Achieved Profit Objectives	.726		
Achieved Sales Objectives	.692		
Achieved Market Share	.602		
Well Perceived Image	.604		
Increase Number of Customers	.608		
Increases the Revenue per Product	.694		
Increases Number of Sold Products	.653		
Increases Number of Products	.669		
Change in Business Strategy	.707		
Change in Operations Techniques	.714		
Periodically Review of Product	.663		
Change in Marketing Techniques	.730		
Plan a Response to Changes	.703		
Respond to Significant Changes	.666		
Corrective Action	.673		

Adopt to Organizational Changes	.622	
Eigenvalues = 2.664 Variance (%) = 4.131 Cumulative variance (%): 66.2		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.746
Approx. Chi-square		7331.371
Bartlett's Test of Sphericity df		721
Sig.		.000