Impact of Research and Development on Cost and Sales Managementin textile industry

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Abstract

The core purpose of the studies to explain the impact of research and development activities on cost management and Sales Growth in the context of textile industry of Pakistan. More specifically, current study investigate the relationship of product Innovation and process innovation with cost management. Study also explains the impact of product Innovation and process innovation on the Sales Growth. Current study, apply the structure equation of modelling. Correlational and cross-sectional Research Design employed to investigate the relationship. A questionnaire survey of 100 professional working in the textile industry of Pakistan was utilized. Moreover, to investigate the propose hypotheses this study employed the aid of measurement model and structure model based on smart pls. Findings of the study indicated that research and development activities through process Innovation and product innovation has a significant impact on the cost management. Moreover, process Innovation and product innovation also influence Sales Growth of a textile industry of Pakistan.Current research have significant policy implications for the managers of textile industry. Corporate manager in the textile industry must focus on process innovation as well as in theproduct innovations to optimize their Sales Growth and cost management.

Keywords; *product Innovation, process innovation, cost management, Sales Growth*

Introduction

Study Background

Sudden increase in the research and development (R&D) spending to enhance the industrial production, which focused on the transforming the whole industry offers innovation base product to final consumer (Ibarra et al., 2018). Now a days industrial plans are to provide innovation based products to their customers (Marshall & Parra, 2019). At the same time industrial sector also more targeted towards the cost management behavior and Sales Growth of the industry. Moreover, existing studies are conducted on the manufacturing sector of the Pakistan. However, current study is focused on the textile industry of the Pakistan. In this study we focused on the Pakistan's textile industry to address cost management behavior and Sales Growth on the basis ofresearch and development activities.

As a result of economic development and expansion textile sector demands for the research and development activities (Evenson, 2019). Which ultimately cause the cost reduction and higher financial performance (Gil-Moltó et al., 2020) to serve the final consumer with innovativeproducts and services. In the domestic manufacturing and production textile industry of the Pakistan heavily relay on the updated machinery and Technological equipment. To reduce the dependent on the imported products and achieving export oriented targets government support the innovative activities in the all sectors of industry.

Research and development (R&D) activities is basically creation and application of updated knowledge (Sagiyeva et al., 2018). In the management perspective, R&D activities are the basic source of Cost reduction (Zhou and Gu, 2019) and product development through the innovative production process (Buryi and Lahiri, 2019), which unable an organization to secure high degree of competitiveness in the textile sector. In particular, research and development activities through corporate investment shift the tangible assets to an intangible asset (Borghesi & Chang, 2020). Furthermore, a study argued that research and development expenditures enhance the Sales Growth and corporate value (Luo et al., 2018) that is more dominant in the modern textile sector which specifically focused on the technological capital and innovative activities through research and development expenditures.

Research and development spending significantly impact on the Sales Growth directly as well as indirectly (Morbey & Reithner, 1990). Most specific research and development personals enhance the knowledge that significantly impact on sales productivity (Ernst et al., 2010). In the context of agriculture sector a number of previous researches found a positive relationship between sales productivity and R&D spending (Naseem et al., 2010). Increasing the absorption capacity in research and development expenditures directly enhance the firms' sales productivity (tang et al., 2019). In addition to its, R&D spending also enhance the cost efficiency. For example, a significant improvement in the Sales Growth due to the R&D spending can help the organizationto attain cost effective production that ultimately get the competitive advantage over the firms as compared to their counter parts which unable to invest in the research and development projects (Wiethaus, 2006). The ultimate competitive advantage of a firm over the industry enhances the Sales Growth which boost up the market share (Agung & Darma, 2019).

Since R&D is significant indicator of corporate performance, researchers and academic Scholars continue to study it and considered as important issue for Cost management and Sales Growth. In the previous literature and studies mostly conducted on the examination of R&D investment with organizational performance (Belderbos et al., 2004; Shin et al., 2017). Other studies found a significant relationship between corporate value and RND investment activities that are ultimate influenced by management decision makings (Behrens, 2016; Diéguez-Soto et al., 2019). Study conducted in the United States found that R&D expenditures significantly improve the corporate value in generally (Parast, 2020). Another study conducted by found that capitalizing the R&D activities positively impact on the corporate value (Khoshnevis&Teirlinck, 2018).

The increase in demand of the textile products in the Pakistan as well as international level forces industry to produce the innovative products at efficient and effective cost management. Inaddition, textile industry can enhance the Sales Growth by offering innovative products through R&D expenditures by serving both National and international customers (Parast, 2020).

Current study investigates how a corporate R&D investment impact on the cost management strategy or behavior and Sales Growth in the textile industry of the Pakistan. In the theory of research and development investments and expenditure which mostly considered as long term investment, has been studied in the area of finance and accounting. However, corporate managers and decision makers can utilize R&D expenditures in their own discretion. Academic Scholars find out that R&D expenditure obtained by the management and decision makers mostly based on the self-serving behavior. In addition, study also explore the impact of R&D investment on the Sales Growth. R&D investment significantly enhance the innovation in production process as well as product innovation which ultimately boost up the Sales Growth.

Problem Statement

Developing country such as in Pakistan textile sector has a major issue in the cost management and Sales Growth due to the improper R&D activities. Multiple factors has a significant impact on the Cost Management activities and Sales Growth of the textile sector. The most prominent and significant factors according to the nature of industry is research and development expenditures (Zhang et al., 2020). For this purpose, current study try to explore the relationshipof R&D expenditures on the cost management activities and the Sales Growth. Previous studies constructed the different models used by management to investigate sales growth or performanceand Cost management strategies. Current study first time try to contribute and add knowledge in the existing literature by a finding out the relationship of RND activities on Cost Management and the Sales Growth in a textile sector of Pakistan.

Significance of study

Pakistan economy is based on the textile industry. Most of Pakistani exports are based on the textile oriented products, hence GDP of the Pakistan depend upon the textile production. Research and development activities considered as a crucial factor in the Sales Growth and Cost management. R&D activities are measured by the process Innovation and product innovation made in the textile industry. Cost management and the Sales Growth measured on the likert scalequestions.

Literature Review

R&D and Cost Management

Evolutionary approach in the corporate sector demands the research and development activities for the sustainability and growth in the industry (Chen &Xu 2022; Fölster&Trofimov, 1997). In this scenario Technological opportunities are considered as more relevant factors which significantly effect on the innovation of product development as well as in process development (Hise et al., 1990; Wakasugi et al., 1997). Indeed Argyres and Silverman, (2004) organizational and industries structure of economy highly depend upon the technological regime. Study obtained by Chowdhury and Maung, (2012) found that research and development activities not only improve the technological change but also develop the new markets. R&D functions in the corporate sector improve the production processes. Findings of studies indicated that decision making regarding innovative activities helps to take the advantage of Cost (Bustinza et al., 2019). Cost reduction is a main priority of the business units. For this purpose innovative activities based on the research and development helps in the cost saving. Furthermore, introduction of innovation activities significantly enhance the cost reduction in the corporate sector (Le & Lei, 2018; Tidd, 2006). Research study conducted by Gao and Zhao (2022) and De Simone et al., (2020) identified that research and development regarding innovation motivate the cost saving. According to the theory of resource based view firms gain the competitive advantage through R&D functions which helps them in lowering the cost of production (Farid et al., 2020). Innovation process based on R&D required a complete change in the system and process of business which ultimately in enhanced the productivity and reduce resource cost (Koutroumpis et al., 2022; Mohnen, 2019). Moreover, it reduces the harmful inputs maximize theproduction process and eliminate negative impact of production to the environment (Zhang, 2021). Another study found that cost saving is the main motivation of innovation process(Battisti et al., 2019). Research and development functions brings the energy productivity and enhance cost saving (Shen et al., 2019). In this way corporate sector can optimize their reduction by R&D functions in the production process. Another study found R&D activities and Technology innovations are significantly important for the organizational performance in terms of Cost reduction optimizing, sales and profitability (Alam et al., 2020; Boiko, 2022). In addition, Research and development activities in the corporate sector are aimed to reduce management cost and utilization of capital efficiently and effectively. Furthermore, Research anddevelopment activities also provide the financial benefits under the framework of economic and cost performance (Donget al., 2020). Hence the study postulated that:

H1: R&D has a significant impact on the Cost management

R&D and Sales Growth

In the literature of organizational performance various studies are conducted that focused on the organizational performance relationship with research and development activities (Bican&Brem, 2020; Kafouros et al., 2020). Some of the researches implies that organizational performance have many different types such as marketing performance, financial performance objectiveperformance and innovation performance (Damanpour et al., 2009; Subramanian &Nilakanta, 1996). In this way current research distinguish from previous studies by exploring the impact of research and development activities on the Sales Growth. Most studies discussed in the previous literature on the relationship between research and development activities and production (Kabiraj& Mukherjee, 2000). A study found that firms can gain the comparative advantage by getting specialization in the research and development activities (Mariani, 2002). Moreover, in the R&D activities companies are structures strategically more cheaply and better as compared totheir

competitors (Isidro-Llobet et al., 2019). Research and development activities help themanager to understand specific functional area of firm which can better perform as compared to their competitors (Lica et al., 2020). A study found that research and development activities impact on overall performance of corporate sector (Jin et al., 2018). As a part of research and development activities a new product development create competitive advantage and over all the performance of Corporates (O'Regan et al., 2008). According to the study Morbey&Reithner, (1990) by getting specialization in the research and development activities a firm get the advantage of higher Sales Growth. Current study looks at the impact of R&D activities on the Sales Growth of textile industry in the context of Pakistan. Hence, in the earliest literature founda gap on the relationship between R&D and Sales Growth. Academics scholars in the marketing focused on exploring the impact of R&D on firms overall performance (Vanino et al., 2019;Chen &Ibhagui, 2019). They consider that the main purpose of R&D is developing new product and introducing the innovative production process. By developing an innovative production process a firm can enhance its Sales Growth (Ramadani et al., 2019). Due to the close connectionbetween R&D functions and the production, a Sales Growth of a corporate is also highly affected. Quality research and development function can enhance the quality production (Santos et al., 2019). In a fact, that production function ultimate responsible for the product quality to target customer and sold by the sales function (Ranjan&Jha, 2019). This sequential connection shows that research and development activities are responsible for the Sales Growth. Hence, the study elaborate following hypothesis:

H2: R&D has a significant impact on the Sales Growth

Theoretical and Conceptual Framework

In the recent literature it is found growing relation of R&D with cost management and Sales Growth. Our study extends the previous work in by incorporating process and product innovation to investigate the cost management and Sales Growth in the Pakistani context. Based on our Hypotheses following model is proposed:
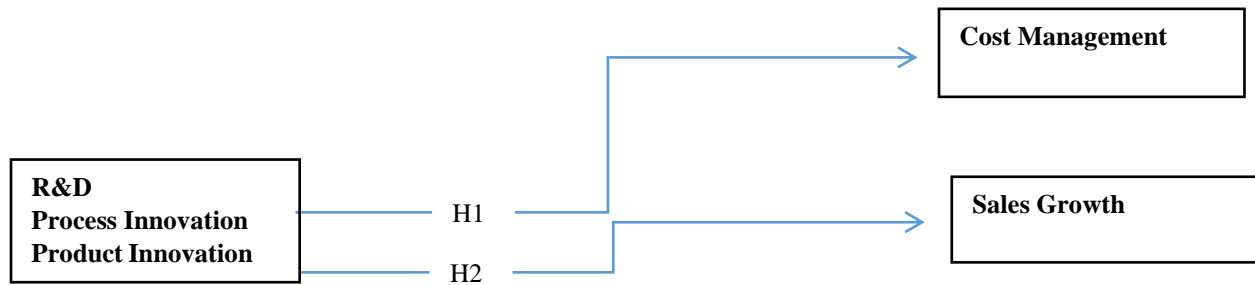

Figure 1. Conceptual Frame work

Data and Methodology

Data would be collected by designing different questionnaires, which would be submitted to respondents through online process and face-to-face. For this purpose, a Likert scale would be used to collect responses from the respondents. Questionnaires that I have designed would be close ended in which respondents having the choice to select any one option. Personally, distributed and online questionnaires would be used in the various textile firms of the Karachi to collect data from management. Smart PLS structured equation modeling would be used in this study. One of the contributing manufacturing industries of Pakistan is the textile industry while it has massive manufacturing and mechanisms but it somewhat found less-efficient in their processes. Henceforth, the study has undertaken its importance and taken it as research population to understand the role of R&D practices on the Sales Growth and cost management of textile industry of Pakistan. However, the data was gathered by professionals of textile firms of Karachi, Pakistan.

Sample Size & Sampling Technique

For the purpose of data collection, the study has used respondents where the total number of three variables in the model. In this regard, the study has aimed to collect 100 sample responses from the professionals of textile firms in Karachi, Pakistan. For the purpose of data collection, study has used self-administered questionnaire methodology to collect data from the sample population using five-point Likert scale quantitative questionnaire. The instrumentation of variables has been presented in the appendix whereas primary data sources were targeted for data collection in terms of first-hand responses from the professionals of textile firms of Karachi, Pakistan. All of the variables are measured at the five point likert scale. This scale is ranged from the strongly disagree to strongly agree with one to five scale. Product innovation and process innovation is measured based on the previous studies by the four items (Hsu et al., 2006). Third variable is cost management that is measured through transaction costs, energy costs and disposal costs relative to major competitors (Adjapong Afrifa, 2013). Fourth variable is Sales

Growth that is measured on the basis of sales turnover, market share, profitability and market growth (Lin and Lekhawipat, 2014).

Results and Findings

Data collection

Study investigates by a positivist paradigm and pursues a deductive approach. The one hundred responses working in textile industry are selected from the Karachi for the research. As the workers have a wide range of skills and knowledge related to the textile sector. The target respondents are directly involved in the textile manufacturing. A convenience sampling used to collect the reposes from a pool of data. To test the relationship between Product innovation, process innovation, cost management and Sales Growth structure equation model, path and the confirmatory analysis is used. For each variable a separate reliability and validity run against items or question that confirm the latent variables. Furthermore, descriptive statistics, variance inflation factor and Derbin Watson applied to test the normality of data, muticolinearity and autocorrelation in the regression model respectively.

Reliability

For the any required model, it is essential to valid and reliable at statistical level. Reliability explains the consistency of results at multiple tests under the same conditions. For reliability test, chronbach's alpha indicates the inter-item correlation in the questionnaire. Moreover, it is also confirmed by the construct reliability coefficients. These two measures were exceed the suggested criteria of 0.70 and 0.80 respectively, that are indicating the confirmation of reliability. The chronbach's alpha of all variables is almost >.70. In the same way the construct reliability ofCost Management, Process Innovation, Product Innovation and Sales Growth is >.80. So the results show that there is inter-item correlation between the items/questions of all variables. Moreover, all variables are confirming internal consistency through construct reliability (**see table I**).

Table I

Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Cost Management	0.784	0.859	0.605
Process Innovation	0.805	0.873	0.633
Product Innovation	0.801	0.877	0.652
Sales Growth	0.783	0.860	0.611

Validity

It refers to which the result analysis of the proposed instrument gives the valid results. The validity of the instrument is measured in terms of construct and content validity. In the content validity we measure the representativeness of the items contain in the questionnaire. There is no such kind of misunderstanding in the questions and the interviewees responded the items correctly with their understanding (Zeng et al., 2010). Confirmatory factor analysis is conducted for the test of construct validity. Construct validity explains the items that are measuring for the constructs are relevant and degree to which measurement results are same for different traits. Convergent validity explains the differentiation of all constructs with each other to show that each construct is measured by own specific items. It shows the divergent measurement for different traits.

In the next step the structure of the confirmatory analysis is explained for the latent variables. Table II explains the result of convergent validity through factor loading and the varianceextracted for the each item underlying the specific construct. All the variances extracted by each item in the construct are greater than about seventy percent. It indicates the strong convergent validity in the each item. To check the overall validity of the CFA Goodness of fit indices are employed. These indices are includes goodness of fit index, adjusted goodness of fit index, comparative fit of index and root mean square error of the approximation (Bagozzi& Yi, 1988). In the measurement of all required indices, there must be a specific criteria value of each index. From the Table III it is shown that all indices are meeting the required criteria. Moreover, discriminant validity is also checked in the model through ASE. The AVE of the any construct exceeds from .50 confirming convergent validity of all items (See Table II). Moreover, the average shared variance is also less than AVE that confirms the discriminant validity of all variables (See Table I).

Table II

	Cost Management	Process Innovation	Product Innovation	Sales Growth
CM1	0.668			
CM2	0.812			
CM3	0.841			
CM4	0.779			
PI1		0.811		
PI2		0.805		
PI3		0.709		
PI4		0.851		
PROI1			0.894	
PROI2			0.895	
PROI3			0.885	
PROI4			0.474	
SG1				0.564
SG2				0.805
SG3				0.849
SG4				0.870

In last table three shows the discriminant validity of all variables. Diagonal values shows the correlation between the items of individual constructs, while remaining values exhibit the correlation between the items of different or inter constructs. As per criteria values of diagonal are greater than remaining values exist in the column (See table III).

Table III

Variables	Cost Management	Process Innovation	Product Innovation	Sales Growth
Cost Management	0.778			
Process Innovation	0.871	0.796		
Product Innovation	0.749	0.704	0.807	
Sales Growth	0.696	0.784	0.949	0.782

Descriptive analysis

Mean and standard deviation of the Cost Management is less than Sales Growth, Process Innovation and Product Innovation. However, the standard deviation of Cost Management is highest than Sales Growth and Process Innovation. Correlation of Product Innovation with Cost Management and Sales Growth is positive and significant (P-value < 0.05) and same results are repeating for the Process Innovation. Hence initial findings of the results shows positive correlation between proposed hypotheses. (**See table IV**)
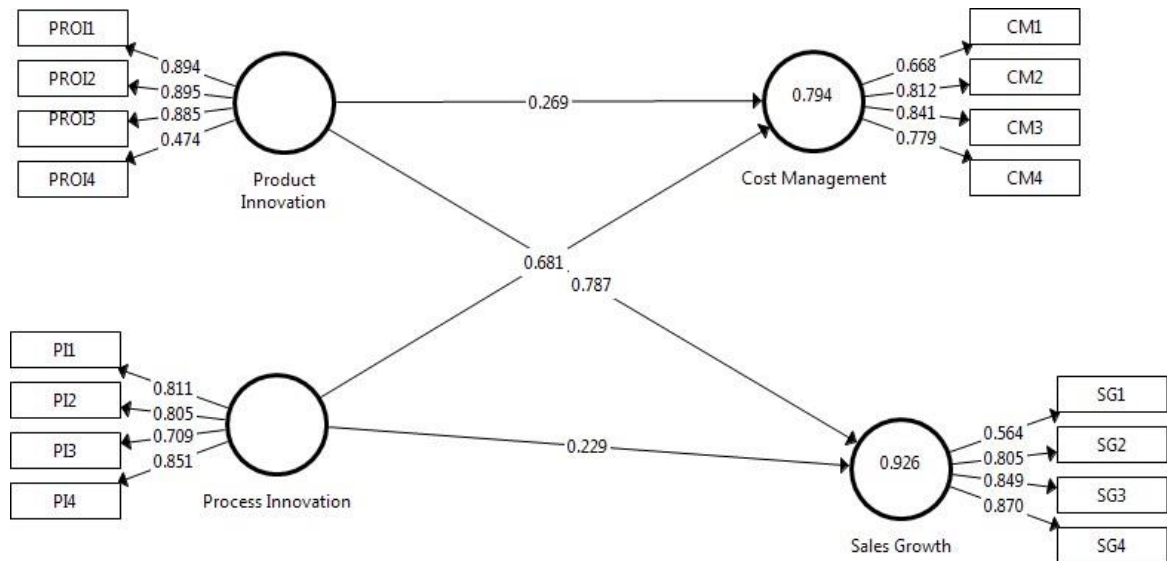
Table IV

| Variables	Mean	Std. Dev.	CS	SG	SI	PI
Cost Management	2.8058	0.98204	1			
Sales Growth	3.1673	0.87404	.690**	1		
Process Innovation	3.2135	0.92715	.759**	.940**	1	
Product Innovation	3.0462	0.98869	.855**	.779**	.705**	1

Structural Equation Model

Once the reliability and validity of data and instrument is checked, we unable to checked the proposed hypotheses. The model was investigated the relationship of Cost Management and Sales Growth with Process Innovation and Product Innovation. Each hypothesis tested under the structural equation model. Process Innovation and Product Innovation considered as dependent variable in the model while Cost Management and Sales Growth. All most all variables are significant in the model (p<0.05). Moreover, the coefficient value (β) of Process Innovation and Cost Management is higher than rest of relationships. One percent increase in the Process Innovation leads to 68% increase in Cost Management. All variables are significant at one percent level of significance (p<0.01). The model output is show in the table V. In the model, adjusted R^2 is 0.794 that shows 79.4 percent of the variation in Cost Management the explained Process Innovation and Product Innovation. While 92 percent of the variation in Sales Growththe explained by Process Innovation and Product Innovation. A closer explanation of the beta coefficients shows that all proposed hypotheses are supported at one percent level of significance. The model output is shown in the Table V&VI

Table V

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Process Innovation -> Cost Management	0.681	0.684	0.051	13.322	0.000
Process Innovation -> Sales Growth	0.229	0.228	0.032	7.269	0.000
Product Innovation -> Cost Management	0.269	0.268	0.066	4.107	0.000
Product Innovation -> Sales Growth	0.787	0.789	0.025	31.545	0.000

Table VI

	R Square	R Square Adjusted
Cost Management	0.794	0.791
Sales Growth	0.926	0.925
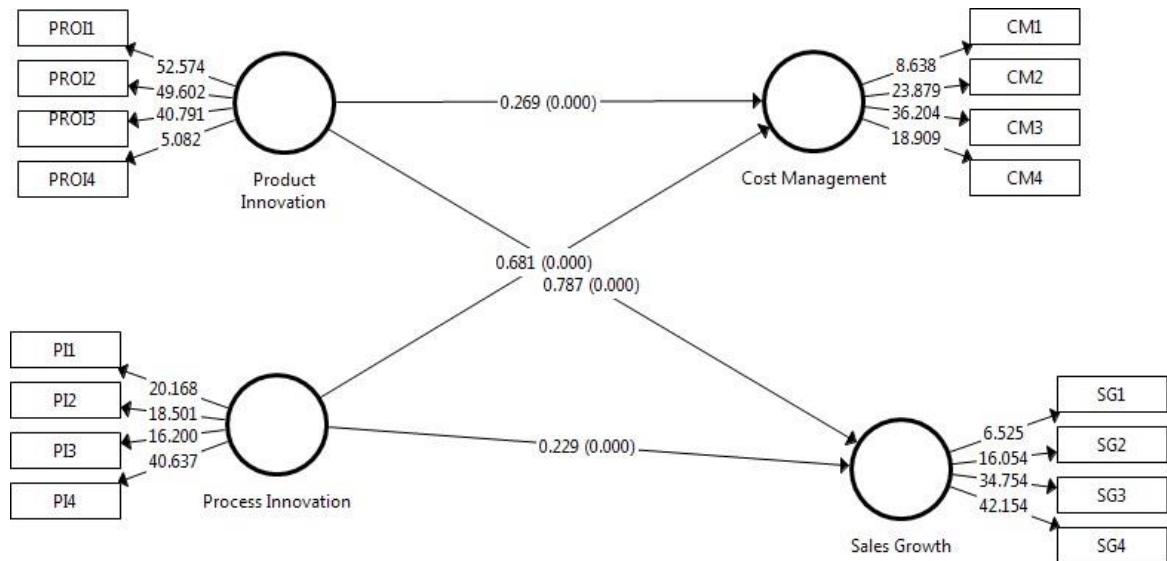
Conclusion, Discussion and Recommendations

Discussion & Conclusion

This study explains how are research and development activities impact on the cost management and Sales Growth in the agriculture and textile industry of Pakistan. R&D practices were found to have highly associated with Sales Growth and cost management. The presence of quality research and development activities have a significant contribution in the performance of textile industry. Process innovation specifically in the textile industry effectively manage the cost of manufacturing. And product innovation enhanced the Sales Growth because of fulfillment of ultimate demand of the customers. Attempts to introducing the process innovation that in the textile industry indicate the research and development activities which ultimately influence on time availability of the products to fulfill final sales of the products. Furthermore, product innovation also impact on the cost management process indicate that textile industry effectively manage their cost by proper product innovation.

Implications

Results of the study shows that structure equation of modelling explain a better understanding of association through quantitative analysis of the investigated variables on to cost management and the Sales Growth. Hence findings of the study provide decision making for the managers of the textile industry to enhance research and development initiative found highest gap in the product development process in terms of product Innovation and process innovation. Furthermore, for the efficient allocation of resources to manage cost, managers must focus on process innovation. Moreover, better decision makings improve the efficiency of textile R&D activities that ultimately impact on productivity of textile sector. Current study have a significant theoretical

implications. Moreover study also provide the suggestion for the policy implications for manager working in the textile industry of Pakistan.

Limitations

The findings of the study are very useful and confirming theoretical as well practical implications. However, every research study must have its own assumptions and limitations. Thelimitation of the study is cross sectional data that collected from the graduate respondents of Karachi. This thing gives the little information of a cost management only in single industry. It isdifficult to assess the changing response of the individual employee. It would very useful for the study if it adds some open response of the target respondents. It will give more information abouttheir response as well as in-depth information that will enhance R&D process. Furthermore, the research can include some qualitative methods that will give the actual picture of the R&D initiatives, which able to explain in terms of 'how' to increase the online repurchase. Moreover, the self-reported scale of the developed instrument also includes the biases in the responses. Respondents are force to response in the selected and given scale items.

Recommendations

In the field of marketing research, there is several factors influence on the cost management and Sales Growth. In addition, these indicators are change with respect time and space of employee behavior and attitude. There must be an exploratory study on the R&D functions that will explore the further indicators with respect to product and services. Future more, research could base on the employees that are experience in other manufacturing industries. Moreover, it explores the indicators with respect to gender that effect on the R&D process. The result of this study promotes the futures studies in terms of including factors that strengthen the relation of R&D functions.

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1	2	3	4	5				
StronglyDisagree	Disagree	Neitheragreenordisagree	Agree	StronglyAgree				
R&D (Service Innovation/product Innovation)				1	2	3	4	5
1 Our organization R&D outputs are superior compared to competitors and are first to the market (SI1)				○	○	○	○	○
2 Our organization places emphasis on novelty of its R&D outputs (SI2)				○	○	○	○	○
3 Our organization's R&D outputs benefit end user through increasing their efficiency or effectiveness(SI3)				○	○	○	○	○
4 Our organization rapidly adjust its R&D activities to market demands (SI4)				○	○	○	○	○
Process Innovation								
5 R&D activities of the organization are undertaken such that more outputs are generated from minimal resource or outputs are of higher performance levels are generated(PI1)				○	○	○	○	○
6 Our organization continuously develops and/or adopts new techniques for improving its R&D outputs (PI2)				○	○	○	○	○
7 Our organization is technologically capable and competitive in undertaking its R&D activities(PI3)				○	○	○	○	○
8 Our organization is involved in adoption of new technology for improving its R&D outputs (PI4)				○	○	○	○	○
Cost Management								
9 Management of inventory is important for increasing the company profitability (CM1)				○	○	○	○	○
10 Management of account receivable is important for increasing the company (CM2)				○	○	○	○	○
11 Management of account payable is important for increase the company profitability (CM3)				○	○	○	○	○
12 Management of cash conversion cycle important for increasing the company profitability (CM4)				○	○	○	○	○
Sales Growth								
13 Our firm gain high sales turnover/growth (SG1).				○	○	○	○	○
14 Our firm achieves profitability targets (SG2).				○	○	○	○	○
15 Our firm contain high market share (SG3)				○	○	○	○	○
16 Over all marked growth in our industry increases (SG4).				○	○	○	○	○