



RESEARCH PAPER

**Effect of Information and Communication Technologies(ICT) as
Innovation Tool on Business Performance: Evidence from Pakistan**

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ABSTRACT

With the increase in innovation and competition among different businesses, Importance of ICT cannot be denied in the modern age. The objective of this study is also to evaluate the importance of ICT in business performance of Small and Medium Enterprises (SMEs) especially as an innovative tool for the business. Most of the studies in literature review suggest that ICT has played very effective role in enhancing business performance of SMEs. Most of the firms have grown innovatively due to the implementation of ICT. For reliability and validity, the evaluating scales used were exposed to the Confirmatory Factor Analysis (CFA) with Maximum Likelihood Technique. Different tests were applied like the Structural Equation Model (SEM) on 186 Punjab-based SMEs. Results indicate that ICTs facilitate innovation favourably and substantially. Business performance was also significantly impacted by innovation and the usage of ICTs. This means that those in charge of making decisions ought to put special consideration to how they handle these critical factors for business performance. This study also recommends that firms must implement ICT as their innovative tool to compete with other firms.

Keywords: Business Performance, ICTs, Small and Medium-Sized Enterprises (SMEs), Innovation, Structural Equation Modeling

Introduction

Increasingly, Mexican firms are looking for ways to boost productivity to keep up with the volatile market circumstances and changing expectations of their consumers. Barnett & Hansen (1996) remark that firms with advanced stages of innovation than their opponents will have a competitive edge in nationwide and worldwide marketplaces (Hitt et al., 2001). It means that small firms have more challenges and must work harder to stay up with the times. When ICTs are regarded to be an innovation facilitator for goods and processes, these sorts of organizations must reconsider their business strategies (Brynjolfsson & Hitt, 2000; Lyytinen & Newman, 2008), So they can handle the various problems of the environment, while being competitive and adaptable on the global marketplaces that businesses face today (Anguilera et al., 2015). ICTs must be included in SMEs' business strategies to increase their efficiency, effectiveness (Ongori & Migiro, 2010), competence (Diewert & Smith, 1994) and customer, worker, and dealer gratification (Cuevas-Vargas, 2015).

ICTs make innovation creation comparatively easier and more cost-effective, according to Gretton et al. (2004). They also claim that the impacts of ICT use might lead to increased productivity. The Cuevas-Vargas et al. (2004), Apulu & Latham (2011) and Piget & Kossa (2013) report that tiny investigation has been conducted on the usage of ICTs in underdeveloped countries based on our literature review. ICTs, innovation, and business success are linked in comparatively insufficient theoretical research and distributed

surveys (Sambamurthy et al., 2003), but even fewer studies link these 3 variables in the framework of small and medium-sized enterprises (Izushi, 2003; Tanabe & Watanabe, 2005). The requirement for further study on ICTs, business performance, and innovation are therefore apparent. To evaluate how ICTs facilitate innovation in SMEs in Punjab, Pakistan, is the goal of this study.

In light of this, three major aspects are considered in this work. ICTs and innovation have a direct link with business performance, as do innovations and business performance. The second aspect, in which Pakistani SMEs are studied, is an examination of the relationship between the three factors studied. In a third aspect, we apply a new technique from prior research to test the theoretical model by validating constructs using CFA in second-order and proving hypotheses using SEM.

Literature Review

Relationship of Innovation with the uses of ICTs

The implementation of modern system and data technologies helps business development and promotes the creation and application of production strategies, as well as process and product control (Huerta et al., 2002). Organizations, particularly small firms, may now significantly enhance administrative processes with the proper uses of ICTs (Tung & Rieck, 2005). Due to the rapid input from consumers (Mosleh & Shannak, 2009), this is particularly correct for active firms functioning in a vastly reasonable climate.

The ICTs may also unswervingly affect company things, procedures, and facilities through ICT-based innovations. This also applies to business models (Brynjolfsson & Saunders, 2010). Additional benefits include the ability to alter corporate processes and assist the development of new goods and services, in addition to meeting product diversity and customization requirements previously unattainable without ICTs (Arvanitis et al., 2011). There is ample academic and experimental confirmation to support the importance of ICTs in fostering modernization in organizations (Arvanitis & Loukis, 2015; Spiezia, 2011) in this respect.

Across recent research by Arvanitis and Loukis, 743 hospitals in 18 European nations were studied (Arvanitis & Loukis, 2015) revealed a favorable influence in the product and procedure innovation via automated hospital apps. ICTs have a beneficial influence on innovation in clinics, and the innovations tend to reinforce the impact of ICTs on enactment. ICTs devour mutually direct and indirect positive influences on hospital enactment through innovation, according to the study. Electrical deals had an influence on process innovation, though electronic recruiting was not an innovation engine, according to Arvanitis et al. (2011)'s research of 271 USA companies. ICTs, on the other hand, provide a tremendous impetus for innovation, especially in countries where the conventional drivers that drive innovation in product, process, and service are absent. Fernández-Mesa et al. (2014) exposed a straight and considerable connection among ICTs and financial achievement of ceramic tile innovations in their investigation of 186 ceramic tiles companies from Spain and Italy. The study by Spiezia (2011) originates that the ICTs facilitate innovation, predominantly in the product and marketing innovations, in the facility providing companies as well as industrial plants, suggesting that ICTs facilitate innovation without increasing the company's invention competences.

Consequently, the first hypothesis is derived from these viewpoints:

H1: More uses of ICTs, results in more Innovation

Relationship of Business Performance with Innovation

A company's success depends heavily on innovation (Cooper, 2000); as a result, it is important that firms rethink their strategy in order to give innovation a higher priority in order to achieve better reasonable recompenses and presentation (Cooper, 2000; Damanpour, 1991). Innovativeness has a substantial influence on business performance in the sense that it improves market position and produces higher performance (Walker, 2004).

Study after study shows a strong link between innovation and business performance. First, Rhee et al. (2010) showed that innovation had a substantial effect on business performance in a sample of 333 small industrially groundbreaking businesses from South Korea. According to Gunday et al. (2011), in their investigation of 184 industrialized businesses in Turkey, product, marketing, and organizational innovations had a favorable influence on business performance. According to Atalay et al. (2013), who studied 113 automotive suppliers in Turkey, process and product innovation has favorable and substantial influence on business performance. In Malaysia, Hedfi-Khayati & Zouaoui (2013) originate that the process and product innovation had substantial effect on business performance, through product innovation having a greater impact than the process innovation. According to Estrada et al. (2015), product innovation, process innovation, and the management system innovations have a confident and substantial impact on the business performance, and size of the firm impacts the effect of these three categories of innovation performance.

Consequently, the second hypothesis is derived from these viewpoints:

H2: More innovation, results in more Business Performance.

Relationship of business performance with uses of ICTs

Because ICTs have become the primary contraption of progression in awareness budget, they have flashed a digital rebellion in industrialized nations and lengthened rapidly to other emerging countries, such as Mexico (Piget&Kossaï, 2013). Companies may enhance their competitiveness by using ICTs, say Bardhan et al. (2006).

According to Santhanam & Hartono (2003), Sambamurthy et al. (2003), and the Kumar (2004), the infrastructure of information technology and digital platforms is a crucial facilitator of organizational capabilities and corporate success. As a result of similar studies (Bhatt & Grover, 2005; Mithas et al., 2005), it has been shown that investments in information technologies and ICTs competences are related to increased yield, customer happiness, managerial skills and enactment. But beyond all, these studies show that the adoption of uses of ICTs by SMEs in developing countries is favorably correlated with their commercial performance (Chinomona, 2013).

On the basis of experiential proof, we establish several types of research that validate a confident connection among uses of ICTs and the business performance, as research of 74 Castilian SMEs, in that Pérez et al. (2009). The Maldonado et al. (2010) studied SMEs in Aguascalientes, México, and found that those that used more ICTs performed better. Similarly, Chinomona (2013) showed that the uses of ICTs had a favorable impact on premeditated purchases by SMEs, logistics integration, and the overall performance of firms in his research of 162 SMEs in Zimbabwe. In Tunisia, Piget & Kossa (2013) discovered that there was a substantial link between the uses of ICTs and business performance for electrical and electronic SMEs.

Consequently, the third hypothesis is derived from these viewpoints:

H3: More uses of ICTs, results in more Business Performance

Material and Methods**Sampling and Data Collection**

We conducted an empirical study utilizing the statistical technique of SEM and a quantitative methodology of descriptive and cross-sectional kind. The study is Looking at data from 186 small and medium-sized manufacturing companies in Punjab with a sureness level of 95% and a 5% margin of inaccuracy. The managers or owners of these types of firms were randomly selected to participate in the poll.

Measurement of Variables

González-Gallego et al. (2010) used a 16-item Likert Type scale with a one to five-point range to calculate the uses of ICTs variable. Cuevas-Vargas et al. (2015) and Aguilera et al. (2015) also used this scale to measure the usage of ICTs variable. To assess innovation, Madrid-Guijarro et al. (2009) developed a scale. Three latent variables are measured by the seven items on the scale, namely process, product, and management system innovation. The whole of these variables was restrained on a Likert-type measure with a one to five-point series, indicating little significance to great significance. Previously, Cuevas et al., (2015). As for measuring business performance, we used the 4 scopes suggested by Quinn & Rohrbaugh (1983) in the whole indicator and Estrada et al. (2015) verified in further researches: open systems model, inner processes model, human relation model, and rational goals model.

Reliability and Validity

We used EQS 6.1's statistical program to do second-order Confirmatory Factor Analysis (CFA). The whole standards of the measures surpassed the required Cronbach Alpha value of 0.7 (Hair et al. 2010; Nunnally & Bernstein, 1994), providing an indication of reliability and validity of the scales' inner consistency. CRI is more than 0.60 (Bagozzi & Yi, 1988), AVE is greater than 0.50 (Fornell & Larcker, 1981) for each and every component. The statistical modifications were further supported by robust statistical testing (Satorra & Bentler, 1988), as it is shown in Table 1.

Table 1
Convergent Validity and Internal Consistency of Hypothetical Model

Constructs	Indicator Variables	Factor Loading Values	Robust t-values	Cronbach's Alpha Values	CRI Values	AVE Values
Uses of ICTs	ICT1- To interchange booklets through dealers	0.747***	1.000 ^a	0.964	0.962	0.689
	ICT2- To exchange documents with customers	0.789***	17.772			
	ICT3- For customers' orders	0.826***	16.551			
	ICT4- To place orders to suppliers	0.847***	18.861			
	ICT5- To inventory management	0.877***	18.264			
	ICT6- To control working hours	0.813***	17.920			
	ICT7- In production control	0.864***	16.734			
	ICT8- To HRM	0.815***	14.231			
	ICT9- Integrated to customers for orders	0.831***	15.642			
	ICT10- Integrated to dealers to place orders	0.830***	16.165			
	ICT11- Influence on excellence of client service	0.820***	17.473			
	ICT13- Impact on quality control	0.875***	17.539			
	ICT14- Impact on relations with suppliers	0.875***	17.778			
	ICT15- Trained staff for handling ICTs	0.825***	15.325			
	ICT16- For decision-making	0.829***	16.984			
	PT11- Changes or improvements in products	0.661***	1.000 ^a			

Product Innovation (PTI) (A1)	PTI2- New products commercialization	0.735***	8.575			
Process Innovation (PSI) (A2)	PSI1- Changes or improvements in processes	0.863***	1.000 ^a	0.772	0.779	0.663
	PSI2- Acquisition of new capital equipment	0.727***	12.079			
Management Systems Innovation (A3)	MTI1- Management and administration	0.760***	1.000 ^a	0.851	0.958	0.921
	MTI2- Purchasing and supplies	0.779***	13.483			
	MTI3- Commercial/sales	0.850***	12.675			
Innovation	A1- Product innovation	0.989***	10.288	0.851	0.958	0.921
	A2- Process innovation	0.987***	21.261			
	A3- Management systems innovation	0.850***	12.675			
Inner Processes Model (A4)	IPS1- Refining superiority of product/service	0.725***	1.000 ^a	0.845	0.844	0.653
	IPS2- Increasing efficiency in business	0.867***	14.020			
	IPS3- Improving organization of staff	0.834***	14.155			
Open Systems Model (A5)	OPS2- Rapid adaptation to marketplace wants	0.784***	1.000 ^a	0.821	0.819	0.669
	OPS3- Refining appearance of the business	0.843***	14.542			
Rational Goals Model (A6)	RNG1- Growing marketplace share	0.786***	1.000 ^a	0.922	0.914	0.750
	RNG2- Increasing profitability	0.920***	16.115			
	RNG3- Increasing productivity	0.923***	15.011			
Human Relation Model (A7)	HNR1- Improving employees' motivation	0.672***	1.000 ^a	0.864	0.840	0.666
	HNR2- Reducing staff turnover	0.871***	10.073			
	HNR3- Reducing work absenteeism	0.843***	10.196			
Business Performance	A4- Inner processes model	0.941***	10.716	0.870	0.932	0.737
	A5- Open systems model	0.922***	11.532			
	A6- Rational goals model	0.842***	9.724			
	A7- Human relation model	0.629***	7.037			

$S-B X^2 = 1015.694$ on $482df$; $(S-B X^2/df) = 2.2$; $p = 0.000$; $NFI = 0.863$; $RMSEA = 0.063$; $NNFI = 0.914$; $CFI = 0.921$
 $\alpha =$ Constraints controlled to this rate in documentation procedure; Significance levels= ** = $p < 0.05$; *** = $p < 0.001$ AVE= Average Variance Extracted Index; CRI= Composite Reliability Index

Because the original model had problems with level adjustment, it was essential to remove 2 noticeable variables from the model, ITC12 (from uses of ICTs model) and OPS1 (from open systems model), because their factor loadings were below the 0.6 recommended by Bagozzi & Yi (1988). $S-B X^2/df$ is less than 3.0, and RMSEA is fewer than 0.08, which is satisfactory [49, 54], as shown in Table 1. Due to this, all of associated factors are substantial ($p < 0.001$), and all of the factor loadings are larger than 0.60 (Bagozzi & Yi, 1988).

Table 2 presents the evidence for discriminant validity in two ways, the 1st with 95 percent consistency range. Lower the diagonal values (in bold), no one of the distinct latent components in the correlation matrix has the value of 1.0 (Anderson & Gerbing, 1988). Zweitens, overhead the crosswise, the retrieved difference among two constructs is smaller than their respective AVE (Fornell & Larcker, 1981). This means that, grounded on these standards, the dissimilar dimensions in this research provide enough support for the theoretical model's reliability, convergence and discriminant validity.

Table 2
Hypothetical Model's Discriminant Validity Measures

Variables	Uses of ICTs	Innovations	Business Performances
Uses of ICTs	0.698	0.278	0.229
Innovations	0.393, 0.661	0.912	0.184
Business Performances	0.363, 0.595	0.335, 0.523	0.728

Results and Discussion

EQS 6.1, a software of CFA (Bentler, 2005; Brown, 2006), was used to perform SEM on the research hypotheses in order to evaluate the model structures and acquire findings that permit us to compare hypotheses shown in Table 3.

Table 3
SEM consequences from Hypothetical Model

Research Hypotheses	Paths	Standardized Paths Coefficient Values	Robust t-values	R Square Values
H1: More uses of ICTs, results in more innovations	Uses of ICTs → Innovations	0.484***	5.942	0.239
H2: More innovations, results in more business performances	Innovations → Business performances	0.335***	3.904	
H3: More uses of ICTs, results in more business performances	Uses of ICTs → Business performances	0.422***	4.822	0.427

Significance levels: * = $p < 0.1$; ** = $p < 0.05$; *** = $p < 0.001$

According to outcomes in the Table 3 ($\beta = 0.484$, $p < 0.001$), ICTs uses has a confident and substantial impact on innovation, so H1 is accepted; similarly, H2 is accepted based on the attained consequences ($\beta = 0.335$, $p < 0.001$), which show that innovation positively impacts business performance; and finally, H3 is accepted due to the results of Table 3 ($\beta = 0.422$, $p < 0.001$).

Overall impacts of constructs the innovation and uses of ICTs on the business performance are shown in Table 4 to determine that how uses of ICTs and innovation affects directly and indirectly on business performance, when uses of ICTs has direct influence is 0.422 and the indirect influence is 0.164, for entire impact of 0.586 on business performance; With respect to business performance and innovation, this model has an overall impact of 0.335.

Table 4
Total Effects and Path Model

Variables	Direct effect on the Business Performances	Indirect effect on the Business Performances	Total effect on the Business Performances
Uses of ICTs	0.422	0.164 ^a	0.586
Innovations	0.335	0.000	0.335

^a = Value attained from effects of the innovation on business performance, and direct effect of uses ICTs on the innovation (0.484×0.335)

Discussion

Positive relationships between ICT use, innovation, and business performance are confirmed by the SEM results. In terms of the influence of uses of ICTs on innovation, the consequences permit us to suppose that there is satisfactory experiential indication representing the confident and substantial influence of uses of ICTs on the innovation of SMEs in Punjab, in agreement with consequences of Arvanitis et al. (2011) of Greece, meanwhile uses of ICTs offer robust motivation for innovation. The findings of Fernández-Mesa et al. (2014) and Spiezia (2011) in Spain and Italy, as well as Arvanitis and Loukis (2015) in Europe, demonstrate that ICTs have a beneficial impact on innovation in hospitals. The effect of innovation on business performance of Punjab's SMEs has also been

demonstrated experimentally. Rhee et al. (2010) from South Korea, in Turkey, Atalay et al. (2013) and Günday et al. (2011); from Malaysia, Hedfi-Khayati and Zouaoui (2013); and in the Mexico, Estrada et al. (2015) achieved similar findings.

The uses of ICTs keep a favourable and considerable effect on the business performance of SMEs in Punjab, according to the study. Chinomona (2013) in Zimbabwe, Maldonado et al. (2010) in Mexico, and Piget and Kossa (2013) in Tunisia have found similar findings in Spain. Consequently, the right uses of ICTs and association with business plan will help Punjab's SMEs to adapt to the globalization of markets and, as stated by Piscitello and Sgobbi (2003) in the research of both of them of Italy, enhance their business performance.

Conclusion

We may deduce that this technology can assist SMEs to enhance their level of innovation based on the positive and substantial impacts that were produced (product, management system and process), and therefore shove up their complete competitiveness, we conclude that uses of ICTs are the critical helper of innovation. Companies' competence, marketplace positioning, productivity, and administrative environment are all affected by how effectively they use ICTs. Therefore, companies must incorporate these variables into their business plans in order to meaningfully rationalize their procedures and managerial actions.

Defined as a crucial component in improving the performance level of organizations, ICTs and innovation are shown to have a positive influence on their development and effectiveness in the market by the research's results. The results of this empirical investigation have two primary consequences. As a first step, directors and proprietors of SMEs in emerging nations should integrate the uses of ICTs into their company plans as well as their everyday operations. From catalogue management and production control to relationship administration, this influence will be mirrored in an increase in whole presentation, reliant on the amount of application and uses of ICTs attained. Referring to information and communication technologies (ICTs) as a key innovation facilitator, ICTs enable companies to considerably advance all organizational activity while achieving substantial productivity advantages, charge up with consumer tendencies, checking the activities of their competitors, and receiving a response from the users quickly, allowing them to seize chances for whole categories of innovation. If your company has already implemented this type of technology, it is not sufficient to just reintroduce or upgrade it; you must also appliance a scheme of uninterrupted exercise for the workforces who will be using it. This will improve not only the business's overall presentation, but also its competitiveness.

Due to the fact that the innovation has a major effect on the business performance, administrators and holders of SMES in emerging nations must pay extraordinary consideration to it, it is therefore essential that enterprises integrate innovation into their product, process, and management system, not individually as the key part in their professional plans, but also a portion of their philosophy, meanwhile innovation permits initiatives to develop their financial, administrative, and monetary performance. - All three forms of innovation will help organizations create a positive feedback loop between the production of valuable resources, motivated employees, stakeholder-focused initiatives, and improved performance.

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