

# IMPACT OF INFORMATION TECHNOLOGY CAPABILITIES ON FIRM PERFORMANCE: UNDERSTANDING THE MEDIATING ROLE OF CORPORATE ENTREPRENEURSHIP IN SMES

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## ABSTRACT

*Corporate entrepreneurship has a tendency to be influenced by information technology capabilities and considered as an essential source of competitive advantage for the firms that allow exploitation and development of new opportunities. Despite the positive impact of Information Technology (IT) capabilities on firm performance, our knowledge of the processes through which performance outcomes are achieved in a dynamic business environment is not clear. Furthermore, scholars have overlooked the dimensional role of Corporate Entrepreneurship (CE) between IT capabilities and firm performance. This study empirically investigates the indirect role of IT capabilities on firm performance through CE dimensions by surveying 420 manufacturing SMEs of Pakistan. The questionnaire measures IT capabilities (IT infrastructure flexibility and IT integration), corporate entrepreneurship (innovation, business venturing, and strategic renewal) and firm performance. Results of the study show that all hypotheses are significant except the relationship between strategic renewal and firm performance. Furthermore, strategic renewal is not mediating the relationship between IT capabilities and firm performance. The practical implications suggest that CEO's need to develop flexible IT infrastructure and integrate their IT resources to enhance CE activities which are helpful to improve the performance of manufacturing SMEs. These implications are also useful for to policymakers to device business strategies for SMEs.*

**Keywords:** Information Technology (IT) Capabilities, IT Infrastructure Flexibility, IT Integration, Corporate Entrepreneurship, Dynamic Capabilities.

## INTRODUCTION

Information Technology (IT) capabilities play a significant role in increasing firm performance (Aydiner et al., 2017; Benitez et al., 2018; Oh et al., 2016). IT capabilities are the multifaceted bundles of IT resources which enable firms to coordinate business activities efficiently through the mobilization and deployment of these IT-based resources, hence improve various firm performance indicators (Bharadwaj, 2000; Nevo & Wade, 2010). Researchers have mostly focused on the role of IT capabilities in large-scale firms and relatively little attention has been given to SMEs (Ling, 2017). In this technological era, SMEs are inevitably crucial for economic development as SMEs tend to have a positive impact on overall economy like creation of job opportunities, improving living standards and elimination of inefficient income distribution which provides foundation for economic advantage to the whole nation (Aparicio et

al., 2016; Ayandibu & Houghton, 2017; Deijl et al., 2013; Jardim-Goncalves et al., 2012; Love & Roper, 2015). Around the globe, the SMEs sector contributed 85 percent growth in employment during the years 2002 to 2010 (De Kok et al., 2011; Wang, 2016). Especially in developing nations like Pakistan, 96%-98% of business settings can be classified as SMEs that engage approximately 78% workforce, contribute over 30% of national GDP and add 35% value in manufacturing industries (SMEDA, 2007). Irrespective of the size and type of business, it is necessary to recognize the contribution of IT resources in the firm's growth and competitive advantage. In this regard, the SMEs sector of Pakistan is needed to be studied with respect to the utilization and development of IT resources (Munir, 2016).

The extant literature shows the significant positive relationship between IT capabilities and SMEs performance, however, this relationship has not been studied thoroughly (Karimi et al., 2007) and the underlying mechanism through which IT capabilities influences the performance of the firm is not yet clear. Our knowledge about those mechanisms will likely to be enhanced if such processes are examined by intervening mechanisms (Melville et al., 2004). By analyzing the intervening mechanisms we can better predict the circumstances under which IT capability indirectly affect SMEs performance.

The framework of this paper is supported by dynamic capability view which is an extension of the resource-based View (RBV). Although RBV helps to understand the relationship between IT capabilities and firm performance however researchers overlook the potential role of IT capabilities in the dynamic business environment (Rojas et al., 2017). Hence, by applying dynamic capabilities view, new insights can be analyzed regarding IT, beyond the traditional understandings of IT capabilities in relation to RBV (Wade & Hulland, 2004). In the field of management sciences and information technology, RBV has been criticized on the basis of its static nature, additionally, the dynamic capabilities are considered as an essential counterpart of RBV, which help to understand the relation between IT capabilities and firm performance in the dynamic business environment (Mithas et al., 2011). Dynamic capabilities allow firms to renew their current resources and capabilities when the opportunity or need arises (Pavlou & El Sawy, 2006). Hence, firms should possess dynamic capabilities in order to develop and renew its resources (Teece et al., 1997) which is particularly true for the firms competing in the dynamic business environment (Wheeler, 2002). Wheeler (2002); Zahra and George (2002b) hypothesized that the effective building, renewal, and exploitation of dynamic capabilities involves firms to embrace a strategic entrepreneurial context. Similarly, they argue that there exists a significant association between IT capabilities, and entrepreneurial activities which help firms to gain competitive advantage.

The CE activities of a firm are leveraged by the use of IT resources and play a significant role in enhancing firm performance (Kim et al., 2011). CE is a dynamic capability as it reflects *"firm's overall efforts toward venturing, innovation, and renewal directed at advancing new opportunities to use or expand its resources"* (Zahra, 1996). CE is necessary for the firms to maintain competitive advantage and respond to business challenges (Yiu & Lau, 2008). CE also allows the integration of various business aspects related to information and firm processes that are critical for SMEs. Furthermore, CE depends on the accessibility of relevant and timely information through reliable communication channels; such assurance tends to be provided by IT capabilities. Undeniably, it has been argued *"IT is the magic ingredient that inspires and most often enables contemporary entrepreneurial endeavors"* (Del Giudice & Straub, 2011). Corporate entrepreneurship is directly linked to a firm's imperative outcomes such as profitability, growth (Zahra, 1991) and high performance in the context of SMEs (Heavey &

Simsek, 2013; Phan et al., 2009). Del Giudice and Straub (2011) argued that IT support and play a significant role in leveraging entrepreneurial activities.

Despite the significant positive relationship between IT capabilities and firm performance (Aydiner et al., 2017), each IT capability dimension has a different impact on firm performance. Furthermore, our knowledge regarding the dimensional role of CE as an intervening mechanism between IT capability dimension and firm performance is limited in a dynamic business environment. Dynamic capabilities perspective not only focuses to strive in business and exploit current resources, but also emphasizes to compete through dynamic capabilities (Teece, 2012; Wheeler, 2002). In relation to this view, we hypothesize that CE dimensions theoretically explain the relationship between IT capability dimensions and firm performance. Thereby, this study fills the gap by analyzing the impact of IT capability dimensions on firm performance considering the dimensions role of CE.

The contributions suggested by this paper are threefold. First, it contributes to IT capabilities and CE literature by developing a theoretically comprehensive model that joins the paths to bridge gap through which IT capabilities indirectly impact firm performance by incorporating the dimensional role of CE. Second, it contributes through extending our knowledge of how IT infrastructure flexibility and IT integration leverages CE dimensional role. Finally, the paper contributes by suggesting practical implications to CEO's and policymakers which helps them better identify the business environment where the investments in IT capabilities and CE activities tend to be most observable, through informed decision making by the utilization and development of IT resources.

The remaining sections of this paper contain the brief discussion on the literature regarding IT capabilities (IT infrastructure and IT integration), CE along with dimensions (strategic renewal, innovation, and corporate venturing) and firm performance. Later on, a detailed hypothesized discussion regarding anticipated relationship between IT capabilities dimensions, CE dimensions, and firm performance. Methodology section includes measures of the study and in the end, with the presentation of the empirical results, this paper will be concluded followed by a discussion related to our findings by mentioning limitations and future research.

## LITERATURE REVIEW

Over the last two decades, Information Technology (IT) has been considered a key resource for the businesses competitiveness (Fink, 2011; Oh & Pinsonneault, 2007; Schryen, 2010). IT resources and related applications allow firms to develop IT capabilities. These capabilities are referred to as "*IT-enabled firms resources that are in a capacity to utilize and mobilize in coordination and combination with other capabilities and resources of a firm*" (Bharadwaj, 2000). The utilization and development of IT capabilities help firms to gain an advantage over their competitors for instance, increase in profit, reduction in cost and higher sale growth (Jacks et al., 2011). IT capabilities allow organizations to capture unique value-creating opportunities (Powell & Dent-Micallef, 1997; Wu et al., 2006). These opportunities allow firms to perform routine activities in different ways to have more coordination.

IT capabilities are the combination of IT infrastructure flexibility and IT integration. The flexibility of IT infrastructure is the extent up to which a firm's infrastructure is capable of being scaled, flexible, and compatible with firm's core systems and has the capacity to incorporate multiple business applications (Byrd & Turner, 2001). IT infrastructure flexibility tends to manage firm's IT-related activities like IT project management, system development and IT

evaluation (Zhang et al., 2008). Such inbuilt flexibility enhances firm's ability to share information and escalate firm's potential to manage the necessary changes across different functional domains. The second dimension, IT integration is the level up to which a firm links the IT-based resources with its business companions, by providing support in information exchange, communication channeling and establishment of supportive relationships (Rai et al., 2006). Furthermore, IT integration allows a firm to effectively forecast and capture opportunities in market thereby managing business processes efficiently (Rai & Tang, 2010).

The concept of IT capabilities is drawn from the resource-based view that has been criticized for not explaining the benefits achieved through IT capabilities in unstable business environments (Wade & Hulland, 2004). A growing body of scholars has stressed on the importance of embracing IT capabilities concept from the perspective of a dynamic capability view that emphasizes the need to adapt and change in the face of rapidly changing market requirements. These capabilities are firm's inter-linked processes that are vital for future resource creation and allow firms to manage upcoming challenges in a dynamic business environment by directing all the focus to create, renew or alter a resource mix to get competitive advantage, thus increases firm performance (Eisenhardt & Martin, 2000; Teece et al., 1997). When firms possess strong IT capabilities, they tend to accelerate in decision making through swift response to changing market needs. Despite the strong appeal of IT capabilities concept, there has been a limited understanding there has been a limited understanding of the dimensional role of IT capabilities towards firm performance. Specifically, few studies explain SMEs performance in developing countries. SMEs in developing countries like Pakistan face issues related to resource limitations, low levels of IT dependency, IT investments decision making, low performance and lack of entrepreneurial activities.

It was also suggested by Nevo and Wade (2010), that IT capabilities tend to support other dynamic capabilities through extending new modules and various ways of routine business processes. In this way IT capabilities support innovation activities and business alliance (Del Giudice & Straub, 2011) capturing and responding to market changes and increase firm performance. Hence, studies should be conducted to make our understanding clear about how IT capabilities enhance SMEs performance through corporate entrepreneurship (Cragg, Mills, & Suraweera, 2013; Kim et al., 2011) which is distinctively a path dependent dynamic capability in its emergence (Teece, 2016). Corporate Entrepreneurship (CE) is defined as "*a vision-directed, organization-wide reliance on entrepreneurial behavior that purposefully and continuously rejuvenates the organization and shapes the scope of its operations through the recognition and exploitation of entrepreneurial opportunity*" (Ireland et al., 2009). Recognizing its inevitable significance to a firm's survival, performance and growth, CE has appealed many strategy scholars (Simsek et al., 2009) as a process through which firms seeks to innovate, create new businesses and transform the domain of a business or its fundamental strategic processes and methods to have an impact on firm's various performance-related outcomes (Simsek et al., 2009). CE comprises of firm-related formal as well as informal activities that focus to discover and pursue new opportunities through innovation, strategic renewal and business venturing (Chua et al., 1999; Guth & Ginsberg, 1990). It is established that CE effectively contributes in Small and Medium-Sized Enterprises (SMEs) to enhance performance (Heavey & Simsek, 2013). Our research study encompasses the dimension wise impact of CE (i.e., strategic renewal, innovation and business venturing) on performance. Strategic renewal involves entrepreneurial activities that alter the domain, related to firm's business or it may transform overall structure. It also means, redefining the business domain or rebuilding a business model. Innovation is

transforming a new idea into value-added products, services or firm level modifications. Business venturing emphasizes the creation of a new business entity or acquiring new business (Zahra et al., 2006). It has been suggested that CE largely depends on the availability of timely, relevant, and reliable information, which is attributed to IT capabilities. CE enables the integration of numerous business aspects related to information and processes that are considered critical and enrich the understanding of IT-enabled CE and SMEs performance.

### **HYPOTHESIS DEVELOPMENT**

The ability of firms to utilize, develop and enhance IT capabilities is critical, (Bharadwaj, 2000). Firm's success is in managing numerous tasks through a well-coordinated system with the support of IT infrastructure flexibility (Byrd & Turner, 2001) which efficiently reduces cost of production and enhance firm's performance (Jacks et al., 2011). Among IT capabilities' dimensions, IT infrastructure has a critical importance (Flyvbjerg & Budzier, 2011). Also, IT integration has its own unique importance as it directs the attention of firm's partnership ties to share ideas, information in order to facilitate mutual interactions (Rai et al., 2006). IT capabilities' interrelationship with corporate entrepreneurship show significant results in various firm-level outcomes. Corporate entrepreneurship involves availing the best opportunity even with fewer resources or capital (Stevenson & Jarillo, 1991); additionally, it refers to firm's behavior that has broad vision, trust on firm's entrepreneurship where constant revitalization of firm or organization is given importance. When CE is at a high level, the processes and related operations are well managed in addition to the identification and utilization of opportunities by entrepreneurs (Ireland et al., 2009) because the focus of CE activities is to innovate, construct and renew businesses and convert these activities into performance.

### **IT Infrastructure Flexibility and Corporate Entrepreneurship Dimensions**

IT capabilities play a major role in enhancing firm performance by creating synergy with dynamic capabilities for instance CE and enhance firm performance (Liang et al., 2010). IT capabilities provide a comprehensive understanding of the relationship between IT capabilities (IT infrastructure and IT integration) and CE activities (Pavlou & El Sawy, 2010). IT infrastructure facilitates the firm's diversified purposes through information technology sharing which facilitates firm's procedures and support innovation activities (Bharadwaj, 2000). IT infrastructure flexibility strengthens firm's management to accelerate in innovation and manages the efficiency of all business functions (Pavlou & El Sawy, 2006; Ray et al., 2005). IT infrastructure flexibility is responsible for firm's development which creates market equilibrium accordingly by initiating introducing innovative activities (Todd & Javalgi, 2007). Thereby, firms have to develop strong IT infrastructure flexibility which can lead a firm towards innovation.

Firms tend to have strong communication, cooperation, and association between departments in terms of well-coordinated activities when the IT infrastructure is developed. The relationship between IT infrastructure flexibility and business venture is based on providing assistance in identification of new business venture needs and execution of venturing activities (Weill et al., 2002). Moreover, IT infrastructure flexibility is helpful from the perspective of business venturing decision making and related upcoming business strategies for the exploitation of venturing activities (Armstrong, 1999).

Entrepreneurial activities are facilitated by firm's IT infrastructure by renewing firm's and beverages, metal and wood and furniture (Bhatt et al., 2010) and allow firms to redefine firm's processes with the help considerable investments in renewal activities (Collinson & Gregson, 2003; Teece, 2014). Consequently, CE activities can successfully be initiated when leveraged by IT infrastructure flexibility (Del Giudice & Straub, 2011).

*H1a: There is a significant relationship between IT infrastructure flexibility and innovation.*

*H1b: There is a significant relationship between IT infrastructure flexibility and business venture.*

*H1c: There is a significant relationship between IT infrastructure flexibility and strategic renewal.*

## **IT Integration and Corporate Entrepreneurship Dimensions**

IT integration facilitates the sharing of relevant information for the entrepreneurial processes and practices across the departments (Edquist, 1997). Such information may be useful for introducing or launching a new business venture in the firm (Zahra, 1991; Zahra & Covin, 1995). IT capabilities use integrated strategies and activities which are further observed as business ventures. IT-based integrated processes enable firms to efficiently collect and disseminate information through electronic integration of various business activities. In this way IT integration assists CE to modify and re-establish business activities (Collinson & Gregson, 2003). In addition, IT integration tends to play a positive role in a firm's innovation strategies (Barua & Mukhopadhyay, 2000; Brynjolfsson & Hitt, 2000; Milgrom & Roberts, 1995) by supporting research and development activities to encourage new product developments (Chaudhuri et al., 2011). Hence, the success of product development can be effectively accomplished by the use of IT integration. IT integration has a potential to create new business strategies and taking initiatives by focusing on gathering and interpreting information about firm's competitors and changes in industry trends (Zahra & Covin, 1995). Hence, we propose that dimensional role of CE will be more effective and significantly positive, when leveraged by IT integration, therefore:

*H2a: There is a significant relationship between IT integration and innovation.*

*H2b: There is a significant relationship between IT integration and business venture.*

*H2c: There is a significant relationship between IT integration and strategic renewal.*

## **Corporate Entrepreneurship Dimensions and Firm Performance**

Zahra (1993) posits that CE has a positive association with firm performance. There are studies depicting the positive impact of CE on subjective and objective performance (as perceived by top management) in comparison with other competing firms. However, differentiating between three dimensions of CE in relation to performance and the context in which these relationships are considered, it is evident that thorough perspective in this regard is needed (Bierwerth et al., 2015).

Innovation activities empower firms to keep a track for evaluating improved changes in the different array of products and service which increases firm performance (Zahra & Covin, 1995). The development of routine processes during entrepreneurial activities follow the trail of cultivating innovation by incorporate the culture of research and development, (Crossan &

Apaydin, 2010; Gunday et al., 2011). Moreover, innovation activities enable firms to comprehend the preliminary performance outcomes as an essential component to strengthen financial performance.

CE is pertinent when an organization embarks for successful business venture with a positive influence on firm performance. Past studies have also validated the relationship between CE and firm performance (Ağca et al., 2012). CE provides support in developing various departments for the upcoming business enhancements; therefore allow success in business ventures, which in turn enhances firm performance (Lin & Lee, 2011). Businesses are also inclined towards venturing activities which helps them in improving overall performance and to have a better competing position in the industry. The initiative of corporate entrepreneurship enables business to grow and learn besides enhancing firm performance (Benner & Tushman, 2003).

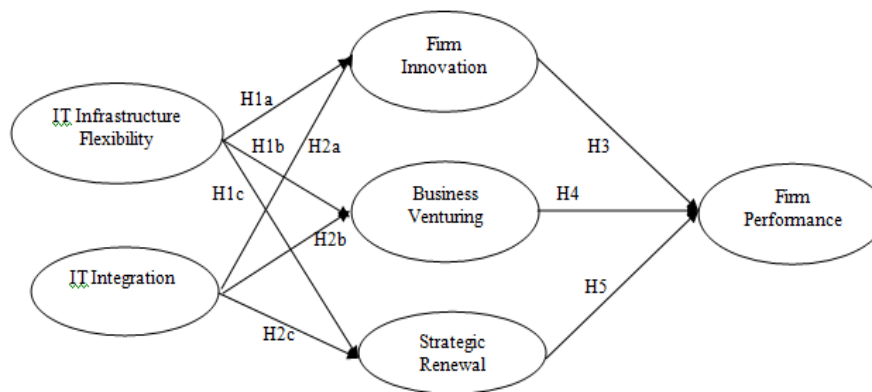
The strategic renewal process has been given excessive value in firms (Heavey & Simsek, 2013). Currently, SME's have been considering to explore new opportunities accessible to them and creating awareness regarding global trends to stay in competition (Phan et al., 2009). Therefore, SMEs' inclination towards adopting strategic renewal process has been increased as a result they redefine themselves in terms of routine tasks, operational activities (Teece et al., 1997). Hence, we propose that CE dimensions are significantly related to firm performance.

*H3: There is a significant relationship between firm innovation and firm performance.*

*H4: There is a significant relationship between business venture and firm performance.*

*H5: There is a significant relationship between strategic renewal and firm performance.*

The theoretical model represents hypotheses with direct paths. The mediation paths have not explicitly hypothesized but mediation relations are analyzed in the discussion of results. Figure.1 shows the integrated framework in which the impact of IT infrastructure flexibility and IT integration has been analyzed on performance through the dimensional role of corporate entrepreneurship.



**FIGURE 1**  
**THEORETICAL FRAMEWORK**

## METHODOLOGY

A pilot study with simple random sampling has been performed for the confirmation process of each industry's characteristics. A randomly self-administrative survey was conducted with 60 CEOs based on the number of industries to examine the variables and importance was given to data's confidentiality. Results of pilot study show that data is normally distributed and reliability of variables is more than accepted range of 0.70. Also, in order to minimize the non-response biases, comparison of characteristics was made among responding and non-responding businesses. The results revealed that no significant difference lies between non-respondents and respondents, which was based particularly on the question of equity return, sales return, assets return and market growth. Besides this, Harman's test has also been applied just to eliminate the common method bias of the data. Further, in the pilot study significant results were obtained.

We analyzed the data through AMOS 19.0, by using confirmatory factor analysis and the method of maximum likelihood estimation was used. Initially, before conducting CFA, exploratory factor analysis was done on all indicators. The procedure of principal axis factoring gave the results which were consistent with our hypothesized measurement model. Reliability and validity of the constructs were tested and all the values were within the acceptable range. The assessment of CFA statistics based on the measurement models was further analyzed to achieve the good fit. The details of descriptive statistics and correlation results are also mentioned. In this section, measures of each variable have been mentioned along with reference and stated by in sample size and sampling technique details. Moreover, statistical analysis has also been reported at the end of this section.

### Sample and Procedure

The population of this study constituted SMEs manufacturing sector of Pakistan, whereas medium-sized firms have been given preference, particularly firms with technology adoption and utilization. The research focuses on manufacturing sector firms due to the interest inherent in carrying out an entrepreneurship and technological study on sectors with a high technological component. Furthermore, we have taken samples from seven major cities of Punjab that have the cluster of industries with main contribution in the economy exports (SMEDA, 2014). A list has been acquired from Small and Medium Enterprises Development Authority (SMEDA), including names of registered medium-size firms with a list of top management/CEOs. Based on SMEDA database, there are total 8623 registered medium-sized firms in seven main cities of Punjab and seven major manufacturing industries of Pakistan. According to SMEDA firms with more than 50 employees but fewer than or equal to 250 employees are considered to be medium-sized manufacturing firms.

The current study includes CEOs from every organization due to their significance of being main informants in their firms. Besides this, for the factual assessment of all variables, they are considered as most reliable and authentic source of having information regarding their firms (Ramos et al., 2012). CEOs were given structured questionnaires to collect data. To get the high response level from firms, total 1200 questionnaire were e-mailed; self-presented and services of survey firms were also acquired. Assurance was also given regarding confidentiality of their responses. Out of 1200 distributed questionnaires, we received 461 with the percentage of 38.41; whereas 41 questionnaires were incomplete and remaining 420 were used in the final data file. Out of total received 461 questionnaires, 113 questionnaires were received through email, 167 questionnaires were self-administrated and the remaining 181 questionnaires were



collected by getting the support of survey conducting firm. A summary of sample distribution by cities is presented in Table 1.

<b>Cities</b>	<b>No. of Firms</b>	<b>Percentage</b>	<b>Questionnaire Distributed</b>	<b>Response Received</b>
Lahore	2328	27	324	122
Faisalabad	1528	18	216	88
Gujranwala	1213	14	168	68
Sialkot	1127	13	156	47
Gujarat	955	11	132	34
Multan	779	9	108	35
Sheikhupura	693	8	96	26
<b>Total</b>	<b>8623</b>	<b>100</b>	<b>1200</b>	<b>420</b>

Cluster sampling has been considered a most appropriate technique for the sampling purpose. While information provided by SMEDA was used to gain insights about the clusters of those industries prevailing in Pakistan's major cities. Whereas, seven major cities of Punjab province has been selected in this research i.e. (Lahore, Faisalabad, Gujranwala, Sialkot, Gujrat, Multan, and Sheikhupura). In this framework, the selection of these cities has been done on the basis of having industries at the maximum number, containing Punjab's sixty-five percent of all production firms. Based on the distributed questionnaires in seven cities we received the response with percentage of 37, 41, 40, 30, 26, 32 and 27 respectively. Furthermore, the selected industries have a maximum contribution in terms of GDP, employment and exports of country. The study involved firms which comprised of numerous sectors i.e. textile, leather, sports, food and beverages, metal and wood and furniture, whereas 56% of the industry was having ages more than five years and remaining 44% industry has fallen in the category of below five years age. Among respondents, 82% of respondents were male and 18% were female shows in Table 2.

<b>Industry</b>	<b>No. of Firms</b>	<b>Percentage</b>	<b>Questionnaire Distributed</b>	<b>Response Received</b>
Textile	2211	26	312	111
Leather	1507	17	204	70
Sports	1274	15	180	37
Food and beverages	1838	21	252	105
Metal	790	9	108	51
Wood and furniture	1003	12	144	46
<b>Total</b>	<b>8623</b>	<b>100</b>	<b>1200</b>	<b>420</b>

## Measures

The constructs used were empirically pre-tested from past studies, so that we can be ensured of their validity and reliability. Constructs and measurement items of this study were adapted from the existing literature and assessed with 7-point Likert scale starting from (1) Strongly Disagree to (7) Strongly Agree. While we perform meta-analysis related to the use of

same measure for constructs, a common issue related to the measurement of items is that they are measured differently in terms of how they are defined in primary literature studies. This issue can be resolved by defining the relevant constructs appropriately (Lipsey & Wilson, 2001), therefore the definitions of constructs we have used are in line with previous studies. In the next step, a random sample of 15 research studies was examined and the main aim was to use standard methodology for coding effect sizes (Tihany et al., 2005).

The IT infrastructure flexibility scale having five items was adopted from (Byrd & Turner, 2001). Respondent were asked to evaluate the compatibility, connectivity and modularity of IT infrastructure of firm. The constructs were measured by using multi-item scales on the basis of previous research. Results of confirmatory factor analysis showed that ( $\chi^2=3.409$ ; CFI =0.985; NFI=0.985, GFI=0.983 and RMSEA=0.076) and the value of reliability is more than the benchmark value of 0.70 ( $\alpha=0.879$ ). The IT integration scale having four items was adopted from (Goodhue et al., 1992). Results of confirmatory factor analysis showed that ( $\chi^2=0.882$ ; CFI=0.999; NFI=0.999, GFI =0.998 and RMSEA=0.001) and the value of reliability is ( $\alpha=0.897$ ).

The business venturing scale having 5 items was adopted from Zahra (1993) (for example, the company has diversified its operations into new industries. The scale was uni-dimensional with reliability ( $\alpha=0.899$ ). Confirmatory factor analysis results to validated the scale for example ( $\chi^2=2.384$ ; CFI=0.993; NFI=0.987, GFI=0.988 and RMSEA=0.057). The innovation scale having 5 items was adopted from (Zahra, 1996), also cited by (Simsek & Heavey, 2011). This scale measurement includes entrepreneurial activities by a firm relevant to product and process innovations the company has pioneered the development of breakthrough innovations in its industry or by count variables referring to the number of product and/or process innovations. The scale for innovation was uni-dimensional with reliability ( $\alpha=0.878$ ). Confirmatory factor analysis results to validated the scale for example ( $\chi^2=1.057$ ; CFI=0.998; NFI=0.995, GFI=0.995 and RMSEA=0.012). The scale for strategic renewal was adopted from (Zahra, 1993) and having six items. Among them one was deleted due to low factor loading. The scale for strategic renewal was uni-dimensional with reliability ( $\alpha=0.900$ ). Confirmatory factor analysis results to validated the scale for example ( $\chi^2=0.786$ ; CFI=0.999; NFI=0.997, GFI=0.996 and RMSEA=0.002). Five items scale for firm performance is adopted from (Murray & Kotabe, 1999). The CFA results of firm performance showed ( $\chi^2=1.558$ ; CFI=0.99; NFI=0.99 and GFI = 0.99) and the value of reliability is ( $\alpha=0.918$ ).

### **Common Method Bias**

The collection of all measures included are from the same source, so we have used Harman's one-factor test to find out the possible problem related to common method variance. Common method variance result would be significant when a single factor is accounted for majority of the covariance in constructs (Podsakoff & Organ, 1986). Hence, Harman's one-factor test helps in assessing the potential of the common method bias in the data set (Podsakoff & Organ, 1986). The first factor in a factor analysis of the dependent and independent variables are not accounted for most of the variance. So, the common method bias is not likely to be a concern.

## ANALYSIS AND RESULTS

### Instrument Validation

The instrument validation procedure was carried out in four steps. In the first step construct reliability was calculated, in the second step variance of the constructs was estimated, in the last two steps discriminant and convergent validity was calculated. According to Phillips and Bagozzi (1986), construct validity can be measured by using the two ways convergent validity and discriminant validity of measurement items. It evaluates the consistency of multiple operationalization of a construct and significance of t-values of all factor loadings shows the satisfactory of convergent validity (Gefen et al., 2000).

Initially, we calculated the correlation between the constructs, mean values along with standardized deviation of the constructs in the model. The values for mean and standardized deviations are in acceptable range. After that, the values of reliability, composite reliability, AVE and range of standardized loading are calculated, as shown in Table 3. Indicator and Composite Reliability (CR) (Fornell & Larcker, 1981) both are measured, presented in Table 4. The Threshold value for the indicator reliability is 0.50 and for CR value is 0.70 (Nunnally & Bernstein, 1994).

	<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>	<b>AVE</b>	<b>The Range of Standardized Loadings</b>
FP	0.918	0.938	0.752	0.82 - 0.86
ITINFR	0.878	0.922	0.704	0.75 - 0.82
ITINTG	0.897	0.928	0.764	0.77 - 0.87
STRENEW	0.900	0.926	0.714	0.78 - 0.83
INNO	0.878	0.911	0.673	0.73 - 0.80
BVENT	0.899	0.923	0.666	0.70 - 0.81

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; FP: firm performance, ITINFR: IT infrastructure flexibility, ITINTG: IT integration, STRENEW: strategic renewal, INNO: firm innovation, BVENT: business venture

The values of Cronbach's alpha and composite reliability are exceeding the threshold value which is 0.7 for the constructs in our model, indicating an acceptable range measurement item's reliability. Average Variance Extracted (AVE) shows the complete variance of indicators elucidated by a latent construct (Fornell & Larcker, 1981). The values of AVE in this study are above threshold values for example 0.50, established by (Hair Jr, 2006). Also, factor loadings fall within the range with the significance level  $p < 0.001$ . All items loadings being significant means that they indicate convergent validity.

<b>Descriptive Statistics</b>								
	<b>Mean</b>	<b>SD</b>	<b>FP</b>	<b>ITINFR</b>	<b>ITINTG</b>	<b>STRENEW</b>	<b>INNOV</b>	<b>BVENT</b>
<b>FP</b>	6.011	0.866	<b>0.867</b>					
<b>ITINFR</b>	5.964	0.851	0.585	<b>0.839</b>				
<b>ITINTG</b>	5.945	0.919	0.552	0.377	<b>0.874</b>			
<b>STRENEW</b>	5.844	0.962	0.562	0.445	0.549	<b>0.845</b>		
<b>INNO</b>	5.961	0.891	0.559	0.389	0.568	0.575	<b>0.820</b>	
<b>BVENT</b>	5.891	0.893	0.506	0.386	0.506	0.522	0.549	<b>0.816</b>

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; FP: firm performance, ITINFR: IT infrastructure flexibility, ITINTG: IT integration, STRENEW: strategic renewal, INNO: firm innovation, BVENT: business venture

While the discriminant validity of constructs is measured by assessing the values of AVE, which should be higher than squared correlation among constructs, the degree to which all constructs deviate from each other (Fornell & Larcker, 1981). The result shows that all constructs are fulfilling the criteria of convergent and discriminant validity. Table 4 presents the inter-construct correlations whereas correlation result shows that there exists a significant correlation between constructs.

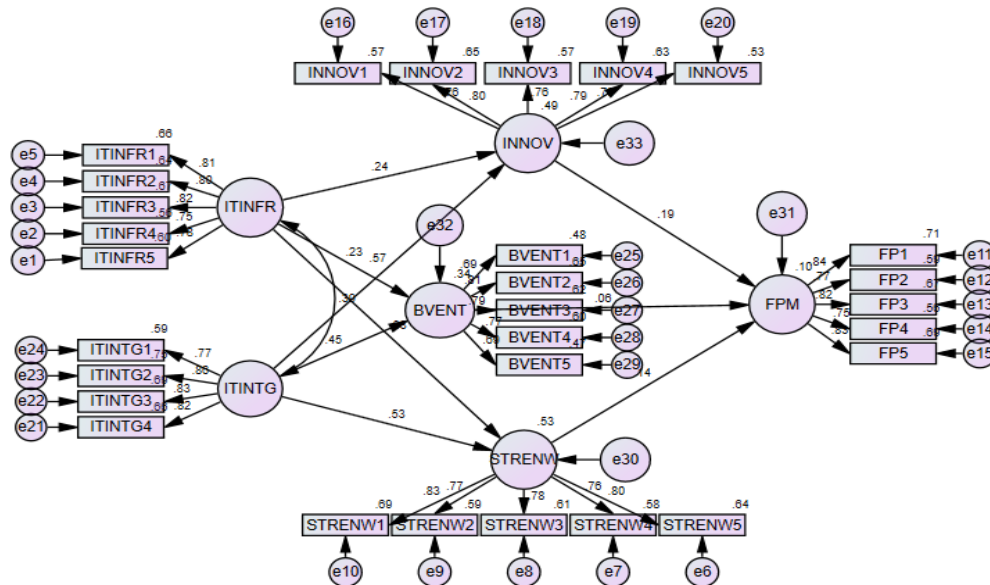
## Data Analysis

In this study different indices were used to assess the structural model fitness (Hair et al. 2006), such as CFI, NFI, GFI, and RMSEA and chi-square. Results showed that all five measurement models are fulfilling the basic criteria of these indices (CFI, NFI and GFI > 0.90; and RMSEA < 0.08 and chi-square < 3). Table 5 shows the fit statistics of all five measurement models. All the measurement models for example IT infrastructure flexibility, IT integration, Innovation, business venturing, strategic business renewal and firm performance individually ran to get fit statistics results, and the results show that all measurement models are a good fit. The values for all fit statistics are mentioned in Table 5.

<b>Constructs</b>	<b>CFI</b>	<b>NFI</b>	<b>GFI</b>	<b>Chi-square</b>	<b>RMSEA</b>
<b>FP</b>	0.966	0.922	0.905	1.712	0.041
<b>ITINFR</b>	0.985	0.985	0.983	3.409	0.076
<b>ITINTG</b>	0.999	0.998	0.998	0.882	0.002
<b>STRENEW</b>	0.999	0.997	0.996	0.786	0.001
<b>INNO</b>	0.998	0.995	0.995	1.057	0.012
<b>BVENT</b>	0.993	0.987	0.988	2.384	0.057

FP: firm performance, ITINFR: IT infrastructure flexibility, ITINTG: IT integration, STRENEW: strategic renewal, INNO: firm innovation, BVENT: business venture

When the CFA test was conducted, firstly, we assessed the model fitness indices of measurement models and then the CFA assessment for structural model was done whereas the fitness indices gave us satisfactory results which were in line with the recommended values. The fitness of indices indicate a good fit for the overall structural model, the fitness indices values for the full structural model are for example CFI=0.973, GFI=0.915, NFI=0.929, Chi-square=1.569, and RMSEA=0.037, resulting in a good model fit.



**FIGURE 2**  
CFA DIAGRAMMATIC REPRESENTATION OF STRUCTURAL MODEL

Relationship	Coefficient value	Significance	Hypothesis testing
ITINFR → INNO	0.237	***	H1a: Accepted
ITINFR → BVENT	0.239	***	H1b: Accepted
ITINFR → STRENEW	0.344	***	H1c: Accepted
ITINTG → INNO	0.577	***	H2a: Accepted
ITINTG → BVENT	0.445	***	H2b: Accepted
ITINTG → STRENEW	0.574	***	H2c: Accepted
INNO → FP	0.153	**	H3: Accepted
BVENT → FP	0.030	n/s	H4: Rejected
STRENEW → FP	0.122	*	H5: Accepted

Note: \*p<0.05; \*\*p<0.01; FP: firm performance, ITINFR: IT infrastructure flexibility, ITINTG: IT integration, STRENEW: strategic renewal, INNO: firm innovation, BVENT: business venture

Hypothesis results are stated in Table 6, according to which, *H1a* is strongly supported which means that IT infrastructure flexibility has a significantly positive relationship with innovation which is established through the direct path coefficient ( $\beta=0.237$ ), it means that IT infrastructure flexibility provides support in achieving innovation at firm level in manufacturing SMEs. *H1b* and *H1c* are also strongly supported which means that IT infrastructure flexibility has a significantly positive relationship with business venturing and strategic renewal which is established through the direct path coefficients for example (*H1b*;  $\beta=0.239$  and *H1c*;  $\beta=0.344$ ), it means that the two activities for example business venturing and strategic renewal are supported by IT infrastructure flexibility. Similarly, *H2a*, *H2b* and *H2c* are also supported and have significant positive relationship with innovation, business venturing and strategic renewal respectively which is established through the direct path coefficient for example (*H2a*;  $\beta=0.577$ , *H2b*;  $\beta=0.445$ , *H2c*;  $\beta=0.574$ ), it means that IT integration provides full support for the enhancement of CE dimensions for example innovation, business venturing and strategic

renewal. The *hypothesis 4*, (mediator to DV) representing direct path from business venturing to firm performance is rejected due to its insignificant impact ( $\beta=0.030$ ). Whereas the other two direct paths from mediator to DV for example *H3* and *H5* are positive and accepted with the value of path coefficient ( $\beta=0.153$ ;  $\beta=0.122$ ) respectively. We have also analyzed mediations paths in which mediator is accounted for the association between IV and DV and for the complete mediation, the direct association between the IV and DV will be insignificant while the effects are controlled for the intervening variable (Judd & Kenny, 1981). Mediation can also be tested by identifying the direct associations between the paths of IV and DV variable as well as the indirect relationship from IV to the mediating variable and then to the DV at the same time (James et al., 2006). The indirect relationship of IT infrastructure flexibility and IT integration on firm performance through mediators (innovation and strategic renewal) are showing partial mediation on the basis of the results by showing direct paths between these mediators as significant for example when innovation was taken as mediator the path coefficient was 0.085 with significant p-value, resulted in partial mediation. Similarly, when strategic renewal was taken as mediator the mediated path coefficient was 0.172 that also depicted partial mediation. Lastly, the mediated impact of IT infrastructure and IT integration on firm performance through business venturing is showing no mediation. On this basis of these results, we have concluded our paper with a detailed discussion.

## DISCUSSION AND CONCLUSION

In recent years, more researchers are interested to explore CE and its impact with other constructs (Phan et al., 2009). There is also a need for more theory development regarding how CE dimensions individually impact other variable for example performance outcomes. Additionally, more research has to be carried out about antecedents of CE (Ireland et al., 2009). Drawing on the literature, the present research is conducted to hypothesize the dimensional role of IT capabilities on firm performance through corporate entrepreneurship dimensions. In our study IT capability dimensions (IT infrastructure flexibility and IT integration) have a significantly positive impact on CE dimensions which further have a contribution to enhance firm performance. This study traces the indirect paths from IT capabilities (IT infrastructure flexibility and IT integration) to firm performance by using the dimensions of CE as the underlying mechanism. Hence, the theoretical model developed our understanding how IT infrastructure flexibility and IT integration impact CE dimension simultaneously, to enhance the firm performance. The empirical investigation of relationships between IT capabilities dimensions (IT infrastructure flexibility and IT integration) and firm performance through the critical role of CE dimensions (innovation, business venturing, and strategic renewal) contributes in the literature by extending the dimensional role of variables in an integrated framework.

The finding of our study provides support to the dimensional role CE, leveraged by IT infrastructure flexibility and IT integration to enhance firm performance. The results have revealed that IT-enables strategic renewal and innovation have a significant impact on firm performance when empirically tested by direct and indirect paths which establish IT infrastructure flexibility and IT integration provides a baseline to enhance entrepreneurial activities. On the other hand, *H4* has shown insignificant relation between business venturing and firm performance. Similarly, two mediated paths have an insignificant impact contrary to the assumed hypothesis in which firm performance is not enhanced when tested through the mediating role of business venturing for instance the indirect paths between IT infrastructure flexibility and IT integration on firm performance through business venturing is insignificant.

These findings suggest that firms should consider time frame before engaging in CE activities. The main reason for the insignificant relationship may be due to that fact that most studies are based on cross-sectional time frame rather than longitudinal, to realized the benefits of business venturing, hence we suggest that effect of business venturing on performance may better judge in a longitudinal time frame to make our understanding more clear regarding dimensional role CE.

Another suggested reason for the insignificant mediated paths is that SMEs find it difficult to attain funding for venturing activities, and with inadequate funding venturing activities may not be successful. The policymakers should be vigilant in providing financial support to the SMEs at the critical time of their business cycle. These findings tend to suggest that SMEs have to be careful when they are undertaking the CE activities initiates by considering its relating implications. Pertaining to CE, business venturing impact on firm performance in this study may be insignificant because SMEs sometimes firms find it tough to make invest due to limited funding. In the business environment of today's world due to globalization, industry and rapid pace of technology change, now firms are smart and vigilant to analyze what to do when they see an opportunity, therefore thoughtful decisions must be made when firms undertake business ventures for successful implementation and positive results.

The study would allow managers to be aware of the possibility of improving SMEs performance by specifically, focusing on the IT-enabled CE dimensions to improve firm performance, as a result managers/CEOs may identify the business environment in a better way to make entrepreneurial investment decision making. The impact of IT infrastructure flexibility on firm performance through innovation support firm's activities by targeting the innovation activities on all levels. In this way, effective use of IT resources developed the flexibility of IT infrastructure and has shown positive impact on new products, new processes which are being focused by SMEs and consequently firm performance increases (Berends et al., 2014). In the same way, the impact of IT infrastructure flexibility on firm performance through strategic renewal support firm's activities. In the dynamic business environment the greater importance is given to the intangible assets for example IT capabilities and CE dimensions (Teece, 2012; Zimmerman & Zeitz, 2002) and in this regard, strategies should be devised to SME businesses along with the use of dynamic capabilities for the performance outcomes. This study has been carried out in a developing country like Pakistan, whereas the business environment of Pakistan (a developing country) have few similarities with India, Bangladesh etc. therefore, SMEs sector of various developing countries would also benefit from the findings of this study.

By proposing and establishing the relationships between the direct paths and elaborating the indirect mediated paths, this study has a significance of being the first academic effort to emphasize the role of IT capability dimensions on firm performance through the dimensional role of CE. Our study contributes to the literature by adopting a perspective on IT capabilities and CE which elaborates on the interaction between IT capability dimensions and IT-enables CE dimensions.

## **LIMITATIONS AND FUTURE RECOMMENDATIONS**

The paper has a few limitations. We have collected data from a one respondent at a particular point in time which is cross-sectional, although the respondents in our study were adequately well-informed about the business, as generally CEO's/managers/top management are more aware of IT-related issues. However, the data collection way can be in time series instead of cross-sectional, which can provide deeper insights regarding this framework. The impact of business venturing on performance may be underestimated in the current study due to long-term

implications of diverse CE activities that require a longitudinal perspective, which is also consistent with the study by (Zahra & Covin, 1995).

This empirical research could be extended by adding other dynamic capabilities with their dimensional role as a mediator with IT capability dimensions. For the inconsistency of results business venturing and firm performance, some boundary condition may be introduced to see how results vary. This research is ought to be extended to the SMEs in other Asian regions in order to have more generalizable results and to analyze differences in cultural and location-based institutional specificities that can affect SMEs' capacity in relation to how much business value can be obtained from the use of IT capabilities. However, SMEs in other regions may not seemingly exhibit any distinctive element in the culture, institutional setting and managerial practices, they follow; but extending research on the basis of regions is imperative to empirically validate our findings. Future studies may explore second-order dynamic capabilities with other constructs because analyzing antecedents along with the nature of CE in relation to the use of IT capabilities in the SMEs sector is an important avenue for the researchers.

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