Pakistan Journal of Commerce and Social Sciences
2017, Vol. 11 (1), 166-183
Pak J Commer Soc Sci

The Integrative Determinants of Innovation Performance: The Role of Learning Organization and Knowledge Creation

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Abstract

This study looks into the mediating effects of knowledge creation in the relationship between learning organization (LO) practices and innovation performance. It was performed with a sample of employees from Pakistani telecommunication companies. Findings from structural equation modeling suggest strong correlations between LO practices and knowledge creation, with both of them being critical drivers of innovation performance of firms. The findings further emphasize that knowledge creation plays a partial mediating role in linking the LO practices to innovation performance. The study suggests that providing training to management for both, effective implementation of LO practices and increasing intra and inter-departmental interaction for knowledge creation, could be useful strategic options to improve and boost innovation performance.

Keywords: learning organization, innovation, knowledge creation, telecommunication, Pakistan

1. Introduction

Innovation performance is considered as the panacea for sustainable economic growth and development. It is the means to achieve long-term improvement in effectiveness, efficiency, productivity, competitiveness, profitability, agility and performance excellence of firms. Innovation performance is expensive and difficult to achieve but it can generate valuable, difficult-to-imitate and matchless competencies and capabilities which, in the long-run, lead to development of sustainable competitive advantages for firms (Kaplan & Poole, 2012; Gunday et al., 2011; Adekola et al., 2008; Wang & Wang, 2012). Firms exhibiting high innovation performance have been found to have positive market image, larger market share, higher profit margins, protection from cyclical downturns, market leadership, more investment opportunities, and access to various sources of capital (Hall & Wagner, 2012; Kaplan & Poole, 2012). Hence, the concept of

innovation performance needs to be well-understood by the managers of all kinds of firms. Managers should have a deeper knowledge of the factors that can play a role in influencing innovation performance of firms.

Given the significant role of innovation in organizational success, several scholars across different research domains have conducted countless studies to investigate the linkage between innovation performance and different independent and dependent variables (Tushman & Anderson, 1986; Feldman & Kelley, 2006; McDonough et al., 2008; Van Looy et al., 2005). For instance, economists have analyzed the effect of innovation on firms' economic growth, whereas marketing studies have looked into the impact of market and product orientation on innovation. Management strategists examine how organizational policies and strategies influence innovation, whereas organizational behavior literature focuses on the organization-specific characteristics that shape innovation. Organizational behaviorists have found several factors that have considerable effects on innovation, and they include organizational structure and culture (Büschgens et al., 2013; Keum & See, 2014), HR practices (Beugelsdijk, 2008), knowledge creation capability (Schulze & Hoegl, 2006), leadership (Borins, 2002), learning organization (LO) practices (Farooq, 2012), technological infrastructure (Tsai, 2001), and creativity-supportive climate (Chen, 2007). Among these various factors, LO practices and knowledge creation capability have been distinguished as two highly influential drivers of firm's innovation performance.

While academicians and practitioners have paid considerable attention to the concepts of LO, knowledge creation and innovation performance, the extant research on their interrelationship is largely fragmented and far from conclusive. Much of the literature focuses on the individual association between knowledge creation and innovation, and between LO and innovation, while the combined effect of LO and knowledge creation on innovation has not received any research attention (Esterhuizen et al., 2012; Jiménez-Jiménez and Sanz-Valle, 2011; Hung et al., 2011; Nonaka et al., 2006). For example Farooq (2012) studied the LO–innovation relationship without considering the role of knowledge creation, while Berraies and Chaher (2014) examined the knowledge creation–innovation link, but LO was not included in the model. As a result, it is unclear whether LO a direct effect on innovation performance has, or an indirect effect can take place through knowledge creation. Though some studies suggest that knowledge creation may mediate the LO–innovation relationship, but empirical evidence for such suggestion is missing. Thus, to date, it is still questionable whether LO or knowledge creation has a greater effect on firms' innovation performance.

In addition, among the studies that have analyzed the individual associations between LO, knowledge creation and innovation performance, most were performed in the develop parts of the world such as South-Eastern Asia and Western Europe (Garcia-Morales et al., 2012; Škerlavaj et al., 2010; Shu et al., 2012; Sankowska, 2013). The knowledge base regarding the linkage between these three variables is limited in the developing world, particularly in South Asian countries. Therefore, there is a dearth of reliable data to answer the following question: are the Western models linking innovation with LO and knowledge creation applicable in non-Western contexts?

Hence, considering these research gaps, this study aims to achieve a two-fold objective: (i) to explore the individual linkages among LO practices, innovation performance and knowledge creation; and (ii) to empirically test a structural model in which knowledge

creation mediates the link between LO practices and innovation performance. The study starts with a comprehensive review of literature examining the current state of LO, knowledge creation and innovation concept. This is followed by structural equation modeling (SEM) analysis for empirically testing the proposed model. The last section discusses the study's results, implications and limitations, and suggests directions for future research.

2. Literature Review

2.1 Learning Organization

The idea of learning as a critical organizational process was first suggested in the late 1970s by Argyris and Schön (1978) in their much celebrated book *Organizational Learning: A Theory of Action Perspective*. Senge further popularized the concept of learning organization through his 90's book *The Fifth Discipline: The Art and Practice of the Learning Organization*. LO has been a prominent concept in the fields of management, organizational psychology and human resource development since past three decades (Song & Kolb, 2013). Over the years, it has received considerable importance from the scholarly community and has also attracted the attention of practitioners and policy makers from various industries (Yoon et al., 2010). LO is not a goal but an organizational strategy to ensure that the right employees learn at the right time and right place, and that these employees could use and share their learning to improve the organizational operations and competitiveness (Senge, 1990; Farooq, 2012). Becoming a LO is essential for firms in their struggle for economic success because it builds decision-making capacities, facilitates management of intellectual capital, stimulates organizational change, and enhances innovation capability (Watkins & Marsick, 2003; Hung et al., 2011).

The underlying philosophy of a LO is 'learn or die'. LOs are organizations that facilitate their people to excel at knowledge creation, acquisition, transference and exploitation. LO is built from three building blocks: (i) a learning-encouraging climate, (ii) concrete learning practices and systems, and (iii) a learning-reinforcing leadership (Garvin et al., 2008). LO, along with its members, continuously learn as a dynamic and integral system. In such an organization, employees learn from the learning entrenched in the organizational practices, systems, structures, policies, values and culture. In LO, people actively identify and solve problems, and in doing so, enable the firm to continuously improve, experiment and augment its capability (Song, 2008). LO rests on values like personal development, problem solving, change acceptance, culture for excellence, open-mindedness, environmental connectivity, team building, collaboration, communication, and passion for learning (Marquardt, 2011).

2.2 Knowledge Creation

Since the 1990s, research on knowledge creation has largely been based on the landmark works of Nonaka and his colleagues. Nonaka and von Krogh (2009) described knowledge as consisting of two dimensions: tacit and explicit. The tacit dimension refers to the non-verbalized feelings, thoughts and experiences, and entails two components: technical and cognitive. Technical components signifies the context-specific and applicable skills and know-how; while, cognitive component implies the viewpoints, paradigms and mental models of individuals (Nonaka & Toyama, 2005). The explicit dimension corresponds to the codified and articulated knowledge, and is generally categorized as rule-based and

object-based. Rule-based knowledge is the knowledge translated into SOPs, routines or policies; whereas, object-based knowledge is the knowledge that is in a tangible form, or is organized as formulas, numbers or words (Nonaka et al., 2006; Nonaka & von Krogh, 2009).

Knowledge creation is a widely studied concept in the areas of organizational development and human resources (Song & Kolb, 2013; Purcarea et al., 2013). Organizational theorists define knowledge creation generally from two broad perspectives: stock and process. The stock perspective considers knowledge creation to be instrumental in building up organizational knowledge stock. Whereas, according to the process perspective, knowledge creation is an interactive and dynamic process which emphasizes the inter-relationships among individuals, groups and organizations to create new knowledge (Nonaka & Toyama, 2005; Nonaka & von Krogh, 2009).

In the knowledge intensive economy of today, knowledge creation is looked upon as the prime ingredient for developing and sustaining companies' strategic advantage, innovation capability and competitiveness, and thus, it is increasingly becoming the foremost concern of managers in the corporate world (Capello & Varga, 2013). However, the creation of knowledge is a managerial task that still remains challenging. The challenges in this process are largely because of the context-specific, dynamic, tacit and personalized nature of knowledge. These factors become especially problematic when knowledge is to be moved beyond physical boundaries of clearly defined functions, departments or units (Berraies & Chaher, 2014). Nonetheless, several companies have been able to successfully overcome these issues, and thus, it is now feasible to acquire, transfer and capitalize on the knowledge that has been created by the individuals and teams within an organization (Nonaka et al., 2006).

2.3 Innovation

One of the most essential means to grow existing market share, enter new markets and create competitive advantage for an organization is innovation (Jiménez-Jiménez & Sanz-Valle, 2011). Motivated by the mounting global competition and rapidly changing technologies that swiftly diminish the value of existing products and services, organizations have started to focus on innovation (Škerlavaj et al., 2010; Liao & Wu, 2010). Hence, innovation constitutes a critical element of organizational strategies for various reasons; for instance, to seek better performance and positive reputation in market, boost productivity of manufacturing processes, and consequently gain sustainable competitive advantages (García-Morales et al., 2012). Innovations provide organizations with a strategic orientation to prevail over the difficulties they face while struggling survives, and to gain and maintain a competitive edge in a turbulent marketplace (BolíVar-Ramos et al., 2012). Since last two decades, particularly owing to its practical relevance, innovation has attracted considerable attention of scholars in various disciplines to define and categorize it, and examine its effects on organizational processes and performance (Gunday et al., 2011; Hung et al., 2011).

Ever since the industrial revolution, organizations view innovation as a strategy to attain competitive edge, and improve their profitability, viability and competitiveness (Kamasak, 2015). Innovation, as per Rogers (1998), is the application of new ideas to the product, process or any other aspect of a firm's activities. According to Kamasak (2015), innovation is a specific function of entrepreneurship, the means by which the

entrepreneur either creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth. A firm's innovation performance encompasses three closely related innovation outcomes: market, process and product innovations. 'Product' is the good/service that a company offers to its customers, 'process' refers to the method through which that good/service is developed or delivered, and 'market' is the way through which the good/service or its news reaches the customers (Baesu et al., 2015). Product innovation is market-focused and is aimed at adding value to the customer or stakeholder; process innovation focuses on the internal functioning of the firm and is meant for improving organizational efficiency; while market innovation focuses on the company's interaction with potential customers, and is aimed at improving the market position of a firm (Drucker, 2002; OECD, 2005).

3. Theoretical Framework

3.1 Theoretical Basis of the Study

The relationship among the constructs of learning organization, knowledge creation and innovation performance has roots in the Resource-Based View (RBV) theory. The RBV theory postulates that firms are basically unique clusters of assets, capabilities and resources of varying levels. Furthermore, the survival of firms in today's dynamic era is contingent on their capacity to develop new capabilities, exploit their resource base, revitalize existing assets, and make resources more inimitable. Proponents of RBV theory believe that when firms possess and exploit capabilities, assets and resources that are rare as well as valuable, they can develop competitive advantages. If the capabilities, assets and resources are both non-substitutable and inimitable, then firms can also sustain those advantages. The achievement of such competitive advantages can, in the long run, facilitate firms to improve their functioning and efficacy, and attain performance-based outcomes.

In line with the principles of RBV theory, management science scholars argue that firms oriented towards learning consistently improve, build, integrate, reconfigure, add and regenerate their competences and resources, and thus, are better able to achieve improved innovativeness, effectiveness, superior performance and sustainable strategic advantages. Learning orientation allows firms to rigorously examine the capabilities, assets and resources that allow them to achieve supernormal return rates and unparalleled market performance. LO continuously creates valuable and irreplaceable tacit knowledge that is hard for the competitors to replicate. This knowledge, if managed and exploited effectively, turns into a strategic organizational resource that serves as a vital source of developing and sustaining innovation-based competitive advantages. LOs can be viewed as social institutions who store knowledge in their behavioral rules, which are constantly being improved, preserved and shaped.

3.2 Relationship between Learning Organization and Innovation Performance

The concept of learning is closely related to innovation, however, only a handful studies have attempted to empirically verify the relationship between LO and innovation capability of firms (Farooq, 2012). According to the literature, learning is a continuous process that encourages firms to question, challenge, and change their fundamental concepts, knowledge, methodologies and behavior (Liao et al., 2010). Learning generates new ideas, encourages creativity, facilitates firms to identify new opportunities, and in

doing so, provides a base for successful innovation (Argyris & Schön, 1978; Hung et al., 2011).

Garcia-Morales et al. (2012) advocated that learning practices improve the capacity of organizations to carry out innovations. In their opinion, single and double-loop learning, which are the basis of organizational meta-learning process, contribute to innovation. Hung et al. (2011) emphasized the significance of individual and organizational learning for innovation, and considered them as a crucial weapon for achieving a competitive edge and lasting performance in a knowledge-intensive industry. Škerlavaj et al. (2010) underscored LO as a precursor of knowledge management and opined that firms which effectively acquire, disseminate and utilize knowledge are more innovative than others. In addition, Jiménez-Jiménez and Sanz-Valle (2011) propounded that learning systems and activities help in creating new knowledge, and are therefore critical for organizational innovation and performance. Thus, on the basis of the relevant prior studies, it is hypothesized that:

- **H_1:** LO practices positively influence innovation performance of firms

3.3 Relationship between Learning Organization and Knowledge Creation

In accordance with the notable works of Nonaka and his colleagues, there should be a supportive environment—'*ba*'—in organizations that could facilitate and promote knowledge creation process (Nonaka et al., 2006). *Ba* is Japanese word which denotes 'workplace context' or 'space' in English. *Ba* can be a mental, virtual or physical collaborative area in the workplace where processes to create, share and utilize knowledge are promoted. *Ba* provides the required place, quality and energy to effectively convert individuals' knowledge into organizational concepts and move along the knowledge creation cycle (Nonaka & Toyama, 2005; Nonaka & von Krogh, 2009).

The review of literature regarding *ba* reveals that the assumptions of this concept are in harmony with LO, especially in terms of (i) systematic connection with environment, (ii) leveraging organizational knowledge, (iii) supportive managerial structure, (iv) systematic inquiry and dialogue, (v) shared mental model and vision, and (vi) continuous individual learning (Song, 2008). The facilitators of knowledge creation process are also similar to the learning-environment's fundamental characteristics (Song & Kolb, 2013). Besides, each of the practices of LO is influential and encouraging for active creation of organizational knowledge and its subsequent transmission, application and maintenance (Yoon et al., 2010). Hence, on the basis of the limited but relevant literature, it can be postulated confidently that LO plays the role of *ba* in supporting knowledge creation. This relationship between the two concepts is hypothesized below:

- **H_2:** LO practices positively influence knowledge creation in firms

3.4 Relationship between Knowledge Creation and Innovation Performance

The extant research suggests that mere reliance on knowledge acquisition from external sources is not sufficient to enhance innovation performance (Purcarea et al., 2013). Organization should therefore simultaneously acquire knowledge from internal and external sources, integrate it to create new knowledge, and employ that new knowledge in the production of novel products and services (Hung et al., 2010). Strictly speaking, knowledge creation process is not only aimed to generate a stock of knowledge, but to

apply the newly created knowledge in the development of valuable, innovative goods and services (Bueno et al., 2008; Shu et al., 2012).

Esterhuizen et al. (2012) opined that the combination and/or recombination of organizational resources results in innovation. Hung et al., (2010) also postulated that the antecedent of organizational innovativeness is new knowledge creation. Sankowska (2013) further promulgated this view by stating that existing organizational knowledge, when combined in a novel manner, stimulates innovation. With respect to knowledge exchange, Nonaka et al., (2006) theorized that when organizational members interact with each other, tacit and explicit knowledge are disseminated. This intra-organizational knowledge exchange provides an opportunity to organizational members to access and obtain unique and different kinds of knowledge. The knowledge exchange induces organizational members to combine or recombine the newly acquired knowledge with their existing knowledge (Shu et al., 2012). This process generates novel ideas which in turn lead to innovation (Esterhuizen et al., 2012; Purcarea et al., 2013). Hence, on account of this argument, it is hypothesized that:

- **H_3:** Knowledge creation positively influences innovation performance of firms

3.5 Mediating Role of Knowledge Creation in Learning Organization–Innovation Performance Relationship

Numerous researchers have argued that to achieve growth, competitive edge, superior performance and sustainable competitive advantage, firms should transform themselves into LOs (Škerlavaj et al., 2010; Farooq, 2012). However, LO alone does not guarantees growth, competitiveness and success. Organizations should also continuously create knowledge to challenge their core competencies, and change, adapt and learn in order to survive and flourish in the dynamic marketplace (Bueno et al., 2008; Purcarea et al., 2013). Without creating knowledge, organizations cannot produce inimitable and valuable intangible resources and successful new products, and develop a competitive advantage over their competitors (Hung et al., 2010; Sankowska, 2013). The foundation for effective knowledge creation is LO (Song, 2008). A LO supports the creation of knowledge by providing a platform where knowledge could be acquired, developed, shared, integrated and applied (Liao & Wu, 2010). Research contends that LO facilitates knowledge creation by providing a clear vision; encouraging dynamic cooperation, collaboration and teamwork; promoting empowerment, dialogue and diversity; and supporting knowledge activities and leverage (Yoon et al., 2010; Song & Kolb, 2013).

A lot of studies discussed in this section have empirically verified the existence of a direct relationship between LO and innovation, and between knowledge creation and innovation. Hence, on the basis of that discussion, it can be said that knowledge creation may mediate the relationship between LO and innovation performance. This mediating relationship is further hypothesized as:

- **H_4:** Knowledge creation mediates the positive relationship between LO practices and innovation performance

4. Methodology

4.1 Sample and Procedure

This study was performed at the Islamabad offices of four Pakistani telecommunication companies in September, 2015. It was initially planned that sample will be drawn through

randomly sampling method, however, at the last moment, convenience sampling method was selected instead. The change in plan was made because, for security reasons, telecommunication companies did not allow the author to go to each floor and department. The higher officials only permitted the author to conduct the survey in certain departments and that too, in specified hours and as quickly as possible. Hence, a convenience sample of 400 participants was recruited from among the lower and middle management employees who had served at least 1 year in their current organization. Employees were assured that participation was voluntary, and that their responses would be kept confidential and would be used for this study only. Interested employees were asked to sign informed consent forms before participating in data collection. With the help of a research assistant, questionnaires were distributed among participants along with unmarked envelopes. Participants were given an hour to complete the questionnaires, and were instructed to insert filled questionnaires in sealed envelopes. Participants were offered sweets to appreciate their participation. The researchers collected a total of 245 questionnaires, of which 224 were fully completed and suitable for statistical analyses, thus yielding a useable response rate of 56%.

The surveyed participants were largely men (71%) in their 30s (32±4.2), who were married (66%) and post-graduates (88%). A large number of them belonged to the lower managerial levels (72%) and were executives (43%), officers (29%) and assistant managers (17%). Most of them represented the customer services (39%), human resources (25%) and I.T./billing (15%) department. Participants mostly had been working for around for the past 7 (±4.76) years and had a 4 (±2.2) year tenure in their current company.

4.2 Measures

Likert scale based questionnaire was designed to measure the extent to which participants agree or disagree with the activities taking place in their respective organizations. The practices of LO were quantified through sixteen items from the Dimensions of Learning Organization Questionnaire (DLOQ) developed by Watkins and Marsick (2003). The LO construct included practices of employee empowerment, system connection, embedded system, and team learning dimensions. Similarly, the dimensions of knowledge combination and knowledge exchange were adopted to assess organizational knowledge creation for this study. Nine items to measure these two dimensions were taken up from the work of Schulze and Hoegl (2006). Lastly, to determine innovation performance, this study utilized three indices from Gunday et al.'s (2011) study: product innovation with six items, process innovation with five items, and market innovation with five items.

To determine whether or not the factor structure of the three measures is compatible with the data, confirmatory factor analysis (CFA) was conducted. CFA evaluates the consistency level of a theory-driven factorial model in comparison to the real data (Hoyle, 2012). In this study, both first-order and second-order CFA was conducted. The second-order CFA results showed an adequate fit for the four-dimensional LO model, where $x^2(86) = 190.73$, $p<.001$, RMSEA=.07, IFI=.95, CFI=.95, NFI=.91, GFI=.91 and SRMR=.03. Similarly, an acceptable fit for the proposed two-dimensional factor structure of knowledge creation was demonstrated by second-order CFA, where $x^2(24)=54.99$, $p<.001$, RMSEA=.07, IFI=.97, CFI=.97, NFI=.95, GFI=.95 and SRMR=.02. Besides, the second-order CFA results identified a reasonable fit for the three indices of innovation performance, where $x^2(93) = 224.76$, $p<.001$, RMSEA = .08, IFI = .94, CFI = .94,

NFI=.91, GFI = .90 and SRMR = .04. These results for CFA along with the acceptable values of each of the fit indices are summarized in table 1.

Table 1: Goodness-of-Fit Indices of Constructs

	x^2	df	*p*	RMSEA	IFI	CFI	NFI	GFI	SRMR
Acceptable Limit*	–	–	≤ .05	≤ .10	≥ .90	≥ .90	≥ .90	≥ .90	≤ .08
Learning Organization	190.73	86	<.001	.07	.95	.95	.91	.91	.03
Knowledge Creation	54.99	24	<.001	.07	.97	.97	.95	.95	.02
Innovation Performance	224.76	93	<.001	.08	.94	.94	.91	.90	.04

*Hair et al. (2006)

Convergent validity of each of the three constructs was ascertained through CFA. It examines that to what extent, indicators of a particular construct correlate with each other. Convergent validity is actually a process that determines whether the different measures used in the study measure the same concept or not (Hoyle, 2012). Table 2 demonstrates the standardized regression weights of each of the constructs and their respective indicators. All the regression weights were found to be statistically significant as their respective *t*-values exceeded ±1.96. This implied that each indicator was significantly correlated with all other indicators of the same construct, and thus, convergent validity of the scales was confirmed.

Table 2: Second-Order CFA of constructs

Dimension	**First-order**						**Second-order**
	Standardized Loading of Item (*T*-Value)						**Standardized Loading (*t*-value)**
	1	**2**	**3**	**4**	**5**	**6**	
Employee Empowerment	.73 (–)	.86 (12.07)	.80 (11.31)	.79 (11.13)			.79 (11.13)
System Connection	.77 (–)	.77 (11.62)	.77 (11.67)	.69 (10.19)			.89 (8.96)
Embedded System	.61 (–)	.81 (8.91)	.74 (8.43)	.72 (8.25)			.97 (6.79)
Team Learning	.62 (–)	.64 (9.36)	.80 (9.12)	.84 (7.74)			.86 (6.62)
Knowledge Combination	.68 (–)	.65 (9.94)	.79 (9.37)	.63 (11.62)	.78 (9.04)		.97 (13.55)
Knowledge Exchange	.77 (–)	.84 (10.14)	.80 (10.95)	.70 (10.47)			.94 (13.18)
Product Innovation	.74 (–)	.79 (11.42)	.78 (11.31)	.81 (11.69)	.78 (11.18)	.71 (10.13)	.97 (9.37)
Process Innovation	.72 (–)	.83 (11.48)	.80 (11.12)	.76 (10.55)	.61 (8.45)		.95 (10.10)
Market Innovation	.79 (–)	.82 (12.75)	.77 (11.90)	.81 (12.64)	.82 (12.72)		.77 (7.69)

To determine the inter-item consistency of each dimension of the study variables, Cronbach's alpha coefficient was employed. Cronbach's alpha measures the level to which the responses of different items are in agreement with each other. It basically examines the correlation among various items of a particular construct. If the inter-item correlation turns out to be high, it implies that all items measure the same construct. As a rule of thumb, scales with alpha coefficient equal to or more than .70 are regarded as reliable (Hair et al., 2006). As exhibited in table 3, the alpha coefficients for the LO dimensions were between .76 and .93, while the overall scale had a coefficient of .83. The knowledge combination and knowledge exchange subscales individually had coefficient alpha of .87 and .85, respectively, whereas the combined scale had alpha of .84. The reliability estimates for three indices of innovation performance were between .79 and .82, while the scale's overall estimate of reliability was .80. In short, each measure used in the study was highly reliable.

To determine whether or not a certain group of items sufficiently represents the specified construct, composite reliability (CR) of scales was calculated. CR is considered as a more accurate and rigorous indicator of a scale's internal consistency compared to Cronbach's alpha (Zikmund, 2003). Hair et al. (2006) recommended .60 as the least acceptable value of CR. As exhibited in table 3, the LO practices had CR in the .81–.88 interval; knowledge combination and knowledge exchange had CR of .83 and .86 respectively; while product, process and market innovation had CR values of .86, .90 and .90 respectively. Since each of the scales' CR values was in excess to the threshold value of .60, their composite reliability was confirmed.

Finally, another effective measure of ascertain the convergence validity, i.e. average variance extracted (AVE), was used. In essence, AVE determines the percentage of variance in a specific construct that is by virtue of its own indicators. It is calculated by taking the sum of squared standardized factor loading and then dividing the sum by the scale's total number of indicators (Zikmund, 2003). As demonstrated in table 3, AVE of the four LO practices was between .52 and .63; AVE of the two knowledge creation dimensions was between .49 and .59; while the AVE of the three innovation dimensions was between .53 and .63. As all these AVE values were higher than the minimum acceptable value of .50, the convergent validity of the scales as established.

Table 3: Scale Validity and Reliability Test

Variable	Standardized loading of item						α	CR	AVE
	1	2	3	4	5	6			
Employee Empowerment	.77	.89	.79	.73			.76	.88	.63
System Connection	.78	.79	.74	.69			.84	.84	.56
Embedded System	.55	.80	.75	.76			.93	.81	.52
Team Learning	.58	.63	.81	.88			.80	.82	.53
Knowledge Combination	.66	.70	.83	.60	.72		.87	.83	.49
Knowledge Exchange	.72	.81	.83	.73			.85	.86	.59
Product Innovation	.84	.56	78	.70	.74	.67	.82	.90	.53
Process Innovation	.69	.86	.81	.75	.61		.79	.86	.55
Market Innovation	.78	.81	.78	.81	.84		.80	.90	.64

Note. α: Cronbach's alpha, CR: composite reliability, AVE: average variance extracted

5. Results

5.1 Initial Analysis

Before conducting the main analyses for hypotheses testing, it was essential to check the discriminant validity of the theory-driven model of this study. Hence, for this purpose, the null hypothesis was tested through the chi-square difference test. The proposed model was tested against an alternate model which omitted the direct link between LO and innovation, and incorporated knowledge creation as a mediating variable between LO and innovation performance. It was noted that the difference between chi-square of proposed and alternate model was significant, thus concluding that alternative model was significantly worse fit compared to the proposed model. The results of this test are given below in table 4.

Table 4: Chi-Square Difference Test

Model	Chi-square	df	Chi-square Δ	df Δ	Probability
Proposed	95.96	24	-9.55	1	.000
Alternate	105.51	25			

Note. Δ: Difference, df: Degree of freedom

5.2 Hypotheses Testing

To find out whether or not the variables in the proposed theoretical model are related to each other, correlation analysis was performed. A relationship established through correlation analysis has three basic characteristics: (i) direction, i.e. the sign (- or +) of correlation statistic, (ii) consistency or strength, i.e. the value of correlation statistic ranging between 1 (perfect) and 0 (not consistent), and (iii) form, i.e. the monotonicity or non-monotonicity of relationship (Zikmund, 2003). The results extracted from the correlation analysis of this study are illustrated in table 5. The LO practices were found to be strongly correlated with each other (r ranging from .76 to .58; $p<.01$). Of the four LO practices, employee empowerment had the strongest correlation with knowledge exchange (r=.64; $p<.01$), while team learning had the strongest correlation with knowledge combination (r=.57; $p<.01$). Similarly, the two knowledge creation dimensions were strongly and significantly interrelated with each other (r=.74; $p<.01$). Knowledge combination exhibited the strongest correlation with product innovation (r=.57; $p<.01$), while knowledge exchange exhibited the strongest correlation with process innovation (r=.56; $p<.01$). Besides, the three types of innovation were also found to have significant interrelationship with each other (r ranging from .62 to .76; $p<.01$). Both, product innovation and process innovation had the highest correlation with team learning (r=.53 and r=.61 respectively; $p<.01$), while market innovation had the highest correlation with embedded system dimension of LO (r=.61; $p<.01$). In conclusion, the three variables of the study and their respective dimensions were positively related with each other (i.e. implying the existence of monotonic or linear linkages) and the strength of their interrelationships varied from moderate to strong.

Table 5: Correlation Matrix

	$\bar{X}$	SD	1	2	3	4	5	6	7	8	9
1. Employee Empowerment	3.91	.64	–								
2. System Connection	3.67	.65	.76**	–							
3. Embedded System	3.80	.58	.64**	.72**	–						
4. Team Learning	3.76	.61	.58**	.63**	.70**	–					
5. Knowledge Combination	3.48	.65	.53**	.57**	.44**	.57**	–				
6. Knowledge Exchange	3.51	.69	.64**	.63**	.59**	.62**	.74**	–			
7. Product Innovation	3.72	.72	.51**	.49**	.45**	.53**	.57**	.54**	–		
8. Process Innovation	3.79	.58	.55**	.60**	.56**	.61**	.53**	.56**	.76**	–	
9. Market Innovation	3.86	.63	.51**	.48**	.60**	.58**	.43**	.48**	.62**	.66**	–

Note. $\bar{X}$: Mean, SD: Standard deviation, $^{**}p<.01$

This study used SEM technique to test the structural model and the proposed research hypotheses (see figure 1). The SEM analysis revealed that the primary factor in LO model was employee empowerment ($\lambda^{x2}=.872$; $p<.01$). This shows that the effect of LO is positive in firms where employees have a say in decision making and an authority to lead and control their work. Knowledge exchange ($\lambda^{y2}=.914$; $p<.01$) was the most significant sub-process of knowledge creation process. This suggests that to effectively create new knowledge, the information and knowledge of different organizational units and members should be exchanged continually. Furthermore, process innovation ($\lambda^{z2}=.906$; $p<.01$) played a key role in influencing innovation performance of firms. This implies that enhancing supporting activities (like computing, maintenance and accounting) and/or bringing improvements in logistic and production methods, can improve the overall innovation performance.

The SEM analysis further exhibited the causal interactions among the three constructs (see figure 1). LO practices positively influenced knowledge creation ($\gamma^1=.814$) and knowledge creation, in turn, positively affected innovation performance ($\gamma^2=.272$). In addition, LO practices had a significant direct effect on innovation performance ($\beta^1=.558$). These findings suggested that adoption of LO practices stimulates knowledge creation and improves innovation performance. Likewise, promotion of knowledge creation also enhances innovation performance of firms. Hence, the analytical findings provided full support to hypotheses H_1, H_2 and H_3. Additionally, the analytical results indicated adequate fitness of the structural model as all fit indices met the acceptable criteria (such as, RMSEA=.08, RMR=.02, TLI=.92, IFI=.95, NFI=.93, CFI=.95, GFI=.91).

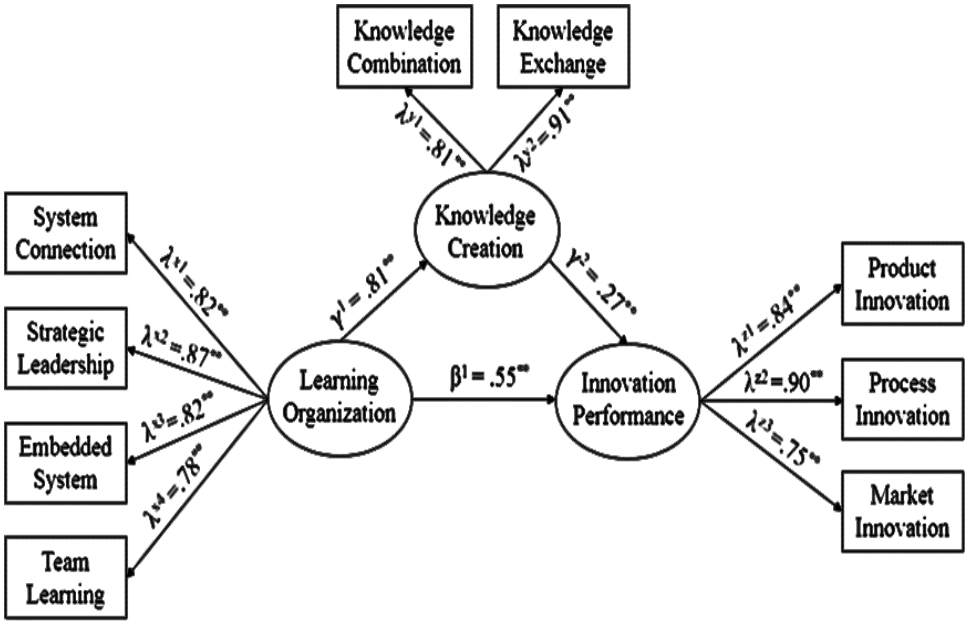

Figure 1: Structural Model

Next, path coefficient decomposition was employed to examine the direct and indirect effect of the constructs on each other (see table 5). It was found that LO practices considerably and positively contributed to knowledge creation (SPC=.814; p<.01) and also to innovation performance of firms (SPC=.558; p<.01). Furthermore, knowledge creation had a significant positive effect on innovation performance (SPC=.272; p<.01). Quite notably, the results demonstrated that through the mediating variable i.e. knowledge creation, the indirect effect of LO practices on innovation performance was reduced to .221 (.814 x .272); thus providing only partial support to hypothesis H_4.

Table 6: Path Coefficient Decomposition Analysis

Independent variable	Effect	Dependent variable	
		Knowledge creation	Innovation performance
Learning organization	Direct	.814**	.558**
	Indirect	—	.221**
	Total	.814**	.779**
Knowledge creation	Direct		.272**
	Indirect		—
	Total		.272**

Note. **t-value > |1.96|

6. Discussion

Using Pakistani telecommunication companies as its subjects, this study conceptualized and empirically analyzed the relationship among LO, knowledge creation and innovation

performance. The main conclusions were like this: (i) there is acceptable goodness-of-fit through SEM analysis of the theoretical model for LO practices-knowledge creation-innovation performance; (ii) LO practices contribute considerably to knowledge creation; (iii) knowledge creation is essential to boost innovation performance of firms, and (iv) LO practices have a substantial direct impact on innovation performance and this impact is partially mediated by knowledge creation.

The study exhibited that the literature and its following discussion provides support to the proposed model for LO practices, knowledge creation and innovation performance. SEM indicated reasonable goodness-of-fit for the model with an empirical dataset gathered from Pakistan. Thus, the structural framework was rational and suitable.

The study further established the significant positive role of LO practices in influencing knowledge creation. The finding was consistent with the seminal work of Senge (1990). It was also in line with the study of Watkins and Marsick (2003), which vindicated that the fundamental function of LO practices is to foster a culture of sharing and trust. Such culture creates a common identity and purpose among employees, and promotes empowerment. Moreover, it facilitates the improvements in organizational systems by supporting knowledge generation, integration and transfer, promoting quality, and thereby stimulating innovation. The SEM analysis identified employee empowerment (λ^{x2}=.872) as one of the critical element of LO practices. Hence, when implementing LO practices in firms, enhancing employee autonomy and inducing employees to learn new skills and new ways of doing things is extremely important.

Additionally, LO practices were found to significantly uplift innovation performance. The studies of Hung et al. (2011) and Farooq (2012) have also reported similar results. Hence, LO practices are not just management tools to promote learning and enhance efficiency, but also to foster an organizational culture of innovation, openness, reliance, and sharing when backed by team learning, system connectivity, empowerment, and embedded systems. This motivates employees to improve process, product, and market innovation performance.

Besides, the study validated the proposition that knowledge creation stimulates innovation performance. The proponents of knowledge creation theory contend that knowledge creation process generates, obtains, shares and combines new insights and information, and can subsequently improve organizational functioning (Bueno, 2008; Sankowska, 2013). The new knowledge creation is also beneficial for augmenting innovation capacity, effectiveness and efficiency, and facilitating overall innovation performance. Effective knowledge exchange and combination provides organizational members with an opportunity to cooperate and learn; develop new knowledge; transfer knowledge intra and inter-organizationally; and apply it to create innovations (Shu et al., 2012; Esterhuizen et al., 2012).

6.1 Implications

There are many ways in which this study makes worthy contributions to the literature. When viewed in the context of today's dynamic environment that constantly pressurizes firms to balance several forces and meet multiple demands, this study is highly important. It determined the interrelations among LO practices, knowledge creation and innovation performance, and also explored the possibility of using knowledge creation as a mediating variable of in the LO-innovation relationship. This study also bridged the three

distinct literatures of learning organization, knowledge management and innovation management. To the best of the authors' knowledge, to date, these three constructs have not been examined together in a single study.

In addition, the study offers valuable suggestions to practitioners. It suggests that firms must improve their learning capacity in order to maintain their competitive advantages and be innovative in today's rapidly changing business environment. Firms should conduct seminars and workshops to emphasize the significance of learning at organizational and individual level. Employees should be given training on issues associated with the adoption of LO practices. Besides, it is advised that managers should also be provided training to determine how to design jobs and workplace in a manner that employees could freely interact with co-workers and share, acquire, combine, and apply knowledge.

6.2 Limitations and Future Research Directions

Despite its several contributions to the literature, this study has certain noteworthy limitations. First, the ability to make causal inferences is precluded by the cross-sectional research design. Though findings from mediation analysis provide preliminary support to the model, they should be interpreted carefully. Further research using hierarchical linear or longitudinal models is warranted to test the mediating effects. Second, the use of self-reported measures to collect data might have led to common method variance bias and social desirability bias. Although the study used well-designed multiple-item scales to reduce the likelihood of these biases, the susceptibility in data cannot be completely eliminated. Future research should consider measuring criterion and predictor variables from different sources, or using qualitative or mixed methods for data collection. Third, the use of convenience sample from a single sector raises concerns for sample representativeness and potential selection bias, thus limiting generalizability of findings. The hypothesized model should be tested in future research with randomly selected employees from different kinds of firms and industries. Finally, this study did not include organizational or industrial attributes in the framework. Future research should test the extent to which those attributes affect the relationships among LO, knowledge creation and innovation performance.

7. Conclusion

The most prominent finding of this research pertains to the integrated framework in which knowledge creation mediates the association between LO practices and innovation performance. LO practices have not only a direct effect on innovation performance, but also an indirect effect via knowledge creation. The study emphasized that firms which implement LO practices are able foster learning-encouraging cultures and flexible structures, leading to continual improvement of processes and increased capacity to perform innovatively. Subsequently, continuous creation of knowledge can further assist firms in producing innovative offerings or solutions for customers. As per the study's implications, providing training to management for both, effective implementation of LO practices and increasing intra and inter-departmental interaction for knowledge creation, could be useful strategies to improve and boost innovation performance.

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