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Knowledge Sharing and Innovation at the Lebanese Banking Industry

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Knowledge Sharing and Innovation at the Lebanese Banking Industry

Abstract

Knowledge is considered the main critical resource for competitive advantage. By encouraging a knowledge-sharing culture within service settings such as banks, the quality of service is enhanced and the opportunities for innovation is created. This research seeks to test the relationship between knowledge sharing (KS) and innovation. A quantitative and explanatory analysis was done by using Structural equations modeling (SEM) to investigate the effect of KS on process and product innovation. Research data were collected through a survey method. The sample result was determined through a probability stratified sampling technique of about 310 employees at 27 banks in Lebanon. The findings confirmed the vital role played by KS in enhancing innovation. The main implications of the research emphasize that knowledge sharing is the most important predictor of process innovation followed by product innovation. The findings highlight how KS produces better outcomes for banks by mobilizing employees to engage in the innovation of products and processes. It is recommended that banks promote KS by establishing a suitable climate that helps employees to meet and communicate ideas effectively. This motivates them to get involve in process and product innovation, by stimulating them to look for novel ideas and adopt advanced technologies. These findings extend the understanding of the processes through which sharing knowledge stimulate innovation, and also stress on the benefits gained by cultivating knowledge sharing processes to generate more innovative outcomes.

Keywords

Knowledge sharing, product innovation, process innovation, banks, Lebanon.

1. INTRODUCTION

Today, the banking sector is facing challenges resulting from the rapidly changing business environment, threatening their survival and long-term success (Easa, 2019; Jyoti and Dev, 2015). Academics and practitioners alike realize the need to be innovative in order to face these challenges (Cheung and Wong, 2011). Innovation becomes one of the major characteristics required for organizational success in twenty-first century workplaces (Cekmecelioglu and Günsel, 2013; Nakano and Wechsler, 2018). Researchers have been trying to identify the factors that stimulate and sustain innovation in organizations (Damanpour and Schneider, 2006; Han et al., 2016). The most significant factor that affect innovation is Knowledge sharing (KS) (Abbas et al., 2019; Bojica and Fuentes, 2012; Mittal and Dhar, 2015).

Knowledge sharing involves converting knowledge into a configuration that can be integrated and applied by others (Hooff and Weenen, 2004). When knowledge is transferred, it helps firms to generates a new knowledge base which in turn enhances innovative activities (Tsai et al., 2001). Hence, the major concern for both academics and businesses is to transform available knowledge into innovations and advertise them successfully (Easa, 2012).

In developing countries like Lebanon, the banking sector also faces several challenges that require innovation. The banking sector is one of the core drivers of stability of the Lebanese economy (Hobeika, 2008; Sujud and Hashem, 2017). The Lebanese banking sector is characterized by a large number of banks of different sizes, nature and ownership structure. A total of 64 banks were operating during 2018 in the Lebanese market, which are classified into, Commercial (47), Private (2), Investment (11) and Islamic banks (4) (Association of Banks in Lebanon, 2018). In Lebanon, banks fall under the jurisdiction of the central bank, which is the bank regulatory authority. It coordinates its activities with the Banking Control Commission (BCC), which ensures compliance with the banking regulations and rules (Association of Banks in Lebanon, 2018).

Until recently the banking industry experienced continual transformation resulting from universal competition resulted from the fast pace of information technology, economics forces and customers' rising expectations of services offered. As such, banks started to launch new series of programs, services and features to be competitive in this market. For instance, banks are providing variety of services ranging from a loyalty point card system to more advanced programs. They started to utilize different digital banking services that provide fast solutions, such as mobile banking, ATMs, and/or online banking as well as services that provide expert and qualified advice such as chatbots and robo-advisors. Globally, Lebanon ranked in the 90th place out of 126 countries (Global Innovation Index, 2018). This implies that banks presently need to leverage innovation as a driving tool for success and survival in extremely competitive environments (Maarouf, 2016). To achieve the desired outcomes, KS has been evaluated as the strategic tool to enable innovation (Ipe, 2003).

Previous research has recognized the association between KS and innovation (Costa and Monteiro, 2016; Wang et al., 2017). However, a lack of empirical research revealed in developing countries, specifically Lebanon, on this topic. Consequently, to fill this gap this study seeks is to examine the impact of knowledge sharing on product and process innovation within the Lebanese banking sector.

In the following, a review of the theoretical background of, knowledge sharing and innovation is presented. Then the development of hypotheses will be introduced. Finally, the research methodology and the empirical findings are described, then the research's implications, limitations, and future directions are presented.

2. THEORETICAL BACKGROUND

Knowledge sharing is regarded as an essential for enhancing innovation. Iyer and Ravindran (2009) stated that KS is considered important to organizations as it enhances organizational performance as it develops the absorptive and innovative capacity and increases customer service quality (Cao and Xiang, 2012). Singh (2008) argued that KS is an essential instrument, as it contributes to individual learning that is essential for new practices. Organisations' skills and competence can be enhanced through KS (Renzl, 2008).

Within the banking context, Valipour et al. (2017) found that the exchange of employees' skills is essential to seek new ways, ideas, experimentations and creative solutions, which are critical for developing current products, processes, systems and technologies.

Scholars have defined KS from different perspectives. For instance, Hooff and Weenen (2004) defined KS as the exchange of knowledge that generate new knowledge. Similarly, Ipe (2003) described KS as the knowledge exchange process with others. From Lin's (2007) point of view, KS encompasses knowledge and skills exchange among employees. Likewise, Kim et al. (2013) viewed KS as the exchange of competencies among organizational members. KS occurs through individual activities such as sharing ideas, suggestions and experiences (Hoof and Ridder, 2004).

Various scholars have reported various kinds of KS processes such as: knowledge seeking and knowledge contribution (Wei et al., 2013); knowledge transmission and knowledge absorption (Ipe, 2003); knowledge possession and knowledge acquisition (Singh et al., 2016). Due to the variety of diverse kinds of KS, this research will adopt Hooff and Weenen's (2004) definition, who classified KS processes as involving two main dimensions: knowledge donation and knowledge collection. This definition is supported and adopted by several scholars (Karkoulian et al., 2010; Lin, 2007; Tohidinia and Mosakhani, 2010).

Knowledge donation concerns with the individual's readiness to communicate enthusiastically with others (Darroch and McNaughton, 2002). It is defined as an interactive process by which personal intellectual capital is communicated to colleagues (Jantunen, 2005). Donating knowledge aims to make the knowledge available for the entire organization (Von Krogh et al., 2012). Knowledge donation is the process of providing knowledge by building communication between individuals (Hooff and Weenen, 2004).

Knowledge collection involves consulting people to gain the know-how from them (Darroch and McNaughton, 2002). It refers to the process of acquiring knowledge from other individuals by consultation and persuasion (Lin, 2007). These two processes of KS build a good reputation in business, which improves potential business partner relationships, thereby, enhancing innovation development (Ritala et al., 2015). It is argued that donating and collecting knowledge among organizational create novel thoughts that mobilize the innovation process (Krongh et al., 2012).

Innovation has been recognized as the deep-seated condition of the 21st century to realize the economic growth and sustainability of an organization (Cekmecelioglu and Gunsul, 2013). Consequently, organizations with innovative capacity are able to recognize advanced technologies, competencies and knowledge assets to achieve a competitive advantage (Teece, 2014). Du Plessis (2007) clarified innovation as the creation of novel concepts that adds value to the organization. De Jong and Hartog (2006) defined innovation as the introduction of novel services on the opening of a new market, and their impact on economic development. Similarly, Andreeva and Kianto (2011) claimed that innovation is the uncovering of novel thoughts, process and products and the proper execution of all these concepts to get new outcomes.

Previous studies have highlighted different forms of innovation. For instance, Tidd and Bessant, 2011) distinguished between incremental and radical innovation. Damanpour and Aravind (2012) focused on product and process innovation. Schilling (2010) embraced technical and administrative innovation. Despite the various forms of innovation, however, each type of innovation incremental, radical, technological or administrative is commonly related to a process or product (Easa, 2012; Valle, 2009). Radical innovation relates to the application of new processes or the generation of novel products (Herrmann et a., 2007; Reichstein and Salter, 2006), while incremental innovation involves minor development in the current processes or products (Gatignon et al., 2002). Technological innovation directly relates to the core organizational activity which includes both process and product innovations (Jansen et al., 2006; Easa, 2012), while administrative innovation indirectly relates to work activities that relate mainly to process innovation (Hussieni, 2014). Despite the different forms of innovation, innovation based on product and process has been commonly recommended and studied empirically in the innovation literature (Hoonsopon and Ruenrom, 2012; Liao and Wu, 2010). Accordingly, this research will focus on products and processes innovation, that are extremely combined sets.

Product innovation is viewed as a vital predecessor to product success, which has significant impact on organizational survival (Valencia et al., 2010). Product innovation relates to the modifications performed in the end consumer's product and service (Shavinina, 2003). Tsai et al. (2001) viewed product innovation as the differentiability of products in the market. Meanwhile, Cooper and Edgett (2009) argued that product innovation is the newness of products launched in a timely manner to the market, while Hung et al. (2010) defined it as the number and the speed of innovative products.

This research, focused on product innovation, as the improvement and implementation of novel products. It refers to the degree to which employees seek advanced solutions; develop new services and adopt the latest technologies to meet clients' needs (Birasnav et al., 2013; Easa, 2012; Liao et al., 2017; Obeidat et al., 2016). Regarding process innovation, Gunday et al. (2011) considered it to be the application of new, considerably changed production and distribution methods by making technical, equipment or software changes. Wong and He (2003) viewed process innovation as the utilization of advanced equipment for novel production processes development and the re-engineering of operational processes. Hence, process innovation in this research is defined as the adoption of novel methods, achieved by utilizing the latest technology, and introducing changes in management structures, practices and techniques (Easa, 2012; Liao et al., 2017; Obeidat et al., 2016).

Generally, product innovation could be described as the introduction of novel services or products to serve the market or customer needs, while process innovation seeks to introduce a novel component in the production, machinery, materials, and processes, to render an improved product or service (Damanpour, 2010). Product innovations are primarily customer driven and have a market focus, while process innovations are often efficiency driven and have an internal focus (Damanpour and Aravind, 2012; Easa, 2012). Therefore, product innovations direct organization to adapt customer need patterns, as well as the features and designs of products and services (Koch and Hauknes, 2005, p. 33), whilst process innovation directs an organization to apply technologies that improve the productivity of its production activities (De Propriis, 2002). In the banking sector, examples of product innovations consist of issuing new credit and debit cards or financing or mortgage options, while process innovations focus on the faster delivery process for issuing credit and debit cards (Easa, 2012; Oke, 2007).

3. HYPOTHESES DEVELOPMENT

Several studies have noted the vital role played by KS in boosting product and process innovation. For instance, trust, motivation and management support are vital for nurturing knowledge transfer and innovation (Brachos et al., 2007; Brown and Calnan, 2016). Similarly, Andreeva and Kianto (2011) demonstrated that sharing knowledge with strategic partners and systematically informing their employees about changes in procedures, instructions and regulations achieved higher innovation capabilities and activities. Encouraging collaboration and the combination of ideas within organizations is likely to accelerate the innovation process and produce novel thoughts (Singh et al., 2016). According to Han and Chen (2017), organizations with KS structures, like brochures, documents, guidebooks, approaches and experiences, or know-how from other enterprises, enabled them to make changes in management innovation. Besides, the practice of coaching, training and functional rotation enhance the generation of new ideas and innovative project management (Saenz et al., 2012).

According to Lopez and Esteves (2013), increasing brainstorming sessions between team members and various units can contribute to developing new ideas and benefitting from each other's experiences, which will accelerate product and process innovation. Furthermore, knowledge exchange improves organizational learning, which are vital for innovation (Kim and Lee, 2006). In addition, the aggregation of new knowledge in an organization may promote creative solutions (Dougherty et al., 2002); through knowledge sharing, employees can relate diverse forms of knowledge and thus are able to transform novel thoughts into innovations (Mura et al., 2013). Likewise, knowledge management processes of utilizing and sharing knowledge have a substantial influence on innovation (Ferraresi et al., 2012).

Further, the mutual interaction and trust between buyer-supplier prompts the sharing of relevant knowledge and constantly develops inventive capability (Charterina et al., 2018). Additionally, the stimulation of sharing the knowledge needed for tasks among colleagues, and the improvement of information systems are essential for innovation (Obeidat et al., 2016). Likewise, in the long-established teams, the social capital accelerates KS, especially in new product development projects (Bakker et al., 2006).

The association between KS and innovation within the banking environment has been investigated from different perspectives. Valipour et al. (2017) argued that the exchange of employees' knowledge and expertise are essential to seek new ways, ideas, and experimentations to advance current methods and technologies. Ojanen (2007) noted that sharing manuals, methods and models with colleagues may attribute to innovations in product and process improvement. Facilitating collaboration and support knowledge conversion induce innovation of process and product (Liao et al., 2012). For instance, when transferring and sharing knowledge and experiences, individuals might increase their efficiency and organizations might be able to accelerate the improvement of novel products and also the generation of more innovative production processes (Bidmeshgipour et al., 2012). Nawab et al. (2015) reported that knowledge creation, organizing, communicating and exploitation significantly contributed to the generation of innovative ideas. Building the firm's ability to attain, arrange and disseminate knowledge enables it to lessen learning efforts and improve innovative capacity (Saghier et al., 2015). Effectively capturing and utilizing organizational collective experience and competence can motivate and expedite innovation (Wei et al., 2013).

In the banking context, it was noted that the research which linked the two concepts of KS and innovation adopted a different approach that varies from the current study approach. For instance, Nawab et al. (2015) defined KS in general but identified innovation from different components, namely: the initiation, recognition and application of novel thoughts. Other studies recognized KS by its two dimensions but defined innovation in general terms (Valipour et al., 2017; Wei et al., 2013). KS and innovation were also defined in general terms (Saghier et al., 2015). It is therefore necessary to conduct a study examining the influence of KS on innovation, particularly on innovation based on process and product in banks.

Focusing on developed countries, majority of empirical studies investigated the linkage of KS with innovation such as Spain (Camelo et al., 2011; Saenz et al., 2012), Australia (Connell et al., 2014), Belgium (Maes and Sels, 2014); and Greece (Brachos et al., 2007). However, the investigation of these phenomena in developing countries suffers from a lack of study (Khan et al., 2012). Therefore, it is highly recommended to extend this research to developing countries. Lebanon, as one of the Arab and developing countries is a valuable model/sample.

Based on the above arguments, this research aims to investigate the following proposed hypotheses in the banking sector in Lebanon.

H1: Knowledge sharing is positively related to innovation.

This leads to the subsequent sub-hypotheses:

H1.1: Knowledge sharing is positively related to product innovation.

H1.2: Knowledge sharing is positively related to process innovation.

The above-mentioned hypotheses are presented in the following research model (Figure 1). The proposed research model shows that KS has a positive relationship with innovation. In this research, the knowledge sharing acts as an independent variable whereas the innovation act as the dependent variable.

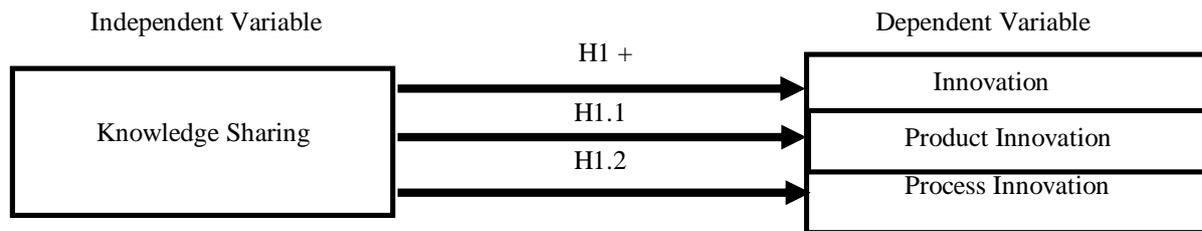


Fig. 1: Research Model

Reference: Charterina et al. (2018); Brown and Calnan (2016); Easa (2019); Valipour et al. (2017); Han and Chen (2017), Hooff and Weenen (2004); Singh et al. (2016).

4. METHEDODOLOGY

A quantitative method is used to examine the associations between KS and innovation; namely, product and process. This research employed a self-administered survey, using a five-point Likert scale with 1-strongly disagree to 5-strongly agree. A total of 600 surveys were distributed to 35 Lebanese banks through electronic mail, of which 310 were reverted and used for examination.

Sixteen items measure KS, reflecting the interchange of expertise and knowledge regarding relative documents and reports; success and failure stories; expertise obtained by training; and discussion of various work-related topics (Hooff and Weenen, 2004). The knowledge donation and collection items were elaborated from Allameh et al. (2015); Hooff and Weenen (2004); Mittal and Dhar (2015); Xiao, Zhang and de Pablos (2017). The survey items are provided in the Appendix.

To measure innovation, twelve items was used, reflecting the development of novel ideas through adopting the latest technologies; launching new products into the market; seeking advanced solutions to solve problems; adopting the latest technology to improve processes; introducing distinctive strategies to manage processes; following flexible management strategies; introducing changes in management structures, practices and techniques; and adopting new marketing strategies in promotions and services. The items of process and product innovation were developed from Birasnav et al. (2013); Easa (2012); Kim et al. (2012); Prajogo and Sohal (2006); Obeidat et al. (2016); Tan and Nasuridin (2010); Tsai et al. (2008).

The population for this research includes all employees at non-managerial level who worked at Lebanese banks through the year 2018. The sample population was selected randomly, using a stratified random sampling method. Then, from different subgroups the respondents were targeted proportionally. The current research established a sample comprised of a total of 27 banks in Lebanon. The data in Table (1) exhibits the demographic details of the participants. A total of 310 participants responded with complete data in this research, of which 46% were male and 54% female. The responses of males and females were approximately the same and the representation is fair for both genders. The marital status of the respondents was identified in four specific categories: 45% were single, 53% were married, 1% was divorced and 1% was widowed. The highest percentage was for married, followed by single respondents (45%).

The age of the respondents was identified in five specific categories: 41% were below 30, 40% were aged between 30 and 35, 14% between 36 and 40, 4% were between 41 and 45, and 1% were older than 46 years. The highest percentage was for the age below 30, followed by respondents aged between 30-35, (40%) indicating that the majority at non-managerial level is represented by the average age. The respondents' work experience was identified in five categories: 36% were participants with experience of less than 10 years, 47% were participants with 11 to 15 years of experience, 13% were participants with 16 to 20 years' experience, 3% were participants with 21 to 25 years' experience and 1% had more than 26 years of experience.

The highest number of responses came from people with 11 to 15 years' experience, followed by people with less than 10 years' experience, which reflects that the responses were fairly representative of the non-managerial level.

As shown in table (1), the educational background of respondents was represented by 45% with business majors, followed by 29% with finance majors, 13% with other majors not listed in the survey, 9% with Information Technology majors and 4% were law majors.

This reveals that the majority of respondents (83%) have a banking background. The educational level of respondents was represented by 80% with Bachelor degrees, followed by 14% with Master degrees. The lowest proportion had only high school diplomas (6%), which indicates that a large majority of participants (94%) hold at least a graduate degree.

Table 1: Demographic Statistics
Reference: The Author

	Frequency (N=310)	Percent (%)
Gender		
Male	143	46%
Female	167	54%
Marital Status		
Single	140	45%
Married	162	53%
Divorced	4	1%
Widowed	4	1%
Age		
Below 30 years old	127	41%
30-35 years old	124	40%
36-40 years old	43	14 %
41-45 years old	13	4%
46 + years old	2	1%
Work experience		
Less than 10 years	113	36%
11-15 years	145	47%
16-20 years	41	13%
21-25 years	8	3%
More than 26 years	3	1%
Education		
Business	141	45%
Finance	90	29%
IT	26	9%
Law	11	4%
Other	41	13%
Level of Education		
High school diploma	18	6%
Bachelor's degree	248	80 %
Master's degree	44	14%
Doctorate's degree	0	0%

5. FINDINGS

A structural equation modelling (SEM) with (AMOS) 24 is employed to investigate the effect of KS on process and product innovation. Two major components involved in the SEM: the measurement model to assess the reliability and validity constructs and a structural model to examine the relations among factors (Hair et al., 2013; Loehlin, 2012).

5.1 Measurement Model

The measurement model specifies the relationships between the response items and their underlying latent variables (Blunch, 2012; Byrne, 2016). To assess the measurement model, the goodness of fit and the validity and reliability of the constructs were used (Blunch, 2012; Schumacker and Lomax, 2016).

In this regard, a confirmatory factor analysis using AMOS 24 was conducted on all variables to ascertain the validity and reliability of each construct and goodness-of-fit (GOF).

To achieve the validity of the measurement, two kinds of construct validity tests were performed: convergent validity and discriminant validity (Sekaran and Bougie, 2016, p. 220). By testing the convergent validity, factor loadings and average variance extracted (AVE) were evaluated. The value was deemed significant at 0.5 or above (Hair et al., 2014, p. 680). Regarding the innovation items, the factor analysis extracted two factors, process and product innovation, to represent the innovation variable. The table (2) clarifies that two latent factors were extracted, and 12 items with loadings of more than 0.50 were considered. The first factor, product innovation contained six items; and the second factor comprised six items related to process innovation.

For the KS items, the factor analysis extracted two factors, knowledge donation and knowledge collection, that represent the KS variable. The below table clarifies that 15 items loaded on two factors and one item with factor loading less than 0.50 were removed. The removed item was: I share relevant reports and documents with my colleagues. The first factor, knowledge donation contained seven items; and the second factor comprised eight items related to knowledge collection.

Regarding construct reliability, two common measures were performed: Cronbach's alpha (α) and composite reliability (CR). Coefficient alpha estimates the multiple item scale's reliability, while CR refers to different outer loadings of the indicator variables (Hair Black, Babin and Anderson, 2014, p. 680). The reliability is achieved when CR and Cronbach's alpha are above 0.70 (Hensele and Sarstedt, 2013; Pallant, 2016, p. 161). As shown in Table (2), the values for all the items were significant.

Table 2: Validity and Reliability of the Measurement Model
Reference: The author

Factors	Code Item (see Appendix D)	Factor Loading (above 0.5)	AVE (above 0.5)	α (above 0.7)	CR (above 0.7)
Knowledge donation F1	KD1	0.679	0.750	0.894	0.860
	KD2	0.712			
	KD3	0.743			
	KD4	0.613			
	KD5	0.704			
	KD6	0.676			
	KD7	0.659			
Knowledge collection F2	KC1	0.620	0.576	0.898	0.870
	KC2	0.695			
	KC3	0.678			
	KC4	0.749			
	KC5	0.667			
	KC6	0.726			
	KC7	0.707			
	KC8	0.668			
Product innovation F3	PV1	0.670	0.594	0.901	0.854
	PV2	0.718			
	PV3	0.741			
	PV4	0.663			
	PV5	0.710			
	PV6	0.712			
Process innovation F4	CV1	0.658	0.714	0.902	0.828
	CV2	0.628			
	CV3	0.575			
	CV4	0.689			
	CV5	0.673			
	CV6	0.770			

Based on the rule of Fornell and Larcker (1981), discriminant validity was evaluated (Hair et al., 2013). According to them, the AVE should exceed 0.5 and greater than the squared correlations between the items as presented in Table (3).

Table 3: Correlations between the Factors and AVEs
Reference: The author

Factors	N=310							
	1	2	3	4	5	6	7	8
Product Innovation	.083	.071	.035	.211	.594			
Process Innovation	.236	.033	.056	.231	.126	.714		
Knowledge Donation	.214	.145	.023	.054	.155	.342	.750	
Knowledge Collection	.148	.138	.143	.034	.034	.235	.217	.576

Notes: The bold numbers in the diagonal row are the square roots of the average variance extracted (AVE). All correlations between variables are significant at 0.01 level (two-tailed)

The measurement model in this research was assessed by the goodness of fit indices. Table 4 shows an acceptable level of goodness of fit. It encompasses two major indices: (1) the fit indices, including, Goodness of Fit Index (GFI), Root Mean Square Residual (RMR) and Root Mean Square Error of Approximation (RMSEA) (Blunch, 2012); (2) the incremental fit measurement, which includes Adjusted Goodness of Fit Index (AGFI); and Comparative Fit Index (CFI) (Bryne, 2013). The model fit indices of innovation is as follows CFI = 0.935, RMR= 0.024; AGFI= 0.905; RMSEA= 0.065; CFI= 0.971. For KS, GFI is 0.905; RMR is equal to 0.025; AGFI is 0.872; RMSEA is 0.067; CFI= 0.948. These results confirm the model fits the sample data for banks.

Table 4: Fit characteristics Measurement Model First-Order
Reference: The author

Fit Indices	N= 310		Recommended Criteria
	Innovation	KS	
GFI	0.935	0.905	≥0.85
RMR	0.024	0.025	< 0.05
AGFI	0.905	0.872	≥0.80
RMSEA	0.065	0.067	< 0.05-0.10
CFI	0.971	0.948	≥0.90

5.2 Structural Model and Hypotheses Testing

The aim of this research is to investigate the KS-innovation relationship in banks in Lebanon. In order to evaluate the structural model fit, an assessment of the goodness-of-fit of the hypothesised model is required. Table (5) shows that the structural model for KS-Innovation relationship falls within the recommended criteria. The model fit indices of the structural model are CFI = 0.8,69 RMR= 0.027; AGFI= 0.844; RMSEA= 0.051; CFI= 0.948.

Table 5: Structural Model Fits
Reference: The author

Fit indices	N= 310		Recommended Criteria
	KS-Innovation		
GFI	0.869		≥0.85
RMR	0.027		< 0.05
AGFI	0.844		≥0.80
RMSEA	0.051		< 0.05-0.10
CFI	0.948		≥0.90

The structural equation modeling procedures are applied to test the strength and direction of the relations among dependent and independent variables. Table (6) provides the findings of the unstandardized estimate for each structural model interaction. The estimate describes the amount of change in the dependent variable (innovation) for each one unit change in the variable predicting it (KS). The table below presents the estimate for the three hypothesized structural paths in this research (KS→ Product; KS → Process; KS → Innovation)

H1 is related to the impact of KS on innovation. In table (6), KS shows a positive direction and a statistically significant relationship with innovation ($p < 0.001$; $CR = 8.322$). The results also reveal the unstandardized estimate, which suggests that for every single unit of increase in KS, innovation increases by 0.917 units. This implies that there is a statistically significant predictive capability of KS on innovation. Thus, the hypothesis is supported; the better the KS, the better the innovation.

Hypotheses (H1.1 - H1.2) are related to the impact of KS on product and process innovation. As shown in table (6), KS is associated significantly and positively with product and process innovation ($\beta = 1.358$, $CR = 8.745$; $\beta = 1.610$, $CR = 8.930$) respectively. This indicates that KS ($\beta = 1.610$) shows the highest contribution to process innovation followed by KS ($\beta = 1.358$) on product innovation. Thus, the hypotheses (H1.1 and H1.2) are supported; therefore, the better the KS, the better the innovation, product and process.

Table 6: Results for the Effects of KS on Innovation
Reference: The author

Hypothesis	Hypothesis path	Estimate	CR	Resulting Support		
				Directional support?	Significant	Hypothesis Supported?
H1.1	KS→ Product Innovation	1.358	8.745	Yes	***	Yes
H1.2	KS → Process Innovation	1.610	8.930	Yes	***	Yes
H1	KS → Innovation	0.917	8.322	Yes	***	Yes

Note: $p < 0.05$, $p^{**} < 0.01$, $p^{***} < 0.001$, CR=Critical Ratio, NS=Insignificance

6. DISCUSSION

The SEM findings provide strong confirmation that the KS process is positively related to product and process innovation (H1.1 and H1.2). The role of KS has emerged as an essential source of innovation in organizations as it leads to the development of novel thoughts (Armbrrecht et al., 2001). Knowledge sharing processes split into knowledge donation and knowledge collection (Lin, 2007). The reason behind donating knowledge is that it turns the individual's knowledge into organizational knowledge over time. Alternatively, knowledge collection is about consulting colleagues to learn from them, reflecting the employees' readiness to collect know-how to internalize and socialize it (Hooff and Weenen, 2004; Lin, 2007; Von Krogh et al., 2012). As organisational members exchange their skills, experiences, reports and documents, as well as failure and success stories, this may facilitate the innovation of product and process (Darroch and McNaughton, 2002; Wang and Wang, 2012).

This research revealed that the employees surveyed in the Lebanese banking sector were eager to communicate their know-how, experiences, reports and documents from each other, which supports their banks to provide new services, (adopt new solution and new ideas) and their process innovation (developing new strategies and adopting new technology). Employees in the Lebanese banking sector exchange their knowledge through intranets, employee rotation, coaching and/or mentoring, seminars, meetings, assemblies and training programmes, which aid to diffuse products and processes innovation.

These findings contradict Kamasak and Bulutlar's (2010) study, which concluded that knowledge donation has an insignificant relationship with exploratory innovation as well as Wang and Wang's (2012) findings, which indicated that implicit knowledge was unrelated to innovation, while explicit knowledge had a positive relation to innovation quality and speed.

Also, these findings are inconsistent with Fauji and Utami's (2013) research, which found that sharing implicit knowledge between employees had no significant effect on product innovation, which indicates that there was no openness among the employees to share their past experiences with their peers.

However, the results contradict Cheng (2012) and Leung's (2010) findings, who both indicated that stimulating knowledge sharing practices by discussing work related topics, experiences and skills, could boost innovation of process and product. The findings are also coinciding with Akram et al. (2018), who claimed that KS played a positive role in creating, encouraging and applying novel ideas that benefit the organization. Further, the finding concurs with Alhady et al. (2011) and Mura et al. (2013), who argued that organizations that support its employees in sharing knowledge can expect to generate novel thoughts, thereby enable innovative activities.

In addition, the findings reinforce the assertions made Gwena and Chinyamurind (2018) that KS's platforms simplify the speed and effectiveness of innovation for various products and services. Similarly, Ritala et al. (2015) and Cheng et al. (2016) findings confirm that a business without knowledge sharing capabilities may barely realize innovation outcomes, because the firm's own knowledge remains unused. Likewise, increasing the frequency of knowledge interactions and the observations of colleagues will enhance the process of the decision-making, the generation of novel value (innovations), and the creation of additional business (Kridan and Goulding, 2006). Furthermore, through social interaction support, employees may exploit existing knowledge in novel ways to enhance their tasks, consequently developing innovative knowledge that may be utilized for generating advanced process and product (Huang and Li, 2009).

The SEM revealed that KS influences process innovation more than product innovation. Heng et al. (2010) pointed out that the vital way to realize product innovation is through process innovation. Thus, the stimulation of KS practices among employees may assist them to embrace innovations such as new marketing strategies, innovative tools and new processes. Therefore, through creating a knowledge-friendly environment, banks will gain advantages when staff share experiences and knowledge, such as encouraging and facilitating collaboration, solid bonds, personal linkages, and frontier-spanning. Sharing knowledge amongst employees might prevent them from repeating the same mistakes and increase their experiences while performing their tasks. Thus, by focusing on providing a supportive environment, banks will motivate their employees to get involve in KS activities such as gatherings, meetings, workshops and social events outside the workplace.

Such an environment can enable the employees to generate novel ideas continuously and be committed to implement these ideas by adopting new services, methods, procedures, tools, devices, and knowledge within the bank.

7. THEORETICAL AND PRACTICAL IMPLICATIONS

This research adds to the extant literature regarding the KS-innovation relationship within a novel setting. The findings of this research empirically strengthen the role KS plays in boosting the innovation of product and process in Lebanese banks and provide information about the KS-innovation relationship in this sector.

Previous research examined KS with various forms of innovation such as: exploitative and exploratory (Wang et al., 2017), radical and incremental (Costa and Monteiro, 2016), as well as product and process (Liao et al., 2007). However, this research considers donating and collecting knowledge as two dimensions of KS, and innovation with its two dimensions: process and product innovation. The findings strengthen the role KS plays in enhancing the banks' ability to create new products and processes and provides information regarding which kind of innovation is most influenced by KS processes. This research also confirms the universality of the effects of KS across cultures. This research is conducted developing country, namely Lebanon, which indicates that KS is a crucial factor in enhancing innovation in the banking sector regardless of geographical context.

From a methodological view, the reliability and validity of KS and innovation is evaluated in a new geographical setting. This provides researchers and academics with a model to track the effects of KS on product and process innovation in other, similar research. The research findings further add new perceptions regarding KS practices, that donating and collecting knowledge, positively affect banks' ability in generating new processes and products.

The findings imply that the management at banks should encourage their experienced staffs to communicate their expertise to develop the provision of the bank to deliver innovation that serves their customers' needs.

The findings also demonstrate that KS has a positive relationship with product and process innovation. This indicates that knowledge collection and knowledge donation as two dimensions of KS are crucial factors of product and process innovation. In particular, practitioners have to pay high consideration to KS process to stimulate the novelty of products and services. For example, practitioners should provide tools and resources to assist staff to share work-related knowledge, such as information about customers and competitors; practitioners need to promote KS by establishing a suitable climate that helps employees to meet and communicate ideas effectively, and to understand and respect each other's opinions and actions.

The findings also exhibit the significance of KS in Lebanese banks for process and product innovation. Therefore, banks should foster a knowledge-sharing environment as a strategic means which empowers them to increase their competitive gain and their chances to succeed and survive.

8. RESEARCH LIMITATIONS AND FURTHER RESEARCH

Although this research provides a number of insights regarding the KS-innovation relationships in the banking sector in Lebanon, it has its own limitations that should be identified. The sample of this research is constrained to the banking sector; hence, the findings drawn from it cannot be generalised to other sectors. Thus, it is recommended to replicate this research in other sectors e.g. industrial, educational and health, and also conduct comparative studies between the industrial and service sectors, as industrialized firms could pursue various phases of innovation than their service counterparts. This research is limited to developing countries, specifically Lebanon, as one of the smallest Arab countries; therefore, it is recommended to replicate and extend this research to other Arab countries to confirm the results, since it is acknowledged that cultural differences may reach dissimilar results. Another limitation, this research investigates quantitatively the impact of KS on innovation among non-managerial employees. Considering different managerial levels may provide a better understanding of the research topic. This research is limited by the use of a cross-sectional design, were the causal relationships result may change over time; a longitudinal study will overcome this limitation and establish the results. Furthermore, innovation, as an independent variable in this research, was studied as a product and process dimension.

However, innovation can be divided into other types, such as administrative, technological, radical, incremental, exploitative and exploratory. Thus, it would be useful for further research to focus on these types of innovation and their relationships to KS.

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Appendix 1: Questionnaire Items

Construct	Code	Items
Knowledge Collection	KC1	I provide relative reports and documents to my colleagues, when they ask
	KC2	I share my success and failure stories about work with my colleagues, when they ask me to.
	KC3	I share my expertise obtained from training with my colleagues, when they ask me to.
	KC4	I share various work related topics with my colleagues, when they ask me
	KC5	My colleagues share with me their success and failure stories about work, when I ask them.
	KC6	My colleagues provide me with relative reports and documents, when I ask
	KC7	My colleagues share their experience obtained from training with me, when I ask them to.
	KC8	My colleagues tell me about various work related topics, when I ask them
Knowledge Donation	KD1	I share relevant reports and documents with my colleagues.
	KD2	I share success and failure stories about my work with my colleagues.
	KD3	I share my expertise obtained from training with my colleagues.
	KD4	I discuss various work-related topics with my colleagues.
	KD5	My colleagues share relevant reports and documents with me.
	KD6	My colleagues share their success and failure stories about work with me.
	KD7	My colleagues share their experience obtained from training with me.
	KD8	My colleagues discuss various work-related topics with me.
Product Innovation	PV1	Follows a formal process to generate and develop new ideas.
	PV2	Initiates the development of new services to meet customers' requirements and market trends.
	PV3	Adopts new technology to provide new services and to improve the current ones.
	PV4	Adopts new solutions to solve problems.
	PV5	Introduces new services into the market before its competitors.
	PV6	Provides new services to improve customers' access to services.
Process Innovation	CV1	Follows a formal process to improve its services to customers.
	CV2	Follows flexible management strategies to deal with unexpected changes.
	CV3	Provides improvements in its structures, practices and techniques.
	CV4	Introduces more developed strategies to manage its processes, in comparison with competitors' strategies.
	CV5	Adopts new marketing strategies in its promotions and services.
	CV6	Adopts new technology to improve its processes.