BAU Journal - Creative Sustainable Development

Volume 3 | Issue 2
ISSN: 2664-9446

Article 8

May 2022

KNOWLEDGE RISKS AND SUSTAINABILITY: AN EMPIRICAL STUDY ON LEBANESE KNOWLEDGE-INTENSIVE FIRMS

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Knowledge risks, knowledge loss, human knowledge risks, organizational performance, sustainability, knowledge-intensive firms.

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Abstract

Today's business environment is characterized by a growing number of knowledge risks. There has been a paucity of empirical research on the impact of knowledge risks on business sustainability. This paper looks at the direct and indirect consequences of knowledge risks on a firm's sustainability. A questionnaire was administered with a sample of 427 respondents from Lebanese knowledge-intensive firms. Structural equation modeling (SEM) was used to test the research framework. The findings indicate that knowledge risks and knowledge loss have a direct and significant detrimental impact on business sustainability. The performance of organizations has a direct and significant positive impact on sustainability. The mediating effect of organizational performance in the relationship between knowledge risks and sustainability of the business was demonstrated. However, the link between human knowledge risks and both organizational performance and sustainability was not significant. Outcomes of the study will persuade knowledge-intensive firms' managers to deploy knowledge management approaches and reduce potential knowledge risks.

Keywords

Knowledge risks, knowledge loss, human knowledge risks, organizational performance, sustainability, knowledge-intensive firms.

1. INTRODUCTION

Because of the rising global competitiveness and economic turmoil, sustainability is critical for any organization today (Brătianu, 2020). Knowledge and sustainability are outstanding concepts for organizations seeking a competitive advantage (Segarra-Oña, Peiró-Signes, & Mondéjar-Jiménez, 2016). However, today's business environment is characterized by a growing number of knowledge risks (Durst, Zieba, & Aisenberg Ferenhof, 2018), which can have a deteriorating impact on organizational sustainability (Brătianu, Neștian, Tiță, Vodă, & Guță, 2020; Durst & Zieba, 2020). Furthermore, organizations are confronted with an unpredictable economic climate as well as unanticipated catastrophic events, putting their survival at risk (Manab & Aziz, 2019). According to Urban and Naidoo (2012), a lack of knowledge is usually related with business failure. As a result, organizations have realized that acquiring knowledge and efficiently using it is the only way to maintain a sustainable competitive advantage (Mahdi, Nassar, & Almsafir, 2019). However, lack of knowledge, its loss, incorrect use, or other implications of varied knowledge's application may expose businesses to a wide range of hazards (El Khatib, Ali, & Mostapha, 2021).

According to Durst and Zieba (2020), organizations must be aware of knowledge threats and the implications of those risks on business sustainability. Knowledge management (KM) methods fail between 50 and 70 percent of the time, necessitating an assessment of knowledge hazards (Handa, Pagani, & Bedford, 2019). Durst (2019) indicated that "without an understanding of knowledge risks and their possible consequences for both public and private organizations, the specified knowledge strategies and KM approaches cannot be effective". Therefore, organizations must assess knowledge risks and their likely implications, as well as implement appropriate mitigation strategies. They must reconsider their knowledge management approaches and integrate such knowledge risks in order to successfully implement it to improve organizational performance (Durst, 2019; Brătianu, 2018).

Previous studies provide a fragmented understanding of the knowledge risk's domain, and the majority of the existing studies are conceptual in nature (El Khatib *et al.*, 2021). Numerous research have examined the relationship between knowledge management and organizational sustainability (Demir, Budur, Omer, & Heshmati, 2021; Gloet, 2006; Robinson, Anumba, Carrillo, & Al-Ghassani, 2006). However, only a few researchers have looked into the link between knowledge risks and business sustainability (Brătianu *et al.*, 2020; Durst & Zieba, 2020). Brătianu et al. (2020) conducted an empirical study of the indirect influence of knowledge risks (particularly knowledge loss) on organizational sustainability. The authors recommended that that future research look into additional types of knowledge risks, such as knowledge hoarding and hiding. Durst and Zieba's (2020) conceptual paper focused on the potential impact of diverse knowledge risks on business sustainability. Moreover, Durst (2019) stated that empirical research is required to investigate the effects of knowledge risks on organizational performance. As a result, additional empirical study on knowledge risks and their relationship to organizational performance and business sustainability is required.

Knowledge risks can be classified in three categories: human, technological and operational (Durst & Zieba, 2018). The study of the human category and knowledge loss is particularly important (Mueller & Mueller, 2019; Sumbal *et al.*, 2020). First, a considerable percentage of organizational information is personalised, residing in people' minds and being critical for job creativity. Second, staff are in charge of the operation and deployment, as well as the utilization and safeguarding of technologies and associated information. According to Harper (2020), a corporation with 1,000 employees should expect to lose $2.4 million in annual productivity owing to daily inefficiencies caused by knowledge loss.

Knowledge-intensive firms (KIFs) are of growing importance worldwide (Millar, Lockett, & Mahon, 2016) and are important players in modern economies (Altukruni, Maynard, Alshaikh, & Ahmad, 2019). According to Obeidat, Al-Suradi, Masa'deh, and Tarhini (2016), knowledge-intensive firms' performance is basically hinged on effective management of organizational knowledge. Examples of KIFs include architecture and engineering consultancy firms, pharmaceutical sector, healthcare sector, banking sector, management consulting firms, information communication and technology (ICT), legal, research and development (R&D) services, computer services, and scientific research (Joe, Yoong, & Patel, 2013). Numerous Middle Eastern knowledge-intensive firms confront difficulties in encouraging their staffs to

employ their distinctive competence via knowledge management procedures (Raudeliūnienė & Kordab, 2019). A company with 1,000 staffs should anticipate to lose $2.4 million in annual productivity due to daily inefficiencies triggered by knowledge loss (Harper, 2020). According to Arab (2017), Lebanon is still suffering from considerable brain drain and entrepreneurs are having difficulties finding skilled and experienced workers. Currently, Lebanon faces its worst crisis since 1920 (Saidi, 2020), with 220,000 careers lost between the end of 2019 and early 2020 (Abdo, Abed, Aouad, & Ayoub, 2020). This crisis have speeded up the "brain drain", in addition knowledgeable professionals pursue employment abroad (Lewis, 2020). These problems are particularly serious in the healthcare sector (Wehbi, 2020), where hundreds of doctors and nurses, with decades of experience in their fields, seek work abroad and who cannot be easily replaced (Lewis, 2020). Around 400 doctors, whose expertise was built over many years, left the country. Also, forty percent of nurses across hospitals have been terminated from their works (Astih, 2020), and around two hundred nurses with many years of practical experience are leaving the country (Lewis, 2020). As a result, the focus of this paper is on investigating knowledge risks in this specific type of organizations, and specifically architectural/engineering firms, as well as healthcare and pharmaceutical sectors.

Knowledge risks is a new area of research within the knowledge management (Durst, 2019), and seems to be a promising area for empirical research (Mueller & Mueller, 2019). It is still at its infancy stage and the existing literature consists mainly of conceptual and theoretical papers (Temel & Durst 2021; Durst & Zieba, 2019). According to Heisig et al. (2016), one of the key gaps in knowledge management research is the gap between knowledge management and firm performance. Although several studies (e.g., Cardoni et al., 2020) have examined the relation between knowledge management and sustainability, only one study (Brătianu et al., 2020) have empirically studied the indirect effect of knowledge risks (specifically knowledge loss) on sustainability through organizational performance. Brătianu et al. (2020) recommended that future research examine other types of knowledge risks such as knowledge hoarding and hiding. On a different aspect, Durst and Zieba (2020) explored two systematic literature reviews executed recently by Durst (2019) devoted to knowledge risks and by Martins et al. (2019) concerning knowledge management in the sustainability framework. The authors found that, to date, there is no published paper that relate knowledge risks with organizational sustainability. Durst & Zieba (2020) wrote a conceptual paper about the potential impact of various knowledge risks on business sustainability. Extant research on knowledge risks are concentrated on developed and western countries. In their study, Skok and Tahir (2010) argued that knowledge management concepts differs based on distinct cultures and what is applicable to western firms, might need to be culturally adapted to fit non-western firms. In addition, there is a necessity to better understand and apply knowledge management in Arab countries (Obeidat *et al.*, 2016). Little research has been conducted on knowledge management within the Lebanese context (e.g., El Chaarani and Abiad, 2020; Epaminonda et al., 2020; Ben Hassen, 2018; Karkoulian et al., 2008). It is contended that their conclusions are limited in terms of understanding the influence of knowledge risks on organizational performance and sustainability. Accordingly, this paper responds to the call for more research in the subject of knowledge risks and fills a gap in the literature by empirically examining the impact of knowledge risks on organizational performance and sustainability.

The paper is structured as follows. The theoretical background is presented in the following section. The subsequent section discusses the proposed conceptual model and hypotheses based on the literature review. Sampling and data collection methods, measurements, validity and reliability are then examined. Key findings and their implications are presented in the subsequent sections. Finally, study's limitations and the potential for future research are explored.

2. THEORETICAL BACKGROUND

2.1 Knowledge-Based View Theory

The knowledge-based view (KBV) is a theory that recognizes knowledge as a crucial resource for sustainable competitive advantage. KBV, an extension of the resource-based perspective, is extensively used in knowledge-intensive literature to indicate that knowledge is seen as the most valuable strategic asset of an organization (Altukuni *et al.*, 2019). The concept of knowledge as a resource establishes a theoretical relationship between the resource-based view and the firm's knowledge-based perspective (Rjavalgi & Grossman,

2014). According to Grant (1996), knowledge is possibly the most strategically essential part of an organization's competitive position, improving overall performance and increasing a firm's ability to innovate (Hörisch, Johnson, & Schaltegger, 2015). Knowledge and organizational learning are the most important aspects for assisting the creation of innovations, particularly sustainable ones (Durst & Zieba, 2020). The knowledge-based view identifies knowledge as the ultimate vital resource where alternate resource hinge on. The knowledge-based view also concentrates on how this vital resource is used and organized to generate value for companies, i.e. how knowledge is handled (Nguyen, 2016).

2.2 Knowledge Risk

Few definitions of knowledge risk are presented in the literature. Bayer and Maier (2006) defined knowledge risk as "an operational risk caused by reliance on, loss of, unsuccessful deliberate or accidental knowledge transfer resources, resulting in non-exclusivity or scarcity of these resources". Perrot (2007) defined knowledge risk as "a likelihood of any loss from an event connected with the identification, storage or protection of knowledge that may decrease the operational or strategic benefit of any party involved in the network". According to Brătianu (2018), knowledge risk refers to any knowledge action performed under uncertainty. He suggests recognizing the likelihood of those events that head to unfavourable outcomes in knowledge management. The authors of this paper have elected to adhere to the definition of Zieba and Durst (2018) of knowledge risk as "a measure of the probability and severity of adverse effects of any activities engaging or related somehow to knowledge that can affect the functioning of an organization on any level". This definition is more comprehensive than the one provided by other scholars which are limited to certain types of risks (e.g., knowledge leakage) or certain conditions (e.g., organizational networks).

2.3 Knowledge Loss

In this study, knowledge loss is conceptualized as "the lack of some professional skills or other knowledge resources as a result of a change in the firm's size or internal human resource" (Yu, 2005). Knowledge loss is "an intentional or unintentional evaporation of knowledge during an accumulation and learning process of the personal and the corporate" (Perrott, 2007). According to Bayer and Maier (2007), knowledge loss can occur "as a result of fluctuation of employees, non-documentation, or deletion of documented knowledge". Knowledge loss occurs "as a result of employee exit, lost codified knowledge or knowledge decay" (Massignham, 2008). Jennex and DurciKova (2013) defined knowledge loss risk as "the expected impact to the organization resulting from the loss of a particular expert or knowledge worker". According to Durst et al. (2018), knowledge loss is "any kind of knowledge deficit that appears either as a direct consequence of not possessing knowledge anymore (e.g. due to a computer system failure) or an indirect one (e.g. an employee leaving a company or being 'stolen' by a competitor)". Knowledge loss is mainly associated with employee departures from organizations for a variety of factors including layoffs, job rotation, retirements, turnover... (Sumbal *et al.*, 2020). Organizations also lose knowledge in case of failures to capture critical knowledge and forgetting the knowledge (Singh & Gupta, 2020). Because it has a direct impact on the dynamics of organizational knowledge, knowledge loss is the most serious knowledge risk (Brătianu, 2018). According to the previous arguments, knowledge loss risk is one of the factors that may impact organizational performance and sustainability of the firms.

2.4 Human Knowledge Risks

In this study, human knowledge risks are "connected with an individual´s personal, social, cultural and psychological factors and thus human resources management" (Durst & Zieba, 2018). Human risks are problems caused by staff (Sadgrove, 2006). Human knowledge risks comprise insufficient or missing competencies, knowledge hoarding, and knowledge hiding (Durst & Zieba, 2018). According to Temel & Durst (2021), missing/inadequate competences of organizational members denotes "a lack of training, experience, skills, and capacities an organization would need to address present and future challenges". It could also be the outcome of weak succession planning, which increases the risk of knowledge attrition or, in the worst-case scenario, knowledge loss.

Connelly, Zweig, Webster, & Trougakos (2012) defined knowledge hoarding as "the act of accumulating knowledge that may or may not be shared at a later date". Durst and

Zieba (2018) added that no one else has requested this knowledge. Connelly et al. (2012) demonstrated that knowledge hiding is a distinct construct than knowledge hoarding and knowledge sharing. In their study, they formulated the knowledge hiding concept and established its measure rendering it as distinct theme in knowledge management field. Knowledge hiding is the endeavor to hold back or hide requested knowledge intentionally. Durst and Zieba (2017) stated that knowledge hiding is "a deliberate approach in the sense that an employee, for some reason, does not want to reveal the possessed knowledge and hides it on purpose". Clear request of knowledge by another organizational colleague and intentional attempt are the prerequisites of knowledge hiding (Xiao & Cooke, 2019).

Knowledge hiding is not basically a modest denial of transmitting information (Connelly *et al.*, 2012). It is a multidimensional concept, constituted of three components: playing dumb, evasive hiding, and rationalized hiding. Playing dumb depicts circumstances through which the concealer imagines unawareness of the applicable information so as to abstain from giving the seeker data. It is the deed of ignoring the knowledge base or information (e.g., a person declares to be new to a theme, and don't acquire the data mentioned). Evasive hiding includes occasions whereby the concealer provides inaccurate data and deceptive guarantee of a complete response later on. The concealer provide fewer details compared with what is really fundamental for the second individual, despite the fact that the individual does not intent to really give this (Connelly *et al.*, 2012). It has the greatest pessimistic result for each of the concealer and the requestor (Anand & Hassan, 2019). Rationalized hiding includes explanations and rationales given to justify lack of information. Rationalized hiding does not of necessity engage fraud. In that event, concealer is defending his fault for not delivering the needed information through accusing others or his inability to exchange such information (Connelly *et al.*, 2012). Human knowledge risks are examined as a variable that will effect organizational performance and sustainability.

2.5 Organizational Performance

In this study, organizational performance is conceptualized as "the outcome of several business factors, including work processes, team/group communication and interaction, corporate culture and image, policies, leadership, and a climate that promotes innovation, creativity, and loyalty" (Cho, 2011). Indeed, measuring performance offers firms the necessary response with respect to the effectiveness and efficiency of their actions and endeavours in order to consider more attentive preferences (Durst, Hinteregger, & Zieba, 2019). Performance evaluation methods in the knowledge management literature can be divided into three broad groups: financial and non-financial performance and the balanced scorecard (BSC) approach. Both scholars and practitioners are considering balanced scorecard as a performance measurement tool to enhance organizational sustainability (Rafiq, Zhang, Yang, Naz, & Maqbool, 2020; Hansen & Schaltegger, 2016). Balanced scorecard was introduced by Kaplan and Norton in the 1990s as a new one performance management system that balance financial and non-financial (Kalender & Vayvay, 2016), short and long-term measures, in addition to quantitative and qualitative success measures (Hansen & Schaltegger, 2016).Because of its comprehensiveness and incorporation of multiple performance dimensions, we chose the BSC model to measure organizational performance.

2.6 Sustainability

Business sustainability has emerged as a substitute to traditional, short-term, profit-driven approaches to corporate management by holistically balancing social, environmental, and economic aspects (Lozano, Carpenter, Huisingh, 2015). Business sustainability is "the ability of firms to respond to their short-term financial needs without compromising their (or others') ability to meet their future needs" (Bansal & Sesjardine, 2014). A commitment to sustainable development necessitates risk and uncertainty management, along with robust knowledge management systems (Gloet, 2006). According to Robinson et al. (2006), knowledge management is inextricably tied to business sustainability. Organizations can benefit from knowledge in addressing the balancing act of the three pillars of sustainability (Durst & Zieba, 2020). In this study, sustainability is conceptualized as "adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future" (Brătianu *et al.*, 2020).

3. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

3.1 Knowledge Risks and Organizational Performance

Knowledge management strategies have a strong and significant impact on organizational performance (Mehralian, Nazaro, & Ghasemzadeh, 2018). In their study, Parise, Cross, and Davenport (2006) argued that the departure of key members from an organization, particularly in KIFs, can have a significant impact on its operation. For instance, scientists at a pharmaceutical firm have critical technical skills in their medical specializations, as well as important contacts with academia that assist the company stay on the cutting edge of research (Parise *et al.*, 2006). Cho (2011) argued that key knowledge is held by employees, and it can simply be lost once an experienced person leaves the firm. Thus, organizations might lose their competitive advantage that rely on the knowledge gained and assimilated via those individuals (Nunes, Annansingh, Eaglestone, & Wakefield, 2006). Gaghman (2019) argued that knowledge loss is a strategic risk that affects firm's overall strategy. According to Dalkir (2013), strategic capabilities are aggregated to organizational competencies and are things that an individual is skilled at. He went on to say that the more valuable a capability is, the less likely it is to be shared among many individuals, making the company more vulnerable if those employees quit.

The loss of knowledge resources is irreversible, resulting in a void that has a negative impact on business activities execution (Bayer & Maier, 2007). According to a recent study by Singh and Gupta (2020), knowledge loss creates a negative impact on the organizational memory and results in declining capability, output and productivity. Employees at all levels in almost every business have a natural tendency to hoard knowledge, particularly critical knowledge (Bilginoğlu, 2019). Knowledge hiding has serious implications for organizations, relationships, and individuals (Connelly, Černe, Dysvik, & Škerlavaj, 2019) and its effects could be destructive (Serenko & Bontis, 2016). It can substantially harm relationships at work, directs to a culture of distrust and unconstructiveness among employees (Anand & Hassan, 2019). It give rise to knowledge gaps and head to poorer organizational and individual performance (Hernaus, Černe, Connelly, Vokic, & Škerlavaj, 2018). Pan, Zhang, Teo, and Lim (2018) highlighted that among the utmost significant reasons causing knowledge management projects' failures is knowledge hiding among coworkers. Hence, the following hypotheses are derived:

H_1: *Knowledge risks negatively impact the performance of knowledge-intensive firms.*
H_{1a}: *Knowledge loss negatively impacts the performance of knowledge-intensive firms.*
H_{1b}: *Human knowledge risks negatively impact the performance of knowledge-intensive firms.*

3.2 Knowledge Risks and Sustainability

Greenwood, Li, Prakash and Deephouse (2005) stated that loss of experts is particularly detrimental to knowledge-intensive firms, as it lessens the capability to offer tailored services and it breaks contacts with customers and may lead to customer churn, thus affecting the long-term survival of the company. Davis (2018) stated that every time an individual leaves an organization, he takes his institutional knowledge with him, putting the company at risk. In addition, several knowledge-intensive firms will encounter the challenge of losing unrecoverable valuable knowledge due to ageing working force who will retire in the upcoming years (Brătianu, 2018; Joe *et al.*, 2013). The loss of knowledge resources is irreversible, resulting in a void that has a negative impact on business activities execution (Bayer & Maier, 2007). If knowledge is lost or the strength of knowledge starts to deteriorate, a company's vital operations may be jeopardized (McBriar *et al.*, 2003). The loss of knowledge might put the company's existence in risk (Mueller & Mueller, 2019). Gaghman (2019) argued that knowledge loss is a strategic risk that affect firm's overall strategy. An average of 42% of the skills and expertise needed to proficiently achieve in a particular position will be known just by the individual presently in that position (Davis, 2018).

According to Durst and Zieba (2020), knowledge hiding or missing/inadequate proficiencies of employees can lead to lower ability to manage organizational assignments, the matter that will deprive a firm of its economic sustainability. Hiding knowledge will

contribute to a less readiness to cooperate and less confidence in the firm; the matter that will weaken the firm's social environment and might as well impact relations with external stakeholders (Durst & Zieba, 2020). According to Abbas and Sağsan (2019), knowledge sharing activities have a significant impact on organizational sustainability. Present research highlights that various employee downsizing endeavours failed to retain knowledge, critical skills, and capabilities (Schmitt, Borzillo, & Probst, 2011). Handa et al. (2019) highlighted that the non-traceability of tacit knowledge is a significant risk to the business as employees may not be willing to share their knowledge. Thus, this might place a business process or a firm at risk since other employees are working with inadequate knowledge. Downsizing and restructuring will also lead to job insecurity where employees have fear from losing their continuity in their current occupations. In such situations, survivors or remaining employees will have mostly negative insights to their firms, and will strive to hide their knowledge to retain their power as a professional and thus guarantee their position (Ali, Ali, Albort-Morant, & Leal-Rodriguez, 2020). Based on prior literature, the following hypotheses are proposed:

H_2: *Knowledge risks negatively impact the sustainability of knowledge-intensive firms.*

H_{2a}: *Knowledge loss negatively impacts the sustainability of knowledge-intensive firms.*

H_{2b}: *Human knowledge risks negatively impact the sustainability of knowledge-intensive firms.*

3.3 Organizational Performance and Sustainability

Rafiq et al. (2020) argued that successful companies will efficiently take on the sustainable development activities that are befalling crucial for any organization. The authors added that organizational performance became a significant aspect for sustainable development. Brătianu et al. (2020) found that organizational performance positively affect firms' sustainability. According to Handa et al. (2019), negative organizational environments may push employees to leave for another firm and take their tacit knowledge with them, affecting organizational performance and, as a result, the company's long-term survival. In fact, a considerable share of the aging workforce will retire in the coming years, reducing the efficiency and performance of knowledge-intensive firms and jeopardizing their long-term survival (Brătianu, 2018; Joe *et al.*, 2013). Muthuveloo, Shanmugam, and Teoh (2017) argues that organizational performance determines the organizations' survival, ensure competitiveness and sustainability, and reveals the ability to achieve stakeholders' requirement. Based on the above reasoning, the following hypothesis is developed:

H_3: *Organizational performance positively influences sustainability in the knowledge-intensive firms.*

3.4 The Mediating Role of Organizational Performance

Previous research has shown that organizational performance relates knowledge management approaches to an organization's success and sustainability (Mehralian *et al.*, 2018). Annansingh (2005) mentioned that knowledge management enhances an organization's sustainability by improving its efficiency, performance, and innovation. According to Torres, Ferraz, and Santos-Rodrigues (2018), knowledge management influences organizational intellectual capital and converts it into long-term competitive advantage through enhanced organizational performance. Brătianu et al. (2020) revealed that knowledge loss influence sustainability through organizational performance. Accordingly, the present study argues that knowledge risks influences sustainability through organizational performance. Hence, the following hypothesis is posed:

H_4: *Organizational performance mediates the relationship between knowledge risks and sustainability in the knowledge-intensive firms.*

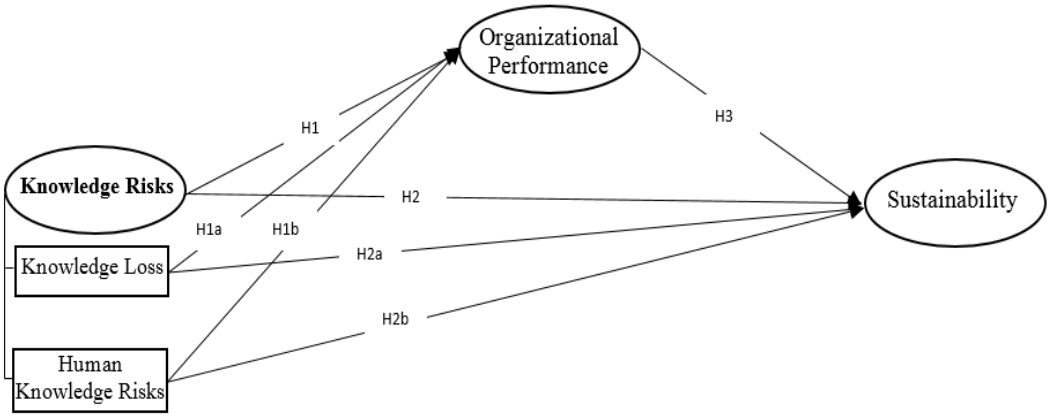

Fig.1: Conceptual model

4. RESEARCH METHODOLOGY

4.1 Sample and Data Collection

This cross-sectional study was carried out among employees in Lebanese knowledge-intensive enterprises from August to October 2021. With the rapid growth of online questionnaires, non-probability sampling have become significantly more prevalent (Saunders, Lewis, and Thornhill, 2019). A convenient sample strategy was used, and professionals and knowledge workers such as architects/engineers and planners, pharmacists, doctors and nurses were approached. According to Nunan, Birks, and Malhotra (2020), nonprobability sampling is the most convenient, least time-consuming, and least expensive. Similar to the approach used by previous researchers in this field, purposive or judgmental sampling technique is adopted for this research as it allows the researcher to go directly to the target unit of interest whom are the knowledge-workers and professionals. When the population is vaguely defined (as in knowledge workers), this strategy is recommended (Muhammed & Zaim, 2020). Survey questionnaire was distributed to all of the researchers' acquaintances, and participants were then requested to dispatch the link to their contacts. The questionnaire provides respondents further confidentiality and enough time to consider their answers (Alhamoudi, 2010). The study population is around 20,000 individuals. Based on Saunders et al. (2019), for a population of 10,000 units or above, the minimum sample size is 384 respondents. A total of 427 valid responses were collected. 65.3 percent of the 427 respondents are male, while 34.7 percent are female. 8.4 percent of respondents are under the age of 25, 32.6 percent are between the ages of 25 and 34, 34.7 percent are between the ages of 34 and 44, 14.5 percent are between the ages of 45 and 54, and 9.8 percent are above 55.

In terms of educational achievement, qualifications extend from high school (6.1 percent) to undergraduate (45.7 percent) to postgraduate (48.5 percent). Some 29.3 percent of those surveyed work in the healthcare and pharmaceutical sectors, while 70.7 percent work in architecture and engineering. The majority of respondents (64.2 percent) have been with their current organizations for more than 5 years. 19.9 percent of respondents have 6 to 10 years of experience with their current employer, 29.5 percent have 11 to 20 years, and 14.8 percent have more than 20 years. The remaining (35.8 percent) have 1 to 5 years of experience with their present companies. The majority (71.2 percent) of firms are large, with more than 250 employees. Small businesses with fewer than 50 employees account for only 16.1 percent, with 11.2 percent having fewer than 20 employees and 4.9 percent having between 20 and 49 employees. The remaining (12.6 percent) is made up of medium-sized businesses with a headcount of 50 to 249 employees.

4.2 Measures

This study's items were all obtained from validated scales reported in the literature. Multi-item indicators were employed for all constructs. Knowledge loss was measured by four items scale adapted from the work of Brătianu et al. (2020). Human knowledge risks were measured with fifteen items scale inspired by Connelly et al. (2012) and Durst and Zieba (2012). Seventeen items organizational performance scale was developed from the scales proposed by Cho (2011). Sustainability was assessed with six items proposed by Gelhard &

Von Delft (2016). A five-point scale spanning from 1 (strongly disagree) to 5 (strongly agree) was employed to arrange responses, providing a convenient and simple approach for participants to register their responses. The scales adopted in this study were developed by past researchers and the survey was reviewed by subject experts to check content validity, clarity and readability of the survey items. An updated version of the questionnaire was produced based on feedback from the pre-test.

5. DATA ANALYSIS

Both exploratory (EFA) and confirmatory factor analysis (CFA) were used to analyse the data. IBM SPSS version 23 was used to perform the exploratory factor analysis. By the aid of AMOS version 23, structural analysis modelling (SEM) was used to evaluate measurement and theoretical models. SEM evaluate the linear correlations between latent and observable variables. By creating path analysis, SEM generates parameter estimates for the direct and indirect links between observable variables and thus tests the mediator effect.

5.1 Data Preparation

Prior to data analysis, data was checked for multicollinearity, normality, linearity and homoscedasticity. The multicollinearity was tested using both the variance inflation factor (VIF) and Pearson coefficient analyses. According to Tabachnick and Fidell (2019), high correlations (0.90 and above) imply strong multicollinearity. Pearson's test confirmed that all constructs of knowledge loss and sustainability were moderately associated, and that these relationships were statistically significant ($p < 0.01$). The Pearson correlation coefficient for organizational performance reveals that most constructs were moderately correlated. All tests were statistically significant at $p < 0.01$ and $p < 0.05$). For human knowledge risks, eleven items were moderately correlated with significant p value, while 4 items had weak correlation ($r < 0.1$) and the test not statistically significant $p > 0.05$ and were excluded from the study. The variance inflation factor shows acceptable values (VIF <3) for all variables. The normality of data distribution was checked using skewness and kurtosis. Both skewness and kurtosis values are within the recommended values of -1 and +1 for skewness and -1.5 and 1.5 for kurtosis according to Schumacker and Lomax (2016). The normal predicted probability (P-P) plot depicts the data normal linearity. Similarly, the standardized residuals plotted against the predicted values are used to test for homoscedasticity in the data. The distribution of points are elliptical and the data tended to cluster toward the center of the plot. Thus, indicating the homoscedasticity assumption is met. Finally, no significant outliers were identified via outlier analysis.

5.2 Quality of Measurement

5.2.1 Reliability

In order to assess the quality of the instruments, Cronbach's alpha is a common internal reliability test (Hair, Page, & Brunsveld, 2020). It is regarded as the most acceptable measure of reliability when utilizing Likert scales (Taherdoost, 2016). Cronbach's alpha values greater than 0.7 are considered acceptable (Hair *et al.*, 2020). Table 1 demonstrates that, for all variables, Cronbach's alpha ranged from 0.85 to 0.96. Thus, internal consistency reliability is achieved.

Table 1: Reliability Scores

Construct	Number of items	Cronbach's alpha
Knowledge Loss (KLO)	4	0.853
Human Knowledge Risks (HKR)	11	0.910
Organizational Performance (OPE)	17	0.960
Sustainability (SUS)	6	0.935

Reference: SPSS output arranged by the authors

5.2.2 Validity

Because the measures were employed for the first time in this combination, EFA was performed to aggregate data, decrease the huge number of survey questions, and confirm the variables factor structure (Hair *et al.*, 2020). A principal axis factor loading with promax rotation was performed separately for each construct. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (range of 0.79 to 0.95) and significant value of the Bartlett test of sphericity (as indicated in table 2) confirmed the suitability of proceeding with the analysis with the collected data.

Table 2: KMO and Bartlett's test of sphericity

Construct		KLO	HKR	OPE	SUS
Kaiser-Meyer-Olkin measure of sampling adequacy		0.793	0.884	0.946	0.922
Bartlett's test of sphericity	Approx. Chi-Square	780.878	3072.324	7327.232	2576.002
	df	6	45	171	28
	Sig.	.000	.000	.000	.000

(Reference: SPSS output arranged by the authors)

The convergent validity was tested by assessing the factor loading of components. Factors with eigenvalues greater than one were considered for further analysis. Hair et al. (2020) recommended that factor loadings greater than 0.50 be considered when determining the number of retained items. The results indicated that knowledge loss had a one-component structure with an eigenvalue larger than one and the standardized factor loadings for all four items measures ranged from 0.67 to 0.85. One item of human knowledge risks was excluded as having factor loading less than 0.40. Similarly, one item of organizational performance was excluded. After removing these two items, human knowledge risks have a two-component structure with standardized factor loadings ranging from 0.43 to 0.82 and organizational performance constructs have a two-component structure with standardized factor loadings ranging from 0.68 to 0.86. Organizational sustainability factor loadings for all six items are higher than the threshold of 0.4 (Taherdoost, 2016). The communalities for all items were higher than 0.40 (Taherdoost, Sahibuddin, & Jalaliyoon, 2014). The findings imply that the scale is unidimensional and has convergent validity. Regarding the discriminant validity, one item of organizational performance was excluded from the study as it loaded on two factors with difference less than 0.20 (Gaskin, 2021). As expected, a total of four factors were formed for the variables knowledge loss, human knowledge risks, organizational performance and sustainability. In addition, factor correlation matrices were examined and no correlations between factors exceed 0.70 or shared variance of 50%. Hence, the measurement model has strong discriminant validity.

In studies that employ a single source of data, common method bias (CMB) could be a concern (Muhammed & Zaim, 2020). According to Podsakoff, MacKenzie, Lee, and Podsakoff (2003), ex ante and ex post measures were used in this study to reduce CMB. To encourage honest responses and lessen evaluation fear, respondents were informed about their anonymity and confidentiality of their responses and there is no correct response (Eichhorn, 2014). To statistically determine that CMB was not a concern in the data set, common latent factor approach was first used (Afthanorhan *et al.*, 2021). When the standardized regression weights from the constrained and unconstrained models were compared, the difference was less than 0.2. Then, the correlation matrix is examined in accordance with Pavlou, Liang, and Xue (2007). According to the findings, the maximum correlation among dimensions is less than 0.9 (r=0.756 between organizational performance and sustainability). As a result, CMB is unlikely to be a serious issue in this study.

5.3 Confirmatory Factor Analysis

Confirmatory factor analysis was first used to evaluate the reliability and validity of each item. Two items measuring human knowledge risks were excluded having standardized factor loading less than 0.5 (Hair, Black, Babin, & Anderson, 2019). Loadings for remaining HKR items range from 0.594 to 0.905, with t-values ranging from 10.446 to 13.733. The loadings of KLO items range from 0.643 to 0.864, while the t-values range from 13.187 to 17.952. The loadings for OPE items range from 0.678 to 0.847, with t-values ranging from 13.394 to 15.909. The loadings of SUS items range from 0.733 to 0.833, with t-values ranging from 15.506 to 21.791. Following Hair et al. (2019), the squared multiple correlation (R^2) of each item exceeded the 0.30 cutoff threshold. The average variance extracted (AVE) and construct composite reliability (CR) were used to assess the convergent validity of the variables as proposed by Fornell and Larcker (1981). All constructs had CR greater than 0.70 and AVE greater than 0.50, indicating that the model had strong convergent validity (as indicated in Table 3). Furthermore, Fornell and Larcker's approach was used to evaluate discriminant validity. As such, the AVE for each construct was compared with the squared correlation between the construct and any of the other constructs (bolded in table 3). Maximum shared variance (MSV) scores, the square of the inter-correlation between two constructs, were compared to AVE. Additionally, average shared variance (ASV) values were compared to MSV. Table 3 shows that all MSV values are smaller than AVE, and ASV values are less than MSV, and the square root of AVE values are bigger than the correlation between each pair of constructs. Thus, the findings demonstrated discriminant validity across all variables.

Table 3: Validity scores

Construct	CR	AVE	MSV	ASV	KLO	HKR	OPE	SUS
KLO	0.857	0.603	0.089	0.062	**0.777**			
HKR	0.922	0.602	0.065	0.031	-0.254 ***	**0.776**		
OPE	0.953	0.578	0.572	0.23	-0.298***	0.132*	**0.760**	
SUS	0.911	0.631	0.572	0.20	-0.179***	0.105*	0.756***	**0.795**

Notes: The Off-diagonal score are the correlations between constructs. The square roots of AVE are in boldface on the diagonal. * $p \leq 0.050$; *** $p \leq 0.001$

(Reference: AMOS output arranged by the authors)

5.4 Measurement Model Fit

The CFA results (as indicated in Table 4) showed that the measurement model suited the data well. The fit measurements matched the permissible cut-off values. According to Hair et al. (2019), supplying at least one absolute (RMSEA) and one incremental indicator (CFI) in addition to Chi-square (CMIN or χ^2) and the degree of freedom (*df*) can give enough information to assess a model. CMIN/DF evaluates the overall fit of the proposed model. χ^2 is 975.278 and *df* is 461, while the relative chi-square (χ^2/ *df*) is 2.116 which is under 3 (Hu & Bentler, 1999). The comparative fit index (CFI) is 0.951, indicating that the suggested model adequately represented the sample data. The Tucker-Lewis index (TLI) is 0.944 higher than 0.90 (Hair et al., 2019). The standardized root mean squared residual (SRMR) is 0.043 less than 0.08, while the root mean squared error of approximation (RMSEA) is 0.51, demonstrating a strong fit between the observed data and the proposed model (Hu & Bentler, 1999).

Table 4: Model fit indices

Measure	Estimate	Threshold	Interpretation
CMIN	975.278	--	--
DF	461	--	--
CMIN/DF	2.116	Between 1 and 3	Acceptable
CFI	0.951	>0.90	Acceptable
TLI	0.944	>0.90	Acceptable
SRMR	0.043	<0.08	Acceptable
RMSEA	0.051	<0.06	Acceptable
PClose	0.327	>0.05	Acceptable

(Reference: AMOS output arranged by the authors)

5.5 Structural Model

5.5.1 Structural model goodness of fit

After validating the measurement model's quality, structural model analysis was performed to assess the relationships among all constructs. The structural model's estimate and fit indices demonstrated an outstanding match between both the model and the data. All of the fit indices fall inside the acceptable range where χ^2 = 975.736, *df*=462, χ^2/ *df*= 2.112, CFI=0.951, TLI=0.944, SRMR=0.043, RMSEA=0.051, and PClose=0.338. Thus, the overall structural model revealed a good fit with the data collected. Likewise, all structural paths for direct and indirect effects exhibited good model fit.

5.5.2 Testing the direct relationships

Following the determination of the structural model goodness-of-fit, the significance of each hypothesis path was examined using Amos version 23. Table 5 shows the findings of the relationship model's standardized estimate. The findings support H_1, which is concerned with the overall effect of knowledge risks on organizational performance (β= -0.588, CR= -2.546, p≤0.05). H_{1a} hypothesizes that knowledge loss has a negative impact on organizational performance. Our analysis confirmed negative direct impact (β=-0.314, CR= -5.04, p≤0.001). Analysis of hypothesis H_{1b}, which predicted that human knowledge risks are negatively related to organizational performance, revealed no significant relationship between them. Thus H_{1b} was not supported. The predicted negative impact of knowledge risks on sustainability was confirmed (β=-0.476, CR= -1.96, p≤0.05), and H_2 was supported. Similarly, the estimated parameter of knowledge loss (β=-0.189, CR= -3.018) is significant at p≤0.05, supporting H_{2a}. Surprisingly, there was no significant link between human knowledge risks and sustainability, hence H2b is rejected. Lastly, H_3 is concerned with the effect of organizational performance on sustainability. As shown in Table 5, OPE is significantly and positively associated with SUS (β=0.786, CR= 12.603, p≤0.001), supporting H_3.

Table 5: Results for the direct effects

Hypothesis	Constructs	Standardized regression weight (β)	CR	Directional support?	Results
H_1	KR ⟶ OPE	-0.588*	-2.546	Yes	Supported
H_{1a}	KLO ⟶ OPE	-0.314***	-5.04	Yes	Supported
H_{1b}	HKR ⟶ OPE	0.078 (ns)	1.43	No	Not Supported
H_2	KR ⟶ SUS	-0.476*	-1.96	Yes	Supported
H_{2a}	KLO ⟶ SUS	-0.189**	-3.018	Yes	Supported
H_{2b}	HKR ⟶ SUS	0.77 (ns)	1.324	No	Not Supported
H_3	OPE ⟶ SUS	0.786***	12.60	Yes	Supported
Notes: *** p ≤ 0.001, ** p ≤ 0.010, * p ≤ 0.050, ns= "not significant"					

(Reference: AMOS output arranged by the authors)

5.5.3 Testing the indirect effect of knowledge risks

H_4 postulated a negative effect of knowledge risks on sustainability through organizational performance. Hair et al. (2019) proposed a guideline for the mediator role, which was followed. With statistically significant individual correlations between the independent (knowledge risks), dependent (sustainability), and mediator (organizational performance), the test of mediation was proceeded. The first step was to test the model fit of indirect path (KR ⟶ OPE ⟶ SUS) between the independent and dependent variables, which resulted in good fit and produced similar χ^2, CFI, and RMSEA to the model that included also a direct link between the independent and dependent variables. Thus, supporting a mediating role for organizational performance. The next step, according to Hair et al. (2019) was to compare two models, one with only direct link between independent (KR) and independent (SUS) and the other with the mediating variable (OPE) included. After OPE was introduced as a mediating

construct, the statistically significant link between KR and SUS (β= -0.476, p≤0.05) was decreased to a non-statistically significant relationship (β= 0.094). As a result, the full mediation role of OPE is supported. According to the data presented above, along with significant relationships between KR and OPE (β = -0.570, p≤ 0.05) and OPE and SUS (β =0.813, p ≤ 0.001), H_4 is therefore supported. This finding was validated using AMOS and the boostrapping approach (as indicated in Table 6).

Table 6: Mediation effects analysis

Hypothesis	Constructs	Direct effect	Indirect effect	Result
H_4	KR⟶OPE ⟶SUS	0.62 (ns)	-3.03***	Full Mediation
Notes: *** p ≤ 0.001, ns= "not significant"				

(Reference: AMOS output arranged by the authors)

6. DISCUSSION

This paper supports the KBV theory concerning knowledge, improved performance and sustainability. The findings confirmed that knowledge risks have a detrimental impact on sustainability. These findings are consistent with those of Salazar, Hackney, and Howells (2003), Annansingh (2005), Robinson et al. (2006), Mohamed, Stankosky, and Mohamed (2009), and Durst et al. (2019), all of whom concluded that knowledge and knowledge management improve an organization's competitive advantage and sustainability. Through its basic processes and actions, knowledge management may improve sustainability. This study validated that knowledge risks have a detrimental impact on organizational performance. Lack of necessary knowledge has a wide-ranging impact on organizational performance, including ensuring the conditions for future performance growth, meeting customer needs, efficient use of available resources, and product and service quality. This conclusion agrees with the findings of Brătianu et al. (2020) and Durst et al (2019). It is also consistent with the findings of Schulz and Jobe (2001), Liu, Chen, and Tsai (2004), who indicated that knowledge management is connected with enhanced performance. The findings, however, contradict those of Chakravarthy, McEvily, Doz, and Rau (2003), who claimed that knowledge management can be detrimental to organizational performance. Furthermore, the findings contradict Vera and Crossan (2003)'s conclusion that past empirical research does not support the notion that more knowledge improves organizational performance. It also contradicts the findings of Sahibzada, Jianfeng, Latif, Shafait, and Sahibzada (2020), who revealed that knowledge management strategies had no direct effect on organizational performance.

Knowledge loss was found to have negative effect on both organizational performance and sustainability. The findings are consistent with Brătianu et al. (2020). Also, the results are in line with Jennex's (2014) findings that knowledge loss has a long-term impact on NASA's operations and performance. Organizational performance decreases as a result of the experienced team member's or specialist's lost skills and technical knowledge. Also, work atmosphere and organizational culture will be negatively affected. As a result, organizations shall focus on limiting the likelihood of a substantial knowledge loss and to mitigate its harmful implications for organizational performance and sustainability. The negative effect of human knowledge risks on organizational performance and sustainability is not significant. This contradicts with previous studies of Chatterjee, Chaudhuri, Thrassou, and Vrontis (2021) and Haar, O'Kane, and Cunnimgham (2021) who found that knowledge hiding negatively affects organizational performance. Furthermore, it does not support Durst and Zieba's (2020) argument that missing/inadequate competencies, knowledge hoarding, and knowledge hiding have an impact on an organization's social, economic, and environmental sustainability. As a result, further research would be needed to study these relationships.

According to the SEM findings, there is a full mediation effect of organizational performance between knowledge risks and sustainability. Organizational performance has a significant impact on sustainability, and the level of organizational performance influences the effect of knowledge risks on the organization's sustainability. These findings are in line with Brătianu et al. (2020) and is consistent with Mehralian et al. (2018), who demonstrated that organizational performance is related to knowledge management techniques and an organization's

sustainability. According to Torres et al. (2018), knowledge management has an impact on organizational sustainability via improving organizational performance.

7. THEORETICAL AND PRACTICAL IMPLICATIONS

The current paper enables us to draw implications that are important to both practitioners and academics. Data analysis demonstrates the applicability of several important aspects of the firm's KBV, particularly the positive impact of knowledge management on sustainability. This study highlights and discusses that knowledge risks reduce organizational performance and have a negative influence on business sustainability. Based on the study's findings, the knowledge-based view theory assumptions concerning the importance of knowledge on maintaining competitive advantage are confirmed. Up to the authors' knowledge, this paper is one of the first to empirically test Dusrt and Zieba's (2018) knowledge risk taxonomy. Besides, this was Lebanon's first examination into the risks of knowledge. Scholars, particularly those in developing countries and the Middle East region, would benefit from it. Furthermore, the current study has major practical implications for business owners and management, assisting in boosting organizational performance and sustainability while also resolving knowledge risks issues. Businesses should realize how a lack of knowledge, knowledge loss, or knowledge hiding may have a detrimental influence on organizational performance and long-term survival. Managers should pay attention to the knowledge of relationships and networks and ensure that it is not lost to a rival. Finally, as Lebanon faces the worst crisis since 1920 resulting in brain drain, Lebanese knowledge-intensive enterprises are being compelled to realign their competitiveness strategies and protect their specialized knowledge in order to ensure long-term survival.

8. LIMITATIONS AND FUTURE RESEARCH

This paper has some limitations. First, the study's survey sample is narrowed to architectural/engineering and healthcare/pharmaceutical sectors. Further research should focus on broadening the sample to include the banking sector, information communication and technology (ICT), computer services, research and development (R&D) services, etc. Second, because the sample is from a single country and a convenient sampling technique was used, which may not properly represent the overall population and limits the generalizability of the results. Hence, additional research could be addressed by collecting data from other countries and future research might use a random sampling technique for data collection. Similarly, probability sampling techniques might improve the generalizability of findings. Third, knowledge risks considered are limited to knowledge loss and human knowledge risks. Other types of knowledge risks, technological and operational, shall be examined. Fourth, studies should look on the interactions between different knowledge risks types. Finally, cross-sectional research design was adopted in this study. Future studies may incorporate a longitudinal study to provide a more comprehensive view of the proposed relationship.

9. CONCLUSION

Knowledge risks research is still in its infancy. The scarce existing research offers only a fragmented understanding of the topic. Knowledge risks are a significant component in attaining organizational performance and influencing an organization's sustainability. Within the limits of the researchers' knowledge, this paper is among the first studies to empirically investigate the influence of knowledge risks on sustainability. Furthermore, the role of organizational performance in mediating the link between knowledge risks and sustainability was empirically tested. This paper found, in accordance with KBV theory, that knowledge risks have an impact on organizational performance and sustainability. Recommendations for future research are presented.

REFERENCES

- Abbas, J., & Sağsan, M. (2019). Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis. *Journal of cleaner production, 229*, 611-620.
- Abdo, N., Abed, D., Aouad, N., & Ayoub, B. (2020). *The IMF and Lebanon: The long road ahead*. Oxford, UK: Oxfam GB.
- Afthanorhan, A., Awang, Z., Abd Majid, N., Foziah, H., Ismail, I., Al Halbusi, H., & Tehseen, S. (2021). Gain More Insight from Common Latent Factor in Structural Equation Modeling. *Journal of Physics: Conference Series, 1793*, 012030.
- Alhamoudi, S.A. (2010). *Strategic knowledge management system in public sector in Saudi Arabia: An adaptation of the Balanced Scorecard*, Doctoral dissertation, Department of Strategy and Business Systems, University of Portsmouth.
- Ali, M., Ali, I., Albort-Morant, G., & Leal-Rodriguez, A. L. (2020). How do job insecurity and perceived well-being affect expatriate employees' willingness to share or hide knowledge? *International Entrepreneurship and Management Journal*, *15*, 185-210.
- Altukuni, H. A., Maynard, S., Alshaikh, M., & Ahmad, A. (2019). Exploring knowledge leakage Risk in Knowledge-Intensive Organisations: Behavioural aspects and key controls. *Australasian Conference on Information Systems*, Perth, Western Australia.
- Anand, P., & Hassan, Y. (2019). Knowledge hiding in organizations: Everything that managers need to know. *Development and Learning Organizations, 33*(6), 12–15.
- Annansingh, F. (2005). *Exploring the risks of knowledge leakage: an information systems case study approach*. Croatia: InTech Open Science, Open Minds.
- Arab, R. (2017). The potential of human capital in Lebanon. *Middle East, 60*(70), 80.
- Astih, P., (2020). *Emigration of doctors threatens hospitals in Lebanon*. https://english.aawsat.com/home/article/2491751/emigration-doctors-threatens-hospitals-lebanon.
- Bansal, P., & Sesjardine, M. R. (2014). Business sustainability: It is about time. *Strategic Organization, 12*(1), 70-78.
- Bayer, F., & Maier, R. (2006). Knowledge risks in inter-organizational knowledge transfer. *Proceedings of I-KNOW '06 Graz*, Austria, 200-208.
- Bayer, F., & Maier, R. (2007). Governing knowledge risks –design and results of an empirical study. *Proceedings of I-KNOW '07 Graz*, Austria, 76-84.
- Ben Hassen, T. (2018). Knowledge and innovation in the Lebanese software industry. *Cogent Social Sciences, 4* (1), 1509416.
- Bilginoğlu, E. (2019). Knowledge hoarding: A literature review. *Management Science Letters, 9*, 61–72.
- Brătianu, C. (2018). A holistic approach to knowledge risk. *Management Dynamics in the Knowledge Economy*, *6*(4), 593-607.
- Brătianu, C. (2020). Sustainability risk management of firms. *Amfiteatru Economic, 22* (55), 635-637.
- Brătianu, C., Neștian, A.Ș, Tiță, S.M., Vodă, A.I., & Guță, A.L. (2020). The impact of knowledge risk on sustainability of firms. *Amfiteatru Economic*, *22*(55), 639-652.
- Cardoni, A., Zanin, F., Corazza, G., & Paradisi, A. (2020). Knowledge management and performance measurement systems for SMEs' economic sustainability. *Sustainability, 12*(7), 2594.
- Chakravarthy, B., McEvily, S., Doz, Y., & Rau, D (2003). Knowledge management and competitive advantage. *The Blackwell handbook of organizational learning and knowledge management*, 305-323.
- Chatterjee, S., Chaudhuri, R., Thrassou, A., & Vrontis, D. (2021). Antecedents and consequences of knowledge hiding: The moderating role of knowledge hiders and knowledge seekers in organizations. *Journal of Business Research, 128*, 303-313.
- Cho, T. (2011). *Knowledge management capabilities and organizational performance: An investigation into the effects of knowledge infrastructure and processes on organizational performance*. PhD Dissertation, University of Illinois at Urbana-Champaign.
- Connelly, C. E., Zweig, D., Webster, J., & Trougakos, J. P. (2012). Knowledge hiding in organizations. *Journal of Organizational Behavior, 33*(1), 64-88.

- Connelly, C. E., Černe, M., Dysvik, A., & Škerlavaj, M. (2019). Understanding knowledge hiding in organizations. *Journal of Organizational Behavior, 40,* 779–782.
- Dalkir, K. (2013). *Knowledge management in theory and practice*. Routledge.
- Davis, J. (2018). *Knowledge loss: Turnover means losing more than employees*. HR Daily Advisor. Retrieved from https://hrdailyadvisor.blr.com/2018/07/18/knowledge-loss-turnover-means-losing- employees
- Demir, A., Budur, T., Omer, H., M., & Heshmati, A. (2021). Links between knowledge management and organisational sustainability: does the ISO 9001 certification have an effect? *Knowledge Management Research & Practice,* 1-14.
- Durst, S. (2019). How far have we come with the study of knowledge risks? *VINE Journal of Information and Knowledge Management Systems, 49*(1), 21-34.
- Durst, S., & Zieba, M. (2017). Knowledge risks - towards a taxonomy. *International Journal of Business Environment, 9*(1), 51-63.
- Durst, S., & Zieba, M. (2018). Mapping knowledge risks: Towards a better understanding of knowledge management. *Knowledge Management Research and Practice, 17,* 1-13.
- Durst, S., & Zięba, M. (2020). Knowledge risks inherent in business sustainability. *Journal of Cleaner Production, 251*, 119670.
- Durst, S., Zieba, M., & Aisenberg Ferenhof, H. (2018). Knowledge risk management in organizations. *Proceedings IFKAD 2018*, Delft, Netherlands.
- Durst, S., Hinteregger, C., & Zięba, M. (2019). The Linkage between knowledge risk management and organizational performance. *Journal of Business Research, 105,* 1-10.
- Eichhorn, B. R. (2014). *Common method variance techniques*. Cleveland, OH: SAS Institute Inc.
- El-Chaarani, H., & El-Abiad, Z. (2020). Knowledge management and job performance: The case of Lebanese banking sector. *International Review of Management and Marketing, 10*(1), 91-98.
- El Khatib, R. A., Ali, A. A., & Mostapha, N. (2021). A review of knowledge risk conception. *BAU Journal - Creative Sustainable Development, 3* (1), 9.
- Epaminonda, E., Chaanine, J., Vrontis, D., Thrassou, A., & Christofi, M. (2020). Information communication technology, knowledge management, job and customer satisfaction: a study of healthcare workers in Lebanon. *Journal of Knowledge Management, 25*(3), 618-641.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.
- Gaghman, A. A. (2019). The Impact of Knowledge Behavioural Factors on Tacit Knowledge Retention: Empirical Study in Oil and Gas Industry in Economies of the Balkan and Eastern European Countries. *KnE Social Sciences,* 34-53, DOI 10.18502/kss.v4i1.5976.
- Gaskin, J. (2021). *EFA*. Gaskination's StatWiki. http://statwiki.gaskination.com
- Gelhard, C., & Von Delft, S. (2016). The role of organizational capabilities in achieving superior sustainability performance. *Journal of Business Research, 69* (10), 4632-4642.
- Greenwood, R., Li, S. X., Prakash, R., & Deephouse, D. L. (2005). Reputation, diversification, and organizational explanations of performance in professional service firms. *Organization Science, 16*(6), 661-673.
- Gloet, M. (2006). Knowledge management and the links to HRM: Developing leadership and management capabilities to support sustainability. *Management Research News, 29*(7), 402-413.
- Grant, R.M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal, 17*(2), 109-122.
- Guang-sheng, Y. U. (2005). The new development of enterprise knowledge management research under the guidance of knowledge theory. *R&D Management, 6*, 70–76.
- Haar, J., O'Kane, C., & Cunnimgham, J. A. (2021). Firm-level antecedents and consequences of knowledge hiding climate. *Journal of Business Research*.
- Hair, J. F., Black, W. C., Babin, B.J., & Anderson, R. E. (2019). *Multivariate Data Analysis*. Hampshire: Cengage Learning EMEA.
- Hair, J. F., JR., Page, M., & Brunsveld, N. (2020). *Essentials of Business Research Methods*. New York: Routledge.
- Handa, P., Pagani, J., & Bedford, D. (2019). Managing risks of knowledge assets. *Knowledge Assets and Knowledge Audits (Working Methods for Knowledge Management)*, Emerald Publishing Limited, Bingley, 169-182.

- Hansen, E. G., & Schaltegger, S. (2016). The Sustainability balanced scorecard: A systematic review of architectures. *Journal of Business Ethics, 133*, 193-221.
- Harper, M. (2020). *What is At-risk Knowledge*? Retrieved from https://www.apqc.org/blog/what-risk-knowledge. (accessed: 17 November, 2021)
- Heisig, P., Suraj, O. A., Kianto, A., Kemboi, C., Arrau, G. P., & Easa, N. F. (2016). Knowledge management and business performance: global experts' views on future research needs. *Journal of Knowledge Management, 20*(6), 1169-1198.
- Hernaus, T., Černe, M., Connelly, C., Pološki Vokić, N., & Škerlavaj, M. (2018). Evasive knowledge hiding in academia: When competitive individuals are asked to collaborate. *Journal of Knowledge Management, 23*(4), 597–618.
- Hörisch, J., Johnson, M. P., & Schaltegger, S. (2015). Implementation of sustainability management and company size: A knowledge-based view. *Business Strategy and the Environment, 24*(8), 765–779.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.
- Jennex, M. E. (2014). A proposed method for assessing knowledge loss risk with departing personnel. *The Journal of Information and Knowledge Management Systems, 44* (2), 185-209.
- Jennex, M. E., & Durcikova, A. (2013). Assessing Knowledge Loss Risk. *46th Hawaii International Conference on Systems Sciences*, 3478- 3487.
- Joe, C., Yoong, P., & Patel, K. (2013). Knowledge loss when older experts leave knowledge-intensive organizations. *Journal of Knowledge Management, 17*(6), 913-927.
- Kalender, Z. T., & Vayvay, O. (2016). The fifth pillar of the balanced scorecard: *Sustainability. Procedia - Social and Behavioral Sciences, 235*, 76-83.
- Karkoulian, S., Halawi, L. A., & McCarthy, R. V. (2008). Knowledge management formal and informal mentoring: An empirical investigation in Lebanese banks. *The Learning* Organization, 15(4), 409-420.
- Lewis, E. (2020). Lebanon hospitals under threat as doctors and nurses emigrate. *The Na-tional*.
- Liu, P., Chen, W., & Tsai, C. (2004). An empirical study on the correlation between knowledge management capability and competitiveness in Taiwan's industries. *Technovation 24*, 971-977.
- Lozano, R., Carpenter, A., & Huisingh, D. (2015). A review of 'theories of the firm' and their contributions to corporate sustainability. *Journal of Cleaner Production, 106*, 430-442.
- Mahdi, O. R., Nassar, I. A., & Almsafir, M. K. (2019). Knowledge management processes and sustainable competitive advantage: An empirical examination in private universities. *Journal of Business Research, 94*, 320-334.
- Manab, N. A., & Aziz, N. A. (2019). Integrating knowledge management in sustainability risk management practices for company survival. *Management Science Letters, 9*, 585-594.
- Massingham, P. (2008). Measuring the impact of knowledge loss: More Than Ripples on a Pond? *Management Learning, 39*(5), 541-560.
- McBriar, I., Smith, C., Bain, G., Unsworth, P., Magraw, S., & Gordon, J. L. (2003). Risk, gap and strength: key concepts in knowledge management. *Knowledge-Based Systems, 16*, 29–36.
- Mehralian, G., Nazaro, J. A., & Ghasemzadeh, P. (2018). The effects of knowledge creation process on organizational performance using the BSC approach: the mediating role of intellectual capital. *Journal of Knowledge Management, 22*(4), 802-823.
- Millar, C.C., Lockett, M., & Mahon, J.F. (2016). Guest editorial: Knowledge intensive organizations: on the frontiers of knowledge management. *Journal of Knowledge Management, 20 (5)*, 845-857.
- Mohamed, M., Stankosky, M., & Mohamed, M. (2009). An empirical assessment of knowledge management criticality for sustainable development. *Journal of knowledge management, 13*(5), 271-286.
- Mueller, F., & Mueller, A. (2019). Knowledge risk management – how to manage future knowledge loss. *Proceedings of the 52nd Hawaii International Conference on System Sciences, 5673-5680*.
- Muhammed, S., & Zaim, H. (2020). Peer knowledge sharing and organizational performance: the role of leadership support and knowledge management success. *Journal of Knowledge Management, 24*(10), 2455-2489.

- Muthuveloo, R., Shanmugam, N., & Teoh, A. P. (2017). The impact of tacit knowledge management on organizational performance: Evidence from Malaysia. *Asia Pacific Management Review, 22* (4), 192-201.
- Nguyen, T. L. (2016). *Assessing knowledge management values by using intellectual capital to measure organizational performance*. PhD thesis, College of Engineering and Computing, Nova Southeastern University, Florida, USA.
- Nunan, D., Birks, D., & Malhotra, N. K. (2020). *Marketing research: Applied insight*. Harlow, UK: Pearson.
- Nunes, M. B., Annansingh, F., Eaglestone, B., & Wakefield, R. (2006). Knowledge management issues in knowledge-intensive SMEs. *Journal of Documentation, 62*(1), 101-119.
- Obeidat, B. Y., Al-Suradi, M.M., Masa'deh, R., & Tarhini, A. (2016). The impact of knowledge management on innovation: An empirical study on Jordanian consultancy firms. *Management Research Review, 39*(10), 1214-1238.
- Pan, W., Zhang, Q., Teo, T. S. H., & Lim, V. K. G. (2018). The dark triad and knowledge hiding. *International Journal of Information Management, 42*, 36–48.
- Parise, S., Cross, R., & Davenport, T. H. (2006). Strategies for preventing a knowledge-loss crisis. *MIT Sloan Management Review, 47*(4), 31-39.
- Pavlou, P., Liang, H., & Xue, Y. (2007). Understanding and mitigating uncertainty in online exchange relationships: a principal-agent perspective. *MIS Quarterly, 31*(1), 105-136.
- Perrot, B. E. (2007). A strategic risk approach to knowledge management. *Business Horizons, 50*, 523-533.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., & Podsakoff, N.P. (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.
- Rafiq, M., Zhang, X. P., Yang, J., Naz, S., & Maqbool, S. (2020). Impact of a balanced scorecard as a strategic management system tool to improve sustainable development: Measuring the mediation of organizational performance through PLS-Smart. *Sustainability, 12*, 1365, 1-19.
- Raudeliūnienė, J., & Kordab, M. (2019). Impact of knowledge oriented leadership on knowledge management processes in the Middle Eastern audit and consulting companies. *Business, Management and Education, 17*(2), 248-268.
- Rjavalgi, R.G., & Grossman, D.A. (2014). Firm resources and host-country factors impacting internationalization of knowledge-intensive service firms. *Thunderbird International Business Review, 56*(3), 285-300.
- Robinson, H.S., Anumba, C.J., Carrillo, P.M., & Al-Ghassani, A.M. (2006). STEPS: a knowledge management maturity roadmap for corporate sustainability. *Business Process Management Journal, 12*(6), 793-808.
- Sadgrove, K. (2016). *The complete guide to business risk management*. Routledge.
- Saidi, N. (2020). Lebanon needs a digital revolution. *Annahar*.
- Salazar, A. Hackney, R., & Howells, J. (2003). The strategic impact of internet technology in Biotechnology and Pharmaceutical firms: Insights from a knowledge management perspective. *Information Technology and Management, 4*, 289-301
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students*. Harlow, United Kingdom: Pearson Education Limited.
- Sahibzada, U. F., Jianfeng, C., Latif, K. F., Shafait, Z., & Sahibzada, H. F. (2020). Interpreting the impact of knowledge management processes on organizational performance in Chinese higher education: mediating role of knowledge worker productivity. *Studies in Higher Education*, 1-18.
- Schmitt, A., Borzillo, S., & Probst, G. (2011). Don't let knowledge walk away: Knowledge retention during employee downsizing. *Management Learning, 43*(1), 53–74.
- Schulz, M., & Jobe, L. A. (2001). Codification and tacitness as knowledge management strategies: an empirical exploration. *The Journal of High Technology Management Research, 12*(1), 139-165.
- Schumacker, R. E., & Lomax, R. G. (2016). *A beginner's guide to structural equation modeling*. New York: Routledge
- Segarra-Oña, M., Peiró-Signes, A., & Mondéjar-Jiménez, J. (2016). Twisting the twist: How manufacturing & knowledge-intensive firms excel over manufacturing & operational and all service sectors in their eco-innovative orientation. *Journal of Cleaner Production, 138*(1), 19-27.

- Serenko, A., and Bontis, N. (2016). Understanding counterproductive knowledge behavior: Antecedents and consequences of intra-organizational knowledge hiding. *Journal of Knowledge Management, 20* (6), 1199–1224.
- Singh, M. K., & Gupta, V. (2020). Critical types of knowledge loss in military organizations. *VINE Journal of Information and Knowledge Management Systems, 51*(4), 618-635.
- Skok, W., & Tahir, S. (2010). Developing a knowledge management strategy for the Arab world. *The Electronic Journal on Information Systems in Developing Countries, 41*(7), 1-11.
- Sumbal, M.S., Tsui, E., Durst, S., Shujahat, M., Irfan, I., & Ali, S.M. (2020). A framework to retain the knowledge of departing knowledge workers in the manufacturing industry. *VINE Journal of Information and Knowledge Management Systems, 50*(4), 631-651.
- Tabachnick, B. G., & Fidell, L. S. (2019). *Using Multivariate Statistics*. New York: Pearson.
- Taherdoost, H. (2016). Validity and reliability of the research instrument: how to test the validation of a questionnaire/survey in a research. *International Journal of Academic Research in Management, 5* (3), 28-36.
- Taherdoost, H., Sahibuddin,S., & Jalaliyoon, N. (2014). Exploratory factor analysis: Concepts and theory. *Advances in Applied and Pure Mathematics, 27*, 375- 382.
- Temel, S., & Durst, S. (2021). Knowledge risk prevention strategies for handling new technological innovations in small businesses. V*INE Journal of Information and Knowledge Management System, 51* (4), 655-673.
- Torres, A. I., Ferraz, S. S., & Santos-Rodrigues, H. (2018). The impact of knowledge management factors in organizational sustainable competitive advantage. *Journal of Intellectual Capital, 19*(2), 453-472.
- Urban, B., & Naidoo, R. (2012). Business sustainability: empirical evidence on operational skills in SMEs in South Africa. *Journal of Small Business and Enterprise, 19*(1), 146-163.
- Vera, D., & Crossan, M. (2003). Organizational learning and knowledge management: Toward an integrative framework. *The Blackwell handbook of organizational learning and knowledge management*, 122-142.
- Wehbi, M. (2020). COVID19: Impact on Lebanese economy. *International Journal of Science and Research (IJSR), 9*(4), 1648-1652.
- Xiao, M., & Cooke, F. L. (2019). Why and when knowledge hiding in the workplace is harmful: A review of the literature and directions for future research in the Chinese context. *Asia Pacific Journal of Human Resources, 57*(4), 470-502.