

Obstacles to applying knowledge management in small enterprises in the Egyptian construction sector, Review

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ABSTRACT

The adoption of knowledge management has become an essential pillar of modern management in the entire world. Knowledge has been recognized as one of the most important assets of any organization, especially in a knowledge-intensive industry such as construction. The application of knowledge management contributes to supporting the transfer of knowledge between stakeholders and preventing “re-inventing the wheel”. Knowledge management is a tool for improving organizational performance and achieving a competitive advantage. A review of the literature shows that there are many more challenges for small construction enterprises in adopting knowledge management systems compared to large enterprises. Because small companies play a prominent role in the contracting sector, they must strive to keep pace with the huge revolution in modern management and the successful application of knowledge management by removing obstacles to its application. This paper presents an overview to identify the obstacles that hinder the application of knowledge management in small construction enterprises. By reviewing the relevant literature, the results showed that the main obstacles associated with the adoption of knowledge management are lack of awareness of the concept of knowledge management, lack of funding, time constraints, nature of construction projects, staff resistance, and lack of documentation.

KEYWORDS

knowledge management (KM), obstacles, small construction enterprises (SCEs), construction.

1. INTRODUCTION:

Our era today is characterized by rapid development and change. It is witnessing an amazing revolution in information technology. It creates new opportunities for the construction industry by providing information from all its sources. The construction sector is a knowledge-intensive industry where numerous knowledge accumulates (Rowley, 2007). Knowledge management (KM) is distinguished by its ability to create, share, and organize knowledge for individuals and groups, and this knowledge becomes available throughout participation. KM application is the best way to invest intellectual capital by making use of the experiences inherent in the minds of individuals, contributing to improving the performance of employees, and raising the efficiency of institutions.

Recently, with the emergence of a new framework based on the use of Building Information Modeling (BIM) technology, which is one of the prominent tools of the 21st century in the construction industry. This framework manages information throughout the building's life cycle (Aouad & Arayici, 2010). Although BIM is an integrated information framework, it focuses on information with little attention and utilization of knowledge (Boyes, 2016). BIM is not developed enough to create and gain knowledge; KM is a stand-alone process isolated from BIM application (Liu et al., 2013). Many researchers have realized the necessity to incorporate knowledge into BIM to permit incessant development in BIM supported projects (Boyes, 2016).

Although knowledge is classified as an important asset and a competitive resource in the construction sector (Rowley, 2007), the fragmentation of construction knowledge is identified as one of the major challenges facing the construction industry. This fragmentation makes it difficult to transfer knowledge among project participants and contributes to the waste of knowledge within the sector (Liu et al., 2013).

On the other hand, small and medium enterprises (SMEs) have become a priority in economic and institutional reform programs for various countries. This interest comes in light of the increase in the number of these companies, and the increase in their contribution to the Gross Domestic Product (GDP). SMEs make up approximately 90 percent of the total number of companies all over the world (Muriithi, 2017). Studies in this regard show that there is as yet a shortage of realization concerning the requirements of small enterprises (SEs) in managing knowledge (Durst et al., 2013). In this context, this paper tries to identify the principal barriers to the application of KM in small construction enterprises.

1. LITERATURE REVIEW:

1.1 *Definition of Knowledge:*

Knowledge is a complicated concept which comprises information and skills gained through experience. Knowledge exists in persons, groups, and organizations, in many forms. The acquisition of an employee's knowledge is important for the organization. Essential decisions are set up on experience and information that is ordinarily shared informally (Hari et al., 2004.)

There are different outlines for distinctive between various types of knowledge. One proposed outline for categorizing the knowledge discriminates between explicit knowledge and tacit knowledge (Nonaka & Takeuchi, 1995). Tacit knowledge is the knowledge that is embedded in the mind through personal experience and skills. It is hard to formalize, encode, communicate, and present in tangible form. Many authors estimate that 80% of important knowledge is tacit knowledge (O'Dell & Leavitt, 2004; Rumizen, 2002). In contrast, Explicit knowledge is the knowledge that is easily recorded, encoded, and articulated. It is usually embedded in various formats like books, databases, datasheets, and reports, etc. Moreover; it can be captured, shared, communicated, and stored.

The interaction between explicit and tacit knowledge is described in the SECI model. It identifies four processes that are ordinarily used by organizations for knowledge transformation from one type of knowledge to another. This model includes socialization, externalization, combination, and internalizations (Nonaka & Takeuchi, 1995.)

Socialization: This process includes the sharing of tacit knowledge between people. It allows exchanging experiences through collective activities such as seminars, discussions, presentations, conferences, and workshops. Social processes play a significant role in transforming individual knowledge into collective knowledge (Walsh, 1995). **Externalization:** It is the process in which tacit knowledge is translated into a form that is easy for people to comprehend (Nonaka & Takeuchi, 1995). Tacit knowledge is stored in a type of documentation. It includes techniques such as concepts, words, or figurative language. **Combination:** The process in which knowledge is gathered throughout the organization and aggregated into a more effective form than explicit knowledge (Huang & Yeh, 2011). **Internalization:** It is converting explicit knowledge provided by the organization or external sources into tacit knowledge applied personally (Nonaka & Takeuchi, 1995).

2.2 Introduction of knowledge management:

Despite the wide literature on knowledge management (KM), it is hard to define (Earl, 2001). KM cannot be restricted to a single definition and is presented as being varied in various fields. There are several definitions for KM clarifying the distinctions in the content and scope. According to Macintosh (1997), KM is "The identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets to fulfill individual and/or organizational objectives" (Macintosh, 1997). Besides, van Donk (2005) defined KM as "Knowledge Management is the process of acquiring, developing, measuring, distributing, and providing a return on organizational intellectual assets through a set of defined methods, tools, techniques and values" (van Donk & Riezebos, 2005). the researchers concluded the

definition of KM as a set of processes or activities for evolving and using knowledge to gain or enhance the assortment of results like organizational performance, or competitive advantage, etc (Bakar et al., 2012).

Recently, there is plenty of studies on KM because many researchers have paid great attention to KM in various fields. According to Scopus database¹ statistics during the past two decades from 2000 to 2020, the ranking of published KM documents by subject area is as follows; the field of computer science ranked first with 30.6%, then business, management, and accounting by 16%, while the engineering field ranked third with 12.4%, respectively (Scopus, 2021c) as shown in [Figure 1](#).

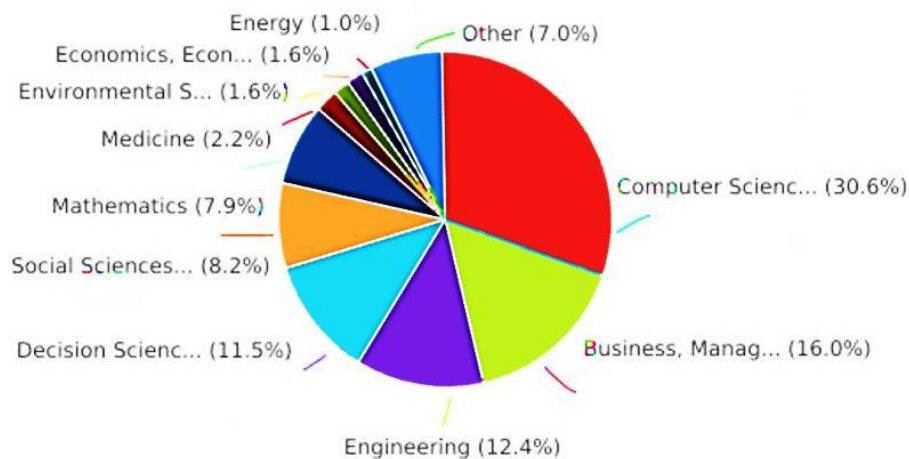


Figure 1: Knowledge management documents published by subject area during the past two decades from 2000 to 2020. Source: (scopus,2021)

2.3 Knowledge management processes:

The principal goal of the knowledge management processes (KMPs) is to enhance the organization's productivity and to efficiently use the organization's collective knowledge. They refer to all the activities that relate to knowledge inside and outside the organization (Alharithy, 2015). They facilitate the transformation of tacit knowledge into explicit and explicit

¹ Scopus database is one of the major search engines and is commonly used among researchers (Yi & Yang, 2014), which includes comprehensive coverage of scientific outputs. In 2020, the database has more than 40 thousand scientific journals (Scopus, 2021a).

knowledge into tacit (Titi, 2010). Different scholars have defined KMPs in diverse dimensions, as shown in [Table 1](#).

Table 1: Models of different KMPs

No	Authors	Knowledge Management processes
1	(De Long, 1997)	Capture-Transfer-Use.
2	(Teece, 1998)	Create-Transfer-Assemble-Integrate-Exploit.
3	(Burk, 1999)	Find/Creation-Organization-Sharing- Use/Reuse.
4	(Alavi & Leidner, 2001)	Creation-Storage-Transfer-Application.
5	(Tserng & Lin, 2004)	Creating-Securing-Capturing/Combining-Distributing-Retrieving.
6	(Alegbeleye, 2010)	Acquisition and Generation-Capture-Organization- Storage-Sharing-Application.
7	(Abdelatif et al., 2013)	Creation-Storage-Sharing-Application-Evaluation.

Based on the previous table, there are many models of KMPs that define the relationship between the basic processes that extend from three processes (creation, organization, and transferring) to seven processes (creation, acquisition, identification, adaptation, organization, distribution, application) (King, 2009). KMPs include four main stages in most organizations (Jashapara, 2004) as below;

Knowledge creation is the continuous transfer, combination, and reconfiguration of different types of knowledge, as it occurs through interaction, practice, and action (Nonaka & Takeuchi, 1995). knowledge creation is the driving force of the organization and indicates its ability to generate new or unique ideas (Ichijo & Nonaka, 2006).

Knowledge Storage refers to a process of transformation that includes organizing, storing, structuring, and combine knowledge so that concerned easily used it in the future (Lin, 2007).

Knowledge sharing is "the processes of exchange of the knowledge between individuals in the organization, it's a two-way interaction" (Françoise, 2008).

Knowledge application is a process that facilitates organizations to convert their organizational expertise into a tangible product by using actual knowledge (Zaied et al., 2012). It supports organizations to increase their performance and decrease costs (Davenport & Klahr, 1998).

4.2 Knowledge management enablers factors:

Knowledge management enabler indicates the key factors that define the effectiveness of KM within the institution, that are the driving power that supports KM (Yeh et al., 2006). KM includes processes to manage knowledge as well as enablers to support these processes. Many researchers have presented KM enablers for KM application in the literature, as shown in Table

Table 2: KM enabler's factors

No	Authors	KM enablers factors
1	(Choi & Lee, 2003)	leadership, Organization, technology, and learning
2	(Probst & Davenport, 2002)	Leadership, organizational policy, performance measurement, knowledge sharing and acquisition, benchmarking and training, information systems structure.
3	(Wong & Aspinwall, 2005)	information technology and organizational infrastructure, strategy culture, and purpose, measurement and management leadership support
4	(Akhavan et al., 2006)	culture, leadership, structure, roles and IT infrastructures, responsibilities, and measurement
5	(Consulting, 1999)	corporate culture, people and information technology

The extended list of KM enablers' factors can be classified into four main categories; people, organization culture, organization structure, and technology, which are essential for KM effectiveness.

People play a vital role in KM success and organization since they are the creative source. Knowledge is possessed by individuals and the sharing, using, and converting personal knowledge to organizational knowledge by enhancing an individual's communication with others is an important step (Nonaka & Takeuchi, 1995). So, several successful organizations

get ready to invest in their employees to support their experiences, capabilities, and visions for the global working environment (Bozbura, 2007).

Organizational culture: it is considered a complicated collection of beliefs, values, and behaviors that affects KM in organizations (Ho, 2009). Each organization possesses its own unique practices and culture (Shin et al., 2001).

Technology: Convenient technology infrastructure is necessary for efficient KM. It comprises information technology (IT) systems that facilitate the integration of knowledge and information in the organization (Webb & Schlemmer, 2006). KM can be supported by applications of IT tools to create an infrastructure for enhancing the scope and efficiency of the KM processes like creation; storage, transfer, and application (Easterby-Smith & Lyles, 2003).

Organizational structure refers to the method and scope to which roles and responsibilities are delegated, coordinated, and controlled, and how information streams among various management levels to achieve the objectives and goals of the organizations. Organization structure includes rules, regulations, the organizational hierarchy, and reporting relationships (Herath, 2007).

2.5 Knowledge management and the construction sector:

Knowledge is beheld to be a significant asset for organizations. Knowledge management KM in the construction sector, which is characterized by intensive knowledge (Kim, 2014). The expression "knowledge-intensive" intimates economists' labeling of companies as labor-intensive or capital-intensive. By analogy, labeling a company as knowledge-intensive presumes that knowledge has more significance than other inputs. The industry has begun to realize that knowledge is an asset, quite such as the physical assets of companies (Zhang, 2010).

Effective KM in construction companies enhances the interaction of the skills and experiences of stakeholders during the project life cycle, contributes to preventing the recurrence of past mistakes and "reinvention of the wheel" (Tan et al., 2006). KM plays a vital role in innovation, building client satisfaction (Lee & Egbu, 2007), entrepreneurship, and improving organizational competitiveness (Tan et al., 2006). The positive effects of a successful KM system implicate project reduced time consumption, costs, and increased quality (Park et al., 2013).

By following the path of documents published in Scopus database by year that relate to the subject of KM in construction industry in the period between 2000-2020 (Scopus, 2021b) as shown in [Figure 2](#), it was revealed that many researchers have gradually become interested in the research in this field.

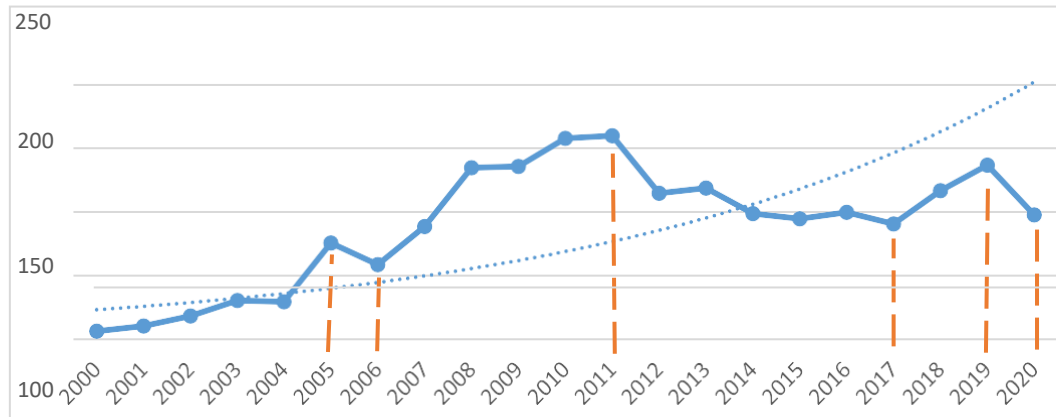


Figure 2: the path of documents published in scopus datadase by year in the field of knowledge management in construction last two decad source: (scopus,2021b)

The data of the previous figure were got by using various keywords associate with the topic; Title-abstract-key (("knowledge management," or limit to exact keyword, "knowledge management system," or "knowledge creations" or "knowledge transfer" or "knowledge acquisition" or "knowledge-sharing" or "knowledge exchange") and ("construction" or limit to exact keyword, "construction industry" or "construction firms" or "construction companies" or "construction projects" or "construction sectors" or "construction organizations" or "construction enterprise") and (limit to (subject area," engineering") or "business and management"))).

The literature review yielded 1883 documents that were published in the period from 2000 to 2020. We divided this period into six phases, which varied between ups and downs. The first phase from 2000 to 2005 represented the early stages of its ascent, in which the curve continued to rise, and the number of documents published annually increased from 7 to 76 documents. While the period between 2005 and 2006 showed a decrease in the number of published documents, to 59 documents. As for the period from 2006 to 2011, the curve rose again until it reached its peak in 2011 when the number of documents published reached 160 documents. On the contrary, **we considered the period between 2012 and 2017** a period of fluctuation, as the numbers decreased in 2012 to reach 112 documents and continued to oscillate between ups and downs until the published documents reached 91 in 2017.

The curve rose again **from 2017 to 2019**, bringing the number of documents published in the year 2019 to 137 documents. **As for the year 2020**, because of the emergence of the Corona epidemic, which affected scientific research at the global level, the number of published documents decreased to 90 documents. In general, the trend line for the number of documents published annually during the past two decades in knowledge management in the construction industry continues to rise significantly.

There has been quite inclusive research showed on the application, the role, and practices of KM in the construction sector. Forcada et al. (2013) presented a survey of awareness of KM application in the Spanish construction sector(Forcada et al., 2013), Patricia Carrillo & Chinowsky (2006) discussed the implementation of KM initiatives in leading engineering design and construction organizations in the USA(Carrillo & Chinowsky, 2006), ElFar et al. (2017) studied The effect of applying KM on performing Egyptian construction companies(ElFar et al., 2017), Oke et al. (2013) assessed the adoption of KM practices among Nigerian construction professionals(Oke et al., 2013), Yusof & Bakar (2012) reported KM and growth performance in construction companies(Yusof & Bakar, 2012).

2-6 Knowledge management and building information modeling

Outspread building information modeling (BIM) technology into the construction process to make a single repository of data(Goedert & Meadati, 2008). BIM supply a coordinated source of organized information to shore all parties implicated in the delivery process such as design, build, or operation. BIM merge technology together with new activities practices to progress the quality of the delivered output as well as improve the accuracy, timeliness, and coherence of the process(Charlesraj, 2014).

However, the present BIM approach is not ripped enough to create and capture knowledge, and knowledge management is an independent and freelance process detached from BIM application. As both KM and BIM are executed all through the life cycle of a project, it is feasible and appropriate to smash their border and merge them into Building Knowledge modeling BKM (Liu et al., 2013). KMS (that stores knowledge in a KM repository) and BIM applications are linked and operated together to satisfy information exchange demands of BIM utilizes and knowledge capture, sharing, reuse, and maintenance demands of KM. This is the essence of the suggested BKM approach, as shown in [Figure 3](#).

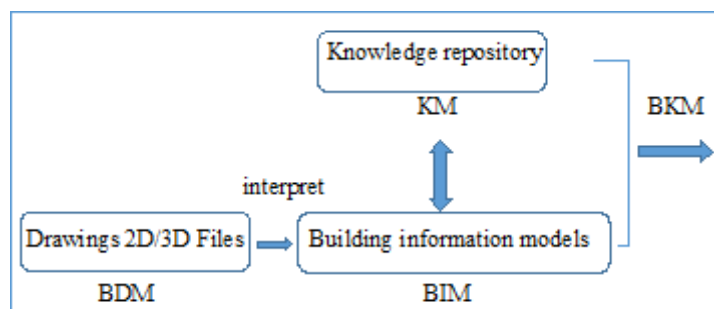


Figure 3: Development of KM, BDM, and BIM to BKM Source: (Liu et al., 2013)

2.7 Small enterprises in Egyptian construction industry:

Definition of small enterprises: Micro, small and medium enterprises MSMEs are the spine of any economy, they play a vital role in the development and economic growth. The criteria for defining SMEs differ among countries or sometimes among industries. Egbu et al. (2003) Clarified there is no particular and uniformly agreeable definition of a small enterprise, However, the World Bank distinguished between MSMEs according to several criteria: the number of employees, size of the organization's assets, and annual turnover. Small enterprises SEs are defined as enterprises have with 10 to 50 employees, and the size of the enterprise's assets and annual sales do not exceed 3 million USD(Dababneh & Tukan, 2007). According to Egyptian law, no. (141/2004) distinguished SMEs focused on two criteria: the number of employees and the enterprise's capital. SEs have less than 50 employees and capital between 50 thousand EGP and 1 million EGP(Accelerate Consulting and Development, 2014).

Small enterprises in Egypt: SMEs in Egypt are estimated at 95% to 98% of the total industrial establishments(Bary, 2019). MSMEs are Distributed over 3.653 million enterprises, representing 75% of the total workforce in Egypt. The number of SEs reached 216.9 thousand out of the total number of MSMEs(CAPMAS, 2020), as shown in [Figure](#).

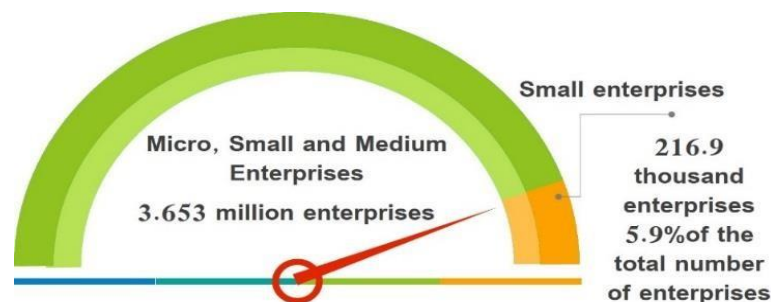


Figure 4: The number of small enterprises out of the total number of MSMEs In Egypt in 2017-2018.

Source: constructed by author using (CAPMAS, 2020)

Small enterprises in Egyptian construction industry: The form of the construction industry like a hierarchical pyramid, wherever the top part comprises large companies and the base comprises relatively SEs. SMEs include a majority of all enterprises and employ a greater number of workers(Balaban-Ökten & Gundes, 2018). the number of SEs are estimated to be around 80% of the enterprises officially registered with the Egyptian Federation of Construction and Building Contractors (EFCBC) in July 2019(Hamdan, 2019), as shown in [Figure 5](#).

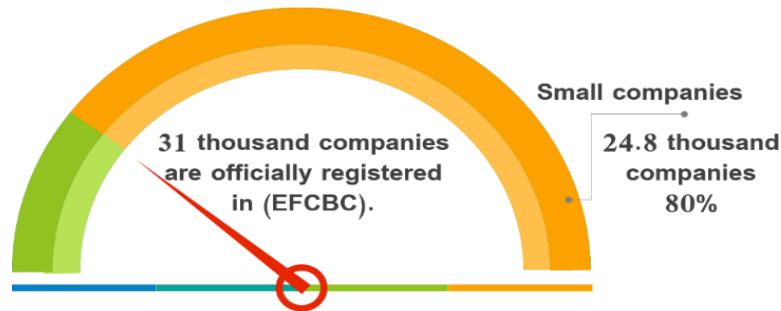


Figure 4: Small enterprises registered in (EFCBC) in July 2019. Source: constructed by author using (Hamdan,2019)

2.8 Obstacles to applying knowledge management in construction sector and small enterprises:

Although many studies have shown an increased awareness of the concept of KM in the construction sector, several barriers are hindered in the application of KM practices (Balaban-Ökten & Gundes, 2018). These barriers arise because of the nature of construction projects in general and the characteristics of SEs in particular. Despite the unique nature of construction projects, there are many experiences that can be used in future projects(Kulkarni & Dahiya, 2018). Because of the temporary project-based nature with significant disassembles, and increased worker turnover (Okere, 2017), the organizations dissolve at the end of the project, and the knowledge generated from this project is lost. Loss of knowledge gained through the project leads to further difficulties and problems in achieving accomplishment for projects in the future, as well as losing organizational knowledge(Kulkarni & Dahiya, 2018). On the other hand, several researchers focused on the different risks and threats of incorporating KM in the construction sector, as shown in Table 3.

Table 3: obstacles to applying KM in the construction sector

No	Authors	Focus group / Obstacles to applying KM
1	(Hackman et al., 2017)	Civil engineering construction firms in Ghana/ Unavailability of KMS, lack of support from top management, shortage of awareness of KM practices, lack of realization of KM, employee resistance.

No	Authors	Focus group / Obstacles to applying KM
		Civil engineering construction firms in Ghana/
1	(Hackman et al., 2017)	Unavailability of KMS, lack of support from top management, shortage of awareness of KM practices, lack of realization of KM, employee resistance.
		Civil engineering construction firms in Ghana/
1	(Hackman et al., 2017)	Unavailability of KMS, lack of support from top management, shortage of awareness of KM practices, lack of realization of KM, employee resistance.
		construction companies in UAE/
2	(Ghabbour, 2017)	The nature of construction projects, the minimal reviews and documentation after the completion of project implementation, limited time, lack of support from senior management, and organizational culture do not support new ideas and technologies.
		The Saudi Construction Industry/
3	(Al Olyani, 2007)	Individual barriers; lack of time, experience level, difference of background and culture.
		Organizations barriers; lack of motivation, lack of resources.
		Technology barriers; lack of technical support, lack of communication.
		Construction sector in north America/
4	(Okere, 2017)	lack of awareness of knowledge as the most important resource, Lack of an appropriate culture and environment to promote knowledge transfer

practices, and

lack of efficient ICT systems.

Civil Engineering Construction Firms in Nigeria/

- 5 (Alhaji et al., 2013) Lack of documentation of experiences and knowledge, Lack of knowledge sharing among employee, Lack of understanding of the concept knowledge, Moving from one organization to another without documenting knowledge, No person responsible for documenting records.

UK Construction sector/

- 6 (Carrillo et al., 2004) Employee Resistance, Lack of Standard Work Processes, Not Enough money, lack of

Time, Lack of IT Infrastructure, Organizational Culture.

large construction organizations/

- 7 (Robinson et al., 2001) Resistance of employee, time constraint, organizational culture, insufficient money, lack of standard work processes, poor IT infrastructure, lack of understanding of KM.

SMEs in the Turkish AEC industry/

- 8 (Balaban-Ökten & Gundes, 2018) SMEs didn't use a systematic KM system and the principles barriers were; not storing knowledge in an organized and systematic way, most institutions prefer to keep hard copies of documents and share them via e-mail, Difficulties converting tacit knowledge into explicit knowledge, and Computer hardware malfunctions caused a

loss of knowledge.

Korean Small and Medium-sized Construction Companies/

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- construction companies in UAE/
- 2 (Ghabbour, 2017) The nature of construction projects, the minimal reviews and documentation after the completion of project implementation, limited time, lack of support from senior management, and organizational culture do not support new ideas and technologies.
- The Saudi Construction Industry/
- 3 (Al Olyani, 2007) Individual barriers; lack of time, experience level, difference of background and culture.
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- Construction sector in north America/
- 4 (Okere, 2017) lack of awareness of knowledge as the most important resource, Lack of an appropriate culture and environment to promote knowledge transfer practices, and lack of efficient ICT systems.
- Civil Engineering Construction Firms in Nigeria/
- 5 (Alhaji et al., 2013) Lack of documentation of experiences and knowledge, Lack of knowledge sharing among employee, Lack of understanding of the concept knowledge, Moving from one organization to another without documenting knowledge, No person responsible for documenting records.
- UK Construction sector/
- 6 (Carrillo et al., 2004) Employee Resistance, Lack of Standard Work Processes, Not Enough money, lack of Time, Lack of IT Infrastructure, Organizational Culture.
- large construction organizations/

- 7 (Robinson et al., 2001) Resistance of employee, time constraint, organizational culture, insufficient money, lack of standard work processes, poor IT infrastructure, lack of understanding of KM.
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- Korean Small and Medium-sized Construction Companies/
-
- 9 (Park et al., 2013) Insufficient funding, Problems of imparting the knowledge at the right time to the right person, not sharing KM, The challenge of integrating and implementing knowledge.
-
- SMEs in Malaysian construction industry/
-
- 10 (Yap & Lock, 2017) Lack of motivation, distrust, Difficulty accessing knowledge when it is needed, loss of an important knowledge, bureaucracy.
-
- construction SMCs in South Africa/
-
- 11 (Aghimien et al., 2019) people-related barriers: Lack of innovation and research, management's/Owner's unwillingness to share knowledge, Lack of training programs, and Lack of aspiration of staff.
- Organizational barriers; difficulty of funds, high-priced IT system, lack of planning, lack of resources, and inability to hire experts.
- Project demand barriers; Time restrictions to share knowledge, lack of recognition and rewards, and lack of information analysis.
-
- SMEs in Indian Construction Industry/
-
- 12 (Kulkarni & Lack of technology system, lack of motivation, reliability of knowledge resources, heavy workload, Lack of high management support, Fear of

Dahiya, 2018) losing and controlling of
knowledge possessions.

3. FINDING OF THE LITERATURE REVIEW:

Through the wide-ranging searches showed above, previous studies revealed that most small construction enterprises SCEs possess no explicit strategy and knowledge management program. They prefer adopting informal knowledge since the establishment of formal knowledge will be more costly compared to informal. We can divide the key obstacles associated with the application of the KM system in SCEs into three obstacles; individual, organizational, and technological obstacles, and there were several issues that were categorized as barriers to implementing KM in SCEs, as shown in Table4.

Table 4: Obstacles to applying knowledge management in small construction enterprises

No	Types of Obstacles	Obstacles to knowledge management application
1	Individual obstacles	1- Culture differences 2- Limited time for knowledge sharing 3- Employee resistance 4- A lack of motivation 5- A different level of experience
2	Organizational obstacles	1- Organizational culture 2- Budgetary constraints 3- A lack of documentation of experience and knowledge 4- Limited resources 5- A lack of top management support
3	Technological obstacles	1- A lack of a robust technical infrastructure 2- Shortage of technical support 3- A lack of training.

Source: constructed by author using (Aghimien et al., 2019; Balaban-Ökten & Gundes, 2018; Kulkarni & Dahiya, 2018; Park et al., 2013; Yap & Lock, 2017).

We can consider these results as a starting point for small construction enterprises. It can help set standards for effective knowledge management adoption. They must create a balanced and integrated structure between individual, organizations, and technology to implement more successful knowledge management systems.

4. CONCLUSION:

From the foregoing discussion, the application of KM strategies is a significant issue. There is a need to adopt effective KM to enable SCEs to gain, store, share, apply, and reuse project-related knowledge efficiently during the project life cycle and after its completion. Culture, structure, leadership, finance, people, and technology can identify the main parameters affecting KM adoption in SEs. In this context, SEs must adopt a knowledge management strategy to enhance and develop their performance, as well as to achieve a competitive advantage. So, it is essential to be aware of the difficulties and barriers that may constrain the successful application of KM initiatives. The three major obstacles to applying KMS in SCEs were individual, organizational, and technological obstacles.

Hence, SCEs need to have a convenient plan and develop an appropriate strategy to overcome any difficulties or problems for the KM system to be applied efficiently. It is essential to build and enhance a culture that rewards employees for creating and sharing knowledge. The organizations should create sufficient time for exchanging experience, support the creation of new knowledge and innovation to enhance the opportunity of learning culture. There is an urgent necessity for using programs and technology to facilitate the communication and transfer of knowledge between stakeholders.

Ultimately, the result of this paper could broadly describe the barriers associated with applying KM in SCEs in order to differentiate best practices, avoid causes that could obstruct effective KM, and present recommendations compatible with the needs of SCEs.

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