Strategic Knowledge Management for Institutional Effectiveness in Construction Procurement: The Role of Stakeholder Inter-Communication

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In the construction industry, knowledge management and knowledge sharing face significant challenges, primarily due to the involvement of diverse stakeholders and the transient nature of work clusters. While technical issues often receive attention, the informal transfer of knowledge from previous projects remains a critical gap, as the preservation of intellectual capital is essential for organizational effectiveness. The dynamic nature of construction projects, with their numerous stakeholders, further complicates the development of efficient knowledge-sharing practices. As a result, construction organizations often struggle to retain valuable insights from past projects, leading to inefficiencies and a lack of continuity in decision-making. To address these challenges, various knowledge management strategies are being explored. This research paper specifically examines knowledge management within construction procurement in Morocco's public sector, presenting a comprehensive and integrated framework validated by industry experts. The proposed framework is designed to empower procurement teams to effectively leverage organizational knowledge, thereby promoting more efficient and informed decision-making and enhancing overall institutional effectiveness. The framework also emphasizes the role of effective inter-communication among stakeholders, which is crucial for fostering a culture of knowledge sharing and ensuring that all parties can contribute to the continuous improvement of procurement practices.

Keywords: knowledge management, knowledge sharing, KM framework, institutional effectiveness, procurement

INTRODUCTION

There has been recently a growing interest in Knowledge Management (KM) in fields where there is heavy reliance on shared information among stakeholders. One of these fields is the construction industry, and especially the procurement aspect that draws on the input of many internal and external participants.

To start with, Cross (1998) defines KM as "the discipline of creating a thriving work and learning environment that fosters the continuous creation, aggregation, use, and re-use of both organisational and

personal knowledge in the pursuit of new business value." Indeed, effective KM serves as the cornerstone for optimizing procurement processes and contributes to cultivating an environment that is conducive to continuous knowledge creation and utilization. By encouraging the sharing and utilization of expertise, it fuels better decision-making across the entire spectrum of procurement activities, from acquiring goods and services to implementing projects.

Procurement, whether private or public, is the process of preparing for the acquisition of goods, performance of services, or implementation of projects. The process involves calling for bids/tenders, selecting the most cost-effective and best contractual arrangement, and agreeing to the various contracts required to get the goods delivered, services performed, or the projects completed. The general process of procurement is presented in figure 1.

FIGURE 1
PROCUREMENT GENERAL PROCESS
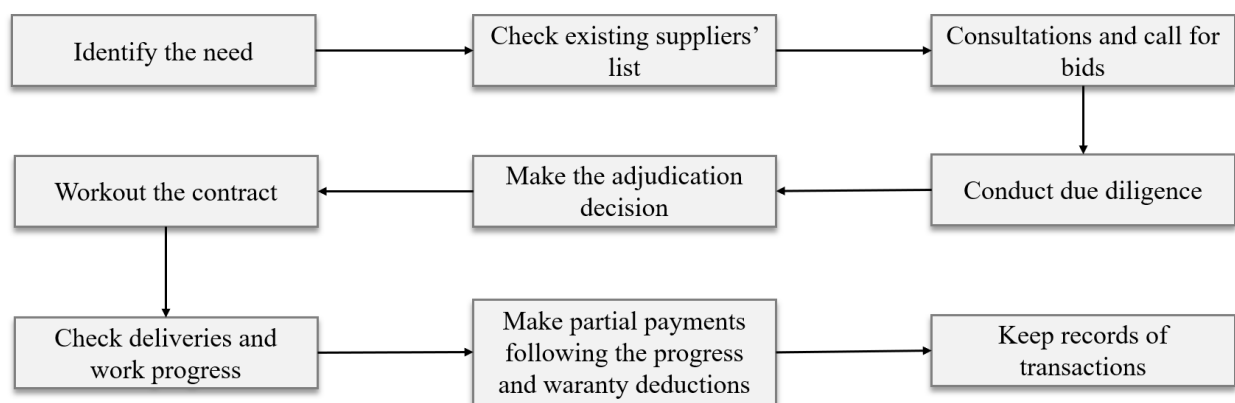
This study focuses on the public sector within Morocco, specifically examining the construction procurement processes in this region. The challenges related to KM and sharing within the context of public sector procurement are explored, with an emphasis on how the construction industry in Morocco can benefit from a tailored KM framework.

From another perspective, in the construction industry throughout the world, following a rigorous procurement procedure is very common and sometimes even required by law. Therefore, stakeholders in the construction industry look up to the knowledge accumulated over the years in processing various sorts of bids. Moreover, and as previously mentioned, many different stakeholders from different backgrounds, fields, and sectors contribute to construction projects and have, in a way or another, a decisive say in the way a construction project unfolds.

For many years, a holistic process known as Building Information Modelling (BIM) has been used to ensure that construction projects respect certain standards from the planning to the delivery phase. IT systems, such as Revit, have been developed to closely manage construction projects. Stakeholders of the construction industry rejoice the resolution of most technical problems that have indeed been identified over the years. However, the major problem that remains is the accumulation of sector-specific knowledge and expertise generated tacitly by individuals and teams belonging to various stakeholders are in great jeopardy because of the transient nature of work clusters and the unstructured approach to learning from previous construction projects. This intellectual capital constitutes a pillar in any KM framework seeking to solidify the effectiveness of dynamic organizations in the construction industry.

This paper is structured as follows. Section II reviews and discusses previous works. Section III presents the methodology. Section IV explains the need for the framework. Section V presents and explains the framework while section VI presents the validation process.

LITERATURE REVIEW

The construction industry is a knowledge intensive industry. In fact, a lot of data, information, and knowledge has been gathered over the years and preserved in databases; however, managing this accumulated knowledge is still perceived as a challenge. This section presents a review of previous works in KM applied to the construction industry. It is, however, worth noting that the literature on KM in construction remains limited. Furthermore, there is a noticeable scarcity of published research addressing the procurement dimension within the construction domain.

KM in Construction

According to Wetherill *et al*. (2002), knowledge from the construction industry can be classified in three main categories:

1. Domain knowledge: also referred to as subject knowledge and is the general knowledge that is available to all people working in the construction industry such as construction standards, regulation, and technical guides.
2. Organizational knowledge: this type of knowledge is specific to each organization and can be found in the form of explicit knowledge (written and codified - in reports, presentations, databases, and so on) or tacit knowledge (employees' experiences and expertise).
3. Project knowledge: this knowledge is specific to each project that the organization has worked on, and can include but not limited to: the processes and procedures adopted, the problems encountered, the proposed solutions.

Moreover, Yu and Yang (2016) proposed a three-dimensional research framework for the construction industry that focuses on management organization, managerial methodology and approach, and managerial objectives. This framework, however, aims at guiding future research to achieve project, organizational, and competitive objectives, but is not intended for research professionals.

Barriers to KM in the Construction Industry

Several barriers as to the implementation of KM practices in the construction industry have been identified in the literature. According to Korkmaz & Bahidrah (2018), there are 4 main barriers that impede the implementation of KM practices in the construction industry.

1. Lack of coordination: according to the researchers, there is clear lack of communication among construction professionals. For instance, on-site workers often do not communicate with off-site workers, resulting in these later not being updated and not knowing what is happening on-site. This lack of communication is the result of infrequent meetings and the low knowledge sharing culture, which in turn leads to delays in finishing projects, higher costs, and a decrease in performance.
2. Limited utilization of communications networks: though the technological advancements in terms of communication networks, many construction professionals do not use any.
3. Absence of firms' structural approach: according to Korkmaz & Bahidrah, "construction projects are highly idiosyncratic requiring unique processes and procedures that are difficult to generalize as a usable collective body of knowledge". Also, construction firms need to put in more effort into generating knowledge from past projects and reusing them. This would give more structure to the work, enhance the workers' efficiency, save time, and reduce costs.
4. Cultural elements: the country's culture and organizational culture play a role in construction projects as they can impact, positively or negatively, the day-to-day business activities of the organization, which will result in an impact over the long-term too.

Additionally, Egwunatum and Oboreh (2022) have also investigated the factors that limit the implementation of KM in construction companies. The authors identified 5 main barriers: insufficient planning and resources, technology, culture and management, absence of clear business objectives, and motivation.

KM for Procurement

KM applied to procurement entails, in addition to the KM processes, locating and tracking suppliers, overseeing contracts, and keeping an eye on and assessing the performance of vendors.

Several ways to implement KM in procurement were identified. To mention but a few examples, through using software for procurement management, building a single repository for procurement data, and encouraging knowledge exchange among staff members. In addition, firms may also obtain insights into supplier performance, and hence pinpoint areas for development, by utilizing advanced analytics techniques and data visualization tools.

According to Liu and Elhag (2007), centralizing best practices, lessons learned, and procurement expertise may help improve procurement efficiency through cost reduction, process streamlining, supplier selection, and contract management. This strategy places a strong emphasis on the value of using knowledge to improve the efficiency of procurement operations inside businesses. Businesses may increase operational efficiency, save costs, and make better decisions by combining insightful procurement-related experiences and insights.

METHODOLOGY

This research employed a 5-step process: problem definition, formulation of research questions, interviews, questionnaires, primary research analysis, and framework development and validation by domain experts. Moreover, the study adopted a mixed methods research approach in which both qualitative and quantitative techniques were used. Likewise purposive sampling was utilized for selecting respondents/ interviewees based on specific criteria to ensure fair representation of the population of interest.

This study utilized triangulation, validating findings through the convergence of various data sources, such as surveys, interviews, and observations, alongside diverse methodologies that incorporate statistical analysis, case study examination, and content analysis. The integration of purposive sampling, triangulation, and mixed methodologies enriched the depth and credibility of understanding within the construction sector research domain.

The Need for an Integrated Framework

A KM framework is intended to provide a managing structure around the understanding, sorting, delivering, and sharing of data, information, and knowledge that encompasses typical processes to timelessly use and maintain them. According to the American Productivity and Quality Center (APQC), a KM framework provides assistance in many ways, including the following:

- identifying important data/information based on document typology and audit life cycle;
- collecting and storing important data/information;
- classifying data/information;
- saving documents based on specific conventions;
- increasing the ability of data/information to be searched by approved people;
- promoting and enabling the sharing of data/information; and
- ensuring the protection of data/information based on a set of permission rules.

Furthermore, it is well known that the three pillars to KM are people, processes, and technology. People are the human resources made at the disposal of an organization and who perform the tasks described in the expected process, by leveraging the technology. Hence, it can be affirmed that the elements comprising the trichotomy of People, Process, and Technology (PPT) are closely interconnected: individuals execute tasks, processes standardize these tasks, and technology aids individuals in task execution, notably through process automation. Collectively, this trichotomy forms the foundation of a fundamental notion commonly known as KM.

In order to be successful in the construction industry, like in all other industries, organizations rely on the knowledge of their workforce (people). This knowledge is treated as an asset, which does not solely rely on hiring skilled employees. Successful organizations devise or adopt reliable processes to store,

expand, and share knowledge to enhance the overall workforce's knowledge base, oftentimes using breakthroughs developed thanks to technology.

Therefore, it can be said that the PPT framework is all about how to keep a balance between the three elements while they interact. Therefore, organizations can achieve institutional effectiveness by balancing and optimizing the relationships between people, processes, and technology. Simon (2019) recapitulates the relevancy of the PPT trichotomy neatly as follows: "People hold the knowledge, and they need to share it with others, especially those who make decisions. Processes should include a step document the knowledge and record information, and the technology can help store and disseminate that knowledge."

Research indicates that other dimensions are equally important in the educated establishment and productive implementation of KM in any organization. Figure 2 includes some of these additional important dimensions in the construction e-procurement along the lines of the PPT trichotomy.

FIGURE 2
**PPT TRICHOTOMY IN CONSTRUCTION PROCUREMENT**
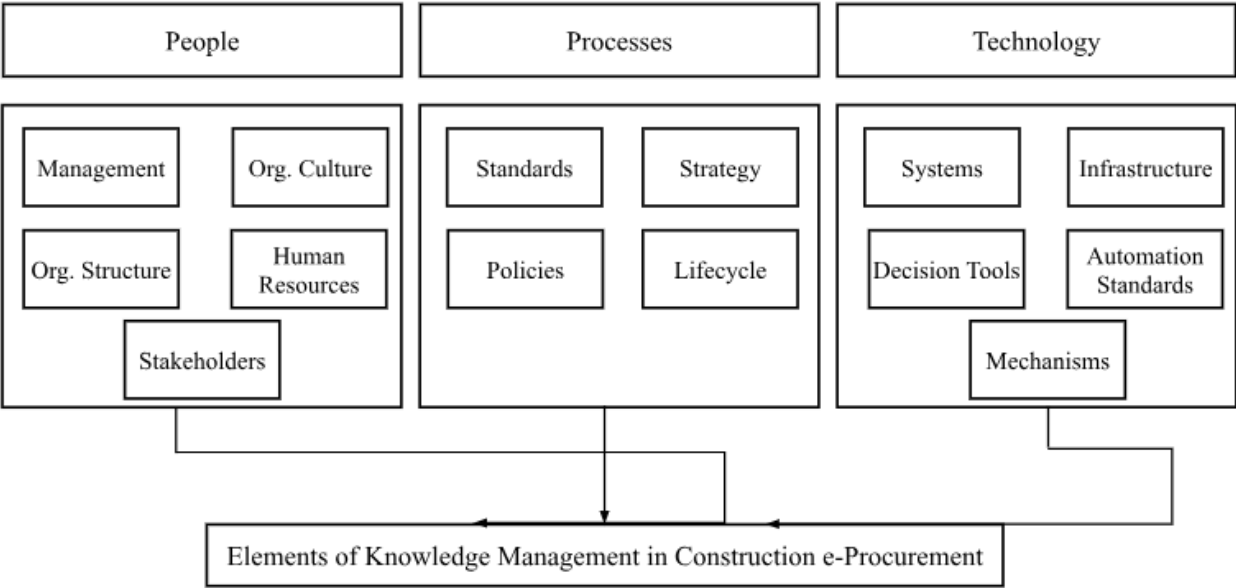
When an organization successfully balances people, processes, and technology, establishing a collaborative framework that fully supports KM becomes feasible. Since a strategy provides a basis for goal-oriented decision making, delineations need to be defined so that KM may be approached in a straightforward manner. Thus, a KM strategy determines what major plans, priorities, and actions are to be undertaken within what time frames and what human, financial, and physical resources are to be allocated. Implementing KM in a systematic manner is an extremely important mission for a construction industry or any other type of organization for that matter.

Finally, a KM framework helps employees and management focus on the value of KM efforts deployed by the conscious stakeholders of the construction industry. For a successful implementation, the framework, thus, ensures its self-direction, management and execution. When incorporating KM into a strategic framework, it is essential to make sure that it includes planning for PPT and that all components are addressed, and all the interconnected items are available for an efficient functioning.

THE PROPOSED KM FRAMEWORK

In this section, the proposed KM Framework is presented and thoroughly explained.

FIGURE 3
INTEGRATED KNOWLEDGE MANAGEMENT FRAMEWORK
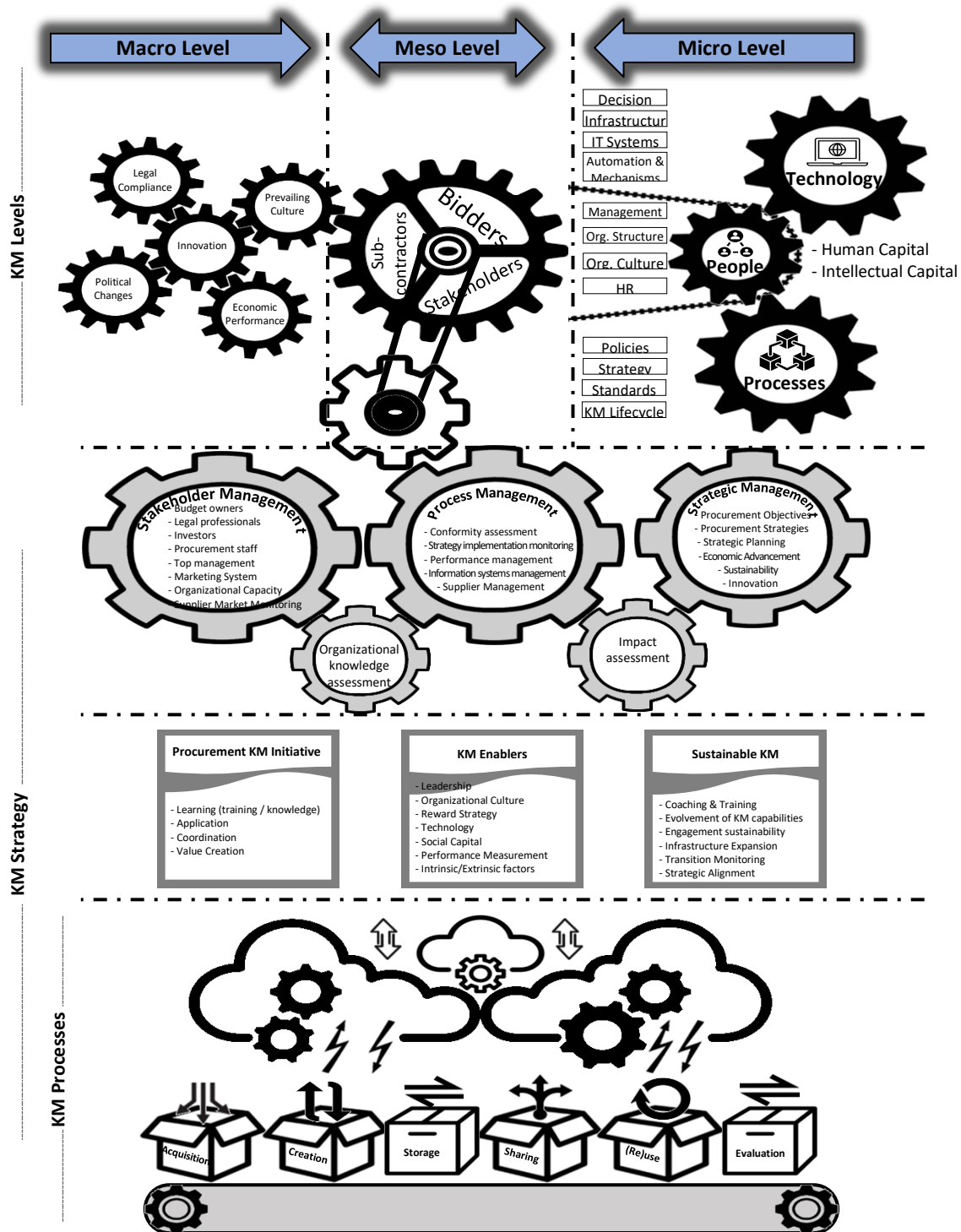
As tallied by Islam and Ikeda (2014), a KM framework contains the following components:
- Identification of needs regarding KM
- Elaboration of a strategy on KM

- Identification of resources of knowledge
- Acquisition, creation, or removal of resources and processes related to knowledge
- Storage of knowledge
- Retrieval, application and sharing of knowledge

Moreover, it should be noted that none of these components are self-determining or self-contained; rather, each one is impacted by a myriad of other variables and factors. Therefore, typically, KM frameworks are very different and can be presented in various ways (Islam and Ikeda, 2014). For instance, some models are linear and seek to give a rough overview, while others tend to display overlapping processes in an attempt to simulate the complexity of what actually happens within an organization. Although it has certain merits, the issue with the latter is that they are typically hard to capture as they can only convey partial reality, but the objective, of course, is not to become more complex to the extent of becoming incomprehensible, thus increasing the likelihood of it being abandoned.

Because KM is inextricably linked to other key corporate areas such as strategy, information management, and project management, to cite but these, and it is enabled by a variety of systems and processes, a KM framework can get very complex indeed. It might be too daring to claim that there is no integrated and fully detailed KM framework, i.e., one that encapsulates all relevant characteristics with appropriate detail. Be that as it may, each model must choose its focus and origin, and, most importantly, its limitations.

A KM framework is made of a structure that is intended to help stakeholders in the construction industry map, generate, share, assess, and enhance organisational knowledge and knowledge resources. The framework is meant to capture everything knowledge-related, from information that can be found in an employee workstation to stakeholder-oriented market research essential for high-stakes decision-making.

The proposed framework is presented along with (people) role descriptions, process descriptions, and technology functionality. It should be noted that the KM assessment maps the current state of the KM framework elements, which must not only interact with one another, but also with the organization's existing systems, structures, infrastructures, and technologies. As a result, there can be no one-size-fits-all KM framework, only frameworks tailored to a specific context.

Furthermore, in the proposed KM framework, a multidimensional approach was adopted to capture as much complexity as possible. The horizontal layers and the vertical levels intertwine in a crisscross fashion to indicate this multidimensional approach. The top layer has a broader categorization to capture three dimensions, i.e., the micro level where the conventional but enhanced PPT trichotomy is represented, the meso-level that steps into the transitional link that connects operations at the grassroots level with external stakeholders, including bidders and subcontractors, and the much larger macro-level, which is related to the governance environment likely to affect the efficiency or fluidity of any KM model.

At the purely KM processes level, which is represented at the bottom of the diagram, the conventional KM cycle is presented sequentially as on a conveyer belt to indicate the transformation of data and information into knowledge. From the several models that have been examined, acquisition, creation, storage, sharing, (re)use, and evaluation are retained as key steps to knowledge formation, which constitutes therefrom the backbone of a solid KM system. It is at this level that the build-up of a solid knowledge base occurs, and it is through the interaction with its components that stakeholders both benefit from and contribute to the growing repository of knowledge.

Above the KM Processes layer, construction procurement is introduced within the KM Strategy to put into proper context the proposed KM framework, which warrants the application of a KM system for procurement in the construction industry. Not only do users of such a system follow the existing guidelines, but they can also take initiatives thanks to several enablers that encourage and reinforce full involvement in a collaborative effort to build a corporate knowledge capital, which allows the construction procurement stakeholders to have both visibility and sustainability. It should be noted that this layer is central to the KM strategy that the construction organization puts in place to continuously assess and sort out knowledge and make it at the disposal of the stakeholder in a timely fashion.

Moreover, the importance of a KM strategy is paramount given the control it provides regarding how knowledge is managed and how visibility into the future is given to all stakeholders, regardless of position or rank. Obviously, having the most talented people, the most well-defined processes, the best technology, and the highest-quality content is not sustainable without a clear, well-elaborate, business-aligned strategy. At the top layer of the KM strategy, just below the Macro-Meso-Macro levels, several management operations take place to guarantee a smooth flow of knowledge capital. Therefore, the processes in the top-layer are linked with this layer at the Meso-level with process management at the KM strategy levels. Process Management includes operations having to do with conformity assessment, monitoring of strategy implementation, performance management, information systems management, supplier Management, cite but these. From there, the stakeholder management and strategic management are covered in tandem in interesting ways that emulate cogs in a revolving and recursive mechanism. Stakeholder Management, on the other hand, comprises operations having to do with key internal and external stakeholders in the construction industry, i.e., budget owners, legal professionals, investors, procurement staff, top management, marketing system, organizational capacity, and monitoring of supplier markets. At the other end that revolves in tandem with the management of processes and stakeholders, there is Strategic Management that deals with, procurement objectives, procurement strategies, strategic planning, economic advancement, sustainability, and innovation, all of which are expected to be incorporated in the vision of the organisation. It must also be specified that assessment of the quality of knowledge and assessment of its impact on organisational operations occurs at this stage in the system, and it concerns all levels and layers.

Framework Evaluation

Regardless of scope, any framework must be validated by experts in the knowledge domain it seeks to cover. In this case, experts and stakeholders from the construction industry were targeted as evaluators of the prosed framework. For this purpose, a questionnaire and a survey were designed to glean expert feedback. Moreover, thorough consideration was given to ensuring a diverse pool of respondents in order to enrich the overall perspective. The diversity of the targeted group included various aspects, such as the geographical location, professional position, and industry experience.

CONCLUSION

KM, as the process of capturing, distributing, and effectively using organizational knowledge, has become a priority in order to make the most of the organizational memory, legacy, data and expertise. Thus, a KM framework places the human capital at the heart of the success of any KM initiative. A KM framework, thus, provides the overall umbrella to gives meaning to any system or strategy and offers stakeholders visibility and the capability to operate efficiently, which in turn reduces frustration, mitigates negative outcomes, and promotes sustainability.

When data/information/knowledge is relevant, beneficial, valuable, convenient, useful, systematized, and well-organized, people tend to be empowered to work more efficiently, which nurtures employee engagement and fosters a better work-life balance. The proposed KM framework provides a detailed process for navigating all the data/information/knowledge that exists in dissimilar systems and helps bridge the knowledge gaps that are likely to cause glitches or problems for the stakeholders. Moreover, for the KM framework to work well, it is critical to make sure it is correctly implemented, which implies putting the right people in the right positions. Therefore, the first step would be identifying the leaders and champions who will be responsible for helping build and execute one's organisational KM strategy. Needless to say, everyone will benefit from the effective implementation of a KM framework, but it is important to start with a few key advocates, for whom KM constitutes a huge plus, e.g., heads of departments such as IT, HR, purchasing, sales, marketing, and customer service. These key stakeholders will not only help in capitalizing KM efforts and identifying possible lacunas to bridge, but they will also help lead the KM engagement across the organisation. As one's KM system gains maturity, it is essential to have a designated employee from each unit/department/team ensure that all the data/information/knowledge shared is correct

and up-to-date. These stakeholders should also make sure that tacit knowledge is retained when senior employees change positions or quit the organisation. Moreover, it is vital to determine who is responsible for presenting the KM-related efforts and dynamism to newly hired personnel and showing them how to access the data/information/knowledge they need.

As far as processes are concerned, the KM framework ensures the proper collection, sharing, and management of data, information, and knowledge, which is crucial for the success of the KM strategy. It might also be critical to decide what data/information/knowledge is worthy of being shared at a given scale and at a given level. It might, thus, be helpful to begin with just a few key individuals or department heads prior to inviting everybody in the organization on board. Ideally, access to data/information/knowledge should be user-friendly, ubiquitous, and secure.

The technology utilized for purposes of implementing the strategy-backed KM framework is at the service of construction stakeholders. Therefore, simple protocols such as naming and tagging conventions, specific to the construction industry, are very helpful to ensure a good level of consistency and homogeneity, without which it might be rather challenging for people to find what they need when they need it. Moreover, to avoid any cluttering of the KM system, it is crucial to review time-sensitive content before archiving. In addition, with an integrated KM framework backed by the right technology and enforced by the right people, the unfolding of processes proves straightforward.

Building and implementing a KM strategy can be complicated, especially for large organisations with a wealth of knowledge siloed within few individuals. Nevertheless, by leveraging a KM framework, knowledge sharing habits can be institutionalized as part of organisational culture so as to ensure that everyone has access to the information they need and use it to achieve measurable institutional effectiveness. This can be attained by using key performance indicators that can be monitored on a regular basis and thus demonstrate a worthwhile return on investment for KM to all the stakeholders.

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