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An ISM Approach to Evaluate Critical Success Factors for Knowledge Management in the Kingdom of Saudi Arabia

Suresh Renukappa, Subashini Suresh, Saeed Al Nabt, Redouane Sarrakh and Khaled Algahtani

Abstract

The Kingdom of Saudi Arabia (KSA) government aims to reduce fiscal deficit by improving efficiency, reducing costs, as well as its subsidies. This often calls for the creation, use and exploitation of new knowledge. Therefore, knowledge assets must be properly managed to provide an environment for well-informed decisions. The aim of this chapter is to investigate the critical success factors (CSFs) for effective implementation of Knowledge Management (KM) strategies in the KSA public sector organisations. Semi-structured interviews with 42 public sector directors and managers were conducted. Nine key CSFs were revealed. The association between the identified factors is established by employing an interpretive structural modelling methodology. The Matrix of Cross-Impact Multiplications Applied to Classification analysis is carried out for identifying the factors having high influential power. The results indicated that 'leadership' and 'organisational culture' are the most significant critical success factors having highest driving power. The chapter concludes that leadership plays a key role in implementing KM strategies in the KSA. Leadership is about preparing organisation with a KM vision and values. The findings of this research provide valuable insight and guidance which will help the public sector decision makers to accomplish KM strategies effectively.

Keywords: interpretive structural modelling, public sector, multi-criteria decision-making, knowledge management strategies

1. Introduction

Today, public sector organisations are also known as knowledge-based organisations and knowledge is as critical a resource to public sector organisations as it is to private sector firms [1]. Knowledge is one of the building blocks for an organisation's success and acts as a survival strategy in this knowledge era [2]. Therefore, knowledge resource resides in employees' minds and organisations must utilise this valuable resource for their competitive advantage [3].

Ragsdell et al. [4] noted that knowledge and know-how cannot simply and freely be flowed and shared among colleagues in organisations. Knowledge is the act of

knowing or being aware or familiar by learning from experience or association. Knowledge has been defined as the factor that enhances an individual's capabilities for taking effective actions [5]. The two dimensions of knowledge according to Nonaka and Takeuchi [6]. The explicit knowledge is organised and well-structured; hence, it is easily communicated. The second dimension is the tacit knowledge which is hard to be explained and interpreted. It is not easily communicated and is based on the individuals' experience, emotions, values and the ideals which they espouse. Madhoushi and Sadati [7] state that KM is a planned and well-structured process that includes managing the construction, designing, disposal and transfer of explicit as well as tacit knowledge in order to gain competitive advantage and encourage innovative ideas.

Jashapara [8] highlights that knowledge is considered as a critical and important factor in organisations for competitiveness and economic growth underlying innovation. Wiig [9] argued that knowledge will be the key to success in the twenty-first century, due to knowledge generating a value for the organisation when it is employed. Egbu [10] noted that knowledge management is the interrelated cyclical and iterative processes by which knowledge is identified, captured, codified, stored and disseminated for the benefit of the organisation. Chase [11] noted that knowledge management is a discipline that some industries and people adopt in order to encourage people to share knowledge or any ideas with the purpose of creating value-added products and services. Alavi and Leidner [12], in their seminal work, concluded that KM involves distinct but interdependent processes of knowledge creation, knowledge storage and retrieval, knowledge transfer and knowledge application. Thus, KM is a natural solution for improving operations and enhancing citizen's satisfaction. The management of both explicit and tacit knowledge is a crucial aspect of the public sector in developing their competencies.

Yahya [13] stated that, in the Middle East and North Africa region, over two-thirds of organisations are evaluating the need for KM, but less than a third have or are currently setting up a KM programme. Milner [14] suggests that the lack of enthusiasm to adopt KM in the public sector is directly linked to the required achievement of innovative and creative outcomes through the sharing of tacit knowledge, "knowledge rich open and creative operating cultures". The Kingdom of Saudi Arabia (KSA) aims to reduce fiscal deficit by improving state efficiency, reducing costs as well as its state subsidies. Consequently, the KSA Government has announced an ambitious new strategy: Vision 2030 [15]. It is tending towards knowledge economy. Therefore, this chapter explores the critical success factors (CSFs) for effective implementation of KM strategies in the KSA public sector organisations. The KSA organisations have been implementing KM solutions, but they face several issues and challenges, such as organisational culture, technology barriers and weaknesses in leadership's lack of learning activities [16].

Digman [17] defined CSFs as the areas where things must go right in order for the business to flourish. Critical success factors are defined as the handful of key areas where an organisation must perform well on a consistent basis so as to achieve its mission [18]. Alazmi and Zairi [19] noted that CSFs are aimed at creating a KM environment that provides organisations with some sustainable competitive advantage through the continued creation of knowledge, maintenance of current knowledge assets and creating an environment in which the KM function can survive and grow. In the context of the implementation of KM strategies, CSFs represent the essential ingredients without which a project stands little chance of success.

2. Research methodology

The aim of this study is to investigate the CSFs and to structure the relationship between these CSFs for effective implementation of KM strategies in the KSA public sector organisations en-route to organisational competitiveness. Therefore, the choice of research methodology is a crucial and difficult step in the research process.

To explore the in-depth understanding of the current study research problem, the research focuses on the perceptions of individuals relating to the CSFs for implementing KM strategies in the KSA public sector organisations. Therefore, to gain an understanding of employees' perceptions, it is necessary to use a methodology that elicits interviewees' inner thoughts and feelings. Kvale [20] stated that an interview's purpose is to gather descriptions of the lifeworld of the interviewee with respect to interpretation of the meaning of the described phenomena. Ribbens and Edwards [21] noted that the suitable number of experts for qualitative research may range from five to 50. Murry and Hammons [22] suggested that, for the qualitative decision-making process, the number of experts may be in the range of 10–30. To ensure greater dependability and transferability [23], a total of 42 professionals were interviewed in the KSA public sector organisations.

The sampling method used is purposive or non-probability sampling, whereby the subjective judgements of the researcher are used in selecting the sample [24]. In purposive sampling, participants are selected to meet a specific set of criteria. The study sample included directors, advisers and managers responsible for implementation of KM strategies in their respective departments/organisations.

An important sample size issue in qualitative research involves saturation of information [25]. Saturation is a term used to describe the point when no new insights or range of ideas are generated through adding more data. In this study, data were collected until no new aspects of the CSFs were revealed. In this study, actual saturation of data occurred before the 40th interview. Therefore, 42 interviews were conducted. Content analysis was used followed by interpretive structural modelling (ISM) method.

2.1 Interpretive structural modelling (ISM)

According to Watson [26], ISM is a method involving a qualitative and interpretive approach (based on the judgement of the experts from the industry and academia) to resolve complex problems based on a structural mapping of interconnections of attributes, followed by transforming them into a multi-level structural model. The finding from content analysis was subjected to ISM method.

According to Raj et al. [27], ISM has several characteristics which make it suitable to be applied in the present study: experts' knowledge and experience is utilised to analyse the complex system and break it into different elements to build a clearer model; it is a modelling technique wherein relationships are depicted into a diagraph model; it is intended to be used for group and individual learning; and it improves the quality of communication within the context of the problem. Although ISM has several advantages, the methodology possesses a few limitations: a limited number of variables are used in the model development, leading, thus, to ignoring the least affecting variables or issues; and people's bias, which may impact the final result.

Malone [28] noted that ISM is an application of simple notations of graph theory used to explain the complex pattern of relationships. This methodology is widely used by researchers for exploring the direct and indirect association among the identified parameters of various disciplines in a simplified way. ISM is utilised to

understand the relationships between the CSFs and to develop insights into a collective understanding of these relationships.

The eight steps involved in the ISM method are listed below [29–32].

Step 1: the CSFs for implementing KM strategies in the KSA public sector organisations context are identified through experts' opinion.

Step 2: a relationship is established between the CSFs determined in step 1.

Step 3: a structural self-interaction matrix (SSIM) of CSFs is developed, indicating a pair relationship between all CSFs.

Step 4: a reachability matrix is formed using the SSIM.

Step 5: the reachability matrix is put into different levels.

Step 6: a diagraph model is developed to illustrate the links.

Step 7: the developed diagraph is converted into a CSFs ISM model.

Step 8: ISM model is checked for consistencies.

3. Interpretive structural modelling (ISM) development

3.1 Identification of the critical success factors for implementing KM in the KSA public sector organisations

In this study, interviewees were asked to list and describe the CSFs for implementing KM strategies in their organisation through face-to-face interviews. **Table 1** shows the nine CSFs for implementing KM strategies in the KSA public sector organisations. Each of these CSFs is discussed in detail below.

3.1.1 Leadership

Organisation leadership forms the foundation for successful KM implementation [33]. Ichijo and Nonaka [34] emphasise the role of leadership in building and managing knowledge in organisations. By reviewing the literature to provide a framework for assessing KM and KM success factors, Jennex and Olfman [35] note that leadership is one of the most important critical success factors.

In this study, overwhelmingly 95% (40 of the 42) said that the absence of active management involvement is likely to mean that the KM process will be handicapped by insufficient time, finance and human resources. Therefore, it is most important that knowledge workers perceive their leaders as being actively engaged

CSFs for effective implementation of KM strategies	Percentage of interviewees cited (N = 42)
Leadership	95% (40/42)
Organisational culture	90% (38/42)
Information and communication technology infrastructure	83% (35/42)
Reward and incentive system	81% (34/42)
KM strategy	76% (32/42)
Knowledge audit	71% (30/42)
Training and education	69% (29/42)
Knowledge sharing	60% (25/42)
Knowledge capture	48% (20/42)

Table 1.
Critical success factors for implementing KM strategies in the KSA public sector organisations.

and committed to supporting knowledge activities and they recognise and reward such attempts in their co-workers. Leadership is most important because this is the authority that shapes the organisation; they can build, create, gain and implement knowledge to achieve organisational goals. If the leaders focus on the knowledge sharing and implementation, the subordinates cannot hoard knowledge. Moreover, the leaders may include KM in the organisation's mission and vision.

For instance, one of the interviewees noted that:

> *"Because of the recent recession, downsizing and cost-cutting initiatives taken by the KSA government, innovation is important for our sector in general and to my department in particular. Amount of knowledge loss because of retirement and downsizing becomes a crucial issue for us. Managing our internal knowledge assets is critical. Therefore, we have created a new position called Chief Knowledge Officer (CKO). The responsibility for developing and implementing KM strategies in our department often falls on the shoulders of a CKO. It becomes the CKO's responsibility to develop a strategy that dictates how a department handles its knowledge assets and to foster a culture that is constantly learning and growing. To meet the CKO's goals, we have created a new knowledge map, information and communication technology infrastructure and reward systems to promote knowledge capture and a sharing culture."*

The aforementioned statement suggests that organisations are creating new leadership positions at the organisation or department levels to create culture for knowledge capture and sharing. Yu et al. [36] pointed out that both the support from high-ranking officers and the activities arranged by KM groups would influence the KM performance positively. Putting transformation and change in perspective helps people balance the fears and opportunities associated with change, and to make better choices about the way that they react. Leadership is everyone's job in an organisation, rather than the job of the leader, and it is hard to envision any degree of sustainability without it. Leadership is the essential ingredient in creating enthusiasm in an organisation, especially when the going gets tough. However, this factor is no different from that required in any other corporation driven by a strong vision [37].

In summary, leadership commitment to KM initiatives would assist in breaking down barriers in achieving KM goals—barriers such as tunnel vision, past practice, old ideas and cultural frameworks that, together, combine to discourage new visions of the future. The key to effective implementation of KM strategies in the KSA public sector organisations is for leadership to establish a culture that is proactive in formulating KM-related objectives, to pursue a strategy of continuous improvement and resource that strategy. In addition, leadership is about preparing organisations with a knowledge-based vision and values that resonate with the leadership team, all employees and key stakeholders. More importantly, top management and senior executives must demonstrate the sharing of their own knowledge, using others' knowledge in the actions they take and giving credit to accountants who share their knowledge [38]. Therefore, leadership is crucial for implementing KM initiatives. Leadership skills need to be reinforced by the corporate values, the funding of corporate change programmes and willingness to transform organisations towards a knowledge-based view of the firm.

3.1.2 Organisational culture

Of the interviewees, 90% (38 of the 42) asserted that organisational culture is one of the main critical success factors for successful implementation of KM-related

initiatives in their organisations. These findings have also been supported by Al-Adaileh and Al-Atawi [58] as, in their study on the topic of significance of organisational culture in the context of Saudi Telecom; they concluded a positive direct relationship of organisational culture in the KM. The absence of active management involvement is likely to mean that the KM process will be handicapped by insufficient time, finance and human resources. Change in culture and individual behaviour must aim towards encouraging the use of knowledge, not for individual advantage, but for the benefits of the organisation as a whole [38].

Drawing on Tseng [39], organisational culture can either enable or disable the knowledge conversion process in an organisation. Liebowitz and Chen [40], for instance, found that it is more difficult to share knowledge in public sector organisations because most people associate knowledge with power, and their promotion opportunities. Tseng's [39] proposition is based on her study to identify the extent of correlation between different types of organisational culture and knowledge conversion and corporate performance.

Schein [41] defined organisational culture as a set of implied principles held by the people in a society which determines the behavioural implications. In the nutshell, cultures are the product of the tacit underlying beliefs and values that enforce the actions needed to achieve organisational goals [42]. Wang et al. [43], in their study, also supported the idea that organisational culture determines the observable norms and practices that prevail in an organisation which then results in laying down the foundation for rituals, expectations, routines, stories and myths. On the other hand, the norms set by the culture lead to the promotion of social context for the communication between people. Hislop [44] hinted at a link between organisational culture and KM through arguing that organisational culture lays down the social context which, in return, determines the source of knowledge in an organisation, such as who holds the knowledge and who is to share the knowledge.

3.1.3 Effective information and communication technology

In this study, 83% (35 of the 42) of the interviewees noted that the effective implementation of information and communication technology (ICT) tools to facilitate knowledge capture, mapping and sharing is another important critical success factor for their organisations. An ICT infrastructure provides a broad platform for mapping knowledge, exchanging knowledge, coordinating activities, sharing knowledge and supporting globalisation of commerce. Certain technologies can go a long way in making knowledge exchange easier and more efficient.

Quintas [45] stated that ICT has an unquestionable place in organisations. Information and communication technologies must work with, and not against, the key fundamentals that make human beings knowledgeable in social contexts. This emphasises the need for the transformation from tacit to explicit knowledge. Some of the advantages of ICTs are that they can lead to effective and efficient practices through the use and exploitation of knowledge and reduction in the number of mistakes being made.

3.1.4 Reward and incentive system

The role of a rewards and incentive system in managing knowledge is to motivate employees to map, capture and share their tacit and explicit knowledge. It is found that the motivation to contribute knowledge is an intangible critical success factor for any KM activity [46]. In this study, 81% (32 of the 42) of the interviewees

stated that a rewards and incentive system to promote KM initiatives is another important critical success factor. Wang et al. [43] also supported the adverse role of monetary reward for the KM, arguing that monetary rewards promote transactional behaviour in an organisation that, in the long-term, demotivates staff and could even lead to the destruction of a firm's financial position.

Knowledge workers are knowledge providers and value creators in an organisation [47]. As such, organisations will not be able to turn 'our people' into 'our most valuable assets' without addressing the real need of 'our people'. Therefore, it is important to encourage, motivate and reward employees who contribute to the organisation's knowledge and this culture-related issue remains a challenging task for most organisations [48]. However, relying solely on the monetary reward or incentive system to promote KM could prove to be a problematic task, hence, it is important for the management to keep a balance between monetary and non-monetary reward as a basis for the promotion of KM [49].

3.1.5 KM strategy

In this study, 76% (32 of 42) of the interviewees noted the need for having a robust KM strategy as one of the most important critical success factors. Many public sector organisations in the KSA suffer from the absence of a KM strategy and even those who do have one usually end up in facing resistance from upper level management to implement it [50]. In recent years, the concept of strategic management has shifted from the resource-based view to the knowledge-based view of the firm, as it enables organisations to increase their capacity and competitive advantage [51]. While the basic strategy of an organisation defines corporate direction through setting up its goals, objectives and strategic policies, when it comes to the KM, strategy becomes the logical architecture that specifies critical elements in an organisation's strategy and serves as a tool for communicating and clarifying that strategy. Despite of the importance of the KM strategy for providing firms with competitive advantage in the marketplace, public sector organisations tend to have a lack in their ability to lay down a robust KM strategy. For instance, while studying the challenges faced by the public sector organisations for promoting open innovation, Mergel and Dsouza [52] found that even western public sector organisation's lack in their ability to promote innovation and the core reasons behind such inability is the lack of a robust KM strategy.

3.1.6 Knowledge audit

In this study, 71% (30 out of 42) of the interviewees also asserted that knowledge audit is an important tool for implementing and monitoring KM practices in the public sector organisations in Saudi Arabia. Alzeban and Sawan [53], in their study on the internal audit among public sector organisations in the Saudi Arabia, concluded a lack of focus of internal audit on the KM with focus instead given to more materialistic factors, such as financial issues and service quality. Generally, an audit is described as a process that investigates whether or not the goals of an organisation are met [54]. In the light of constant changes in the way organisations are run in the modern world, a knowledge audit has become a necessary part since it assists in identifying the extent of the efficiency by which one system has been replaced by another through comparing the resources consumed during the process and the new system, hence, helping in justifying the adoption of the new system. Similarly, while studying the process of knowledge audit in the implementation of KM in the public sector organisations in Malaysia, Zulkifli et al. [55] signified

the importance of KM audit in public sector organisations through arguing that the work of public sector organisations involves both tacit and explicit knowledge; however, they insisted that there tends to be more tacit knowledge involved in the daily work of public sector organisations than explicit ones, due to the involvement of a hierarchical management structure.

Furthermore, hierarchical management structure has been found to negatively impact the process of knowledge capturing and the knowledge sharing process, hence, this further necessitates the conduct of a knowledge audit in the public sector firms [55]. While investigating the auditing concept within the information management field, Yatin et al. [54] provided a knowledge spectrum that emphasises on conducting a knowledge audit on the basis of four areas: wisdom, knowledge, information and data. By wisdom, Yatin et al. [54] meant wisdom of individuals over the overall purpose of the organisation. On the other hand, Yatin et al. [54] distinguished between data and information from knowledge by arguing that, while establishment of knowledge requires an extensive amount of experience with information on a subject, ultimately, information and data merely assist in the creation of knowledge and wisdom is usually reached after acquiring sufficient knowledge about the subject matter. Therefore, it would not be wrong to argue that a knowledge audit covers all other three elements of the knowledge spectrum, such a data audit, wisdom audit and information audit, and, hence, plays an important role in leveraging the knowledge in an organisation.

3.1.7 Training and education

In this study, 69% (29 out of 42) interviewees noted that training and education is an important critical success factor for effective implementation of KM strategies. Drawing on the study by Abd-Rahman et al. [56], training and education cannot provide any material benefit to the organisation unless knowledge gained through training and education is shared, applied and documented for the purpose of organisational-wide use. To this end, Abd-Rahman et al. [56], in their study, concluded that it is important for the employees to apply and protect newly gained knowledge in the organisation so that improved organisational-wide results are achieved. However, while studying the main barriers to KM in the Saudi organisations, Al-Hussain et al. [50] found that the process used for training and educating employees is weak, as it is influenced by the cultural characteristics of collectivism. Collectivism has been defined as the cultural characteristics under which people tend to give preference to people to whom they know and has been recognised as a killer for merit. Therefore, Al-Hussain et al. [50] argued that, thanks to collectivism, a 'wastav' (bribing and connection) system prevails in the Saudi public sector organisations which, in turn, leads to the distribution of learning and development opportunities among those employees who are close to the management and, hence, directly impacts the KM process.

3.1.8 Knowledge sharing

In this study, 60% (25 out of 42) of the interviewees noted that sharing knowledge is the most impactful critical success factor for effective implementation of KM strategies. Among the many processes of the KM cycle, knowledge sharing has been identified as the most significant process as well as the cornerstone for effective KM [57]. Knowledge sharing has been associated with numerous positive outcomes in the past, such as organisational effectiveness, organisational innovation capability,

improved productivity and team task performance. In their study on knowledge sharing, Wang and Wang [43] identified a direct relationship between knowledge sharing and organisational level innovation and performance. However, when it comes to the Saudi public sector organisations, such as Saudi Telecom Company (STC), Al-Adaileh and Al-Atawi [58] found cultural implications that prohibit the process required for the exchange of knowledge among employees in the organisation. This is despite the fact that effective KM cannot be attained unless knowledge is exchanged, distributed and shared among members of the organisation [59].

In relation to public service, knowledge sharing is able to improve the quality of a public service delivery system and enhance the productivity level of public service employees [57]. However, there is further need to identify whether the practice has been used effectively by the management or not.

3.1.9 Knowledge capture

In this study, only 48% (20 out of 42) interviewees noted that capturing knowledge is a key success factor for implementing KM strategies. Capturing tacit knowledge is the process through which the experience and expertise of an individual in an organisation is collected and made available to anyone who needs it [60]. Undoubtedly, capturing knowledge may be difficult, particularly in the case of tacit knowledge, but knowledge often only remains tacit until someone asks an appropriate question. At that point, tacit knowledge can become explicit, but, unless that knowledge is captured for someone else to use it again at a later date, learning, productivity and innovation are stifled. Knowledge work already represents 40% of the global economy. Unfortunately, over 50% of organisational knowledge is tacit and non-formalised. It is resident in the minds of its workers. Hence, the capture of knowledge is vital for any organisation, especially for key decisions made based on experience, which is usually shared informally.

Alamri and Abuaghayed [61] concluded that, while management in the Saudi organisations does recognise the importance of capturing knowledge for an effective KM, due to the problems at the structural level, such as public sector firms usually being run under a close rational and tightly controlled institutional mechanism, this results in the prohibition of the knowledge capturing practice.

3.2 Development of a structural self-interaction matrix (SSIM) model

In the present study, ISM method coupled with MICMAC (Matrix of Cross-Impact Multiplications Applied to Classification) is applied to form the interrelationships between the identified critical factors for knowledge management and establish their driving and dependence power.

The interviews were analysed closely to identify any existing pair-wise relationships. The Structural Self-Interaction Matrix (SSIM) is formulated based on the interrelationship between the nine CSFs identified, as shown in **Table 2**. Four symbols were used to define the direction of the relationship between the CSFs.

V	CSF i will help achieve CSF j
A	CSF j will help achieve CSF i
X	CSF i and j will help achieve each other
O	No relation between CSF i and j

Sl. no	Critical success factors	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6	CSF7	CSF8	CSF9
CSF1	Leadership	—	X	V	V	V	O	V	V	V
CSF2	Organisational culture	—	—	O	V	V	O	V	V	V
CSF3	Information and communication technology infrastructure	—	—	—	O	X	V	V	V	V
CSF4	Reward and incentive system	—	—	—	—	A	O	V	V	V
CSF5	KM strategy	—	—	—	—	—	V	V	V	V
CSF6	Knowledge audit						—	X	V	V
CSF7	Training and education							—	X	X
CSF8	Knowledge sharing									X
CSF9	Knowledge capture									

Table 2.
Structural self-interaction matrix (SSIM) of the critical success factors for implementing KM strategies in the KSA public sector organisations.

3.3 Reachability matrix

The initial reachability matrix (binary matrix) shown in **Table 3** is developed from the SSIM. The reachability matrix shown in **Table 4** is obtained by manually adding the transitivity property to the initial reachability matrix. For instance, if a CSF i is related to j and j is related to n, then i is necessarily related to n.

3.4 Level partition

CSFs in which the reachability and the intersection sets are similar would be allocated the top level in the ISM hierarchy. CSFs at this level do not have any other CSFs above them. Once CSFs within the top-level are identified, they are separated from the rest of the CSFs. The same process is repeated to identify CSFs within the next levels, until all CSFs fall in each level. This level partition helps with diagraph modelling. **Table 5** shows the reachability set, antecedent set, intersection set, and the initial and final levels of all the CSFs. The level evaluation process of all the nine CSFs is completed in four iterations.

3.5 Diagraph model

A preliminary diagraph containing the transitive links shown in **Figure 1** is obtained from the final reachability matrix. In the case of a relationship between CSF i and j, an arrow points from i to j. The final diagraph is developed after the removal of indirect links. The top-level CSFs are positioned at the top of the diagraph, followed by second level CSFs and so on.

Sl. no	Critical success factors	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6	CSF7	CSF8	CSF9
CSF1	Leadership	1	1	1	1	1	0	1	1	1
CSF2	Organisational culture	1	1	0	1	1	0	1	1	1
CSF3	Information and communication technology infrastructure	0	0	1	0	1	1	1	1	1
CSF4	Reward and incentive system	0	0	0	1	0	0	1	1	1
CSF5	KM strategy	0	0	1	1	1	1	1	1	1
CSF6	Knowledge audit	0	0	0	0	0	1	1	0	0
CSF7	Training and education	0	0	0	0	0	1	1	1	1
CSF8	Knowledge sharing	0	0	0	0	0	0	1	1	1
CSF9	Knowledge capture	0	0	0	0	0	0	1	1	1

Table 3.
Initial reachability matrix of the of the critical success factors for implementing KM strategies in the KSA public sector organisations.

3.6 ISM model

The developed diagraph is converted into an ISM model by transforming the nodes by the CSFs' statements, as shown in **Figure 2**. From **Table 5**, it can be seen that CSFs knowledge audit, training and education, knowledge sharing, and knowledge capture were found at level one. Therefore, these CSFs were positioned at the top-level of the ISM hierarchy. The rest of the CSFs have been positioned in the hierarchy, reflecting their levels, as presented in **Figure 2**. The arrow direction indicates the relationship between the different CSFs. For example, the relationship between the organisational culture and leadership was a two-way relationship. Therefore, an arrow pointing in both directions was used to denote this relationship, whereas the relationship between the leadership and KM strategy was only one direction, in which the leadership influences the KM strategy. Therefore, an arrow pointing from the leadership to the KM strategy was used. It can be observed from **Figure 2** that leadership and organisational culture were significant CSFs for implementing KM strategies in the KSA public sector organisations, as they came at the base level of the ISM model.

3.7 Classifying CSFs for implementing KM strategies in the KSA public sector organisations: MICMAC analysis

Based on the driver power and dependence power generated in **Table 4**, the CSFs for implementing KM strategies in the KSA organisations were classified into four clusters (namely autonomous, dependent, linkage and driving factors) as shown in **Figure 3**, which are explained below.

Autonomous clusters are the CSFs with a weak driving as well as dependency power and are relatively disconnected from the system. These CSFs do not have

Sl. no	Critical success factors	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6	CSF7	CSF8	CSF9	Driving power
CSF1	Leadership	1	1	1	1	1	1*	1	1	1	9
CSF2	Organisational culture	1	1	1*	1	1	1*	1	1	1	9
CSF3	Information and communication technology infrastructure	0	0	1	1*	1	1	1	1	1	7
CSF4	Reward and incentive system	0	0	0	1	0	1*	1	1	1	5
CSF5	KM strategy	0	0	1	1	1	1	1	1	1	7
CSF6	Knowledge audit	0	0	0	0	0	1	1	1*	1*	4
CSF7	Training and education	0	0	0	0	0	1	1	1	1	4
CSF8	Knowledge sharing	0	0	0	0	0	1*	1	1	1	4
CSF9	Knowledge capture	0	0	0	0	0	1*	1	1	1	4
	Dependence power	2	2	4	5	4	9	9	9	9	53/53

*Entries are adapted to incorporate the transitivity concept, to fill in the gap. The final reachability matrix is obtained after the incorporation of the transitivity

Table 4.
Final reachability matrix of the of the critical success factors for implementing KM strategies in the KSA public sector organisations.

Sl. no	Reachability set	Antecedent set	Intersection	Level
CSF1	1,2,3,4,5,6,7,8,9	1,2	1,2	IV
CSF2	1,2,3,4,5,6,7,8,9	1,2	1,2	IV
CSF3	3,4,5,6,7,8,9	1,2,3,5	3,5	III
CSF4	4,6,7,8,9	1,2,3,4,5	4	II
CSF5	3,4,5,6,7,8,9	1,2,3,5	3,5	III
CSF6	6,7,8,9	1,2,3,4,5,6,7,8,9	6,7,8,9	I
CSF7	6,7,8,9	1,2,3,4,5,6,7,8,9	6,7,8,9	I
CSF8	6,7,8,9	1,2,3,4,5,6,7,8,9	6,7,8,9	I
CSF9	6,7,8,9	1,2,3,4,5,6,7,8,9	6,7,8,9	I

Table 5.
Level partitions of the reachability matrix (iteration I to iteration IV).
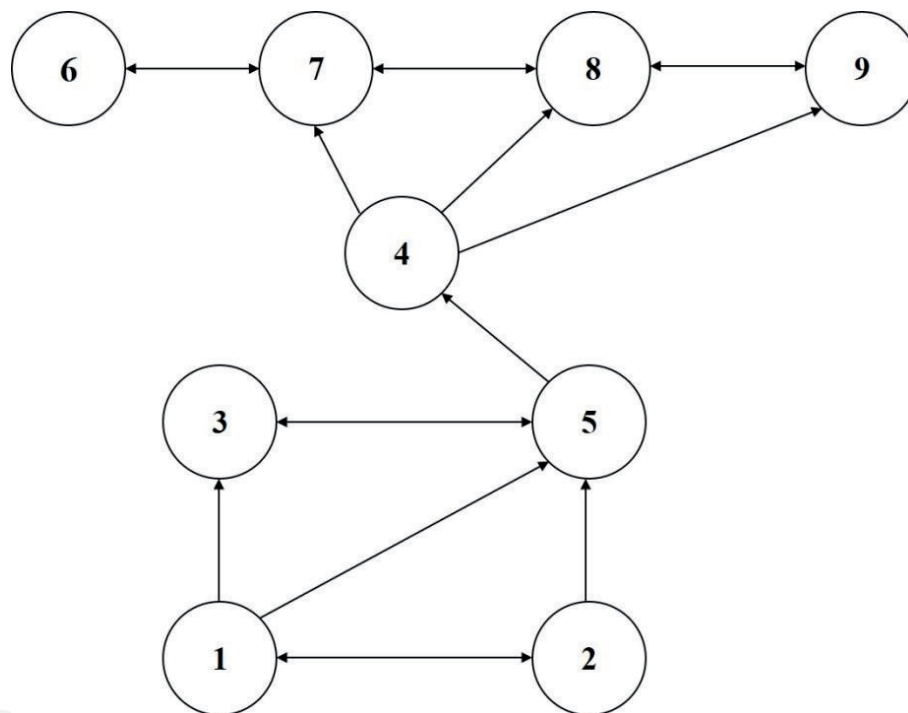
Figure 1.
Final diagraph showing the relationship between the CSFs.

much influence on the other CSFs of the system and are less significant to the policy and decision-makers. It is clear from **Figure 3** that there no CSFs come under an autonomous cluster. The dependent cluster comprises of knowledge audit (CSF6), training and education (CSF7), knowledge sharing (CSF8), and knowledge capture (CSF9), having driving power value of 4 and high dependency power value of 9. In the cluster of linking factors, there is one CSF, namely reward and incentives system (CSF4), having dependency and driving power value of 5. In the driving factors cluster, there are four factors, namely leadership (CSF1) and organisational culture (CSF2), with the highest driving power of 9 and least dependency power value of 2. Two CSFs, namely information and communication technology infrastructure (CSF3) and KM strategy (CSF5), are found to have a driving power of 7 and dependency power of 4. The factors of this cluster are very significant for the decision and policy makers as these CSFs have very high influential power and less dependency on the other CSFs.
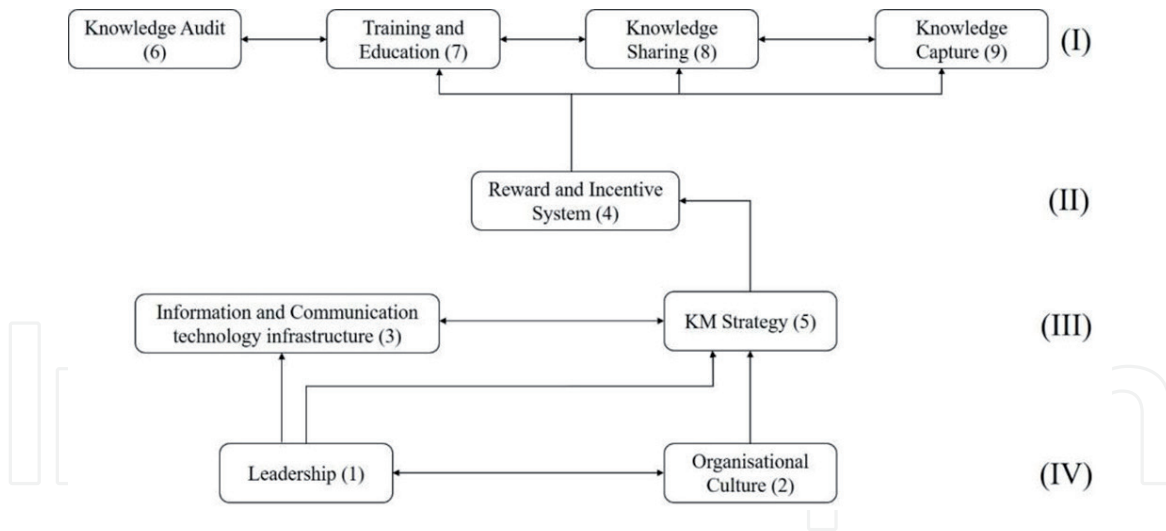
Figure 2.
ISM based model of CSFs.

Figure 3.
The driving and dependence power diagram of CSFs.

In the current study, the CSFs for implementing KM strategies within the KSA public sector organisations are identified and modelled. The study findings suggest that leadership and organisational culture are very important CSFs for successful implementation of KM strategies.

Scholars have proposed that public sector decision-makers face unique challenges, which includes declining resources, frequent political influences, demands from external sources and, generally, the requirements to accomplish more with fewer resources [62]. Hence, there is a significant need in the public sector to deliver better value for money in services with increasing pressure to deliver more with less, the public sector needs to introduce more innovative and effective solutions and reduce decision-making time and the level of bureaucracy.

KM offers a perspective, principles, methods, practices and tools that can help KSA public sector organisations become more like intelligent and adaptive organisations. KM methods, practices and tools support better decisions and actions by enabling

people to integrate (identify, capture and share) relevant existing knowledge and to produce new knowledge. However, there is a vast amount of knowledge within KSA public sector organisations. In KM the role of leadership has become a key operational component in the public sector due to the ever-changing and increasing demands from the public for government employees to do more with less [63]. The leadership must ensure that there is continuous personal development and lifelong learning for employees associated with KM in order to attract the right calibre of employees with career aspirations in KM. Furthermore, the leadership must ensure that a reward and recognition system is in place that promotes a joint sense of ownership of the KM programme.

4. Conclusion

This chapter has empirically investigated CSFs for successful implementation of KM strategies in the KSA public sector organisations. Semi-structured interviews were conducted with 42 KM experts. By applying content analysis, the CSFs which emerged from the analysis were grouped into nine categories: leadership, organisational culture, information and communication technology infrastructure, reward and incentive system, KM strategy, knowledge audit, training and education, knowledge sharing, and knowledge capture. The CSFs have been then put into an ISM model to analyse the interaction between them. A hierarchical model of the CSFs was developed based on their significance by employing an ISM methodology. The developed model highlighted leadership (CSF1) and organisational culture (CSF2) as the most significant factors influencing the implementation of KM strategies in the KSA public sector organisations. The ISM-based model developed in this study provides decision-makers with a more realistic representation of the CSFs for implementing KM strategies in the KSA public sector organisations. The results demonstrated that leadership is the most important critical success factor for implementing KM strategies in the KSA public sector organisations.

Practical implication of this research would meet the Saudi Vision 2030, public sector organisations must show leadership. The scarcity of knowledge and expertise is, and will continue to be, a huge challenge for many organisations regardless of sector. The key to successful deployment of KM strategies lies in having a balance between the human, technological and process aspects of KM. It is imperative that public sector organisations view KM as a strategic tool and feel confident and positive about its impact on performance in the long term. It is essential to address the nine CSFs during the conceptualisation, design and implementation stages of KM programmes. This research has made significant original contributions, particularly on CSFs for implementing KM strategies in the KSA using an interpretive structural modelling (ISM) approach. It also gives valuable insight and guidance which will help the public sector decision-makers to accomplish KM strategies effectively.

Despite the novel insights provided by this study, it has some limitations. Given that the research reported in this chapter is largely exploratory by nature and participants were managers and directors only, the results presented are only tentative and of limited value for the purpose of generalisation. Furthermore, the findings of this chapter are limited to the KSA public sector organisations only; as such, the level of applicability outside this context may be very limited. However, we argue that the results obtained are useful to similar developed countries. Extending this study using a larger sample with more balanced representation across different public sector organisations will provide relevance of these findings to other countries' public sector organisations. Furthermore, attitudes and behaviours towards knowledge sharing vary across national cultures. Therefore, this may limit the applicability of the findings to other countries or regions.

Author details

Suresh Renukappa*, Subashini Suresh, Saeed Al Nabt, Redouane Sarrakh
and Khaled Algahtani
Faculty of Science and Engineering, University of Wolverhampton,
Wolverhampton, England, United Kingdom

*Address all correspondence to: suresh.renukappa@wlv.ac.uk

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