



An Analytical Review of Strategic Technology Management in the Public Sector in the GCC: The Case of Kuwait

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ABSTRACT: Strategic technology management (STM) is a both a concept, and indeed a practice, that is well-known within international organisations. However, in national organisations within the GCC, an understanding of both the concept and practice remain somewhat lacking. In this conceptual study, we shed light on the importance of adopting effective strategic technology management practices within public sector organisations. Our study is intended to address this gap in the currently rather under-developed literature in this regard, and further the dearth of relevant information on strategic technology management. We argue that while GCC countries can acquire the necessarily capacity and resources to develop the strategic technology, it is still way beyond the means of developing countries to adopt appropriate strategic technology management and the relevant practices within their organizations. Using data from multiple case studies that included 27 interviews with members of management teams, results showed that raising strategic awareness among organizational members and aligning both individual- and group-level cognition are key drivers in the successful implementation of strategic technology management within public sector organizations. Furthermore, managers at different levels need to be equipped with the correct tools and required training to aid them in this process. Moreover, a major reason for the lack of implementation of strategic technology management was found to be related to the absence of strategic joining and alignment between various managerial teams. Our exploration demonstrates a vital contribution to the under-researched area of strategic technology management and the cognitive understanding of this concept and its relevant practices.

Keywords: Strategic technology management, managerial teams, strategy communication, strategy implementation, GCC.

Abbreviations: STM, strategic technology management; TM, technology management; GCC, gulf cooperation council.

I. INTRODUCTION

Technology allows the knowledge required to design, create/modify and implement a production process or service to be realized in practice; it is the practical application of scientific and technical knowledge in the production of goods or services. Technology is widely recognized to be an essential element in a nation's socio-economic growth and prosperity. It represents one of the building blocks in establishing an industrial base and its subsequent development, and is a key factor in the promotion of efficient production and continuous improvement of the productivity of techno-economic systems. Consequently, the acquisition of technology is imperative to the development process and growth of an economy. Technology is embodied in various forms, both tangible and intangible, such as tools, equipment, documents, machinery, industrial complexes, patents, licenses, know-how, contracts and skills. Knowledge, innovation and professional skills are incorporated in the form of nascent technology.

In the context of a business, technology can have a wide range of potential effects on management, including:

- Reduced costs of operations.
- Enhanced productivity.

- Creation of new products and markets.
- Adaptation to changes in terms of scale and format.
- Improved customer service.
- Reorganized administrative operations.

It is important to understand that merely devoting the resources that would be needed to acquire the required technology is not sufficient in itself to achieve organizational goals as this requires the integration of multiple functions, including technical, marketing, human and financial resources. The successful incorporation of technology is, ultimately, highly dependent on effective strategic technology management.

Current technology management may not aid decision-makers to successfully implement relevant strategies. This is due to many issues including for instance human errors, negative personal behavior, and continuous expenses on organisations. Equally, adopting a strategy for a technology management may also have some drawbacks at the early stage. This may include for instance, the large amount of capital needed for such adoption, the intensive training for current manpower, and the required supportive tools for such technology adoption.

However, it is important to report that this may only be at the early stage of technology adoption as them a in benefits might be gained on the future scale. Such benefits may include, bridging the cultural gap among employees, cost effectiveness, and better communication [48].

In relation to strategy, Strategic Technology Management (STM) is a both a concept, and indeed a practice, that is well-known within international organisations. However, in national organisations within the GCC, an understanding of both the concept and practice remain somewhat lacking. In this conceptual study, we shed light on the importance of adopting effective strategic technology management practices within public sector organisations. This notion addresses this gap in the currently rather under-developed literature in this regard, and further the dearth of relevant information on strategic technology management.

II. LITERATURE REVIEW

A. Management of Technology

Since technology is such a vital tool, the field of technology management emerged as a means to address the particular ways in which organizations should approach the use of technology in their business strategies and operations. Different technology management working definitions, paradigms, frameworks, concepts, objects, propositions, perspectives, measurements, and impacts have been examined and described to explore the questions: What is technology management? What are its methods and techniques? What are its functions for supporting individuals and organizations in terms of managing technology? [18].

For the purposes of this paper, technology management will be defined as the linking of various activities to plan, develop, implement, monitor and control technological capabilities in order to shape and accomplish strategic goals [7]. As new forms of technology are emerging at an unprecedented pace, technology management has become increasingly important. It has been recognized as a crucial activity within both industry and government organizations [20].

The aim of technology management is to maximize the cost-effectiveness of investments made in technology development, which in itself contributes to the value of an organization. In essence, technology management includes planning for the development of technological capabilities; identifying key technologies and their related fields for development; determining whether 'to buy' or 'to make'; and establishing institutional mechanisms for directing and coordinating the development of technological capabilities, and the design of policy measures to ensure appropriate controls are in place [18].

Traditional management styles are changing. In the past, setting a direction and implementing policy to take the organization in that direction was sufficient. However, in the digital era, and particularly with the rapid escalation of technological innovation seen today, modifying management styles to take advantage of and implement such innovation is critical to success. Technology management focusses on the integration of

technology and business, encompassing not only technological creation but also its application, dissemination, and impact. Given these trends, a new profession, that of the technology manager, has emerged. Defined as a generalist with many technological-based specializations and who possessed managerial skills, techniques, and ways of thinking, technology managers are familiar with their firm's strategy and how technology could be used most effectively to support its goals and objectives.

Over the past few decades, how one manages technology has become an important issue, and a wide range of methodologies and applications have been developed from both academic research and in practical applications. In addition, technology management has attracted considerable effort in terms of exploring its nature, concepts, frameworks, architectures, theories, systems, models, tools, functions, and real-world implementations in order to demonstrate technology management methodologies and their applications [40]. Task Force on Management of Technology [38] summarized the importance of technology management as follows:

- Primary source of innovation.
- Maximizing competitiveness by effective use of new technologies.
- Exploiting technological opportunities demands a cross-disciplinary approach to cope with the rapid pace of technological change.

- The lifecycle of products has shortened due to rapid technological development and the escalating sophistication of consumers.

Brady *et al.*, [4] stressed that there is a wide range of tools that can assist with technology management. These tools are a subset of the management tools related to decision making and support-related activities associated with technologies. These tools can be generally classified into three categories including:

Positioning: tools that help to clarify a firm's position within a sector

Diagnostic: tools that help with the performance of a firm in terms of its goals

Intervention: tools that help the firm to attain its goals

Managing technology is an inherently complex task that management has to appreciate and deal with cautiously [3]. The challenges associated with technology management are compounded by various factors including, but not limited to, increasing costs, complexity, pace and unpredictable technological development, the diversity of technology sources, globalization of competitors and alliances, and the impact of information technology [26]. While technology management techniques are themselves important to a firm's competitiveness, they are most effective when they complement the overall strategic posture the firm adopts.

B. Strategic Technology Management

Strategic management is a detailed and a comprehensive planning process intended to direct the firm towards accomplishing its long-term goals through the effective utilization of resources. Technology is important as it can form an integral part of strategic planning such as in marketing, financial, HRM, etc.

It is imperative to view the role of technology in a strategic manner, namely as a vital component of the basic competitive posture that the firm has adopted. Therefore, the management of technology must be treated as a specialist task that should not simply be subsumed under general management or, indeed, under any other managerial discipline [37].

It is well appreciated that an appropriate technology strategy is a prerequisite for the effective transfer and utilization of imported technology. Most of the industrialized nations have taken definite steps towards building essential components of their national technology strategies. Ford [36] defined technology strategy as the policies, plans and procedures required to acquire knowledge and an organization's ability to manage that knowledge and exploit it for profit. Whittaker (2018) suggested that technology strategy should be implemented through the adoption of technology planning as an integral part of any national development plan. Technology planning should embrace essential responsibilities such as budgeting, management, coordination, stimulation and execution of technological activities and cover specific requirements at the sectorial and inter-sectorial levels for the assessment, transfer, acquisition and adaptation of technology. In other words, these plans should reflect short-term, medium-term and long-term strategies, including the determination of technological priorities and identification of sectors in which imported technology would be required. It was further noted that technology strategy is the aspect of overall business strategy that is concerned with exploiting, developing and maintaining the sum total of the company's knowledge and abilities. A technology strategy, therefore, like any other functional strategy, must always be conceived and implemented within the context of the overall strategic management of the business [41].

The strategic management of technology is one of the means by which to create competitiveness by incorporating technological opportunities into the corporate strategy. Technology strategy helps in the anticipation, creation and utilization of technology for economic advantage. Technology strategy may have three elements: a strategy for technology acquisition, a strategy for technology exploitation, and a strategy for technology management [39]. The successful management of technology requires the capacity to orchestrate and integrate functional and specialist groups for the implementation of innovations, continuous questioning of the appropriateness of exploiting existing technology, and a willingness to take a long view of technological accumulation within the firm.

Frohman, [11] has described what may happen when an organization does not consider the inclusion of technology in its business plans. The author also suggested that strategic planning cannot anticipate all technical developments or their impacts on markets or products. However, when strategic planning systematically considers technology forecasts and assessments relevant to both market needs and opportunities, technology can become an effective competitive weapon. A framework for incorporating

technological issues into business strategy has been proposed, which consists of the following four steps:

- (1) Identifying the organization's distinctive technological competence(s)
- (2) Identifying technology that contributes, or will contribute, to business success
- (3) Coordinating business goals and technological implications
- (4) Aligning systems for implementation

The backbone of effective strategy technology management is having the availability of an updated and reliable database of technologies available within the market. Braun (1998) [37] identified several categories of inquiries required for planning purposes including technology obsolescence, standard of the competition, suitability of substitute technologies, effectiveness of supply chain management, organizational level of knowledge, the acquisition process, requirements for new skills, and any new regulations required.

C. Technology Management within Business Functions

Within a dynamic organization, the rapid evolution of technologies and associated world of uncertainty have made it necessary for organizations to introduce technology management as one of their core multi-business functions. Organizations' process would be further unique if technology management is linked with the overall organizational strategy. The aim of this newly introduced function is to improve organizations' technology process and competitive positions [17]. However, in order for this function to be effective, three main issues need to be synchronized, namely leadership, motivation of manpower, and the way in which this technology is managed [19]. If it works well through effective and efficient monitoring, technology management could promote a strong synergy with other business functions including, for instance, planning, customer service, research and development, human resource management, accounting and finance, and operation management. Technology management can further enable public sector decision makers to pursue greater service productivity [34], and result in profit for companies in the long term [17].

Strategic management is therefore not limited solely to the private sector; it can also be beneficial to the public as well as voluntary sectors. Evidence for the positive relationship between technology management and organizational performance, as well as between technology management and other business functions, have been demonstrated by research. For instance, [30] found that HR, finance, and IT functions are positively correlated with performance. In a similar vein, [22] concluded that higher levels of IT investment, dual-emphasis in IT strategy or IT strategic ambidexterity increasingly pays off. Equally, Wu *et al.*, [33] uncovered a significant and impactful relationship between IT mechanisms and strategic alignment, and consequently between strategic alignment and organizational performance. It can therefore be suggested that the introduction of a technology management unit or department to an organization's overall business functions will likely promote and underpin the successful incorporation of strategic technology management within overall organizational strategy.

D. An Overview of the GCC Countries

The Gulf Cooperation Council (GCC) is comprised of six Arab Gulf states: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE). According to the GCC charter, the underlying objectives of the GCC are to effect coordination, integration and interconnection between member states in all fields, such as in economy, finance, trade, customs, tourism, legislation, and administration. The economies of most of these states are small and relatively open. These countries share similar economic, technological and industrial aspects, as follows:

- the public sectors in the GCC play a major role in socio-economic activities
- oil contributes about 90% to the total GDP and three-quarters to annual government revenues and exports.
- these countries possess sizable financial assets.
- an extensive welfare system is in place in all GCC countries.
- these countries rely extensively on foreign technologies for their economic and industrial development
- government services in many GCC countries are provided free or at highly subsidised prices.
- GCC countries are highly dependent on a large expatriate labour force, particularly technical specialists, reflecting the small size of the domestic workforce and the limited domestic supply of adequate skills. Expatriate workers account for about three-quarters of the total workforce in most GCC countries.

E. Technology Strategy in the GCC

Technical knowledge has become an increasingly important factor in the development of developing nations. Consequently, trade in technology has emerged as an essential element of socio-economic activities. Given their weak, or even lack of in-house technological policies, science policies and R&D capabilities, developing nations rely heavily on international technology transfer in order to establish their industrialization and infrastructure [1].

As is the case with most developing countries, the GCC states depend on imported technologies to promote and stimulate their economies. The abundant financial resources raised from their oil revenues enables the GCC states to acquire the latest technologies worldwide. The technologies so acquired are concentrated in six major fields: communications, medical services and equipment, petrochemical and chemical industries, military equipment, civil aviation industry and water and power stations. Turnkey operations constitute the dominant form of technology transfer [2].

Despite realizing the particular importance of technology for their development and industrialization, it seems that the majority of developing countries are not yet able to employ effective strategies or policies to enable the successful transfer of technology. Any form of technology involves four major components: organizational strategy and structure, know-how, the human side of a system, and the physical part of that technology. It seems that very little attention has been devoted to the first three of these components by

developing countries, while their main focus has been on the latter.

The situation in the GCC countries is no different. As indicated earlier, the GCC states rely heavily on oil and oil-related exports for economic and industrial development. The nature of the development projects can be described as "explosive" due to the abundance of oil resources and the surge in oil prices since the 1970s. As a result, the GCC governments have adopted a heavy import-oriented strategy to allow for the development of their infrastructure projects without making any particular effort to establish and augment their technological and scientific bases through a coherent and explicit technology strategy in order to benefit from the technology transfer process. With such strong infrastructure, available economic wealth, systematic strategy and educated manpower, one might wonder why Kuwait is importing technology management strategy rather than exporting it, and equally why strategic technology management has not yet been introduced within public sector organizations.

III. MATERIALS AND METHODS

A. Sample and Data Collection

Since this study is exploratory in nature, focussing on an understanding of why strategic technology management has not yet been adopted within public sector organizations along with its relevant job positions, a qualitative approach was adopted that used multiple case studies. Following case studies can be a good way to explore a setting in order to understand it [9]. Furthermore, multiple case studies can be utilized to either support or contrast results for expected reasons with regards to the phenomenon under investigation [35]. Such practice can confirm whether the findings of the study are valuable or otherwise [10].

With multiple case studies on each of five public sector organizations in Kuwait, 27 semi-structured interviews were conducted to provide answers to the research questions [28]. It is noteworthy reporting that reaching data saturation is important for qualitative research and therefore we followed suggestion of Creswell [43] conducting between 20 to 30 interviews to reach data saturation. Furthermore, Hennink [44] also suggested that 16 to 24 interviews were needed to reach data saturation. In both cases, our sample size is in line with the recommended sample size.

We draw our sample from participants who currently hold managerial positions; more specifically, we interviewed 11 top and 16 middle managers, giving a total of 27 interviews. Thus, both purposive and snowballing sampling techniques were adopted as this research targets a specific group of internal stakeholders who are believed to have the appropriate knowledge, skills, and experience to answer the questions posed by this research [24]. Prior to conducting the interviews, an interview protocol was designed to ensure effective coverage of the research phenomenon under investigation, including, for instance, strategic planning, strategic practices, communication frameworks, managerial interactions, agreement about mission and objectives, strategy formulation and execution loops, and a strategic emergency framework.

Therefore, our interview questions were directed towards managers to ensure the satisfactory representation of responses in relation to strategic technology management.

The fieldwork was carried out in Kuwait over a period of three months. All chosen organizations were from the public sector and therefore were entitled to provide public services to the community. The rationale underlying our choice was built on two facts: firstly, multiple organizations acquire a large number of individuals within higher management who will be representative of different geographical backgrounds; therefore, various perspectives can be gained. Secondly, the chosen organizations are connected in terms of the general strategy plan adopted by the country; therefore, the area of research is of particular

interest to these organizations. These two reasons positioned the selected organizations in a manner that suited the research objectives and concerns under investigation. Prior to conducting the interviews, six pilot interviews were conducted and, based on the pilot study results, four questions in the interview protocol were revised to ensure the clarity of those delivered [29]. Upon the completion of the pilot phase, we approached an additional 21 participants, providing a total of 27 interviews. The full profile for each of the interviewees is provided in Table 1. With regards to ethical considerations, ethical clearance was granted prior to conducting the interviews to comply with the research's ethical guidelines, therefore assuring interviewees of their anonymity.

Table 1: Interviewee profile.

S. No.	ID	Managerial Level	Gender	Managerial Level	Job Function	Experience
1.	I-1-MM	Middle Management	Male	Departmental Head	Project Supervisor	8 Years
2.	I-2-MM	Middle Management	Female	Departmental Head	Supervisor in Supply Projects	8 Years
3.	I-3-MM	Middle Management	Female	Departmental Head	Technical Support Team Leader	8 Years
4.	I-4-TM	Top Management	Male	Division Head	Manager in Control Unit and Surveillance	10 Years
5.	I-5-TM	Top Management	Male	Division Head	Manager in Maintenance	10 Years
6.	I-6-MM	Middle Management	Male	Departmental Head	Supervisor in Administrative Affairs	8 Years
7.	I-7-TM	Top Management	Female	Unit Head	Manager in Training and Research	6 Years
8.	I-8-MM	Middle Management	Male	Departmental Head	Assistant Supervisor in Media	8 Years
9.	I-9-MM	Middle Management	Male	Departmental Head	Networks Team Leader	8 Years
10.	I-10-MM	Middle Management	Male	Departmental Head	Consumer Affairs Consultant	8 Years
11.	I-11-TM	Top Management	Male	Division Head	Manager in Projects and Networks	10 Years
12.	I-12-MM	Middle Management	Female	Departmental Head	Assistant Supervisor in Maintenance	8 years
13.	I-13-MM	Middle Management	Male	Departmental Head	Quality Assurance Team Leader	8 years
14.	I-14-MM	Middle Management	Male	Departmental Head	Consultant in Administrative Affairs	8 years
15.	I-15-MM	Middle Management	Male	Departmental Head	Assistant Team leader in Legal Affairs	8 years
16.	I-16-MM	Middle Management	Male	Departmental Head	Supervisor in Operation and Maintenance	8 years
17.	I-17-MM	Middle Management	Male	Departmental Head	Supervisor in Technical Services	8 years
18.	I-18-TM	Top Management	Male	Division Head	Manager in Networks Maintenance	10 years
19.	I-19-MM	Middle Management	Male	Departmental Head	Supervisor in Technical Control	8 years
20.	I-20-MM	Middle Management	Male	Departmental Head	Production Supervisor	8 years
21.	I-21-TM	Top Management	Male	Division Head	Manager in Bids and Internal Affairs	10 years
22.	I-22-MM	Middle Management	Male	Departmental Head	Employment Team Leader	8 years
23.	I-23-TM	Top Management	Male	Division Head	Manager in Project Design	10 years
24.	I-24-TM	Top Management	Male	Division Head	Manager in Financial Affairs	10 years
25.	I-25-TM	Top Management	Male	Division Head	Manager in Planning and Follow-Up	10 years
26.	I-26-TM	Top Management	Male	Division Head	Assistant Team Leader in Internal Quality Assurance	10 years
27.	I-27-TM	Top Management	Male	Division Head	Manager in Training and Development	10 years

Keys: I-TM: Interviewee from the top management; I-MM: Interviewee from the middle management.

Additional note: due to ethical considerations and at the request of the organizations involved, the job functions of the interviewees have been anonymized.

Table 2: Code commonalities across the interviews.

S.No.	Code	Respondents	Similar Words	Interviews
1.	Technology management concepts	15	New era, disconnected, different strategies, against change, lack of strategic joining, public acceptance, availability of expertise	2-6, 11-13, 14, 15-17, 25-27
2.	Technology management practice	12	Multi-tasks, lack of specialisation, various decisions, strategic consensus, high rotation, exporting preferences	1-2,5-8, 9, 13, 15, 22, 24-25
3.	Technology management enablers	12	Understanding, individual power, integration, authority support, proper rewards, availability of information, budgeting, holistic vision, unified objectives, scenarios analysis	1, 3, 6-9, 11-12, 15-18
4.	Technology management disablers	18	Lack of integration, absence of accountability, individual power, spirit of teamwork, international politics, serious investigation, availability of expertise	3, 5-9, 11, 14-18, 20, 22, 24-27

B. Data Analysis and Coding

After finalizing the interviews, the data gathered were analysed manually. We started the data analysis process by assigning each interview question an open code, and the collected codes were further broken-down to sub-codes in order to create a sense of meaning. With regards to the coding process, we have coded all sentences and responses from managers in which they identified issues either as enablers of or as obstacles to technology strategy management. This practice was followed by categorizing the concept of technology strategy management into two main categories, namely technology management concepts and technology management practice. Key words, sentences, expressions, and local languages terminologies identified by the interviewees were fully coded, including for instances of statements about strategic technology management, strategy control, context-practices, technology transfer, GCC best practices, information comparison, ownership, openness, worldwide protocol, cooperation, confliction, understanding, priorities, and reciprocity. Table 2 shows the code commonalities found across the interviewees. Our coded data were then carefully analysed following the six stages to thematic analysis introduced by Braun and Clarke [5]. These stages include the following steps:

- (1) Familiarize the researcher with the gathered data
- (2) Generate initial codes
- (3) Search for themes
- (4) Review themes
- (5) Define and name themes
- (6) Finally produce the report

Although other approaches are also adopted in qualitative research, thematic analysis is easily applied within the ontological, epistemological, and theoretical frameworks underpinning qualitative research [21]. Moreover, thematic analysis can make qualitative research results available to a wider audience [6]. Furthermore, the approach can be used to answer most of the questions for qualitative researchers [21]. Thematic analysis also grants researchers the liberty to move between deductive and inductive approaches [21, 29]. Within the analysis process, a large number of potential codes were identified, as this is vital to assure consistency and rigorous analysis. Codes were generated for one hundred and fifty-one pages, generating more than 45 sub-codes. This was followed by the data reduction process, as commonalities were aggregated together and irrelevant codes were excluded from the analysis.

However, excluding irrelevant codes does not mean ignoring them, however, as they can be utilized for future studies. The data reduction process resulted in only two main themes being identified. Fig. 1 below represents a sample map of aggregated codes, while Fig. 2 represents the final two main themes along with their respective sub-codes.

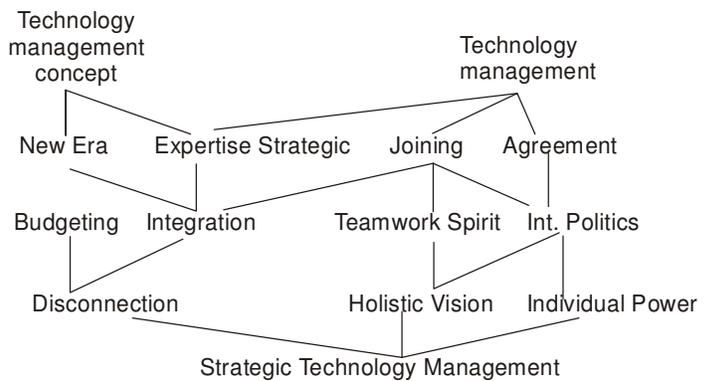
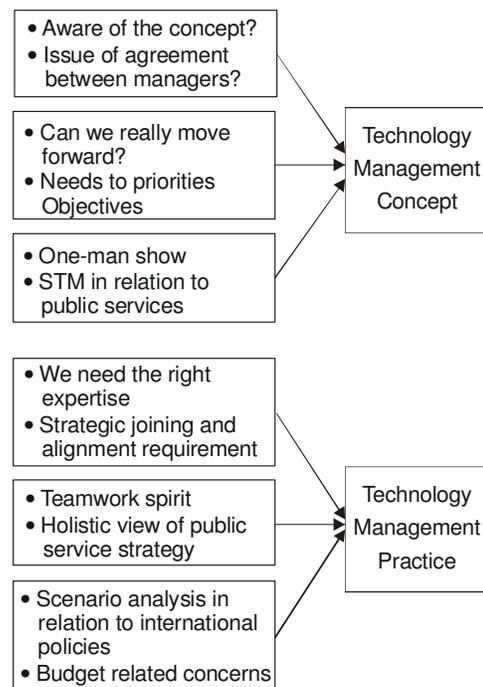


Fig. 1. Sample map of aggregated codes.



(Source: Adapted from Corley and Gioia, 2004)

Fig. 2. Final two main themes along with their respective sub-codes.

IV. EMPIRICAL DATA AND FINDINGS

The findings of this research demonstrate that management teams are not aware of the importance of strategic technology management, both as a concept and as a practice. However, both teams were found to be encouraging the adoption of strategic technology management as one of the key criteria of public sector strategy. Indeed, most of the participants showed considerable support for, and awareness of worldwide practice. However, their encouragement was not free of obstacles that might hinder the adoption of strategic technology management. The findings also revealed that the positional power roles of managers does indeed have some influence over why strategy technology management has not yet been implemented in Kuwaiti public sector organizations. The interactions between each of the management teams considered regulate their practices with regards to forming strategic agreement and a shared understanding of the intended technology management strategies. Furthermore, such agreement was also found to affect the priority assigned to strategic objectives. However, even with this regulation, the findings revealed that even where there was agreement among internal stakeholders with regards to appropriate strategy content, this may still not create the conditions under which strategic technology management can occur.

This finding was found in representative quotes from 18 of the 27 interviewees. After aggregating the relative codes, four sub-codes emerged from the interview responses, namely new era, lack of expertise, strategic joining, and lack of agreement. Below are some of the direct quotes from participants that reflect how the positional power of managers has influenced the adoption of strategic technology management.

"I think that we are important people here, we have past experience, we served this organization for such a long time, and because of this we are the decision makers here and we shout to be involved from the beginning of the strategy process. What we say needs to be followed, otherwise we will not cooperate!" (I-3-MM).

Middle manager 3 clearly stated that operational managers are considered to be the decision makers who should be participating in the formulation of the organizational strategy. Furthermore, the interviewee further reflects how powerful a manager in the public sector organization is, as he clearly demonstrates that being uncooperative represents a solution to resolving contentious issues. Middle managers are responsible for ensuring strategic awareness amongst front-line employees and therefore they need to be involved in various strategy processes. However, the above quote revealed that this particular middle manager might not be fully aware of the organizational strategy in the first place. Such a lack of awareness may not encourage the promotion of new initiatives, including the adoption of strategic technology management. This may further suggest that strategic awareness is minimal within the organization, as argued by the following top manager:

"Mmmm...well the point is that, are we all involved in the strategic vision of the organization or not? We need to work as one team, help each other, share new perspectives, not individually!.... [Unrecorded].... unlike

private companies, public sector organizations needs such practice!" (I-18-TM).

The above top manager argued that neither all the top nor middle managers were involved in reviewing organizational strategy, which may be one of the reasons why new initiatives are not considered on-board. The interviewee clearly demonstrated that team spirit is missing within the public sector organizations, which could be a result of the extreme positional power of the various individuals involved. Team spirit may be considered one of the criteria that facilitates the realization of an intended strategy, more specifically in this instance the implementation of strategic technology management. It is further obvious from the quote that the participant is aware of the key difference between the private and public sectors in terms of strategy process. He further extended his answer to summarize his quote by stressing what is missing within the management portfolio that would otherwise allow the adoption of such strategy for technology management. In a similar vein, middle manager 20 argued that:

"I understand that knowing all the details of the strategy is vital for use especially with our roles as managers.... The concept of strategic technology management represents an ongoing trend and totally new initiative for us, and this requires collaboration and agreement on many issues between us to make it work!..... [Unrecorded]" (I-20-MM).

The above interviewee raised a critical point relating to the new era of the concept of strategic technology management within the public sector. The interviewee indirectly appointed this task to decision makers at the managerial levels; however, he implied that the details pertaining to organizational strategy could be considered missing information from his perspective. Middle manager 20 also re-emphasised the importance of mutual understanding and collaboration regarding the introduction of such new strategic objectives. He further confirmed that in order to make strategic technology management work, team spirit, as well as strategic priority agreement, is needed. It can also be inferred that the top and management teams might not currently have the expertise to adopt strategic technology management. This is reflected in the experiences of middle managers 15 and top manager 25, respectively:

"Oooooh.... Although the concept seems encouraging and has potential for public service growth, we cannot ignore that fact that it may need searching for those who are capable to handle such initiative from A to Z!.....[unrecorded]!" (I-15-MM).

"The question is are we really ready for such challenge!... I mean we have been working for years and years without engaging in such strategy... we can't take a thing at face value.....[unrecorded].... either we do it right or leave it to those who can do it right elsewhere!" (I-25-TM).

The above quotes reveal that a lack of expertise could be the major challenge facing the adoption of strategic technology management. Both managers clearly stated that they did not engage in such strategy as it is new to them, given the fact that they had served within the organization for many years. It also seems that top- and middle-level managers can become quite frustrated if

new strategic priorities are adopted. Such frustration might leave them confused as to what their strategic priorities actually are. Although top managers are seen to promote change within their organizations, they might in fact delegate some of the associated tasks to other, perhaps more capable individuals. Top manager 25 also encouraged the idea of delegating such tasks to other stakeholders who might have more appropriate expertise. Delegating others could be seen as a sign of weakness which may have a harmful effect on strategy alignment. This view is also shared in the following quote by middle manager 8:

"I strongly disagree with sharing the strategy itself with other employees in other positions in the ministry; it is not their job to know such issues..... it is the job of senior management only, also I disagree to delegate others of my authority, if we are not capable to do so, then we should not be here in the first place!" (I-8-MM).

Even though managers are responsible for the strategy, some of them might reject the idea of delegating their responsibilities to others in order to promote the adoption of strategic technology management or, indeed, even outsourcing it to those with the appropriate expertise. These interviewees are of the view that they should create the appropriate awareness of such a new initiative instead of depending on others. This is exemplified in the following quote:

"Well... we should be careful here as this is a very sensitive issue for the future of public sector organizations.... I personally think that it is better for use in the short and long term to raise the awareness of the concept instead of risking it with external individuals who might not be aware of the overall strategy!.....[unrecorded].....we know our strategy, we know our strengths and weaknesses, and we know where such new initiative can fit!" (I-27-TM).

The above excerpt demonstrates that the top management team have considerable responsibility with regards to raising strategic awareness amongst the entirety of the organizational members. Top manager 27 is in support of strategic alignment being connected with other parts of the organizational strategy. It is noteworthy that the interviewee described outsourcing such an initiative could be considered part of the risk management process. This implies that quality and strategy control might be a vital and, indeed, integral part of public sector organizations; furthermore, such agreement over strategy is viewed as an integral part of the strategy implementation process. Commitment to strategy initiatives seems to be subjective in nature rather than a systematic process in the sense that managers may prioritize the associated objectives according to their own [subjective] perceptions. This may lead to management conflict and, ultimately, new strategic initiatives not being implemented.

When asked about what issues could hinder the adoption of strategy technology management into public sector organisations, middle manager 7 shared the following experience:

"Honestly, I think that there are many obstacles facing this issue... [unrecorded]..... I guess we do not have a constructive training and revision of real word practices to implement this strategy!.... We need the key people

who believe in promoting such change, don't we?!" (I-7-MM).

Middle manager 7 admits that a lack of training is a major obstacle facing this transformation. Furthermore, the interviewee is clearly of the view that adopting strategy technology management requires the support of both internal and external key decision makers for this idea. It can also be inferred that there is a negative tone in the quote where one interviewee stressed key people and in repeating what had been said. A similar opinion was shared by middle manager 15 in the following quote:

"Mmmm.... none of us has been sent to practical training for a long time... dealing with technology requires a regular update with what is going on... We have been importers of technology for years and years... adopting such initiative needs huge efforts and changes in behaviour" (I-15-MM).

Beside emphasising the importance of training, middle manager 15 reflects that intensive efforts are required for such challenges. He further acknowledged the life-long practice of being a technology management-importing country, and changing such behaviour will require both behavioural and cultural change. It would seem that such a rapid change in social roots might well be unrealistic as it would require a change in social practice. From a top management team perspective, the following quote is shared by top manager 21:

"Ok.... In my opinion, this issue may need alignment in terms of strategy and mindsets with different management teams... Not everyone might agree to the idea of technology management!" (I-21-MM).

Top manager 21 raised a very important issue as he stressed the importance of aligning both organisational strategy as well as the individuals' mindsets. The quotes emphasised the fact that alignment in organisational resources might be another hidden obstacle to the adoption of strategic technology management. It seems that aligning social groups with this approach would be somewhat difficult and that a considerable number of managers might, in fact, resist such an initiative.

From another perspective, financial availability in general might be one of the reasons why decision makers are not willing to adopt strategic technology management as an in-house operation. This is exemplified in the following excerpts by middle managers 1 and 2, respectively:

"Why do you think we need to adopt a strategy for technology management while we can buy the best technologies by the strong budget available to us!.... [unrecorded]" (I-1-MM).

"Well... I believe as much as we have financial capacity, we won't think to develop our internal processes including the concept of strategic technology management!" (I-2-MM).

However, top manager 27 has a totally different opinion to the above two middle managers, where he stressed that financial capacity should be utilised for the benefit of the country and that technology should be outsourced; he claimed that:

"I can't understand why a country which is one of the major oil producers in import technology while at the same time can bring the best technology and develop

itself for the future... [unrecorded]... I believe that financial capacity should help to develop new initiatives!" (I-2-MM).

Apart from financial issues, an interesting remark was made by middle managers 8 and 22 as they emphasised the vital role that could be played in changing organisations' processes if relevant technology management departments are introduced within public sector organisations. Both managers argued that a new department should handle and deal with strategy technology management. Middle manager 8 further extended his comments to say that such an issue will encourage change to the public service spirit and relevant services. The question as to whether this department should be inside or outside the organisation is a critical decision that needs to be fulfilled by decision makers, as stated by middle manager 22. These views were clearly reflected in the following statements:

"Although I'm unaware and haven't really engaged in such scenarios...., my thoughts tell me that if we have a separate department with the right expertise to handle the technology management strategy, then I can assure you we will have different public service ethos!" (I-8-MM).

"I think within a rapid and dynamic environment, we are in a hurry to cope with what is going on elsewhere... [unrecorded]... This issue is a new one to everyone here, so it needs to be included in a new division, either inside the organization or at the country level!" (I-22-MM).

V. DISCUSSION OF FINDINGS

This section discusses the findings of the research based on the rich insights gained from the interviewees at the management levels. Despite the mixed answers received from the interviewees according to their own subjective views, the findings revealed that introducing, as well as adopting strategic technology management and the respective positions in public sector organizations represents a step in the right direction. The speed of competition in every field requires an emphasis on automation [46]. The findings suggest that the roles of managers in strategy formulation seem to be extremely complex within the context of strategy process. The focal point is not the complexity itself, but rather the social interaction between managers that allows the various strategic initiatives to be processed. The role of senior managers in terms of organizing and communicating strategic initiatives to other organizational members resonates with the findings of Jarzabkowski *et al.*, [14], who suggested that stakeholders with different managerial roles within organizations can make divergent choices as a result of the various processes that can occur. This further suggests that strategy is not the work of any one individual; rather, it is the cumulative work of various organizational members. This further requires new tools and techniques to be adopted in public sector organizations for better strategic management technology execution. Batra & Saraf [47] argued that old tools used to implement strategies may not work properly in recent times due to uncertainties occurring daily.

The responses gathered from interviewees reflect their awareness of strategic technology management as new, demanding trend within organizations; however, enacting such initiatives requires collaboration and a shared understanding between the various decision makers. This was found to be in line with the findings of Powell *et al.*, [27], who emphasized the importance of aligning both individual- and group-level cognition to reach better performance in an organization. Agreement with regards to strategic initiatives is an integral part of the overall strategy communication process [16]. Extensive internal communication was also found to be associated with a strong shared identity and increased shared context [13]. Shared understanding is not the only key requirement for the smooth adoption of strategic technology management; this further requires the correct manpower and expertise to handle the respective processes. Within this dynamic and challenging environment, managers are required to be technically skilled and follow up on strategic technology management requirements. This is in line with the findings of Petts (1997) [25], who argued that the availability of expertise was found to be critical to having a significant impact on public performance and the consequent responses. Equally, availability of the correct expertise can foster the process of knowledge transfer between organizational members in order to introduce new strategic initiatives, such as, in this instance, strategic technology management [32]. Implementing strategic technology management requires that managers at different levels be equipped with the correct tools to aid them in this process. It also requires them to take appropriate training in line with other nearby practices. Furthermore, managers need to interact with each other, communicate, and solve problems to realize the atmosphere of business corporation [45]. This will assure that appropriate knowledge has been effectively transferred and managers are equipped with the required skills to successfully implement any strategic technology management initiative. This is also echoed by the suggestion made by Journé *et al.*, [42] cited in Morua & Marin [23] who argued that the aim of supportive tools is not to develop solutions but to enhance knowledge delivery among members, develop criteria and respective guidelines to guide strategy, and address the required actions.

A major reason for the lack of implementation of strategic technology management is the absence of strategic joining and alignment. Although public sector organizations develop their own strategies, their vision and strategic objectives must be in alignment with the country's general public sector strategy. This is conducted in light of the general vision, strategy, and objectives of the general and sectoral plans approved by interrelated parties [12]. This further requires collaboration between the internal and external environments, more specifically between each ministry and other related entities. It is also important to note that in order to turn strategic technology management into a successfully realized strategy, the strategic alignment in this case needs to be between management teams, and not within one single managerial group. This is

particularly noteworthy as the recent literature only focusses on strategic understanding and joining within particular managerial levels [15, 31].

The results of this research also suggest that recruiters and managers in public sector organizations need to look seriously at hiring individuals with considerable technical proficiency in their chosen fields. Strategic technology management can be considered as an added value feature amongst public sector organizations when empowering appropriate individuals with the correct tools and real-world experience required. This is due to the close relationship between strategic technology management and the various industries involved. Our results should therefore be of importance to policy makers in Kuwait in particular, and the GCC in general, with regards to the need to formulate a future agenda to manage the available manpower, resources, techniques, information, and relevant expertise to ensure the successful adoption of strategic technology management. A potential explanation as to why such an initiative has not yet been implemented in the country is not due to a lack of supporting resources or infrastructure, but a lack of managing strategic technology management itself in order to gain the best utilization of available resources. Another challenge facing decision makers is how to turn from being a technology importer to a technology exporter, and what consequent effects this approach might have on the relevant international policy.

VI. CONCLUSION

The aim of this study was to identify the importance of the role of strategic technology management and the need for associated job positions in public sector organizations. The insights gained through this research were collected from interviewees from the management levels in multiple public sector organizations in Kuwait. Our results showed that raising strategic awareness among organizational members and aligning both individual- and group-level cognition are key drivers in the successful implementation of strategic technology management within public sector organizations. Furthermore, managers at different levels need to be equipped with the correct tools and required training programs to aid them in this process. Moreover, a major reason for the lack of implementation of strategic technology management was found to be related to the absence of strategic joining and alignment between various managerial teams. Based on the above findings, our research can be said to have extended the knowledge of strategic technology management research in three ways. Firstly, it has demonstrated the importance of introducing strategic technology management as being a key strategy on its own and in its integration into intended public sector organizations' strategies. More specifically, our research has demonstrated that introducing, as well as adopting such initiative can raise both the effectiveness and the efficiency of public sector organizations. Secondly, we provided qualitative evidence for a strategic technology management social practice relationship. We were able to reflect the idea that strategic technology management

is not an object that can be taken at face value; it is rather an accumulation of various individuals' efforts and the interactions between internal organizational stakeholders. Thirdly, our investigation represents a vital contribution to the under-researched area of strategic technology management at the management levels. Moreover, it is worth noting that, to our best of knowledge, our research has been the first to examine the importance of introducing strategic technology management and creating respective administrative positions within public sector organizations as based on qualitative data.

VII. FUTURE SCOPE

Future research should consider focussing on strategic technology management research in various ways. For instance, it should focus on the implementation of strategy technology management, which was not examined in the course of this research. Furthermore, since the business environment is not isolated from external boundaries, and such connections require various interactions with the external environment, future research could explore the way in which strategic technology management might be aligned between the internal and the external environments. Moreover, this work was based solely on the public sector domain; therefore, it can be further extended to test its generalizability and applicability to other sectors, including public and voluntary organizations. Additionally, future studies are encouraged to integrate the strategic technology management literature from the strategy-as-practice perspective to gain inclusive insight into this new era, as well as push the field forward.

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