Information Systems

The Impact of Social Capital and Collaboration Quality of E-Government Systems on Knowledge Sharing Behavior in Saudi Arabia

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Number # HRE2019-0572 and HRE2020-0651.

Saleh Alsindi

26 Nov. 21

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ABSTRACT

This research investigates the impact of social capital and collaboration quality (CQ) on knowledge sharing behaviour (KSB) in e-government systems in Saudi Arabia. Many countries have reached advanced e-government services while others are still in the early stages; Saudi Arabia has taken significant steps towards e-government, especially after April 2016 when it announced its Vision 2030. However, while most e-government studies have focused on government-to-citizens (G2C), those concerning government-to-employees (G2E) are negligible. Because employees are vital players in delivering government services to citizens and to business, more attention to G2E is needed.

Improved knowledge sharing is a core objective of G2E and one way to further G2E research is to investigate knowledge sharing behaviour between employees in e-government systems. Knowledge sharing depends strongly on social capital, which facilitates knowledge management and makes it more efficient, both within and across organisations. Those with more social capital are more capable of managing knowledge.

This research began with a review of the literature on social capital and knowledge sharing. Two search strategies were used – a systematic literature search and a bibliometric analysis – which resulted in the identification of 71 relevant papers. This review distinguished between knowledge sharing behaviour in IT and non-IT mediated contexts, and moreover, the context of e-government systems examined here was different from other IT contexts that have been considered in prior research. Notably, e-government systems are mostly functionally oriented, and therefore it was necessary to introduce collaboration quality into the research framework.

A research model was then developed based on the literature which hypothesised that social ties (ST), trust (TRU), shared vision (SV) and collaboration quality (CQ) affect knowledge sharing behaviour (KSB).

This research then employed sequential explanatory mixed methods in which a quantitative phase was followed by a qualitative phase. The first phase tested the research model, and the second phase explained and elaborated the findings of the first.

In the quantitative phase, 638 records were collected from Saudi public sector servants using an online questionnaire. To analyse the data, partial least squares structural equation modelling (PLS-SEM) was used. Two versions of the model were tested: model version 1 included only social ties (ST), trust (TRU), and shared vision (SV), while model version 2 also included CQ. Results from model version 1 showed that both ST and TRU were significantly related to KSB, but SV was not. However, results for model 2 showed that when CQ is introduced to the model it is the most significant antecedent to KSB, while the social capital variables become less influential.

The second phase aimed to explain these findings qualitatively. Data were collected using semi-structured interviews with 15 public sector employees and analysed using a thematic approach. The findings were consistent with the quantitative data and furthermore gave concrete details about the behavioural aspects of e-government systems. In particular, it seems that ST does not influence knowledge giving but does affect knowledge seeking; furthermore, ST was found to affect knowledge quality in the sense that knowledge is more likely to be provided in a form that the recipient prefers.

The qualitative results also suggest that trust in colleagues might not be necessary so long as trust in management is high. At the same time, the interviews suggest that SV might not affect KSB. However, SV might promote KSB if it is coupled with fair incentives.

The significance of this research stems from identifying the impact of social capital on knowledge sharing in the novel context of e-government systems; this context has been neglected in the literature. Furthermore, the study introduces the new variable of Collaboration Quality (CQ) and investigates its impact on knowledge sharing behaviour and in doing so this study adds a new insights to the knowledge and literature on social capital and knowledge sharing. The thesis finds that CQ is a vital variable that facilitates the influence of social capital in e-government systems. If the collaboration features of e-government systems are aligned with the needs of employees, this allows them to share knowledge and perform their tasks better.

The research also has practical significance, as the study findings will assist governments to build more successful systems and to minimise the rate of system failures.

The thesis concludes by discussing theoretical and practical implications of the research. An important issue is mandatory-use systems as distinct from voluntary-use systems, which can lead to very different KSB outcomes. In an IT-mediated context, the role of CQ is essential in enabling the impact of other factors in promoting KSB. The findings provide a deeper understanding of the three variables of social capital (ST, TRU, and SV) in affecting behaviour in e-government systems.

Finally, recommendations regarding KSB in e-government systems are provided which may be helpful to public sector organisations. The limitations of the research and directions for future investigation are also set out.

ACKNOWLEDGEMENTS

First and foremost, praise be to Allah for blessings and power he gave me to finish this journey. "My success lies only with Allah. In him I trust, and to him I turn".

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I am also so grateful to those who helped me with data collection. Collecting data from the public sector is not easy but with their help and cooperation, things were done smoothly.

I want to thank all the people who agreed to participate in both phases of this research. Their opinions and statements were the basis of the knowledge around which this dissertation was formed.

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1 Introduction to the Research

1.1. Research problem

With life accelerating and with more intense competition between organizations, knowledge has become key to many organizations' success and for this reason practitioners and scholars have paid great attention to how organizations manage knowledge. Because knowledge is a valuable asset and helps an organization gain competitive advantage, knowledge management has become an essential area of management. This research contributes to this field by investigating the impact of social capital and the collaboration quality of e-government systems on knowledge sharing behaviour in the Saudi Arabian public sector.

1.2. Aim and objectives of the research

This research aims to investigate intra-organizational knowledge-sharing behaviour in e-government systems in the Saudi Arabian public sector. Specifically, its objectives are:

- To examine the impact of social capital on knowledge-sharing behaviour in e-government systems.
- To investigate the impact of collaborative quality of e-government systems on knowledge sharing behaviour in e-government systems.
- To investigate how social capital and collaboration quality in e-government systems interact to influence knowledge-sharing behaviour in e-government systems.

In investigating the impact of social capital on knowledge-sharing behaviour in e-government systems, this thesis looks at the intersection of three different areas: knowledge management, social capital, and electronic government. Introductions to these three topics are provided in chapter 3 (sections 3.1.1, 3.1.2, and 3.1.3).

1.3. Research questions

As mentioned later in section 2.11, the vast majority of e-government studies have focused on citizens but not employees. This research is directed to the perspective of employees, filling a gap in the literature. Therefore, this research seeks to answer the following research questions:

RQ 1. What is the impact of social ties on knowledge sharing behaviour in e-government systems?

RQ 2. What is the impact of trust on employees' knowledge sharing behaviour in e-government systems?

RQ 3. What is the impact of shared vision on knowledge sharing behaviour in e-government systems?

RQ 4. What is the impact of shared language on employees' knowledge sharing behaviour in e-government systems?

RQ 5. What is the impact of collaboration quality (CQ) of e-government systems on knowledge sharing behaviour in e-government systems?

RQ 6. What is the role of CQ in its interaction with social capital?

1.4. Significance of the research

This thesis reviews social capital and knowledge-sharing literature to determine what are the gaps and weaknesses, and then addressing these. The study's motivations relating to theoretical and practical significance are discussed in more detail in Chapter 3 but in brief, regarding theoretical motivations, this study investigates the impact of social capital on knowledge sharing in a new context which is e-government systems. This context is different from other contexts that have already been researched (see Chapter 2). Unlike the majority of studies, this research focuses on the difference between knowledge sharing in IT-mediated from non-IT-mediated scenarios. The reason to do so was the results of the systematic literature review (Chapter 3) that indicates that the literature gets more consistent when sorted based such scenarios. This point of view then will help to improve the rigor of the work and then increase the credibility of the conclusions documented in the thesis. Moreover, this analysis introduces the variable collaboration quality of the systems with social capital to test how they shape knowledge-sharing behaviour. This examination will add a new dimension to the knowledge and literature on social capital and knowledge sharing. As is seen throughout the thesis, this work explored the crucial role of collaboration quality which should open new avenues of research in knowledge-sharing behaviour in IT-mediated contexts. Another contribution of this research is the use of mixed methods investigation which has been neglected to some extent in the literature. In terms of making a practical contribution, the reported results on e-government systems

will help governments build successful systems and minimise the high failure rate. Further, this work can help governments to increase their return on investment in e-government systems in terms of delivering their services of high quality which is important to the public sector. The significance and contribution of this research are discussed in more detail in Chapter 2 under section 2.11.

1.5. Overview of the Kingdom of Saudi Arabia (KSA)

This work investigates knowledge sharing behaviour in e-government systems in the Saudi public sector. Hence, it is useful to provide some background about where the research is being conducted. This section includes three sub-sections: the first is a geographical sketch of Saudi Arabia, the second describes the Saudi Vision 2030, and the third is an outline of e-government in the country.

1.5.1. Background about the KSA

The contemporary Kingdom of Saudi Arabia is the third state of the royal family, Al Saud. It was established on January 15th, 1902, AD by King Abdulaziz Al Saud, the father of the current king, Salman bin Abdulaziz. The official announcement of the current identity of the country was on September 19th, 1932, AD.

It is located in Western Asia – the Middle East – spanning most of the Arabian Peninsula and occupying 2,215,000 square kilometres. Figure 1 shows location of Saudi Arabia.

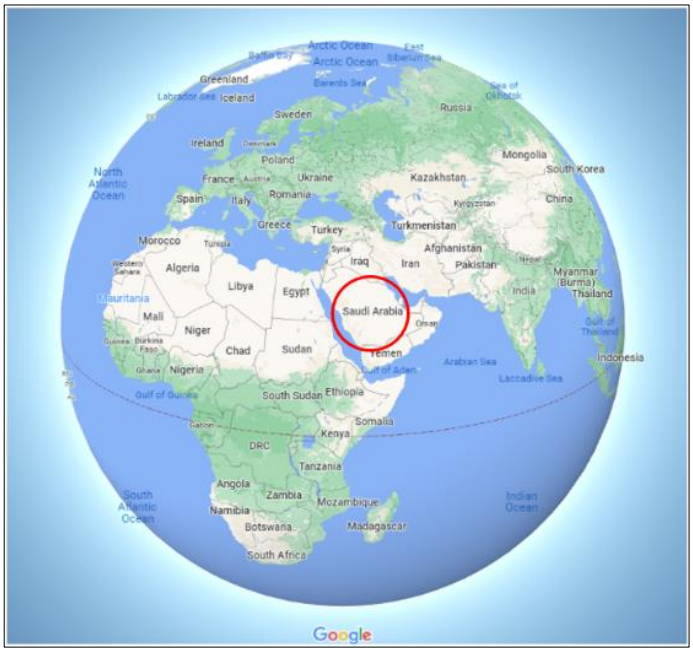

Figure 1: Location of KSA (Map data ©2022 Google, INEGI).

The country is divided into 13 administrative regions in which 35,013,414 people live, according to the 2020 residential census. The capital city is Riyadh located nearly in the middle of the country (Figure 2). The country has a unique religious and economic status.

In terms of religion, it embraces two holy Islamic cities: Makkah, where the religion of Islam was born, and Al-Madinah, the capital of the first historical Islamic state that was established and directed by Prophet Mohammad. Annually, millions of Muslims from all around the world visit these two cities to perform sacred rituals. The Saudi government is honoured to serve them and extends massive efforts to make them safe and comfortable, especially during the Al-Hajj season when around two million pilgrims swarm in and move between sacred sites around Makkah. Notably, the culture in Saudi Arabia is strongly influenced by its Islamic heritage ("Know about kingdom," 2021).

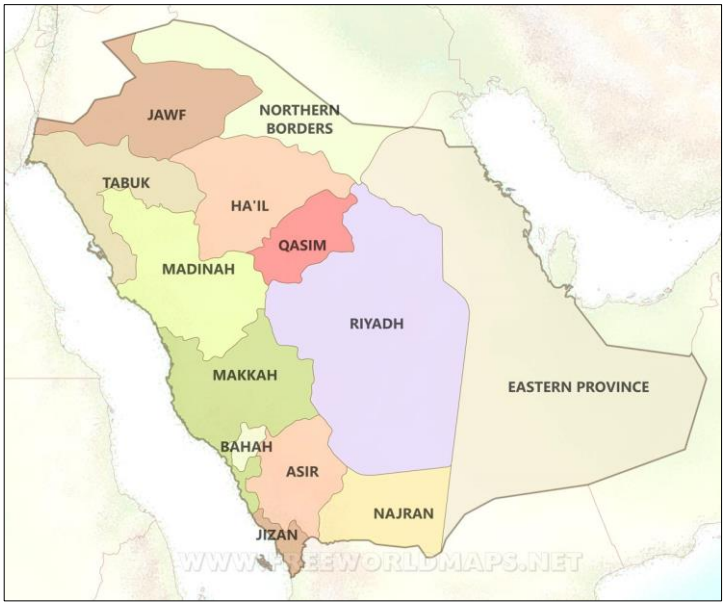

Figure 2: The administrative regions in KSA (Link: freeworldmaps.net/asia/saudiarabia).

Economically, the country is the largest free-market economy in the Middle East and North Africa. Moreover, its geographic location gives it easy access to export markets in the continents of Asia, Africa, and Europe. Further it has 25% of the world's oil, representing the largest reserves in the world, in addition to a wide range of other natural resources ("Emerging economy," 2021).

1.5.2. Saudi Vision 2030

On April 25th, 2016, Vision 2030 was announced to achieve three of the country's strategic objectives: an ambitious nation, a thriving economy, and a vibrant society.

The ambitious nation strategy aims to achieve efficiency and responsibility at all levels. It involves rebuilding the government with high standards of effectiveness, accountability, ability, and transparency to achieve high governmental performance. The strategy of the thriving economy involves two aspects: rebuilding the education system to prepare youth with the appropriate skills for the future economy, and creating economic opportunities for all, including entrepreneurs of small and large companies. The strategy of the vibrant society aims to enhance the lifestyle of citizens and increase happiness by achieving safe and secure environments for families and achieving world standards for education and healthcare. In addition, the aim is to strengthen the national identity and support the Islamic principle of moderation.

To achieve the vision, the government harnesses the country's three intrinsic strengths: (1) its place at the heart of the Arab and Islamic world, (2) its strategic position, and (3) its investment power. Since the vision was launched, all departments of the kingdom have been working diligently to achieve the goals by 2030. During the first five years of the vision – from 2016 to 2021 – the government has made many noteworthy achievements across the three strategic levels of the vision ("Vision 2030," 2021).

1.5.3. E-government in Saudi Arabia

The history of e-government service in Saudi Arabia started early in the first decade of this century. In March 2003, the Saudi government issued a royal decree (7/B/2427) instructing the Ministry of Finance to establish electronic services in the country. Later in July, another royal decree (133) was issued to give authority to the Ministry of Communication and Information Technology (MCIT) to develop and supervise the information and technology sector, which included setting up and launching government services. In September of the same year and pursuant to another royal decree (7/B/33181), the government ordered MCIT to set up a plan to electronically deliver e-government services and provide the necessary resources for its implementation.

1.5.3.1. The National Strategy for Digital Transformation

Saudi Arabia has drawn up a digital transformation strategy consisting of three 5-year action plans. The first action plan (2006–10) enabled everyone – anywhere and anytime – to receive government services at a high level through secure electronic channels and integrated in an easy way. The second action plan (2012–16) sought to enable everyone to use secure, integrated, and easy-to-use government services through multi-electronic means. Lastly, the current third action plan (2020–24) sets out how to achieve the digital government concept. In 2005 and collaboratively with both the Ministry of Finance and the Communication and Information Technology Commission (CITC), the MCIT established the Saudi e-government program named "Yesser".

1.5.3.2. Yesser, the Saudi e-government program

The term 'Yesser' is a pronunciation of an Arabic word that means "make it easy". Yesser is the primary entity that has been managing e-government in Saudi Arabia. Its main aim is to deliver government services and transactions electronically by managing all required resources. In addition, the aim includes digital transfer in governmental organizations by empowering and motivating them, so that each organization is responsible for developing its own e-government system in coordination with Yesser's plans.

To achieve the aim, Yesser set up the objectives:

- Provide higher quality and more accessible services for individuals and the private sector.
- Increase the efficiency and productivity of the public sector.
- Provide the required information with quality in terms of time and accuracy.
- Increase return on investment.

In 2017 the government formed the National Committee for Digital Transformation to supervise the program, chaired by the minister of MCIT. Later in 2018, the committee was reformed to contain members of different essential governmental entities such as the Ministries of MCIT, Health, Economy and planning, Finance, Commerce and investment, Energy, Industry and Mineral Resources, and Education, as well as

members of some other government organizations ("About e-Government," 2021). Since it was established, Yesser has developed many initiatives and products to empower government agencies to transform into electronic services. Yesser's products and services include:

- Governmental Integration Channel: aims to enable reciprocity of common governmental data among all authorised agencies so as to provide electronic governmental services in an easy, swift, accurate, and secure way.
- National Center for Digital Certification: to provide digital documentation services for government, citizens, and businesses so that all parties can perform various electronic transactions in a reliable, confidential, and safe manner.
- Unified National System for Government Correspondence: an integrated platform that aims to achieve the concept of "Paperless Government". It allows all government organizations to exchange correspondence and documents in a secure, easy, and high-quality electronic way, which will save time, effort, and cost.
- Smart Government Development Center (GOVx): a specialised centre to utilise advanced tools, methods, and techniques to improve innovation within digital government. The centre supports the digital capabilities of government agencies, offers them digital consultations, and elevates the way in which they perform their activities.
- Government Service Observatory (Marsad): a system to measure the maturity of government agencies' electronic services. It aims to motivate agencies to reach 100% digital service. Marsad further works on standardising joint business among the agencies.
- Measurement (Qiyas): this initiative was launched to develop digital government through periodic follow ups and evaluations using global measurement indicators.

Information Technology Leadership Portal: an interactive portal that allows IT leaders in government agencies to take advantage of national services and applications provided by Yesser to support the digital transformation in the kingdom. It also allows IT managers to easily update and leverage the services.

1.5.3.3. Services maturity indicator:

Yesser through the Government Service Observatory (Marsad), has developed an indicator to measure the maturity of e-government services in each agency and at the aggregate level. In cooperation with government agencies, all services provided by an agency are first identified. Then, the services are classified into:

- Traditional service: those which are provided in a paper fashion and which have no electronic channels. Customers must attend the place where the agency is located in order to use it.
- Informational service: only information about the service is available on the electronic channels such as description, requirements, forms, and so on.
- Interactive service: a service where a customer can fill out forms and send them to the agency through electronic channels. Then the customer is required to attend physically in the place of the agency in order to complete the process. Thus, the interaction of the service is one-way, from the customer to the agency.
- Procedural service: the government agency allows the customer to fill out the form and then send it electronically. After that, the agency processes the entire transaction within its boundaries then delivers the service without requiring the customer to attend. This service is a two-way interaction between the customer and agency.
- Transformational service: a two-way interaction where the government agency allows the customer to apply the service electronically. The agency fully processes transactions within its boundaries and outside of it with integration from other parties until the service is fully complete without the need for the customer's attendance.

In September 2021, the maturity level of the electronic services indicated that 30.7% of the entire electronic services in KSA were transformational, while 54.4%, 10.8%, and 4% were procedural, interactive, and informational, respectively ("Service Performance Indicators," 2021).

In addition, Yesser had created other service packages directed to individuals to speed up digital transformation in the country, like GOV.SA and AMER.

- *Unified National Platform (GOV.SA)*

GOV.SA is an integrated centralised electronic platform that provides easy access to all governmental services. Citizens, residents, business owners, and visitors can use it to obtain government services efficiently from anywhere at any time. Access to different electronic services can either be through integration with other government agencies or by providing website links to them and their services on the platform. GOV.SA incorporates the most advanced technology to enable several channels to link to its services (Figure 3). In addition, GOV.SA is a reliable source to disseminate news about the country and offers a directory of government agencies, service performance indicators, links to Saudi regulations, plans and initiatives, open data, and more. GOV.SA is a personalised platform designed for a customer's particular needs.

GOV.SA lists indicators for each government agency showing performance reached in electronic services against the traditional ones. An indicator on the cumulative level is available as well. By the third quarter of 2021, 98% of all government services in all agencies had become electronic, with 2% still being delivered in the traditional way ("Service Performance Indicators," 2021).

In 2018, KSA was ranked as high level in the E-Government Development Index (EGDI), but in 2020 it jumped directly – for the first time – to the very high-level (second class, V2) (*UN E-Government Survey 2020*, 2020).

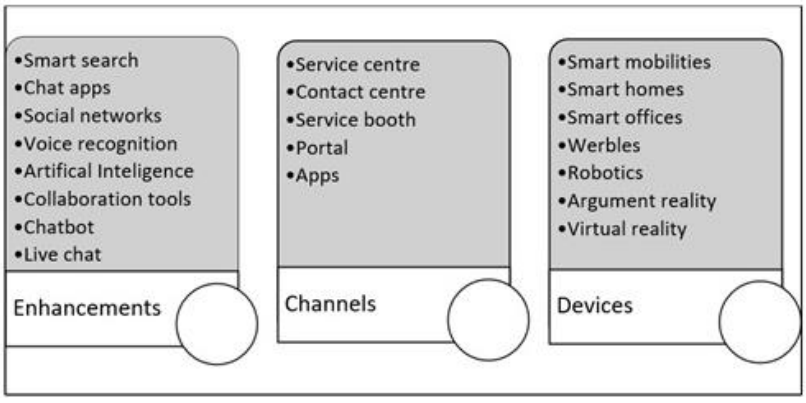

Figure 3: Channels through which GOV.SA provides its services (according to GOV.SA).

- *Citizen Interaction Center (AMER)*

Many citizens use various electronic government services from different organizations. Hence, to assist those people, Yesser has established this centre to answer their queries about electronic services. In addition, the centre offers channels

to interact with the audience: toll-free, SMS, instant chat, email, fax, and different social media. Moreover, the centre provides visual interpreter services to communicate with deaf people. A team of female interpreters is available as well to maintain the privacy of female inquirers.

1.5.3.4. Other governmental entities to support digital transformation

The Saudi government has established other agencies to push toward the country's digital transformation and achieve its Vision 2030 ("About the Authority," 2021). Those agencies include the National Cybersecurity Authority and the National Digital Transformation Unit.

- National Cybersecurity Authority (NCA): It was established in 2017 to be a specialised agency in maintaining and promoting cybersecurity in the country. NCA makes, supervises, and updates strategic cybersecurity plans. It also sets up cybersecurity policies, standards, and instructions; it then circulates them to the relevant authorities, follows up on commitments to them, and updates them. Many other activities NCA carries out can be found on its website nca.GOV.SA ("About the Authority," 2021).
- National Digital Transformation Unit: It is an excellence centre established in 2017 to push toward the digital transformation in the kingdom and achieve Vision 2030. It provides strategic steering, experience, and supervision in cooperation with the public and private sectors ("About the National Digital Transformation Unit," 2021).

Recently, in March 2021, the government rescinded both Yesser and the National Center for Digital Certification and transferred most of their authorities to the Digital Government Commission, a newly established governmental body linked directly to the head of the council of ministers ("Regulation of Digital Government Commission," 2021). The establishment of this organization reflected an eagerness for the kingdom to push toward its ambitious e-government plan.

Overall, this determination to continue to improve e-government services in the country is encouraging to this research work. Concerted research efforts, together with the government effort, will be helpful during this stage of service development. It is

hoped that this study of knowledge sharing in e-government systems can help government agencies enhance their systems' outcomes.

1.6. Thesis structure

This research basically consists of three main parts: a systematic literature review, first quantitative phase, and second qualitative phase. The thesis is written as seven chapters in which each stage of the research is described.

This chapter has set out the research's aim, objectives, questions, and the significance of the research. Additionally, it has provided a background about Saudi Arabia and its e-government history.

Chapter 2 involves a systematic literature review of social capital and knowledge sharing. It included an identification of weaknesses and gaps in literature then the research significance. Chapter 3 discusses theory development and the research framework. It contains of two main parts. First, a foundation for the research intersection areas, which have been split into three parts: knowledge and knowledge management, social capital theory, and e-government is provided. Second, the research model is discussed, and hypotheses for the study are framed, followed by an introduction of the research model.

Chapter 4 describes the adopted research methodology in the project, which involved a sequential explanatory mixed-methods approach. The research then develops two research phases: a quantitative phase and a qualitative one. The chapter further addresses the research population and the data collection techniques and analysis methods of both phases.

Chapter 5 presents the first quantitative phase. It involves all details related to the phase starting with survey development, data collection and analysis, and ending with discussion and questions about the results. Chapter 6 contains the second qualitative phase. It discusses the methods, data collection, and findings.

The last chapter, Chapter 7, involves two parts: discussion of the results and conclusion. So, it analyses the findings, explains the results of the first phase, and answers questions surrounding them. In the second part, it sets out the research contributions – both theoretical and practical. The limitations and directions for future research are given as well. Finally, the chapter ends with a summary of the thesis.

1.7. Chapter summary

This chapter has introduced the plan of the research. First, it provided definitions of the research's aim, objectives, and questions. Then followed a description of Saudi Arabia and its national e-government national program, and the contributions of the research were summarised. Finally, the overall structure of the thesis was set out.

2 Systematic literature review

This chapter presents a systematic literature review (SLR) on the topic of social capital and knowledge sharing. The objectives, methodology, and steps of review are set out in detail, and are followed by the outcome of the review, which includes weaknesses and gaps in the literature. Finally, the significance of the research is assessed.

2.1. Objectives of the review

Conducting a literature review is a major part of the research process and one that generates new ideas and knowledge. It draws on the history of a particular research area or topic (Mentzer & Kahn, 1995) and organizes valuable ideas and findings to identify potential research gaps concerning certain phenomena (Tranfield, Denyer, & Smart, 2003). When reviewing business and management-related topics, analysis of a wide range of literature is required, resulting in many sources being found from web-based search engines and/or databases. Large numbers of publications make it extremely difficult, if not impossible, to review everything that has been written on a given topic. For this reason, researchers need to conduct a critical literature review of the relevant studies in order to evaluate the most significant work done on their chosen research topic(s) (Saunders, Lewis, & Thornhill, 2016).

A systematic literature review (SLR) is a pre-planned strategy undertaken for finding, evaluating, analysing, and synthesising published scholarly work on a given research topic (Saunders et al., 2016). SLR is of more scientific value than a traditional review (Keele, 2007), and it is increasingly being used for exploring new research avenues (Kitchenham et al., 2010). In the same way, researchers use this technique to better understand a phenomenon (Unterkalmsteiner et al., 2011). Information systems (IS) research scholars have embraced the concept of SLR and some universities highly recommend it to their staff and students (Boell & Cecez-Kecmanovic, 2015). This review sets out to do two things. Firstly, to search for reported differences in knowledge sharing behaviour and relate that to various levels of social capital both in IT and non-IT mediated settings. Secondly, to determine research gaps in the literature, and thirdly to make recommendations for future studies.

2.2. Methodology of the review

Researchers adopt different types of critical review (or in some cases implement a combination of two or more types) depending on the nature of the topic and the aims and types of questions being asked. For this systematic review, the analysis follows three main phases: planning, conducting, and reporting (Kitchenham & Charters, 2007). In the planning stage, the review's protocol was first developed. The development of the review protocol involved five steps: (1) determining the review questions, (2) the search strategy, (3) inclusion and exclusion criteria, (4) study selection, and (5) data extraction and synthesis.

2.3. Review questions

The specific review questions were devised, and these are set out as follows:

- What is known about the impact of social capital – in the form of social ties, trust, and shared vision – on knowledge-sharing behaviour?
- How does the impact differ if knowledge is shared in an IT or non-IT-mediated setting?
- What is the role of collaboration quality (CQ), as well as social capital, on knowledge sharing behaviour in the IT-mediated setting?

2.4. Search strategy

In terms of search strategy, this was a two-stage approach which set out to identify the most relevant papers on the subject – the impact of social capital on knowledge sharing behaviour. The first search stage used Google Scholar, while the second involved visualizing citation numbers using CitNetExplorer, a bibliometric analysis tool. The first stage – as illustrated in Figure 4 – aimed to find papers that matched the search criteria, with a focus on finding only high-quality publications on the subject; the second stage was to highlight key papers according to its citation network. Each search stage was conducted through a number of steps which are illustrated in sections 2.4.1 and 2.4.2. The identified relevant papers from both stages were aggregated into one group and then analysed and reported together. Figure 4 shows the search strategy.

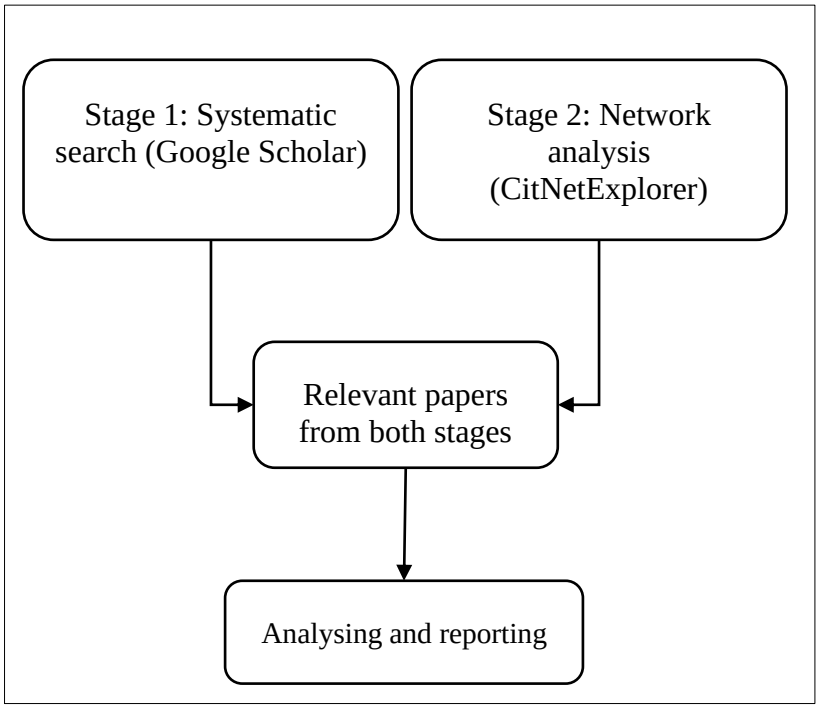

Figure 4: Two-stage search strategy

Together, both stages returned 71 papers in total, with some overlap between them. Figure 5 displays the numbers of papers found in both stages. The rest of this chapter discusses both stages in detail, providing statistical information about the papers, articulating and discussing the findings, making conclusions, and then commenting on the limitations and recommendations for future work.

2.4.1. Search Stage 1: Systematic search using Google Scholar

Establishing a rigorous search strategy for retrieving relevant studies is an essential step in SLR and helps researchers find studies in an unbiased way (Kitchenham & Charters, 2007). A search strategy consists basically of determining the search string and the data source. The researcher drew up a list of key terms or phrases based on the review questions, and then combined different search phrases until no more relevant studies were found. He also used possible synonyms of “knowledge sharing” – i.e., “knowledge management”, “knowledge transfer”, “willingness to share knowledge”, “knowledge distribution", "information sharing", and "information distribution" (see Table 2).

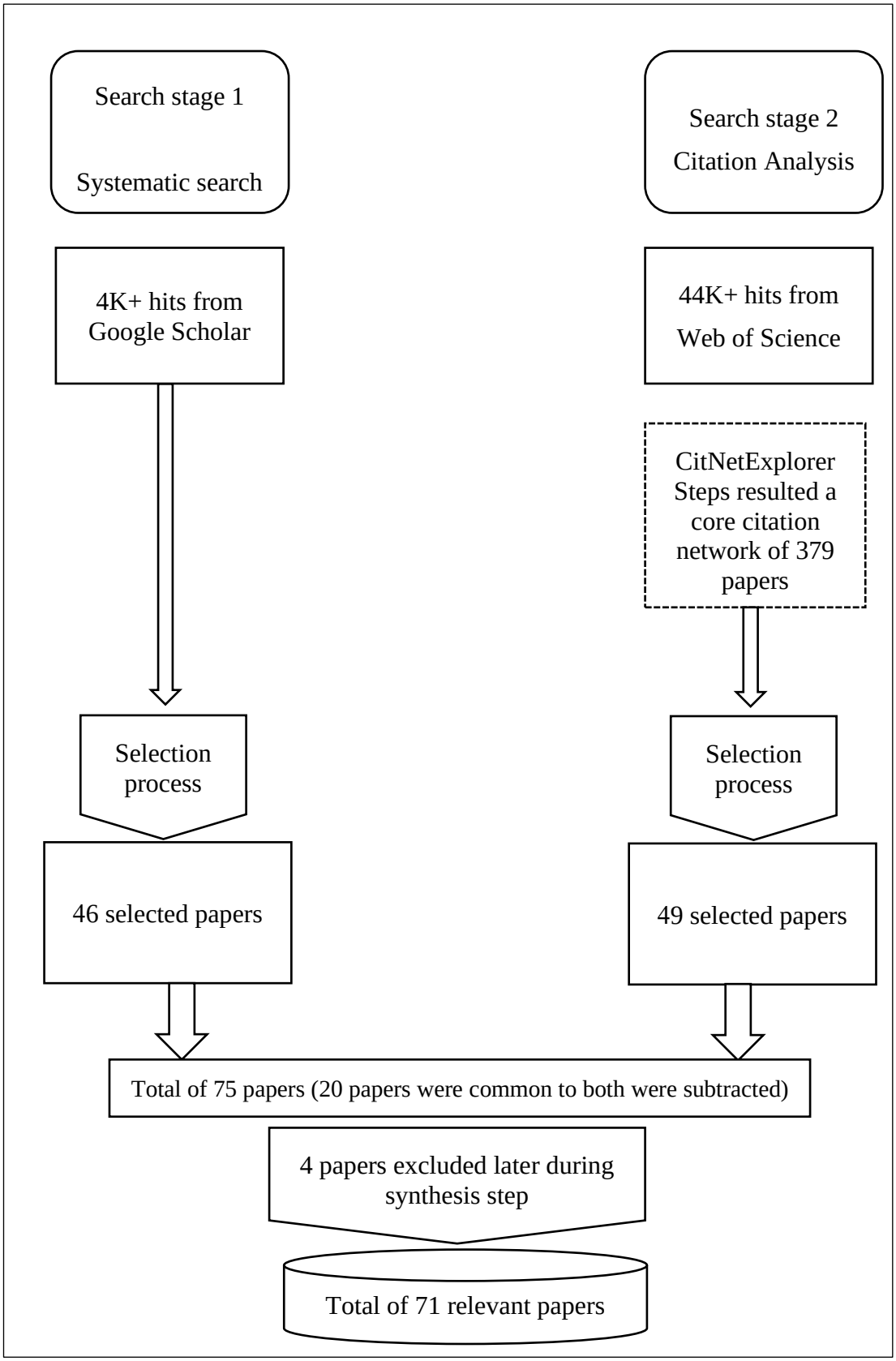

Figure 5: Numbers of papers found in both stages.

Google Scholar served as the search source in order to avoid publisher bias (Wohlin, 2014). Google Scholar retrieves results from a wide range of sources from various thematic areas, although it has fewer advanced search options compared to other digital libraries. For example, neither searching of abstracts nor of keywords is available in Google Scholar. With such limitations in the search engine, some search phrases returned too many results (hundreds of thousands) which made it impossible to handle them using human effort. The researcher employed certain advanced search options when the number of returned results was too large in order to better focus the review topic. He used, for instance, quotation marks around phrases, or exact search terms, so that all the relevant publications were retrieved.

The stipulated search period for publications was 2000 to 2021, and the researcher used the Curtin Library Catalogue to access full texts when titles were unavailable. Only studies published in English were included. Table 1 summarizes the details of the search strategy that was run with Google Scholar.

Table 1: Search parameters in Google Scholar.

Database	Google Scholar
Dated between	2000–2021
Language	English only
Run on	Anywhere in the article or only the title
Published in	Not specified
Search phrases	Based on review questions
Quality accepted	Only Q1 and Q2 according to (SJR)

2.4.1.1. Inclusion and exclusion criteria in Google Scholar search

The selection of relevant studies was governed by inclusion and exclusion criteria (Kitchenham & Charters, 2007) that are formulated to achieve a systematic review (Meline, 2006). The inclusion and exclusion criteria were devised to find relevant studies that best answered the review questions. Four criteria were applied:

1- Peer-reviewed papers, book chapters, and published conference papers were accepted whereas other forms of articles such as tutorials, summaries, personal opinions, etc., were excluded.

2- Only papers that tested the impact of social capital (or at least one of its variables, i.e. social ties, trust, or shared vision) on knowledge-sharing behaviour were accepted. It should be noted here that papers that did not

explicitly use the term “social capital” were accepted because those kinds of studies have contributed significantly to development of social capital theory (Gabbay & Leenders, 1999).

3- In regard to the quality of chosen studies, only those rated Q1 or Q2 according to Scimago Journal Rankings (SJR) were accepted. Scimago Institutions Rankings (SIR) is “a classification of academic and research-related institutions”. It utilizes research performance, innovation outputs, and societal impact as three composited sets of indicators to rank journals. These indicators are measured by their web visibility ("SCImago, about us," 2020).

4- This work aimed to review the intraorganizational effects of social capital on knowledge sharing behaviour. A number of scholars have differentiated between knowledge being shared intra-organizationally or inter-organizationally (Filieri, McNally, O'Dwyer, & O'Malley, 2014; Huggins, Johnston, & Thompson, 2012; Zhao & Wang, 2009; Zimmermann & Ravishankar, 2014). This analysis only accepted papers that tested knowledge-sharing in an intra-organizational setting.

These criteria were applied to all studies that were retrieved based on the search phrases in Google Scholar. Any study that did not meet one or more of the criteria was discarded.

2.4.1.2. Study selection in Google Scholar search

To filter the results retrieved from Google Scholar, a selection procedure was used. At the outset, the researcher read the titles of the search results to assess if they were relevant. To avoid possible researcher bias at this point, only titles that obviously appeared to be irrelevant where skipped such as those titles referring to different disciplines. If a title seemed relevant then the researcher read the abstract. When an abstract indicated some relevance between the paper and the review’s topic, the quality of the publisher journal was checked. As stated previously, it had to be at least Q1 or Q2 in order to be accepted. When it did meet the quality criteria, the researcher finally looked at the full-text version to ensure that it met at least one of the social capital variables in an intra-organizational context. Figure 6 depicts the selection flow chart.

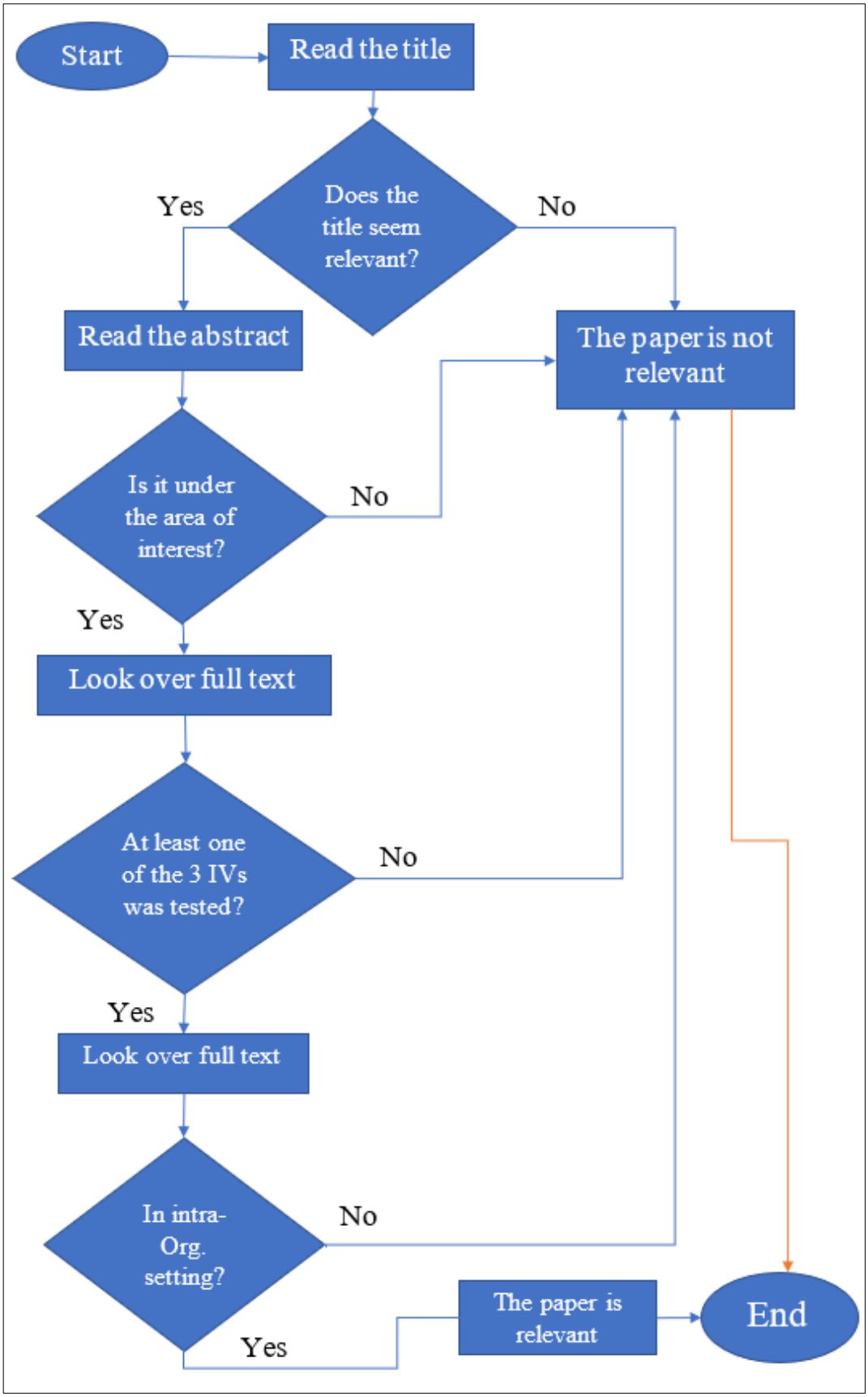

Figure 6: Flow chart for selecting studies.

2.4.1.3. Phrases and returned hits in Google Scholar search

Table 2 tabulates the search phrases with the number of retrieved results and number of relevant studies. Here, the search phrases are coded (Ph1 to Ph 8) and, henceforth, these codes will be used to indicate the phrase.

Table 2: search phrases with numbers of retrieved results and relevant studies.

Phrase code	Phrase	Number of hits	Articles Added
Ph1	Allintitle: “social capital” “knowledge”	1244	20
Ph2	*"social capital" "knowledge sharing" "trust" "shared vision" "shared goals" "social interactions”*	388	10
Ph3	allintitle: Trust "knowledge sharing" OR "knowledge contribution" OR "knowledge distribution" OR "information sharing" OR "information distribution”	883	8
Ph4	“social capital” “willingness to share knowledge”	1790	6
Ph5	allintitle: "shared vision" OR "shared goals" "knowledge sharing" OR "knowledge contribution" OR "knowledge distribution" OR "information sharing" OR "information distribution"	10	2
Ph6	allintitle: social ties "knowledge sharing" OR "knowledge contribution" OR "knowledge distribution" OR "information sharing" OR "information distribution”	33	0
Ph7	allintitle: Social interaction "knowledge sharing" OR "knowledge contribution" OR "knowledge distribution" OR "information sharing" OR "information distribution"	43	0
Ph8	allintitle: Social interactions "knowledge sharing" OR "knowledge contribution" OR "knowledge distribution" OR "information sharing" OR "information distribution"	6	0
Total papers found			**46**

In Ph1, the word “knowledge” has not been combined with other words like “sharing” or its synonyms, which did not limit the search scope in the domain of “knowledge sharing”. Thus, with Ph1 there was the likelihood of finding bigger number of relevant papers. This is why the researcher checked all the 1244 hits individually. For the rest of the search phrases, the researcher checked all hits when there were 500 or less, but if they amounted to more than 500 (i.e. Ph3 and Ph4), he used a simple rule to justify whether the rest of the results were checked. If no more relevant studies were found after the 500th hit, then checking ceased, otherwise checking continued. Such a

justification has been recommended when Google Scholar retrieves too many 'hits' (Wohlin, 2014). Also, if a relevant study was discovered using more than one search phrase, it was recorded only under the first phrase from which it was originally found. Figure 7 below is a graph indicating the number of relevant studies found using each of the search phrases in Google Scholar. The last three search phrases added no more articles, giving the researcher confidence that he had reached the saturation point.

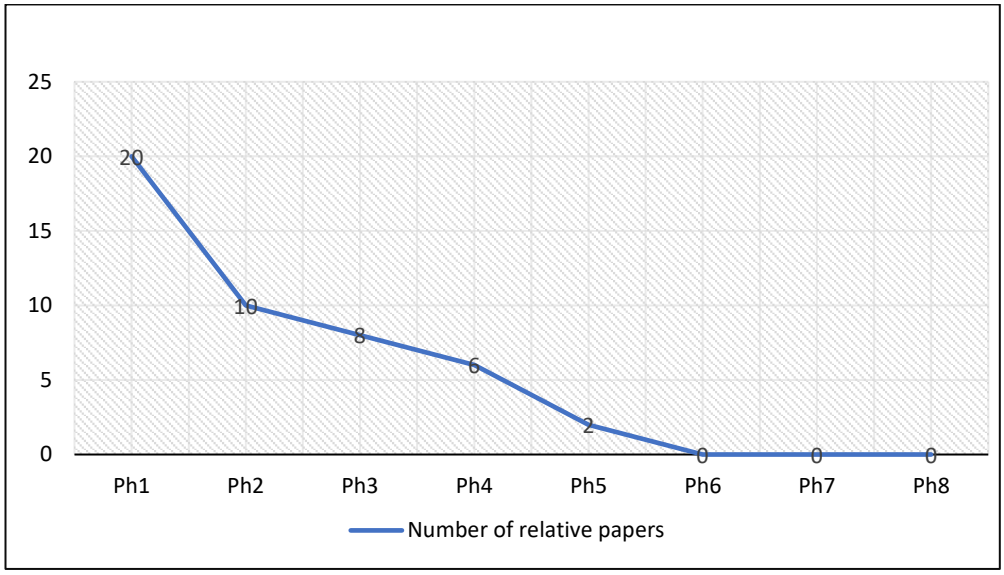

Figure 7: Number of relevant papers by search phrase.

2.4.2. Search Stage 2: Bibliometric network analysis using CitNetExplorer

This was a second separate stage of search in the review. It is a method of bibliometric analysis which provides quantitative data about a specific literature. It consists mostly of a bibliographic overview of scientific outcomes involving a range of highly cited publications (Ellegaard & Wallin, 2015). Researchers commonly employ one or two bibliometric methods: citation analysis or content analysis. For a given research subject, citation analysis identifies the core literature, countries, journals, and so on by assuming there is a relationship between the quality of a publication and the number of times it is cited. In contrast, content analysis identifies what is a current 'hot' research topic based on the frequency of keywords and other distributions (Gao, Sun, Geng, Wu, & Chen, 2016). In the second stage of search, the researcher applied the citation analysis method to identify the network of research papers on the subject of social capital and its effect on knowledge sharing behaviour. Publication networks

reveal how information is linked and how it spreads through a network (Gao et al., 2016).

A variety of bibliometric analysis software has been developed. Using such tools for citation analysis is a robust way to survey a recent topic and then identify additional emerging research themes or concepts (Fahimnia, Tang, Davarzani, & Sarkis, 2015; Mishra, Gunasekaran, Papadopoulos, & Hazen, 2017). Software like Publish or Perish, Gephi, HistCite, BibExcel, and others are all examples of different bibliometric analysis packages, and each has its own advantages and limitations (Mishra et al., 2017). Another notable piece of bibliometric analysis software is CitNetExplorer, devised by Van Eck and Waltman (2014). CitNetExplorer handles much bigger networks of publications and citation relationships than does other software. It can sift through a citation network that may consist of millions of publications, and identify small subnetworks – possibly containing less than 100 publications – within a specific topic of interest. Moreover, CitNetExplorer has certain useful visualization and user interaction features such as smart labelling, zooming, and panning (Van Eck & Waltman, 2014).

The developers of CitNetExplorer have indicated it can be used for: (i) studying the most influential publications in a specific field of research (developed over a period of time); (ii) identifying publications based on relationships among citations; (iii) studying an individual researcher's publications; and (iv) a literature review (Van Eck & Waltman, 2014). Because of these features, CitNetExplorer was chosen here to perform the citation analysis and visualize the citation network of papers published on the research topic. How CitNetExplorer was used for searching is explained in more detail below.

2.4.2.1. The CitNetExplorer Process

To identify the core citation network, searching involved 7 procedural steps which included working with CitNetExplorer (Figure 8).

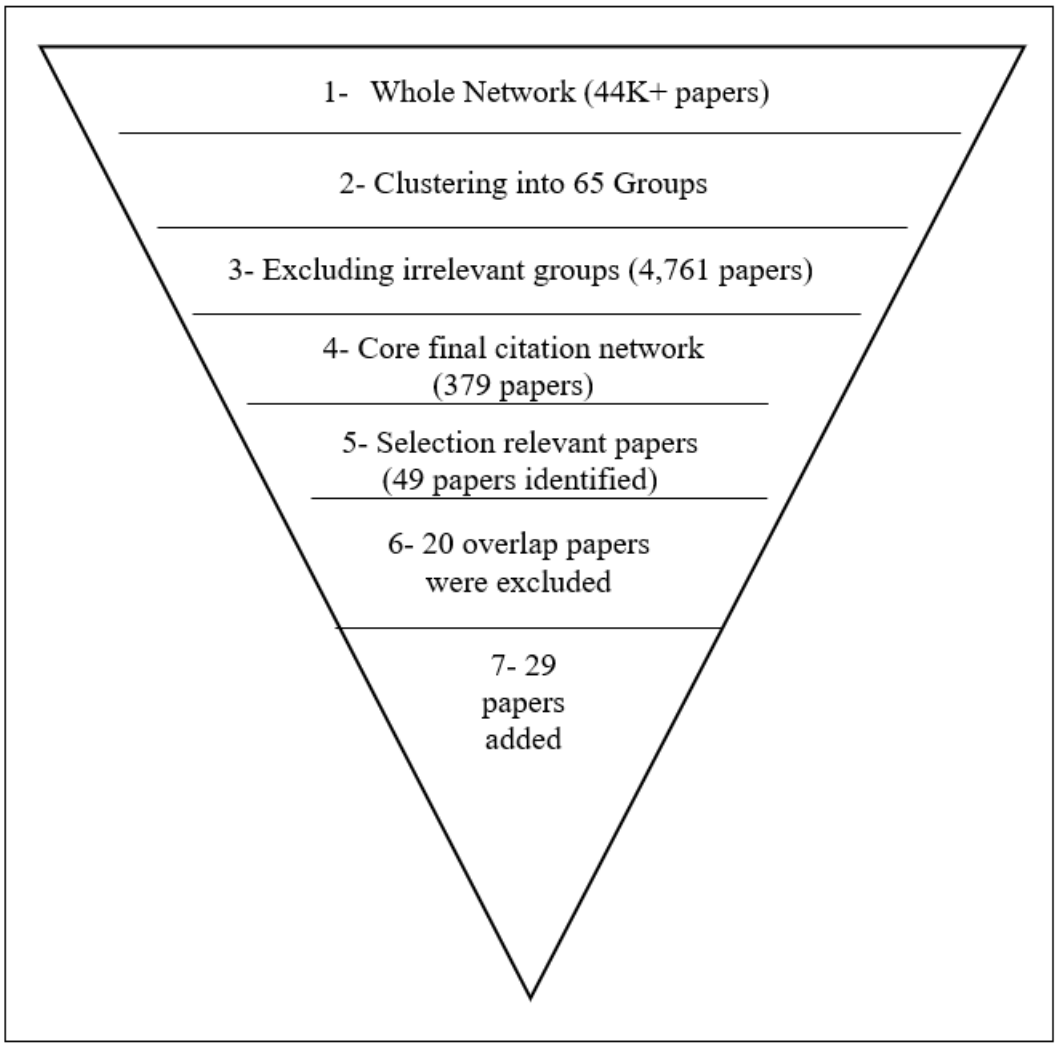

Figure 8: Steps taken in CitNetExplorer.

Firstly, the Web of Science database was accessed to import data into the software. The reason for employing Web of Science was its compatibility with CitNetExplorer. The search timespan included all years available in the database. The reason not to limit publication years to 2000 – 2021 (as was done in the Google Scholar search stage) was to concentrate on collecting the most influential papers written on the subject regardless of when they were published. Furthermore, all ranges of quality were accepted during this stage of the search. In the same way that the search was not limited to a specific range of dates, the rationale was to find the most influential papers regardless of their journal ranking (see Table 3).

Table 3: Search parameters in Web of Science.

Database	Web of Science
Dated between	All years
Language	English only
Run on	All fields
Published in	Not specified
Search phrases	Based on review questions
Quality accepted	All qualities

Research keywords were also used, depending on the review question. Exchangeable words for "sharing" such as "exchange" and "transfer" helped to return the largest possible number of relevant publications. The Boolean operator OR was used to involve all search phrases in one hit, while AND was used between search phrases. Moreover, the researcher combined the social capital variables of social ties, trust, and shared vision with the word "knowledge" (excluding the word "sharing" and its synonyms). In this way, as mentioned previously, this procedure does not restrict the search engine to limit results with only those synonyms. Table 4 shows the search phrases in the Web of Science database.

Table 4: Search phrases in Web of Science.

Boolean operator	Phrase
	"social capital" AND "knowledge sharing"
OR	"social capital" AND "knowledge exchange"
OR	"social capital" AND "knowledge transfer"
OR	"social capital" AND "knowledge management"
OR	"shared language" AND "knowledge"
OR	"shared goals" AND "knowledge"
OR	"shared vision" AND "knowledge"
OR	"social ties" AND "knowledge"
OR	"social interactions" AND "knowledge"
OR	"trust" AND "knowledge"
OR	'social capital" AND "willingness to share knowledge"
OR	'social capital" AND "intention to share knowledge"
OR	'social capital" AND "knowledge sharing intention"

The research engine returned 44,539 publications whose metadata was entered into CitNetExplorer, and the resulting citation network is visualized in Figure 9 below.

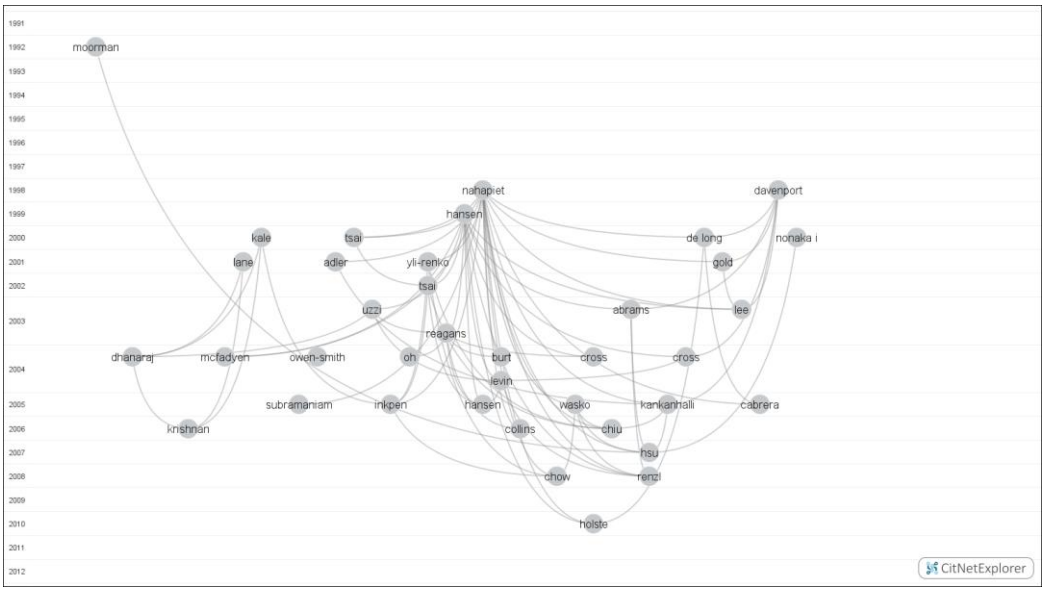

Figure 9: The whole network of 44K+ publications from CitNetExplorer.

The whole network consisted of papers published from 1981 to 2021. Figure 9 shows the most 40 frequently cited papers in the network. The circles indicate the citing papers and the citation relationships are represented by curved lines. CitNetExplorer provides a clustering approach where it can split an extensive network into smaller groups depending on the citations related to the publications, and each group will include closely connected publications. In this way, the whole network was clustered into 65 groups comprising 12,993 publications from 1991 to 2019.

Not all these clusters were within the scope of the research's area, nor even in the field of knowledge management. Therefore, the researcher needed to isolate clusters within or close to the field of knowledge management. Fortunately, it was possible to determine the relevant clusters by looking at the titles of publications within each cluster. The titles were more or less close to each other depending on the level of clustering detail. So the researcher carefully looked at the titles in each group and the names of the journals in which the publications were published in order to include or exclude clusters. This was straight forward as the titles were such clear signs. For example, clusters with common topics such as biology, ecological economics, climate issues, marine policy, etc., were excluded, while knowledge management titles were included.

The detection process concluded that two clusters were within the research scope, while the others were not. The first cluster included 2,988 publications with the common theme of knowledge management and social capital. The second cluster

included 1,773 publications which were closer to social capital and knowledge sharing. The two clusters are shown as blue and green in Figure 10. Consequently, these two clusters were advanced to the next steps and the others were excluded. Appendix A-11 shows the titles of the first 10 publications in the two clusters, which overall included 4,761 publications dating from 1993 to 2019.

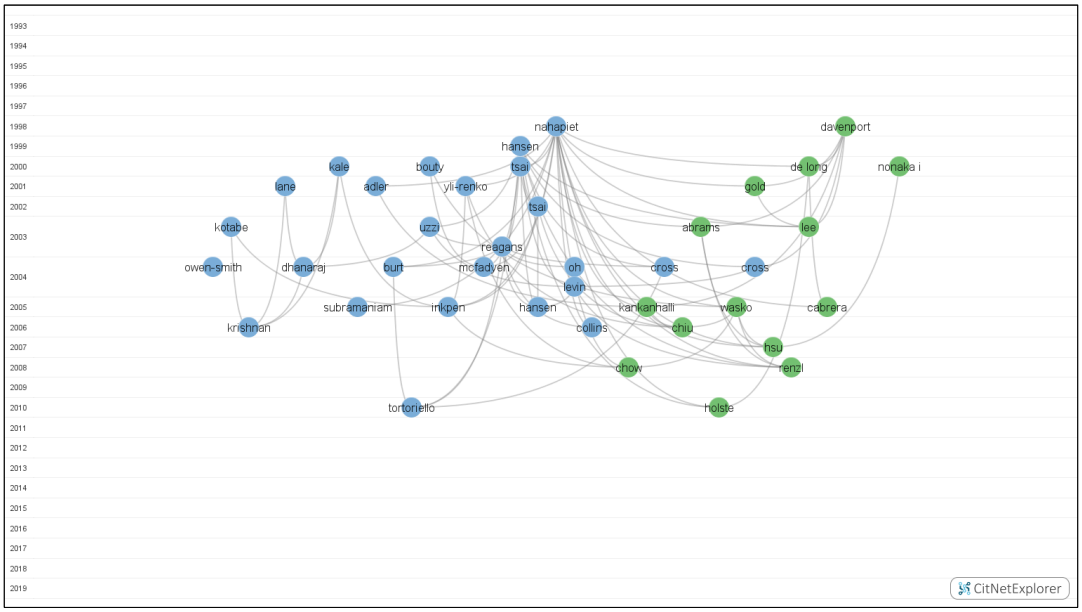

Figure 10: The two included clusters.

Subsequently, the core citation network focused on these two clusters. The core publications are those papers connected with a certain minimum number of either incoming or outgoing citation relations with the other publications. The minimum number indicates the centrality of the core network. The software gives the option to set the centrality number to identify the core network. Here, the researcher checked the publications within each possible centrality number as shown in Figure 11.

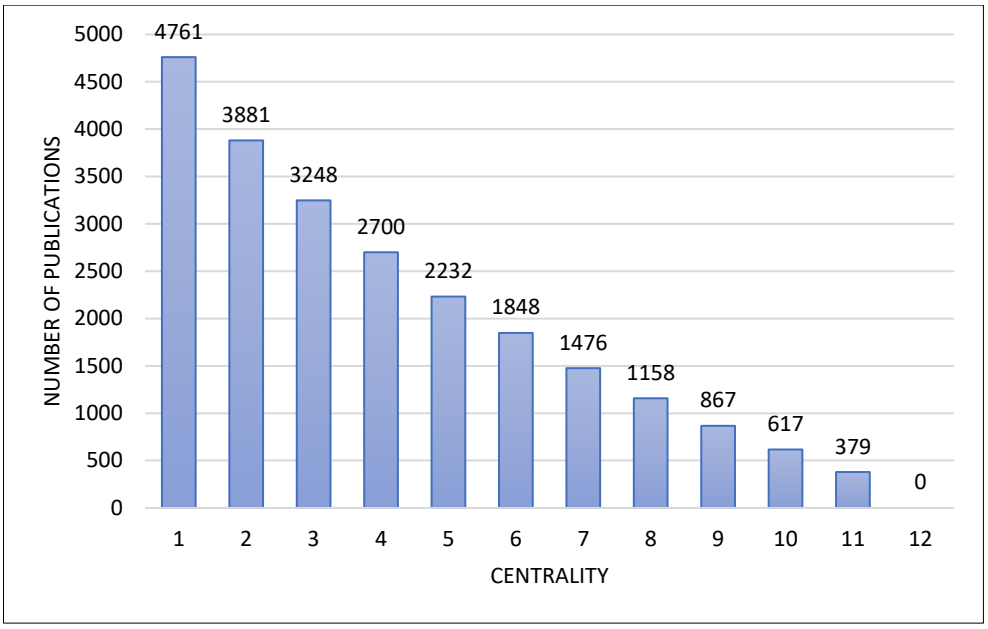

Figure 11: Core network sizes with each level of centrality.

Figure 11 shows that a centrality of 1 returned all publications in the two clusters (the 4,761). With increasing centrality, the number of publications in the core networks becomes smaller. No core network was identified with a centrality of 12, meaning that the centrality option was limited to between 1 and 11. The researcher carefully checked the publications with each centrality and ascertained that centrality 11 resulted in a core network with the fewest irrelevant publications. Therefore, a centrality of 11 was chosen as the most suitable number. This resulted in the most homogeneous core citation network with 379 publications dating between 1993 and 2018. Figure 12 visualises the most cited 40 papers in the core network.

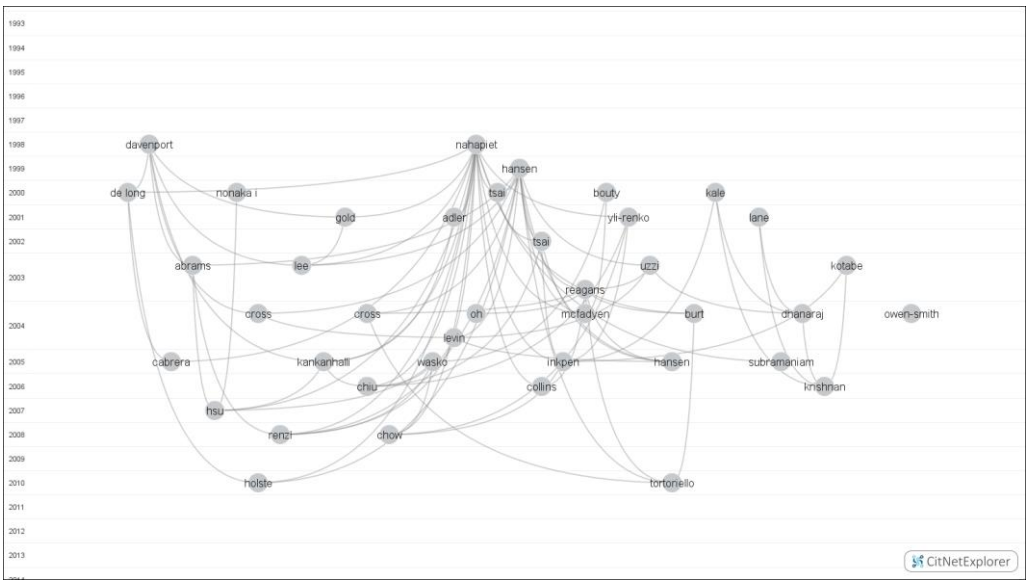

Figure 12: The core citation network of 379 publications (centrality 11).

2.4.2.2. Selecting relevant papers in the CitNetExplorer search

Not all the 379 publications in the core network satisfied the selection criteria of the review. Hence, for this stage, the same inclusion and exclusion criteria and selection process (sections 2.4.1.1 and 2.4.1.2) were applied except for publication date and quality of papers. Here, all publishing years and the quality of all papers were accepted, since CitNetExplorer aims to visualize how a specific topic has developed over a period of years. This criterion was used to avoid possibly missing the central papers contributing to core developments in the research topic.

After reviewing the 379 papers in the final core network, 49 relevant papers in total were selected. However, 20 of them had already been found in the first Google Scholar search stage, meaning that the first search stage was sufficient to find 41%. Thus, the bibliometric stage added 29 new relevant papers to the basket.

2.4.3. Additional searching for CQ

The research aimed to investigate the effect of social capital and collaboration quality within e-government systems; hence the research focuses on the social capital and knowledge sharing domains. By default, searching for CQ was already included within the previous searching stages because there was no term which excluded it. If a search had been done for CQ among the social capital domain, it would have shown up within the identified papers. However, this step was intended to add more rigour to the review. As was done in the previous steps, searches for CQ were done with Google Scholar and CitNetExplorer using exact criteria.

The first step was to use Google Scholar, so more seven search phrases (Ph9 to Ph15) were added (Table 5). In particular, the phrase “collaborative features”, which is close in meaning to CQ, was included. The search returned a total of 2,674 hits; the same search parameters in Table 1. and inclusion and exclusion criteria in section 2.4.1.1 were applied to these hits. However, no paper fitting the criteria was found.

Table 5: Search phrases about CQ in the social capital literature.

Phrase code	Phrase	Number of hits	Articles Added
Ph9	“collaboration quality” “knowledge” "social capital"	237	0
Ph10	“collaboration quality” “knowledge management system”	46	0
Ph11	allintitle: knowledge OR sharing OR system OR quality "collaboration quality"	122	0
Ph12	"collaborative features" "knowledge" social capital	930	0
Ph13	"knowledge sharing" "collaborative features"	837	0
Ph14	"collaborative features" "trust " OR shared OR vision" OR "shared goals" OR "social tie "knowledge sharing"	299	0
Ph15	"collaboration quality" "trust " OR shared OR vision" OR "shared goals" OR "social tie "knowledge sharing"	203	0
Total papers found			**0**

The second step was to use CitNetExplorer. Web of Science was used again to search for CQ. However, this time the search was extended the review to the literature on e-collaboration and computer-mediated communications (CMC). The phrases were searched in the Web of Science database (Table 6).

Table 6: CQ search parameters applied to the Web of Science database.

Boolean operator	Phrase	Doc. Type	Filed	Time-span
	"collaboration quality" and "knowledge" and "social capital"	All documents	All fields	All years
OR	"collaboration quality" and "knowledge management system"			
OR	"knowledge sharing" and "collaboration quality"			
OR	"knowledge sharing" and "collaborative features" or "collaborative tools"			
OR	"collaborative features" and "trust" OR "shared vision" OR "shared goals" OR "social ties"			
OR	"collaboration quality" and "trust" OR "shared vision" OR "shared goals" OR "social ties"			
OR	"social capital" AND "e-collaboration"			
OR	"social capital" AND "electronic collaboration"			
OR	"social capital" AND "computer-mediated communication"			
OR	"social capital" AND "CMC"			
OR	"trust" AND "electronic collaboration" or "e-collaboration"			
OR	"shared goals" or "shared vision" and "electronic collaboration" or "e-collaboration"			
OR	"social ties" or "social interactions" and "electronic collaboration" or "e-collaboration			

The search returned 8,442 hits which were all entered into CitNetExplorer for visualisation. The result is shown in Figure 13

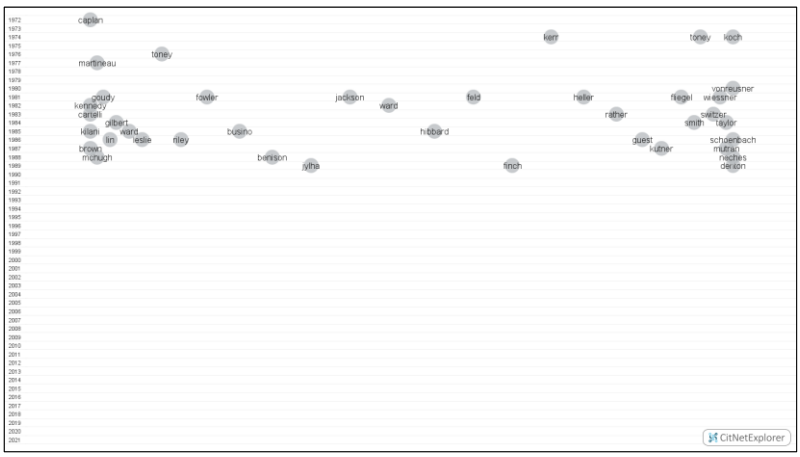

Figure 13: The whole CQ network of 8,442 publications.

It is notable that the publications in Figure 13 are not connected. The researcher then minimised the clustering parameter to discover if there were weaker connections between them, but nothing was detected. Therefore, he was confident that CQ had not been included in the social capital and knowledge sharing literature. Moreover, this separate search for CQ further confirmed the reliability of the two search stages search (see sections 2.4.1 and 2.4.2).

2.5. Summary of papers found in both search stages

As illustrated in Figure 4, the search for relevant papers in this review was done in two stages: the first was a Google Scholar search while the second was a CitNetExplorer search. It is well known that when searching Google Scholar, a massive number of hits or results makes it difficult or impossible for one person to manage. Thus, the first stage was subjective filtering of a very large data set, while the second stage was objectively done using software to find the most influential papers on the topic. This difference in approach explains why some papers were found in one stage but not the other. The first stage filtered the results and was limited by human capacity, whereas the second focused on influence regardless of the quality. A total of 46 relevant papers were found in the Google Scholar search and 49 in CitNetExplorer. There were 20 papers common to both stages, which means that a total of 75 relevant papers were identified in both search stages.

Comparing the quality of papers found in the Google Scholar search and the centrality of papers in the CitNetExplorer search, it can be said that Google Scholar found 26 high quality but not necessarily influential papers, while CitNetExplorer found 29 influential but not necessarily high-quality papers. At the same time, the 20 overlapping papers were both high quality and influential. In other words, the two search stages removed some limitations that were evident in the other. Google Scholar covers only a paucity of sources in Web of Science although it does extend over a wider range of material. Meanwhile CitNetExplorer overcame limitations in human capacity by dealing with a massive number of search hits that had been returned by Google Scholar. Finally, this two-stage search approach managed to uncover 75 important and relevant papers that have been published in the area of social capital and knowledge sharing (Figure 14). However, because 4 papers were later excluded during the synthesis process, this review ended up with 71 relevant papers.

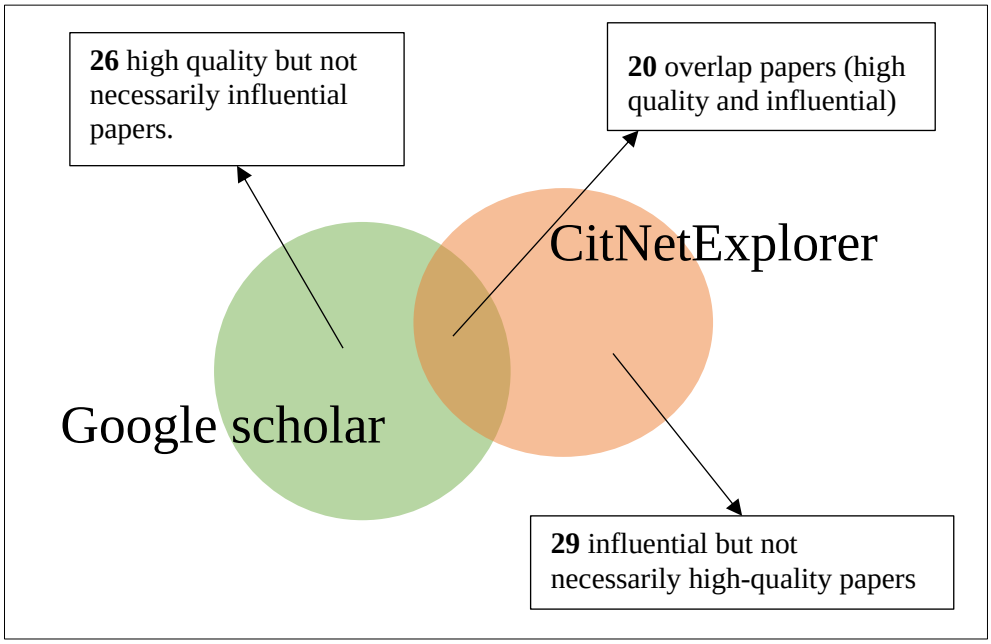

Figure 14: Papers found in both search stages.

2.6. Attributes of the relevant papers

This review included 49 papers of quality Q1, 15 of quality Q2, 2 of quality Q3, 3 unranked papers, and 6 conference proceedings. Table 7 and Figure 15 show these numbers and percentages.

Table 7: Quality of papers found in analysis.

Paper quality	Total	Percentage
Q1	49	65%
Q2	15	20%
Q3	2	3%
Not ranked	3	4%
Conference	6	8%
Total	75	100%

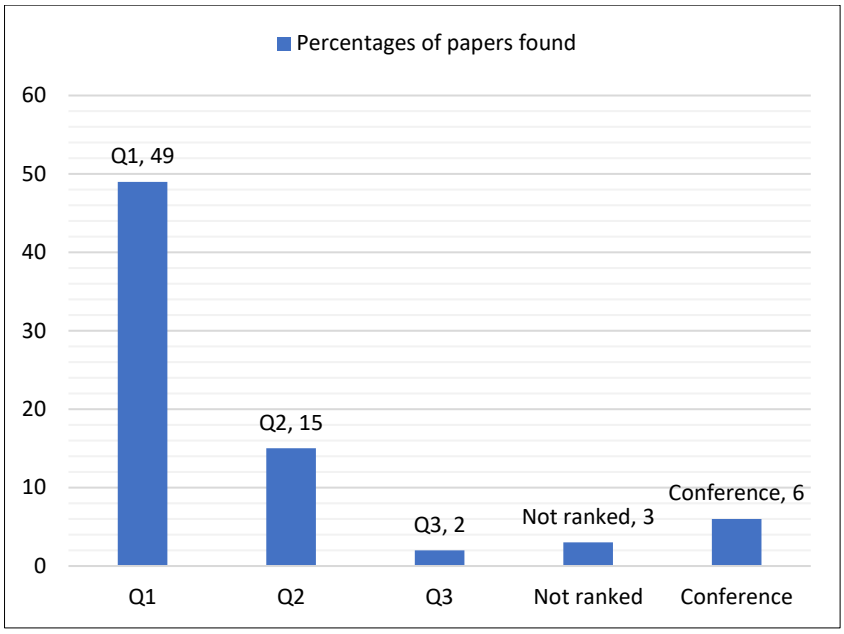

Figure 15: Quality of papers in analysis.

Figure 16 shows the annual number of papers published in the period 2006 to early 2020.

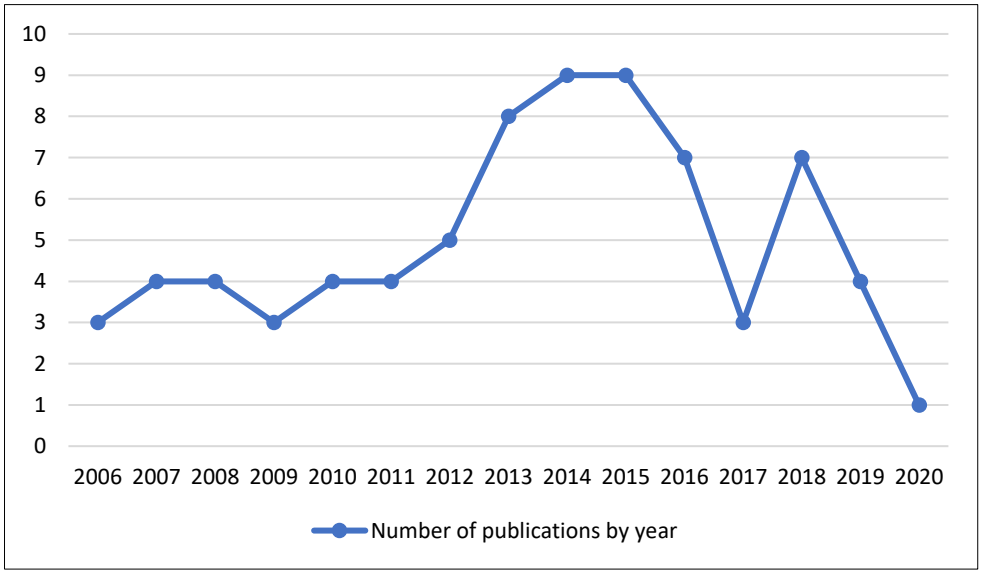

Figure 16: Total number of publications found by year.

It can be clearly seen that the study of the impact of social capital on knowledge-sharing behaviour greatly increased in the first half of the second decade. The year 2014 and 2015 documented the highest number with 9 published papers for each. Figure 17 shows the countries from which these papers appeared. It is noted that Taiwan, Korea, and China were the origin of most studies concerning the research

topic. However, about 10% of the studies did not explicitly state where the data was gathered from, so these were categorized as not specified.

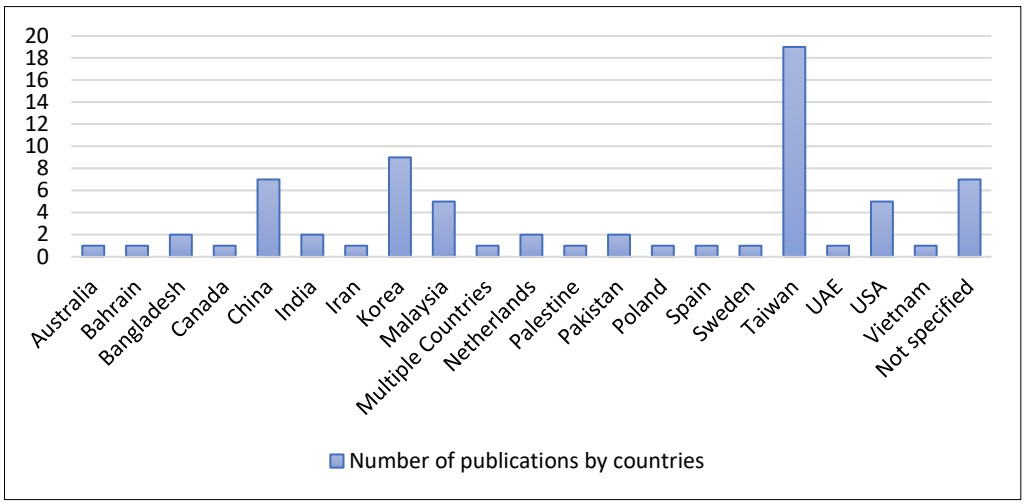

Figure 17: Total number of publications found by countries.

While most papers applied quantitative research methods, only two involved qualitative analysis and one undertook a mixed methods approach (Figure 18). The survey method was used in 70 papers, while 3 utilized interviews, 1 did observation, and another paper used secondary data. In terms of the approaches used to evaluate the quantitative data, partial least-squares-based SEM (PLS-SEM) was the most common in 32% of the papers, followed by covariance-based SEM (COV-SEM) in 25% of them. The third group (24%) involved regression analysis using a variety of regression types, i.e., linear regression, multi-regression, and multi-hierarchical regression. Other methods such as Pearson's correlation, ANOVA, and others were used as well.

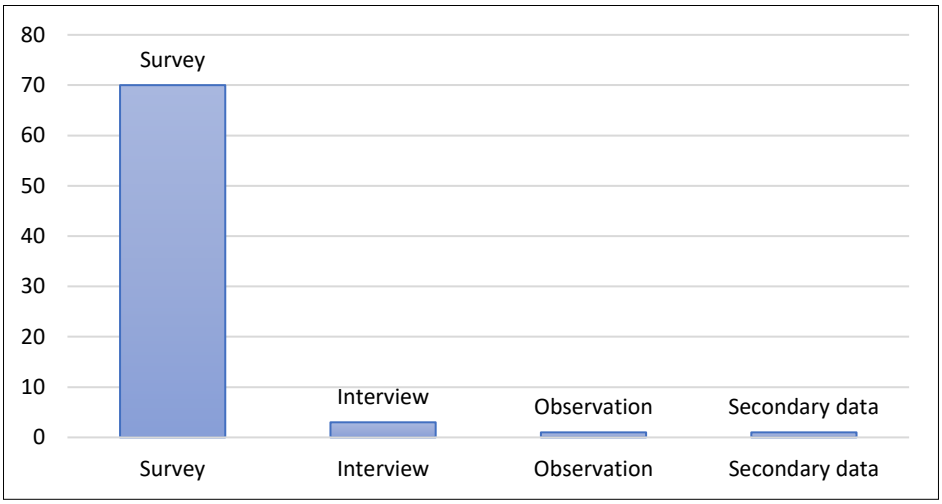

Figure 18: Data collection methods (number of papers) used in the literature.

In regard to the focus of the studies, there were 67 studies that looked at private sector organizations, while the remaining 4 were done on the public sector (Figure 19).

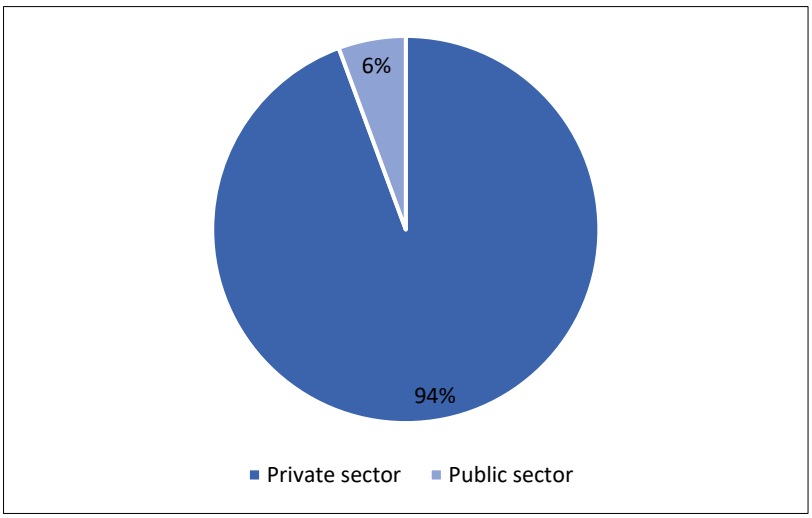

Figure 19: Studies conducted in public or private sector.

2.7. Data extraction

The data extraction step in an SLR aims to look into the relevant papers to gather data that is needed to answer the research questions (Zahedi, Shahin, & Babar, 2016). An extraction form should be designed and filled out for each relevant paper (Wohlin, 2014). For this purpose, a spreadsheet was designed and filled in with all the data on each relevant paper. The information collected was author and year, title, study context, research questions or objectives, data set and unit of analysis, analysis method, conducted country, dependant and independent variables, results of relationships, findings, and limitations. Only relationships relating to social capital were collected.

2.8. Data synthesis

Data synthesis in an SLR refers to collating and summarising the outcomes of the relevant papers and can take the form of a narrative (descriptive) or quantitative synthesis. This review adopted the narrative technique and, consequently, a spreadsheet reporting data extraction was created to highlight the similarities and differences between the findings of the relevant papers (Wohlin, 2014).

In addition to the selection criteria used by the relevant papers, the synthesis step further looked at the ways in which the prior studies defined social capital variables. Some studies considered different aspects of the variables, which might lead to disparate outcomes. For example, Wu, Hsu, and Yeh (2007) investigated knowledge

transfer at a team-level of analysis. They defined social ties as "activities designed and implemented by team leaders and companies to promote knowledge transfer". The outcome of a study using a variable defined in this way could not be compared with the outcomes of other studies that used the more common definition of social ties. In the same way, trust, which is a complex phenomenon with several dimensions, might be analysed at multiple levels (Wasko & Faraj, 2005). In looking at knowledge sharing within and across teams, Mooradian, Renzl, and Matzler (2006) differentiated between the impact of trust between project team members and trust in management. Moreover, Renzl (2008) evaluated the impact of trust in management on knowledge sharing (KS) within and between teams. In this thesis, trust in management is not considered. In this regard, some studies have failed to provide enough information about how the variables were measured, and in some situations the researcher needed to review the original sources in which the variables appeared in order to confirm the exclusion or inclusion decision. In general, studies that used clearly different dimensions of the variables were excluded. After applying this criterion about definitions, 4 papers were excluded. This left 71 papers for the final number of papers used in this review (Figure 5). Those papers are listed in Appendix A-1.

After this filtering process had been done, the review focused on the possible differences in behaviour between knowledge sharing in an IT and non-IT context. IT-mediated indicates that knowledge sharing behaviour occurs through information systems, whilst non-IT sharing refers to such behaviour occurring outside information systems. Non-IT knowledge sharing can take place in an organization as employees interact with each other such as at meetings, private conversations, training activities/sessions, and so on. This research argues that the effect of social capital might be different when colleagues share their knowledge in or outside IS, and this difference was one of the areas focused on.

This study concerned the impact of social capital on knowledge sharing behaviour in e-government systems. This means that its context is different from other knowledge-based systems. E-government systems are work-based systems through which employees are forced to conduct their work on line and are prevented from doing work by other means (Elbanna & Linderoth, 2015). Knowledge-based systems such as wikis, discussion boards, and communities of practices are perceived more as

voluntary use systems, so that any organizational benefits from them depend on whether employees choose to use them or not (Y. Wang, Meister, & Gray, 2013).

Moreover, socio-psychological processes are the key to KMS use (Y. Wang et al., 2013), so the role of social factors might be different if the use is mandatory (Hwang & Kim, 2007). Hence, this research argues that knowledge sharing behaviour reflects the mandatory property of the system and the required daily work tasks. Therefore, the synthesis of the data considered the mandatory level of use, and Figure 20 shows the synthesis focus points.

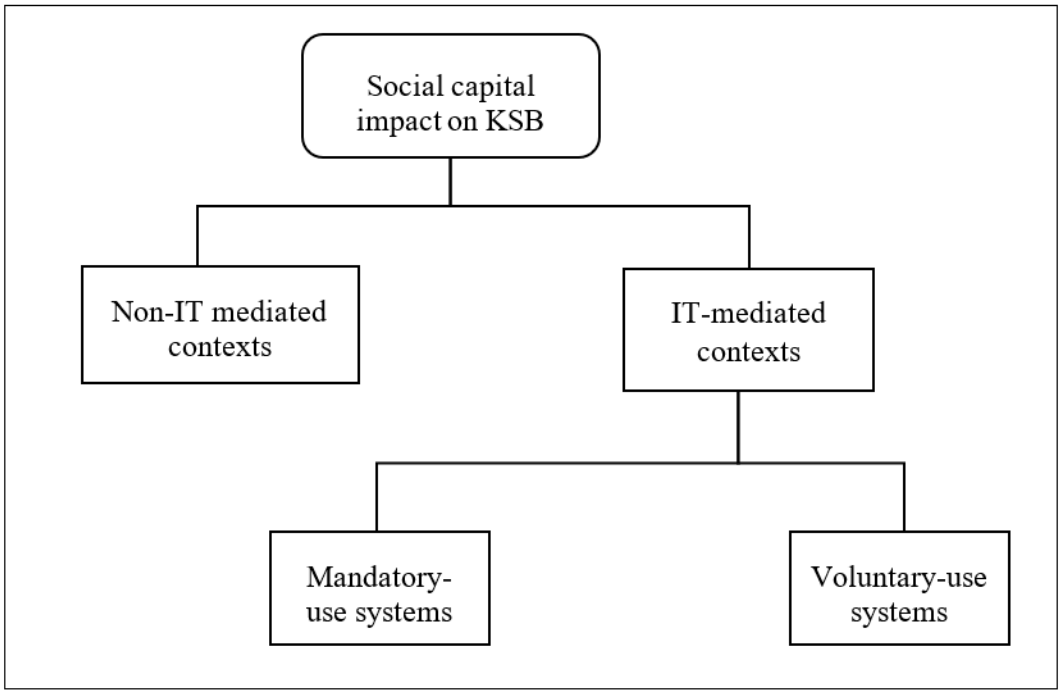

Figure 20: Data synthesis focus points

2.9. Findings and discussion

2.9.1. IT and Non-IT-mediated knowledge sharing

This review considered the basic distinction in the two ways that knowledge can be shared: i.e., IT and non-IT mediated. Most previous studies have investigated the impact of social capital on KS in terms of non-IT-mediated knowledge, with only a few looking at the IT context. This distinction might explain previous inconsistent results, in that sometimes research did not distinguish between the two contexts. T. P. Liang, Liu, and Wu (2008) did acknowledge the distinction, and suggested that the way in which IT may affect people's knowledge sharing behaviour should be investigated. This review, therefore, has tried to discover if there are differences in

KSB between the two scenarios – information systems and other contexts. Here it is important to note that there are some studies which have considered IT systems as tools facilitating knowledge sharing in the workplace, but because they did not ascertain in which specific context the behaviour was measured, this review was unable to draw on them to distinguish IT and non-IT contexts.

2.9.2. Social capital in the literature

In the literature on knowledge sharing, studies have dealt with social capital in four ways. The first examined social capital theory on a single scale incorporating two or more of the social capital variables. Thus, Yao, Tsai, and Fang (2015) used nine measured items under the single variable social capital to examine the relationships between the theory, team learning, and electronic loyalty in virtual communities. The second way in which some other studies used social capital is as a second order variable in research models. S. Lee, J. G. Park, and J. Lee (2015) used team social capital as a parent variable of social ties, trust, and shared vision to explain knowledge-sharing behaviour in information systems development (ISD).

The third way to present social capital theory in the literature is to use the theory's scale of dimensions. As it will be mentioned later in section 3.1.2.3, social capital comprises three dimensions. Firstly, the structural dimension includes variables like network ties, network configuration, and appropriate organization. The second dimension is the relational one, which contains variables such as trust, norms, identification, and obligations. The third dimension refers to shared vision, a cognitive dimension that includes other variables such as shared codes, language, and narratives (Nahapiet & Ghoshal, 1998). When researchers use theoretical scales of dimensions, they mostly take terms from previous studies, combining different variable dimensions but without specifically isolating which variables were measured. However, some work has specifically defined the terms that they measured on each scale (T. T. Kim, Lee, Paek, & Lee, 2013). Nevertheless, most scholars have failed to discuss the differences that emerge when social capital is measured on various dimensions, and this might have led to erroneous conclusions. The fourth and most common way in which variables of social capital are tested is separately. These studies hypothesise that there is a clear connection between each independent social capital variable and the dependent variable of knowledge sharing (for example, the impact of trust on

knowledge sharing). To ensure precision in this review, the researcher concentrated on how these fourth group of papers define the social capital dimensions, relying only on those that clearly define the dimensions, or at least specified the items from which the dimensions were measured.

2.9.3. Social ties (ST)

The impact of social ties on KS has been addressed in many previous studies. In this review, 31% of the studies emphasized that social ties are a key factor behind knowledge-sharing behaviour. In non-IT-mediated knowledge sharing, Amayah (2013) explored the factors influencing knowledge sharing in a public academic institution and found that social ties had a significant effect. A significant relationship was also found in hotels (T. T. Kim et al., 2013; T. W. Tang, Wang, & Tang, 2015), R&D group members (Kang & Hau, 2014), and academic research teams (García-Sánchez, Díaz-Díaz, & De Saá-Pérez, 2019). However, Y. H. Tsai, Ma, Lin, Chiu, and Chen (2014) did not find any significant effect of social ties on knowledge sharing between leaders of work groups. Possible reasons for this inconsistency were that the study had limitations such as evaluating positive affective tone, the likelihood of common method variance, and the nature of the subject sample, which were virtual team leaders in Taiwanese IT workplaces. In general, however, most studies confirm that, in various contexts, social ties exert a definite impact on non-IT-mediated knowledge sharing.

The reviewed articles indicate that social ties do influence knowledge sharing in IT-mediated contexts as well. For instance, social ties drive KS in virtual communities (C. P. Hsu, 2015); H. Liu, Zhang, Liu, and Li (2014); online learning systems (G. Li & Li, 2010; Tseng & Kuo, 2011); social network sites (Chai & Kim, 2012; Kwahk & Park, 2016); and bloggers (Chai, Das, & Rao, 2011).

The synthesis detected differences in how social ties impact the knowledge sharing of students. Some research found no significant effect of social ties on knowledge-sharing behaviour. For example, the study by Havelka (2019) that surveyed students working on project teams in software development courses. For IT-mediated knowledge sharing, Koranteng, Wiafe, and Kuada (2019) stated that social ties did not influence knowledge sharing in social networks among students. They concluded that the impact of social ties among students is different from those among employees in

organizations. Such studies indicate that social ties might not be a good indicator or enabler of knowledge sharing when it comes to students.

Overall, except for groups of students, it can be said that social ties have a clear influence on knowledge sharing in both IT and non-IT mediated contexts. However, most of these studies tested the relationship in IT-mediated contexts where the systems were mostly classified as voluntary-use. Systems like virtual communities, social networks, and blogs are different from those are used formally in organizations. Knowledge-sharing behaviour of an employee through IT systems might differ from that of a person who has an account in a social network or has a blog page. Future comparative studies might focus on such differences.

2.9.4. Trust (TRU)

Compared to other social capital variables, trust is the variable most investigated in previous studies. In total, 80% of the 71 relevant papers evaluated trust. Generally, most studies investigated trust in various non-IT-mediated settings, where they found a positive significant relationship between trust and KSB. For example, the positive relationship between trust and KSB was found in both public and private sector organizations by Al-Alawi, Al-Marzooqi, and Mohammed (2007). They analysed the role of various critical factors in organizational culture on the degree of knowledge sharing. This has been echoed in research on team settings (Ho, Kuo, Lin, & Lin, 2010; Kang & Hau, 2014; Park & Lee, 2014) and virtual teams (O. K. Choi & Cho, 2019; Pinjani & Palvia, 2013; Staples & Webster, 2008; Y. H. Tsai et al., 2014). The latter four studies did not specify how knowledge was shared, so it cannot be definitely said that the knowledge sharing was tested in an IT-mediated setting. In contrast, Seonghee and Boryung (2008) detected no significant relationship between trust and knowledge sharing among faculty members in a university. The study restricted knowledge sharing to members' course materials, which limits the generalization of its results to other scenarios. Overall, the review confirms the importance of trust in non-IT mediated settings.

In an IT-mediated context, the concept of trust and how it is approached seems somewhat different. The review indicated that trust might be less influential in an IT-mediated than a non-IT mediated context. For example, C. M. Chiu, M. H. Hsu, and E. T. G. Wang (2006) stated that trust might be not important in predicting the quantity

of knowledge sharing in low-risk environments such as the professional virtual community (VC) in which they tested trust. H. H. Chang and Chuang (2011) documented a similar result from testing in several VCs. Other studies failed to find a significant relationship between trust and knowledge sharing in systems like online learning (G. Li & Li, 2010), or in Facebook's social network (Liou, Chih, Hsu, & Huang, 2015). However, several other studies conducted in IT-mediated settings (blogs and virtual communities) confirmed the significant impact of trust (Chai et al., 2011; Chai & Kim, 2010; Chen & Hung, 2010; C. P. Hsu, 2015; M. J. J. Lin, Hung, & Chen, 2009; H. Liu et al., 2014; Usoro, Sharratt, Tsui, & Shekhar, 2007; Y. Yan, Zha, & Yan, 2014). None of these studies indicated how mandatory was the use of the system, which means that the issue of compulsion has not been raised in the literature.

By comparing the results of both IT and non-IT-mediated scenarios, it can be deduced that trust is generally less crucial in the former. Further, based on the narrative synthesis of the discussions and outcomes, strength of trust and its effect on KSB varies depending on the type of system and the information being shared. In other words, this review suggests that trust might play different roles in different IT-mediated systems. For example, the role of trust in knowledge sharing by individuals in a low risk IT-mediated system (such as a social network or online blog) might differ from when it shared by employees in the KMS of an organization where other considerations might apply. Moreover, no study was found where use of the system was mandatory; instead, all of them were largely voluntary. Many studies have explored the concept of trust in detail, but they have not looked at this key difference. More studies are needed in this area to better understand this widely researched variable.

Regarding trust in the context of students, no difference has been noticed in the results of students and the results from other groups of subjects. Two exceptions were reported regarding to the influence of trust on KSB in social networks (IT-mediated). Sharabati (2018) found no significant relationship between trust and knowledge sharing, and Koranteng et al. (2019) who reported a significant negative relationship.

2.9.5. Shared vision (SV)

Shared vision appears to be the least investigated variable in the literature. It was evaluated in 18% of the reviewed papers compared to social ties being investigated in

31% and trust investigated in 80% of papers. Selecting only the non-IT-mediated context, the impact of shared vision on KSB has been tested directly in technology organizations (Goswami & Agrawal, 2019; Y. H. Tsai, Joe, Lin, Wu, & Cheng, 2017), hotels (T. T. Kim et al., 2013; T. W. Tang et al., 2015); project teams and virtual teams (Y. H. Tsai et al., 2014), and working professionals (Cao, Guo, Vogel, & Zhang, 2016). All these studies reported a significant relationship between shared vision and KSB. However, in an IT-mediated knowledge sharing context, C. M. Chiu et al. (2006) reported a negative significant relationship in a professional VC, while G. Li and Li (2010) and C. P. Hsu (2015) found an insignificant relationship in two large VC and online learning systems. These contrasting reports in a non-IT-mediated context draw attention to the possibility that shared vision is less influential in IT-mediated KS contexts. The three previously mentioned IT-mediated context studies tested the relationship in which social capital develops and evolves between members online, a situation where mandatory use does not apply. In terms of this review, we conclude that we do not yet know enough about SV to say what effect it would have on KSB in a mandatory use system – such as might occur between employees who physically work in the same place but use the system to execute their daily work tasks.

2.9.6. Collaboration quality (CQ)

Technologies are tools that can support knowledge sharing in organizations (Kipkosgei, Kang, & Choi, 2020), and organizations need to use tools that allow communication and collaboration among their employees (Clarke & Cooper, 2000). This review underlines the difference between IT and non-IT mediated knowledge sharing, and the thesis investigates the wider impact of social capital on knowledge sharing behaviour in e-government systems. However, in doing so, the CQ of a system is a crucial factor in the knowledge sharing process; indeed, CQ is required in order to manage knowledge effectively (Gold, Malhotra, & Segars, 2001). Collaboration is a broad topic that has been extensively studied in different disciplines and at different levels. For example, management scholars widely study the subject of collaboration, and they have developed research frameworks to understand its complexity (Diaz-Kope, Miller-Stevens, & Morris, 2015). Electronic collaboration (e-collaboration) is another sort of collaboration that came about in the late 1960s; it is defined as "collaboration among individuals engaged in a common task using electronic technologies". It is used in various research fields but particularly in knowledge

management (Kock, Davison, Wazlawick, & Ocker, 2001). Kock (2005) set out six conceptual elements of e-collaboration: (1) the collaborative tasks, where people in different places work together to accomplish a specific task; (2) e-collaboration technology is not so much the technology itself but rather the features designed to support e-collaboration; (3) the characteristics of the involving individuals; (4) the knowledge that the individuals have; (5) the physical environment; and (6) the social environment surrounding the individuals.

This research has investigated how two distinct elements of e-collaboration (i.e., the technology's collaborative feature and the underlying social capital) affect knowledge sharing behaviour in e-government systems. Even though many studies have stated that collaborative tools are essential to facilitate knowledge sharing (Bechina & Bommen, 2006; Lacosta & Thomas, 2020; Linnes, 2016), the review has shown that no study has investigated how those tools and social capital together influence knowledge sharing. In an IT-mediated context, CQ appears to be an important construct to consider. Indeed, this area of research is a research gap that this thesis aims to fill.

2.10. Review conclusion and literature gaps

This work first set out to review the impact of social capital (in the form of social ties, trust, and shared vision) and from there determine where the knowledge gaps are and suggest areas for further exploration. The review applied a two-stage search strategy that included a systematic search and a citation network analysis to find relevant papers. A narrative synthesis was used to find 71 relevant documents. To this point, findings have been discussed and gaps in the field have been determined. This section offers some recommendations for researchers to follow up.

As stated earlier in section 2.9.2, prior studies have dealt with social capital in four ways: (1) by examining the theory on a single scale; (2) testing it as a second order variable; (3) using a multi-dimensional scale; and (4) testing separate variables of social capital. Regarding the third way, where some studies have measured different variables within each dimension of social capital, the review found that some of the later studies did not use the same variables that earlier studies had used within the dimension scales. Instead, they discussed the effects of different variables as if they

were the same. The recommendation here is to look at such differences in a better way so as to enhance the rigour of research and generate reasonable interpretations.

Moreover, some studies used different definitions of the variables, which means there are inevitably inconsistent outcomes (section 2.8). This review used the most common definitions of the terms provided in the literature (see Chapter 3). The researcher noted an increase in the level of inconsistent results when social capital variables were defined in different ways. For example, as said before, Wu et al. (2007), who described social ties differently, came up with results disagreeing with what other analyses had found. Such differences in the construct's definition might be the main reason for the inconsistencies. Hence, this review recommends explicitly defining social capital terms, and comparing results without neglecting the different definitions; doing so will improve our understanding of the theory.

Further implications for scholars are highlighted here. This review has shown that the impact of social capital varies depending on the medium through which knowledge is shared. This work insists on the importance of declaring whether KS is being measured in a non-IT or IT-mediated context (because the answers they give will not be the same). It is recommended here to explicitly determine the context of knowledge sharing. Comparative studies between the two contexts are a worthwhile direction for future studies to explore. This recommendation will help restructure and give order to the current randomness in most of the literature discussing the impact of social capital on knowledge sharing.

More knowledge management studies are required in the public sector since it operates differently from private sector institutions (Massaro, Dumay, & Garlatti, 2015). This issue is still open, as most studies tackling social capital and knowledge sharing have been conducted in the private sector (Sandhu, Jain, & bte Ahmad, 2011; Willem & Buelens, 2007). This gap was confirmed by this review which found that only about 6% of studies looked at the public sector.

The literature also does not have enough qualitative studies. Qualitative methods go deeper and interpret issues in much more detail compared to quantitative analyses. This review found little research (about 6%) used qualitative methods, but quantitative analysis alone is not enough to interpret differences between contexts. This is

particularly true for knowledge-sharing behaviour where one needs to differentiate between different types of systems.

2.11. Significance of the research

This study investigates the effect of social capital and collaboration quality within e-government systems on user's knowledge sharing behaviour. The research has both theoretical and practical significance. In terms of theoretical significance, the research investigates a somewhat unique context. Most studies in social capital and knowledge sharing have been conducted in settings such as communities of practice, social networks, and other KMS. However, this review found no study which has investigated knowledge sharing in the setting of an e-government system, even though there is some research which has been conducted in the public sector. E-government systems are not knowledge-based systems; instead, they are work-based systems, and so one might expect a somewhat different type of behaviour. Moreover, they are systems whose use is compulsory, so that employees are forced to deliver governmental services through those systems. This research fills the existing gap by examining knowledge sharing behaviour in e-government systems in Saudi Arabia.

The second theoretical aspect of significance is that this work considers the CQ of the system. Managing knowledge requires a socio-technical system in which technology tools, business procedures, knowledge, people, and social capital are strategically merged (Carayannis, 1998; Meso & Smith, 2000). Such integration makes it crucial that KMSs should include a combination of knowledge-oriented technologies, function-oriented technologies, and specialty-oriented technologies (Meso & Smith, 2000). However, the literature review found no study investigating the influence of CQ and social capital on knowledge sharing behaviour. This means that the literature has not considered the knowledge-oriented side of behaviour or how social capital affects behaviour. This study is significant because it considers both social capital and collaboration quality within e-government systems. Furthermore, it investigates how the effect of social capital might differ depending on the collaborative technology tools embedded within the system. Ultimately, this research endeavours to cover this gap and add to our understanding of how social capital affects knowledge sharing in an IT-mediated context.

Third, the review uncovered another weakness the literature suffers, which is a scarcity of qualitative research. The difference between qualitative and quantitative approaches is much bigger than just the presence or absence of statistics. In fact, they carry different research strategies (Bryman, 2011a). Quantitative research involves numbers while qualitative studies involve words and images, and so the last is richer and deeper. This research has adopted a mixed methods approach, which combines the advantages of both. It then triangulates the findings and adds a deeper level of understanding of the phenomenon, filling an unknown area.

In terms of the practical significance of the research, it tries to build upon the success of e-government. Even with significant investments in e-government, high failure rates have been experienced (Scott, DeLone, & Golden, 2009). In developing countries, e-government projects are at risk failure (Guha & Chakrabarti, 2014) to the extent that some projects have been abandoned (Gunawong & Gao, 2017). On the other hand, knowledge sharing is one factor that promotes the success of information systems in both public and private organizations in Saudi Arabia (Alattas & Kang, 2016). Thus, this study would be significant if it could provide valuable insight into how knowledge sharing might be increased and success of the system enhanced.

Second, e-government projects, as previously mentioned, require substantial investments and huge budgets. Billions of dollars have been allocated to invest in e-government services in Saudi Arabia (Weerakkody & Al-Sobhi, 2011), and the Saudi government is pursing enhanced e-services. Another perspective is that e-government focuses on function-oriented technologies (Jho & Song, 2015; Stratu-Strelet, Gil-Gómez, Oltra-Badenes, & Oltra-Gutierrez, 2021), so that this research might contribute to understanding how, in an e-government system, a knowledge-orientation can be enhanced. This could help governmental organizations make better use of their systems and increase return on investment.

Most of the e-government literature has focused on the demand side, mainly investigating e-government from a citizen's perspective (K. P. Gupta, Bhaskar, & Singh, 2017). However, citizens are outside organizations, and their needs are different from employees. To satisfy citizens about the services on offer, governments could usefully pay attention to other potential e-government channels (Rao, 2017). One essential channel is government to employees (G2E) as it helps promote information exchange between employees and departments, supports learning, and increases

performance (Baležentis & Paražinskaitė, 2012; H. Tang, Zhang, Song, & Yan, 2011), all of which lead to enhanced service quality to citizens. Moreover, this channel strengthens government organizations (Sijabat, 2020) and has been called 'internal efficiency and effectiveness' (Baležentis & Paražinskaitė, 2012; Carter & Bélanger, 2005). However, even though public sector employees are a central part of the supply side of providing e-services, G2E is a neglected part in the e-government literature (Abusamhadana, Bakon, & Elias, 2021; Alshihi, 2006). Employees need to be competent in order to provide citizens with the information and services they need (Carter & Bélanger, 2005), so this study looked at this neglected gap which has the potential to enhance the e-government systems environment by supporting knowledge sharing. If knowledge sharing is facilitated, then the quality of e-services can be increased and the success of e-government systems enhanced.

As a result of the review, it has been found that most studies of social capital and knowledge sharing have been done in the private sector. The scarcity of studies in the public sector emphasises the need to update our knowledge in this area (Henttonen, Kianto, & Ritala, 2016). Furthermore, the public sector is fundamentally a knowledge-intensive one, and it operates in such a way as to facilitate knowledge sharing among its managers and other employees (Willem & Buelens, 2007). Another significant aspect of this research is therefore to fill this gap within the Saudi Arabian public sector. At the broadest level, the research here aims to help knowledge managers in the public sector effectively manage knowledge within Saudi e-government systems.

2.12. Summary of the chapter

This chapter has discussed in detail a systematic literature review on the topic of social capital and knowledge sharing. Each of the steps of the review have been elaborated in detail, including its two-stage search strategy. The review has documented both descriptive aspects and statistics concerning the existing literature. It has further identified certain weaknesses and gaps in the literature which the rest of this thesis aims to fill.

3 Theory Development and Research Framework

This chapter mainly contains two main parts. The first discusses concern topics in this thesis (section 3.1) while the second main section introduces the research model and hypothesis development (section 3.2).

3.1. Background of the research

This research investigates the impact of social capital on knowledge-sharing behaviour in e-government systems. It looks at the intersection of three different areas: knowledge management, social capital, and e-government. This section provides background to these three areas:

3.1.1. Knowledge and knowledge management

This section provides background to the field of knowledge management (KM). It begins with a brief overview of the meaning of knowledge, and then defines knowledge within a hierarchy and discusses its types. Subsequently, a definition of knowledge management and an explanation of the knowledge management cycle model are provided. Finally, discussion about knowledge sharing is also provided.

3.1.1.1. Meaning of knowledge

Epistemology, the branch of philosophy that looks into the nature of knowledge, has provided a traditional definition of knowledge as "justified true belief". In this regard, knowledge is considered basic when someone believes that a statement is true without needing a justification from another statement. In contrast, knowledge is not basic if it needs to be justified by other statements (Lehrer & Paxson, 1969). This definition had been discussed extensively by philosophers (Gettier, 1963, p. 121). For example, they argue about the veracity or accuracy of knowledge which the definition assumes. More than a decade ago, the need to distinguish between knowledge and information was raised (P. Wallace, 2007).

3.1.1.2. The knowledge hierarchy

The knowledge pyramid, or DIKW hierarchy (an acronym for Data-Information-Knowledge-Wisdom, Figure 21), is widely used in management information systems, and the knowledge management literature. It is a central model in these disciplines

(Baškarada & Koronios, 2013; Rowley, 2007). Many sources suggest that the idea of DIKW was initially mentioned in the poem "Choruses" from 'The Rock' by T.S. Eliot in 1934:

"Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?"

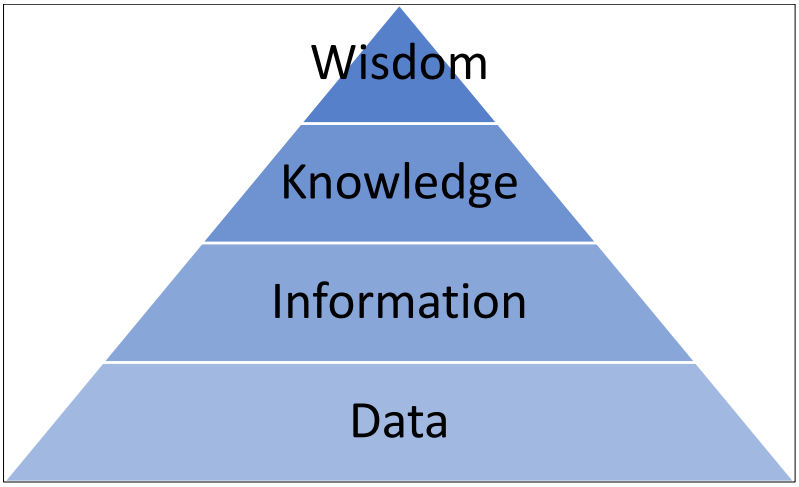

Figure 21: The DIKW hierarchy.

It is still unclear when and who first presented the DIKW hierarchy, but it is known that several authors attempted to build an understanding of it (P. Wallace, 2007). The definitions of the three terms data, information, and knowledge vary depending on the discipline, so the use of the terms is often inconsistent and conflicting (Min et al., 2009). In the knowledge management literature, it is fundamental to distinguish between data, information, and knowledge. Because these three concepts are interrelated and inevitably have circular definitions (Liew, 2007). Data refers to symbols, observations, or facts having no intrinsic meaning, while information results from processing data (Baškarada & Koronios, 2013). In other words, data, where an actual event is embedded, is the raw product of information (Liew, 2007). Information helps solve problems, make decisions, and evaluate opportunities (Liew, 2007) – it has the ability to answer questions concerning "what", "who", "where", and "when" (Nürnberger & Wenzel, 2011). Regarding knowledge, many alternative definitions have been given (P. Wallace, 2007). Knowledge is the beliefs and values formed in the mind from accumulating information through experiences and communication (Zack, 1999). It is further defined as the development of data and information evolution (Amidon, 1997). Moreover, it is a combination of information, capability,

and understanding in the mind of people, a combination which enhances their ability to make predictions from recognising patterns (Groff & P. Jones, 2012). Knowledge therefore results from synthesizing information that answers "how" questions (Min et al., 2009; Nürnberger & Wenzel, 2011; Rowley, 2007).

3.1.1.3. Knowledge types

Researchers have focused on two types of knowledge. The most common type of knowledge is tacit knowledge, while the other is explicit knowledge. Tacit knowledge is embedded in an individual's experiences, beliefs, values, perceptions, insights, and assumptions. It is highly personal, and people apply their tacit knowledge in unique manners without thinking about it (Polanyi, 1966; Smith, 2001). It is, thus, usually hard to transfer to another person. However, as soon as the tacit knowledge has been articulated or documented, it becomes explicit knowledge, easily transferred to another person. In other words, each piece of knowledge must be "either tacit or rooted in tacit knowledge" (Polanyi, 1966). In the perspective of the knowledge economy, explicit knowledge plays a more significant role in organizations and is crucial in creating new knowledge (Zack, 1999). Hence, it is clear that one of the essential functions of knowledge workers is to convert tacit knowledge in an organization into explicit knowledge and transfer it to other people (Groff & P. Jones, 2012; P. Wallace, 2007; Zack, 1999). Table 8 compares tacit and explicit knowledge (Dalkir, 2005).

Table 8: Properties of tacit and explicit knowledge, according to Dalkir (2005).

Comparison of Properties of Tacit vs. Explicit Knowledge	
Properties of Tacit Knowledge	Properties of Explicit Knowledge
Ability to adapt, to deal with and exceptional situations	Ability to disseminate, to reproduce, to access, and to reapply throughout the organization
Expertise, know-how, know-why, and care-why	Ability to teach to train
Ability to collaborate, to share a vision, to transmit a culture	Ability to organize, to systematize; to translate a vision into a mission statement, into operational guidelines
Coaching and mentoring to transfer experiential knowledge on a one-to-one, face-to-face basis	Transfer of knowledge via products, service, and documented process

3.1.1.4. Knowledge management (KM)

The need to manage and apply knowledge correctly is a vital issue in organizations (Quintas, Lefrere, & Jones, 1997). Economics, sociology, and philosophy are three background fields that have contributed to raising awareness of the need for knowledge management in organizations (Prusak, 2001).

Regarding economics, resources in organizations take two forms, tangible and intangible. Intangible resources are essential for an organization's success as they are not quickly developed or replicated (Rifat, 2017). In this regard, knowledge represents one of the precious, intangible assets in an organization (Dalkir, 2005). All organizations incorporate knowledge economies that are a crucial source of advantage (Quintas et al., 1997); consequently, the learning process can help organizations become more efficient (Prusak, 2001).

KM is further impacted by sociology on both the macro and micro levels. Regarding the macro level, the post-industrial world has altered perspectives on knowledge and work. At the micro-level, knowledge practitioners firmly believe that social structure and networks are essential analysis points in managing knowledge in organizations. Studying the perceptions and behaviours of people toward knowledge sharing and its application under various social situations has led to developing effective knowledge management tools and techniques (Prusak, 2001).

However, building and managing intellectual capital is challenging in an organization, since knowledge management requires a deep cultural background and operational and technical infrastructure (Demarest, 1997). The presence of IT has facilitated access to vast amounts of information. However, more information pooled in an organization does not necessarily mean the organization will benefit it (Quintas et al., 1997). The abundance of information has raised the need to focus on the philosophical distinction between knowing-how and knowing-what, or in other words, tacit and explicit knowledge (Prusak, 2001). Thus, it is essential that an organization should be able to access and understand the right knowledge within the relevant context and at the correct time (Quintas et al., 1997). That ability to perform knowledge management is a distinguishing characteristic from information management (Dalkir, 2005).

The term knowledge management has been given many definitions and is often used ambiguously (Maier & Hadrich, 2011). Groff and P. Jones (2012, p. 2) define KM as

"the tools, techniques, and strategies to retain, analyze, organize, improve, and share business expertise". It has been further defined as "the process that creates or locates knowledge and manages the dissemination and use of knowledge within and between organizations" (Darroch, 2003). Thus, from a process perspective, organizations can be seen to manage knowledge through eight focused activities: (1) creation of new knowledge, (2) knowledge access from outside sources, (3) using knowledge in the decision-making process, (4) embedding knowledge in processes and products, (5) representing knowledge in documents, databases, and software, (6) using culture and incentives to support the growth of knowledge, (7) transferring knowledge from one part of the organization to another, and (8) measuring the value of knowledge and/or the impact of knowledge management (Ruggles, 1998).

3.1.1.5. Knowledge management cycle model

Evans, Kimiz, and Catalin (2014) developed a seven-step knowledge management cycle model. Its value is to recognise a holistic knowledge life cycle through seven phases, i.e., identify, store, share, use, learn, improve, and create.

The model starts with 'identify' which starts when a need for knowledge arises. A knowledge seeker then identifies whether the knowledge exists in the organization or not. In this step, analysis and assessment of the available knowledge take place to extract the appropriate knowledge. If the needed knowledge is not available in the store, the created phase is the starting point of the model. Here, new knowledge assets are created to satisfy the need for knowledge. In some cases, the identified knowledge might partly satisfy the need of the identifier. In such cases, the model would start with the two phases in which the needed knowledge is identified, and the rest of the needed knowledge would then be created.

The identify step is linked with the knowledge store, which should be organized and sufficiently structured to allow efficient manipulation, retrieval, and sharing. Knowledge-based technology can play an essential role in providing tools to support archiving, linking, and optimizing search and retrieval. The next step is to share the knowledge. This represents the bridge between knowledge gathering and knowledge exploitation in the KMC. Thus, the process through which knowledge is shared is essential as there might be many obstacles in the way.

Once knowledge is shared, it can be used and the organization thereby benefits. However, if the knowledge is not used, the cycle would be in vain. The share and use step can put the knowledge in a new contextual understanding, increasing the experience of employees. The learning step starts when employees integrate, connect, and combine their knowledge with the new experience. The learning step could be an iterative process, as it might loop again through the steps of identify and create. As the learning steps take place, the knowledge assets of the organization increase.

3.1.1.6. The core role of knowledge sharing

Knowledge management involves several main activities, which are creation, acquisition, codification, sharing, and application of knowledge (Ford, 2001; Raudeliūnienė, Davidavičienė, & Jakubavičius, 2018; Rubenstein-Montano et al., 2001). Much research supports the idea that knowledge sharing is the core component of knowledge management activities (Ahmad & Karim, 2019; Ologbo, Nor, & Okyere-Kwakye, 2015; Susanty, Salwa, Chandradini, Evanisa, & Iriani, 2016). KM will not succeed if individuals refrain from sharing their knowledge. The benefits of knowledge sharing can impact all organizational levels and flow over to the individual level, such as improving the employee's job and life satisfaction (Ahmad & Karim, 2019). An organization might be able to bring in new knowledge-based initiatives and build a firm infrastructure but it is never able to force employees to share their knowledge (Henttonen et al., 2016). Building a knowledge sharing culture is a challenging task for organizations (Usoro et al., 2007). Knowledge sharing is subject to the individual's decision, and many factors might influence their attitude to it. Hence, knowledge management practitioners need to understand knowledge sharing enablers and hinders to build a knowledge-friendly environment in their organizations.

The process of knowledge sharing requires a resource (knowledge) being exchanged between source and recipient. However, the knowledge will be based on the source's experience. Meanwhile, the recipient frames it to fit his/her understanding. The variation in understanding between the two parties leads to an interplay that eventually creates new knowledge (Sharratt & Usoro, 2003). In short, knowledge sharing is "a process of communication between two or more participants involving the provision and acquisition of knowledge" (Usoro et al., 2007).

Knowledge sharing is a holistic topic, however, it can be divided into three primary levels: individual level, team level, and organizational level (Ahmad & Karim, 2019). It might also take place within an organization or between organizations (L. Li, 2005). Moreover, several factors have been found to affect knowledge sharing in organizations. Ipe (2003) presented a theoretical model (Figure 22) to identify the most significant four factors influencing knowledge sharing at the individual level. The first factor is the nature of knowledge. The nature of knowledge pertains to whether the knowledge is tacit or explicit, as well as the value attributed to it. These three characteristics strongly influence the way by which individuals share knowledge. The second factor is the motivation to share knowledge, which can be divided into internal and external factors. Internal factors relate to the perspective of individuals towards knowledge power and reciprocity. In comparison, external factors are those such as the relationship with recipients and the rewards for sharing. The third factor is opportunities to share, which might take place through formal purposive learning channels such as training programs. More commonly, the opportunity might be through informal relational channels like social interactions. The last factor is the organizational culture, which is the most important and also affects the first three factors.

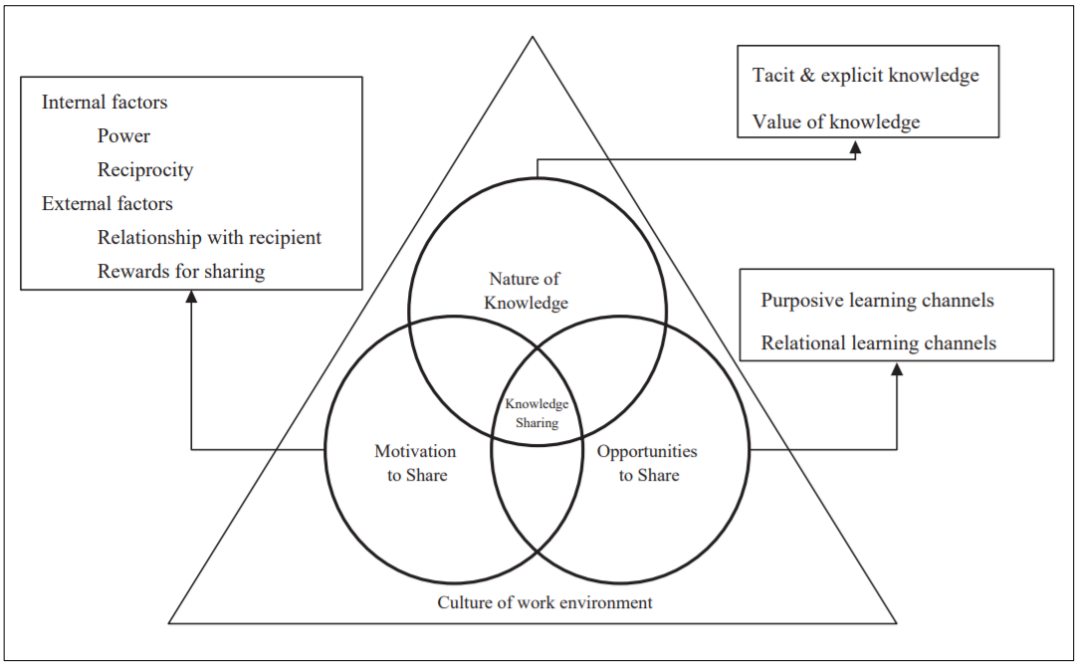

Figure 22: Main factors influencing KS at the individual level in organizations, according to Ipe (2003).

3.1.2. Social capital

3.1.2.1. The three capitals of society

Each society has three basic kinds of capital: economic, cultural, and social (Bourdieu, 1985). People within a society possess different levels of these capitals, such as different annual incomes, levels of education and skills, and broader or narrower social relationships. Thus, an individual's position in society is determined according to the amount he or she has of each of these three capitals (Häuberer, 2011). Moreover, the three are convertible into each other (Bourdieu, 1985). Economic capital represents property rights, and such rights can be directly converted into money. However, cultural capital, – like gaining a higher educational qualification or having skills such as painting or playing musical instruments – usually takes longer to build. People who possess higher levels of cultural capital can make more money by having higher salaries because of the educational levels they have gained or skills they have developed. This increase in their financial status is a conversion of cultural capital into economic capital. The volume of social capital a person possesses can provide support when called on, like asking for a helping hand or borrowing something (Häuberer, 2011). Members in a social group reinforce their social capital through mutual interactions and social practices such as greetings, gifts, friendships, marriages, and so on. This reinforcing of social capital usually costs time and money, which is an example of the conversion of economic capital into social capital (Bourdieu, 1985; Häuberer, 2011).

3.1.2.2. Definition of social capital

Social capital was put forward as an independent concept by Pierre Bourdieu. He defined it as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition” (Bourdieu, 1985).

Bourdieu’s definition is considered the most precise theoretical definition of social capital as it focused on benefits gained from the building of sociability (Portes, 1998). Social capital is not a resource given by default. Instead, it needs to be constructed through investment strategies oriented to group relations. The strategies should aim at social relationships through which access to resources is gained, enhancing the amount

and quality of the resources (Bourdieu, 1985; Portes, 1998). Therefore, social capital "inheres in the structure of their relationships," which means an individual must build it in relation with others (Portes, 1998). To put it another way, it is a resource that lies within social structure, and the benefit an actor might gain from it depends on his or her location in the structure (Adler & Kwon, 2002).

Social scientists have offered other definitions that are more or less similar but with some nuance (Adler & Kwon, 2002). For example, social capital can be analysed on micro and macro levels. The first is the analysis at the individual level, such as having personal support from the network when needed, like borrowing someone's car (Häuberer, 2011). The second is the collective benefits to the public good or 'civic engagement', such as families trusting that their children will be fine playing outside because the tight-knit community guarantees their safety (Portes, 2000), or that working together in a community with a higher volume of social capital makes life easier (Putnam, 1996).

These two levels of analysis and the comprehensive utilisation of the concept of social capital have led scholars in different disciplines to define it in different ways (Lefebvre, Sorenson, Henchion, & Gellynck, 2016). Focusing on relation linkages, Adler and Kwon (2002) divided social capital into three groups: (1) external relations between an actor with other actors (bridging), (2) internal collective structure of relations among actors (bonding), and (3) both external and internal relations. The researchers offered their definition of social capital encompassing both bridging and bonding linkages: "Social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor" (Adler & Kwon, 2002).

Management studies generally agree that social capital is a resource gained through network relationships (Lefebvre et al., 2016). In the knowledge management domain, the definition of SC by Nahapiet and Ghoshal (1998) is frequently cited. The researchers define it as "the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by individuals or social units"

3.1.2.3. Dimensions of social capital

Social capital was further clustered into three main dimensions by Nahapiet and Ghoshal (1998). The dimensions were structural, relational, and cognitive. The structural dimension involves two main aspects of social capital: the whole social network ties and the pattern of connections between network actors. The density, connectivity, and hierarchy of the social ties are all concerns of this dimension (Nahapiet & Ghoshal, 1998). On the individual level, the structural dimension is related to the number of ties an actor has and how strong those ties are (Taylor, 2007). Then, recognising centrality and structural holes is essential to develop and utilise social capital in organizations (Koka & Prescott, 2002; Widén-Wulff & Ginman, 2004). Such utilisations have four aspects. First, it provides communication channels to the network actors. Second, the timing means more density of ties in the network which allow quicker communications and gain advantages faster. Third, informing actors about the availability and accessibility of additional ties in the network. Fourth, the ability to utilise the network for other purposes (Hazleton & Kennan, 2000; Widén-Wulff & Ginman, 2004).

The relational dimension concerns how actors within a social network develop their personal relationships over time (Nahapiet & Ghoshal, 1998). It encompasses the quality of relationships between actors (Muniady, Mamun, Mohamad, Permarupan, & Zainol, 2015). Such a quality is built up from historical interactions and is mainly shown by trust, norms, obligations, and identification (Carey, Lawson, & Krause, 2011). Thus, the dimension influences the ways in which actors deal with each other. For example, the level of trustworthiness between a worker and a well-known colleague differs from that of a newly joined colleague with no history of interactions.

The cognitive dimension encompasses the common meanings, explanations, and interpretations within a social network (Nahapiet & Ghoshal, 1998). It concerns the level of shared vision, language, and narrative within a social network. Building such a shared context takes place through two mechanisms. First, shared use of objects like documents, procedures, and manuals helps to increase understanding. The second is using stories to "convey a sense of shared history" (Lesser & Prusak, 1999).

This three-dimensional approach has become one of the most frequently adopted in the social capital and knowledge-sharing literature. It is worth noticing that these three

dimensions are intrinsically connected (Figure 23), although the separation is analysis-based to reflect the importance of the theory's aspects (Nahapiet & Ghoshal, 1998).

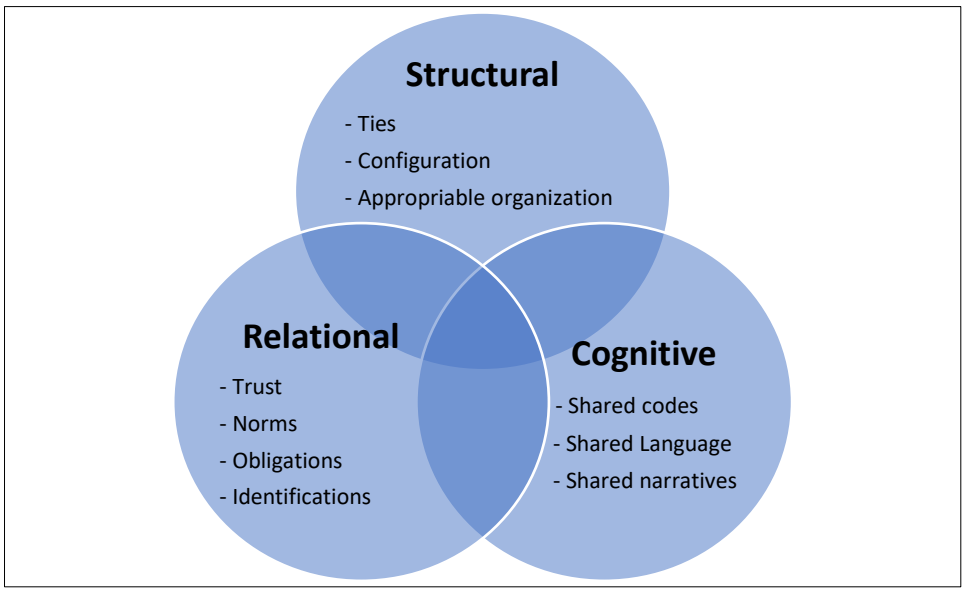

Figure 23: Social capital dimensions according to Nahapiet and Ghoshal (1998).

3.1.2.4. Social capital in knowledge management

Several studies have discussed the connection between social capital and knowledge management (Hoffman, Hoelscher, & Sherif, 2005; Manning, 2010; McElroy, Jorna, & van Engelen, 2006; Tymon & Stumpf, 2003). The socio-economic analysis applied in both social capital and knowledge management has made this area of knowledge a contested topic between both disciplines. Thus, knowledge has intruded into inter-disciplinary discussions between both literatures (Manning, 2010). Social capital facilitates knowledge management activities and makes them more efficient within and across organizations. Such a role improves the value of social capital in organizations, making those with higher volumes of social capital more capable of managing knowledge (Bharati, Zhang, & Chaudhury, 2015; Hoffman et al., 2005). The crucial implications of social capital in knowledge management give scholars reasonable grounds to use 'social capital management' as an interchangeable term for knowledge management (McElroy et al., 2006). Social capital is often analysed at the same levels at which knowledge sharing is analysed, i.e., individual, team, and organizational levels.

3.1.3. Electronic government

3.1.3.1. Definition of electronic government

Information and Communication Technology (ICT) has become indispensable in organizations. The tremendous development of ICTs in all aspects of human life have paved the way for the emergence of electronic government (e-government[1]). The main aim of e-government is to bring beneficiaries (citizens and businesses) closer to governments. Moreover, around the world the use of ICTs and the internet in public administrations – to form new bridges with its citizens – is one of the goals of e-government (Fang, 2002).

Broadly, e-government means the use of ICTs by public administrations (Twizeyimana & Andersson, 2019). It involves service delivery, efficiency and effectiveness, interactivity, decentralisation, transparency, and accountability (Yildiz, 2007). However, e-government is a complex concept and hard to define comprehensively. Consequently, poor or narrow understandings of the concept are one of the reasons e-government initiatives fail (Ndou, 2004). In the literature several definitions of e-government are offered. They mostly revolve around the idea of using ICT to give beneficiaries access to government services and information. Table 9 lists some definitions of e-government.

[1] Also referred to as “E-government”, “E-gov”, “e-gov”, “e-Gov”, with or without the hyphen.

Table 9: Definitions of e-government.

Definition	Source
"Government's use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities".	(Layne & Lee, 2001)
"A way for governments to use the most innovative information and communication technologies, particularly web-based Internet applications, to provide citizens and businesses with more convenient access to government information and services, to improve the quality of the services and to provide greater opportunities to participate in democratic institutions and processes".	(Fang, 2002)
"The use of information technology, especially telecommunications, to enable and improve the efficiency with which government services and information are provided to citizens, employees, businesses, and government agencies".	(Carter & Belanger, 2004)
"The intensive or generalised use of information technologies in government for the provision of public services, the improvement of managerial effectiveness, and the promotion of democratic values and mechanisms".	(Gil-García & Pardo, 2005)
"Government use of information communication technologies to offer for citizens and businesses the opportunity to interact and conduct business with government by using different electronic media such as telephone touch pad, fax, smart cards, self-service kiosks, email / Internet, and EDI".	(Almarabeh & AbuAli, 2010)
"The use of ICTs to more effectively and efficiently deliver government services to citizens and businesses. It is the application of ICT in government operations, achieving public ends by digital means".	UN ("E-Government," 2021)

Some scholars use closely related terms for e-government. For instance, Mobile government or M-government is another term that has been used a lot. It involves utilising wireless technology to provide governmental services through portable devices like laptops and mobiles phones. M-government is a new direction for e-government due to the many devices now supporting wireless technology, making it crucial to consider it in e-government strategies (Kushchu & Kuscu, 2003). Therefore, M-government is complementary to e-government, not a substitute (Palvia & Sharma, 2007).

E-governance is another concept that has been used interchangeably with e-government, although it is different. E-governance concerns using information technology to draw up policies in partnership with citizens, while e-government concerns carrying out the policies (Marche & McNiven, 2003). Moreover, e-governance describes the relationship with society and new ways to deliver information and services, while e-government provides information and routine transactions (D'Agostino, Schwester, Carrizales, & Melitski, 2011; Marche &

McNiven, 2003). In other words, e-governance goes beyond delivering services to enhance citizens participation in political decision making (Kolsaker & Lee-Kelley, 2008). There is overlap between the two terms (Palvia & Sharma, 2007), but understanding the difference is essential when dealing with challenges arising from public administration and policymaking (Marche & McNiven, 2003).

3.1.3.2. Generations of e-government

E-government is not only a project or group of technology projects. Rather, it requires governments to keep up with the rapid evolution of ICT and the immersion of human life in them. Such evolution puts continuous pressure on governments around the world to force them to update their strategies and keep up with emerging technologies (Lips, 2012). For example, with the emergence of the internet, government organizations adopted an early form of e-government which built on web-based technology (Charalabidis, Loukis, Alexopoulos, & Lachana, 2019). The information was passive in nature, so that there was a one-way flow of information: government information and forms could be posted on websites to be available to citizens and business. Scholars have called this stage e-Government 1.0 or Government 1.0 (Chun, Shulman, Sandoval, & Hovy, 2010). Later, the emergence of Web 2.0 applications and the accompanying widespread use of online social tools – like blogs, wikis, RSS, social networking, etc. – has led to the second generation of e-government services called E-government 2.0 (or Government 2.0). By then, governments needed to change their services to two-way communication, increasing citizens' participation and enhancing openness, accountability, transparency, and trustworthiness (Charalabidis et al., 2019; Chun et al., 2010).

The third generation of e-government is e-Government 3.0 or Digital Government (Charalabidis et al., 2019), wherein the scope of government services have exceeded the traditional portal-based systems (Bounabat, 2017). Digital government concerns the ways through which governments “find innovative digital solutions to social, economic, political and other pressures, and how they transform themselves in the process” (Janowski, 2015).

The concept of digital government is a response to modern society’s concerns with second generation e-government issues (Charalabidis et al., 2019). The trend toward utilising recent communication technologies such as cloud computing, mobility, big

data, social media, and the Internet of Things (IoT) has pushed governments toward digital government (Bounabat, 2017). Moreover, the transformation to digital-only services has greatly increased the importance of providing information and services (McNeal, Tolbert, Mossberger, & Dotterweich, 2003). However, the transformation is not limited to digital-only services. It further concerns the transformation of the civil and private sector as well. Digital government requires massive support for citizens to create meaningful dialogue between government and citizens and between citizens themselves (Chun et al., 2010).

3.1.3.3. E-government taxonomy

Scholars typically classify e-government depending on who receives the online services. Accordingly, a taxonomy of e-government services involves four groups: government to citizen (G2C), government to business (G2B), government to government (G2G), and government to employee (G2E). G2C identifies communications and interactions between the government and its citizens. It includes facilitation of service delivery without regard to a specific geographical area or time. Examples of E2C services are applying for a driver's license, renewing a passport, enrolling children in school, etc. G2B involves the services provided to the private sector like exchange of information and executing transactions between business and public organizations, which has many benefits for both sides (like cost reduction and productivity increases). G2E is the online interaction, through applications, to facilitate workflow between employees and exchange information between departments. It enhances communication and decision-making regarding work and performance as well. It further promotes knowledge sharing among employees and units (Baležentis & Paražinskaitė, 2012). Lastly, G2G represents the exchange of information between public organizations and between different hierarchical levels of one organization. Scholars typically classify e-government depending on who receives the online services. Accordingly, a taxonomy of e-government services involves four groups: government to citizen (G2C), government to business (G2B), government to government (G2G), and government to employee (G2E). G2C identifies communications and interactions between the government and its citizens. It includes facilitation of service delivery without regard to a specific geographical area or time. Examples of E2C services are applying for a driver's license, renewing a passport,

enrolling children in school, etc. G2B involves the services provided to the private sector like exchange of information and executing transactions between business and public organizations, which has many benefits for both sides (like cost reduction and productivity increases). G2E is the online interaction, through applications, to facilitate workflow between employees and exchange information between departments. It enhances communication and decision-making regarding work and performance as well. It further promotes knowledge sharing among employees and units (Baležentis & Paražinskaitė, 2012). Lastly, G2G represents the exchange of information between public organizations and between different hierarchical levels of one organization.

3.2. Research model and hypothesis development

The research framework here follows the work of Nahapiet and Ghoshal (1998) who divided social capital into three dimensions: structural, relational, and cognitive social capital (section 3.1.2.3).

This section presents the development of the research model. It defines the research model's constructs and its hypotheses. The research framework is discussed under three main sections: knowledge sharing behaviour, social capital (and its components), and collaboration quality. Figure 24 illustrates the relationships between them.

3.2.1. Knowledge sharing behaviour (KSB)

To survive in a rapidly changing and highly competitive environment, organizations tend to rely on intellectual assets rather than physical ones (Al-Alawi et al., 2007). Knowledge is a valuable asset in an organization, and sharing it provides it with a competitive advantage. Gaining such assets does not happen if the organization only relies on staff training of employees. In addition, they need to consider transferring knowledge from experts to those who need it (S. Wang & Noe, 2010). Employees in organizations are considered knowledge workers because in a modern economy each employee possesses valuable and unique knowledge (Trivellas, Akrivouli, Tsifora, & Tsoutsa, 2015). In other words, knowledge sharing is at the core of knowledge management in an organization (Vong, Zo, & Ciganek, 2016).

Knowledge sharing benefits organizations in various ways, such as increasing productivity and innovation. Knowledge sharing has become a crucial issue, even though it is not easy to create knowledge sharing communities (Torabi & El-Den, 2017). Exchanging tacit and explicit knowledge creates new knowledge and enhances

organizational effectiveness; that is why organizations are increasingly motivating their employees to share knowledge (Aslam, Shahzad, Syed, & Ramish, 2013).

Many scholars have attempted to define knowledge sharing. According to one recent work, it is the provision of know-how about tasks and collaboration to solve issues, develop new insights, or accomplish instructions or procedures (S. Wang & Noe, 2010). Bartol and Srivastava (2002) defined it as the act of a worker sharing work relevant information, expertise, ideas, and suggestions with another. Sharratt and Usoro (2003) focused on online knowledge sharing, and said it is the instant response to a request for help allowing a member respond with what he or she knows. All these definitions agree that knowledge sharing is a process or behaviour that allows knowledge to be transferred from one party to another.

This research focuses on knowledge sharing in e-government systems. Even though there are great benefits from e-government, governments are still seeking to find ways of increasing benefits and making e-government more effective and efficient. One key benefit that governments seek is the sharing and dissemination of accurate information (Carter, Schaupp, Hobbs, & Campbell, 2012). To enhance its effectiveness, e-government needs to be combined with effective knowledge management systems (Prybutok, Zhang, Ryan, & Sharp, 2012). Other benefits of e-government are the formation of a knowledge repository and a pathway to learning (Prybutok et al., 2012).

Knowledge sharing has been considered a critical factor in the success of e-government (Soonhee Kim & Lee, 2004). Here, e-government systems refer to the institutional online portals through which governmental e-services are delivered to customers. The Saudi government is still striving to motivate public agencies to increase their e-services, transforming them into a mature, integrated system. In such a system, knowledge is shared between employees at the same time as they are performing their tasks or services. In this research, knowledge sharing behaviour focuses on the G2E side of e-government. It refers to the acts of public sector employees where, through their e-government system, they provide their organizational colleagues with knowledge to solve work problems, provide opinions, suggestions, and new ideas.

3.2.2. Social capital (SC)

Social relationships are fundamental factors in the theory of knowledge sharing (Wah, Menkhoff, Loh, & Evers, 2007). The theoretical framework for this research was developed based on social capital theory (Nahapiet & Ghoshal, 1998; Wasko & Faraj, 2005). Social capital has occupied a prominent place in many research disciplines (Gabbay & Leenders, 1999). It has been widely used in information system studies (Zheng, Li, Wu, & Xu, 2014), and has become one of the most used theoretical perspectives in the knowledge sharing literature (Akhavan & Mahdi Hosseini, 2015). Even though there has been much interest, there are still some aspects which have not been examined.

This study follows the three key dimensions of SC suggested by Nahapiet and Ghoshal (1998) who clustered SC into structural, relational, and cognitive (as explained in section 3.1.2.3). In this context, Chow and Chan (2008) emphasized social ties as representing the first dimension, while trust and shared vision represent the second and third dimensions, respectively. Accordingly, in this research, four dimensions – social ties, trust, shared vision, and shared language – are considered to represent social capital theory. For example, an organization's employee might share knowledge to the organizational database, or engage in formal or informal interactions with a community of practice.

This study investigates the impact of the social capital (at the individual level) and collaboration quality of e-government systems on knowledge sharing behaviour via the e-government systems. Hypotheses of the research are introduced in the following sections.

3.2.2.1. Social ties (ST)

ST refers to the strength of relationships among individuals of a specific social group. The power of social ties is proposed to be linear and built up of reciprocal services, emotional intensity, mutual confidence, and time spent with other social members (Granovetter, 1973). An individual will possess greater strength of such a network of relationships by interacting more with other social members (C. M. Chiu et al., 2006). This combination of factors has been adopted to define social ties in many studies, e.g., (Bapna, Gupta, Rice, & Sundararajan, 2011; C. M. Chiu et al., 2006; Y. K. Choi,

Seo, & Yoon, 2017; Shen, Chiou, Hsiao, Wang, & Li, 2016; Stanko, Bonner, & Calantone, 2007).

Social interactions are required to strengthen social ties. When a network actor interacts more with other actors, the strength of social ties he or she possesses will become higher, making knowledge flow more through those ties. In other words, social ties are built on social interactions that increase the propensity of more contact between network actors (Lee, 2009). Hence, the term social interaction exists in the literature as an exchangeable term with social ties, e.g. (G. Li & Li, 2010; Noorderhaven & Harzing, 2009; Y. H. Tsai et al., 2014). When actors interact with each other, they have access to resources such as knowledge. This idea of facilitating access to resources is considered a fundamental proposition of social capital theory. Further, it is a central idea on which most knowledge-sharing literature has been built (Nahapiet & Ghoshal, 1998).

Social ties have been considered as connections among network actors (Cabrera & Cabrera, 2005). They have also been defined as the interconnection among actors and the intensity of the connection (J. Lee, J. G. Park, & S. Lee, 2015). Similarly, they have been defined as the degree of contact and accessibility among actors (Chow & Chan, 2008). It is clear that strong social ties will affect the knowledge sharing process, because if network actors interact more frequently with each other, they will have more contacts and more access to information. Therefore, social ties here are defined as the extent to which social interactions and communications exist among employees so as to facilitate access to knowledge (Aslam et al., 2013; Huang, 2009; Koranteng et al., 2019).

Chow and Chan (2008) found that social ties positively correlated with attitudes toward KS and subjective norms about KS in organizations. Darvish and Nikbakhsh (2010) also found the same positive result, with both attitude and expectation about KS and quality of KS among members in the research department of IRIB. Gross and Kluge (2012) developed a shared mental model, based on the team level, and found a positive relationship between social ties and knowledge sharing. Social ties can also be established among members of an electronic network. Wasko and Faraj (2005) extended the definition to two-way interactions (rather than one way) in an electronic network of practice. ST also related to knowledge sharing between social commerce websites (Ghahtarani, Sheikhmohammady, & Rostami, 2020). To create social ties,

they argued that interactions between network members need to take place in a conversational style, perhaps by posting messages and responding to them in a network.

Notably, organizational social capital can also shape the tone of individual SC (Inkpen & Tsang, 2005). Marouf (2005) broke down the strength of ties into strength of business and strength of social ties. This proposed division was based on the nature of ties: the first is formal whereas the second is informal. Further, the two components were measured in terms of closeness and frequency of interaction. Conversely, some studies have found no impact of social ties on KS, e.g. (C. W. Chang, Huang, Chiang, Hsu, & Chang, 2012; Y. H. Tsai et al., 2014; Wu et al., 2007). Moreover, C. M. Chiu et al. (2006) found ST significantly related to knowledge quantity but not quality in a virtual community, whereas H. H. Chang and Chuang (2011) found the opposite – that ST was related to quality, but not quantity. Overall, even though many studies support the theoretical assumptions about ST, others report inconsistencies.

This study investigated the relationship between ST and knowledge sharing behaviour in e-government systems through the hypotheses:

H1: *Social ties have a significant positive impact on KS behaviour in e-government systems.*

3.2.2.2. Trust (TRU)

Social trust is a crucial factor that enables knowledge sharing among network actors (C.-M. Chiu, M.-H. Hsu, & E. T. G. Wang, 2006). Among the relational social capital indicators, trust has been portrayed as a key aspect (Wasko & Faraj, 2005) or a most critical indicator (Hu & Randel, 2014). Thus, use of TRU has been accepted as a measure of this relational dimension (Chow & Chan, 2008). Some earlier work had difficulty in distinguishing between trust and its outcomes and influencing factors. There has also been confusion in separating trust from its close constructs: cooperation, confidence, and predictability (Mayer, Davis, & Schoorman, 1995).

Trust is a complex concept with no single definition in the literature (Ho et al., 2010). Trust has been defined at multidimensional levels (Bakker, Leenders, Gabbay, Kratzer, & Van Engelen, 2006), and in the knowledge-sharing domain, it has been

defined at different dimensions as well. Bakker et al. (2006) adopted the three dimensions from Mayer et al. (1995) – ability-based trust, benevolence-based trust, and integrity-based trust – and used them to investigate knowledge sharing in product development projects. Ability-based trust is the influence a trustee has in some specific domain when possessing some skills, competencies, or characteristics. Specifying the domain means a person may become someone in whom trust is placed (a trustee) in some areas but in others may not (depending on the skills he or she has, such as high skills in some technical area) (Mayer et al., 1995). Later, Holste and Fields (2010) adopted similar dimensions of ability-based trust and cognition-based trust, based on a member's reliability and competence. Benevolence-based trust refers to the belief that a trustee has a positive orientation toward the confiding person (the trustor) without wishing to profit themselves. Studies have shown that ability-based trust and benevolence-based trust are two critical dimensions for determining the outcomes between peers and managers (Abrams, Cross, Lesser, & Levin, 2003). Integrity-based trust refers to the extent to which a trustor believes that the trustee follows a set of principles that are acceptable to the trustor (Mayer et al., 1995).

Affect-based trust is another domain of trust which was adopted by Wu et al. (2007) to analyse knowledge sharing in teams, where affect-based trust was taken to be "reciprocated interpersonal care and concern". In other words, parties help each other with no expectation of future obligation or benefit. Some other studies have used slightly different definitions of trust. Ho et al. (2010) defined trust in the workplace as "mutually dependent workgroups within an organization", in which the focus was on faith in others and confidence in their ability. This definition approaches the aforementioned ability-based trust, but it adds the element of faith among the whole work group. Another example is the work of Law and Chang (2008), who applied social capital theory to test knowledge sharing in online communities. The researchers defined trust as the extent to which an online community member believes that fair rules, procedures, and outcomes occur in the community and are established competently, reliably, and with integrity. Trust has often been defined as the set of beliefs that a network actor has about another actor. With such beliefs, the second actor will act positively toward the first (Nahapiet & Ghoshal, 1998), even though there is the possibility of detrimental or non-productive behaviour (H. H. Chang & Chuang, 2011; C. M. Chiu et al., 2006; Koranteng et al., 2019).

In this study, trust refers to the extent to which there is expectation of positive behaviour from others despite the possibility that they could behave maliciously. A number of scholars consider that network actors engage more freely in knowledge exchange activities when trust among them is high because they are able to reassure each other (van Dijk, Hendriks, & Romo-Leroux, 2016). Further, trust reduces the cost of knowledge exchange (Abrams et al., 2003). Moreover, trust confers a greater degree of acceptance when verifying information (McNeish & Mann, 2010). Holste and Fields (2010) concluded that both affect-based trust and cognition-based trust significantly increase the willingness to share and to use tacit knowledge. Trust has been shown to increase the knowledge sharing behaviour of a top management team (MacCurtain, Flood, Ramamoorthy, West, & Dawson, 2008) and between post-graduate students (Han, Yoon, & Chae, 2020). It is also influenced student team knowledge sharing (C.-Y. Lin & Huang, 2020) and employees virtual teams (Davidavičienė, Al Majzoub, & Meidute-Kavaliauskiene, 2020). Conversely, however, trust was not related to knowledge sharing among academic faculty members (Seonghee & Boryung, 2008), in social network sites (J. H. Choi & Scott, 2013), or online communities (J. H. Choi & Scott, 2013; G. Li & Li, 2010). Recently, it did not relate to knowledge sharing between members in social commerce platforms (Ghahtarani et al., 2020). Likewise, Rese, Kopplin, and Nielebock (2020) found no relationship between trust and knowledge sharing behaviour.

That is, even though trust seems to be such a crucial variable in knowledge sharing studies, some studies have found no impact of trust on KSB. There seems to be some conflict between the theoretical assumptions and the results from prior studies. Further, given the different aspects of e-government systems, it is unclear how trust would impact knowledge sharing behaviour in such a context. Thus, this research hypothesised:

H2: *Trust has a significant positive impact on KS behaviour in e-government systems.*

3.2.2.3. Shared vision (SV)

A shared vision is grounded in common objectives and aspirations among actors of a network organization. Such a vision can help actors understand each other and therefore have more opportunities to share ideas and resources. It helps increase

coherence in diverse activities within an organization, creating a sense of commonality (Loon Hoe, 2007), and melds individual interests and directs them toward the common interest (Coleman, 1988). Shared vision is described in the literature as a bonding mechanism that affects the actions of both individuals and groups, resulting in benefits for the whole organization (W. Tsai & Ghoshal, 1998). When employees are bonded together, they become encouraged to share knowledge (Chow & Chan, 2008). Shared vision further facilitates meaningful communication, and becomes a critical condition for the exchanging information (L. Li, 2005). It helps members recognize the value of the knowledge they have (W. Tsai & Ghoshal, 1998), and promotes more knowledge sharing and higher knowledge quality (Darvish & Nikbakhsh, 2010).

This enhanced value underlies why developing a shared vision in knowledge-based firms should be part of their strategic plans (Y. H. Tsai et al., 2014). A shared vision can be analysed at various levels such as individuals, organizations, inter-organizations, and societies (W. Tsai & Ghoshal, 1998). This research investigates the impact of social capital on knowledge sharing behaviour between employees who use e-government systems. The shared vision was analysed here at the individual level in an intra-organizational setting. Here, shared vision refers to the common aspirations and goals an employee aspires to achieve with other colleagues.

The knowledge sharing literature has shown the impact of shared vision on knowledge sharing at various levels. For instance, it positively related to knowledge sharing between nurses (C. W. Chang et al., 2012), and to knowledge sharing with subsidiaries in both intra- and inter-organizational relationships. Goswami and Agrawal (2019) found a similar result in an emerging economic context. The role of shared vision was confirmed by Evans, Wensley, and Choo (2012). In a similar meaning, SV had a negative relationship with knowledge hiding behaviour between students (Nadeem, Liu, Ghani, Younis, & Xu, 2020). However, it is possible for shared vision to have a positive impact on knowledge quality but a negative one on quantity (C. M. Chiu et al., 2006). Recently, SV was found to be significantly related to knowledge sharing quality in virtual learning and M-learning between students (Razzaque, 2020a, 2020b). It has also been reported that there is no significant connection between shared vision and knowledge sharing in the context of online learning among virtual communities (C. P. Hsu, 2015). To clarity this aspect, this research hypothesised:

H3: *Shared vision has a significant positive impact on KS behaviour in e-government systems.*

3.2.2.4. Shared language (SL)

Shared language is another factor of cognitive social capital. It is not simply the spoken language (C. M. Chiu et al., 2006), rather, it is referred to as "the acronyms, subtleties, and underlying assumptions that are the staples of day-to-day interactions" (Lesser & Storck, 2001). A social community may develop its concepts from its day-to-day interactions, common interests, and understandings (Cao, Guo, Liu, & Gu, 2015; Nahapiet & Ghoshal, 1998). In brief, SL gives a social member the ability to access other members' knowledge, and it plays an important role in social interactions where members interact, discuss, and exchange knowledge. Since it provides a common conceptual apparatus, it is an organisation's highly valuable asset (Nahapiet & Ghoshal, 1997, 1998). SL goes further than helping parties share ideas; it increases communication efficiency between them (Chiu et al., 2006) so that the shared vocabulary enhances sharing capacity (Nahapiet & Ghoshal, 1998).

SL has been investigated in knowledge management studies in different ways. First, it has been shown to affect knowledge sharing between employees in organizations (Hooff & Huysman, 2009). Second, it impacts both the process and quality of knowledge sharing in a globally distributed network (van Dijk et al., 2016).

In the IT-mediated context, SL has been shown to be the most decisive factor affecting knowledge integration in social media (Cao et al., 2015). H. H. Chang and Chuang (2011) found that SL influences both the quantity and quality of knowledge sharing between members of different virtual communities, while (Chiu et al., 2006) investigated members of a professional virtual community and found that SL influences knowledge sharing quality but not quantity. Moreover, T. Wang, Yeh, Chen, and Tsydypov (2016) found no impact of SL on intention to engage in Electronic Word of Mouth (eWOM) between social network sites possibly because it basically accepts the communication protocol. These studies indicate that shared language might have different impacts depending on the context in which it is examined. To investigate, SL impact was hypothesised to be as follows:

H4: *Shared language has a significant positive impact on KS behaviour in e-government systems.*

3.2.3. Collaboration quality (CQ)

Most studies integrate CQ into the updated DeLone and McLean model for information systems success (DeLone & McLean, 2003). It has found to be another significant facet in the success of an information system. Specifically, it is a crucial predictor of B2B e-commerce success (Victor Chen, Chen, & Paolo S. Capistrano, 2013) and in e-filing information systems (Hambali, 2020).

Further, CQ has been found to be a highly influential variable amongst the other quality dimensions of an IS (i.e. system quality, information quality, and service quality). Urbach, Smolnik, and Riempp (2010) have integrated CQ into an IS success model in employee portals, and Cidral, Oliveira, Di Felice, and Aparicio (2018) have done the same in e-learning systems. Both studies found that CQ had the largest effect on system use, but not on user satisfaction. Even though the use of the system in employee portals and in e-learning does include an aspect of knowledge sharing, it is not clear enough to be certain of its impact on knowledge sharing behaviour. In this regard, Bhatti, Baile, and Yasin (2018) found that higher CQ increased user satisfaction in the use of an enterprise wiki system (which of course includes sharing and collection of knowledge). However, both academic and non-academic staff in a Malaysian university did not perceive CQ to be useful in a campus portal because they did not use the system for collaboration purposes (Saghapour, Iranmanesh, Zailani, & Goh, 2018). These studies indicate that there is an important role for CQ in the success of information systems, but its role, together with social capital, in enabling knowledge sharing behaviour is still not clear, especially for an e-government system. Hence, knowledge sharing behaviour might be considered a potential factor that makes such a system successful.

Some studies find that organizational culture can support knowledge management (J. T. Yang, 2007), especially in terms of knowledge sharing (Mueller, 2014). Creating a collaborative climate is a precondition for achieving effective knowledge management in an organization because it fosters knowledge sharing between employees (Cameron, 2002). A collaborative climate is one of the cultural aspects that influence knowledge

sharing behaviour in organizations (Kumaraswamy & Chitale, 2012; Lei, Do, & Le, 2019; J. T. Yang, 2007).

Technology can support knowledge sharing in organizations (Kipkosgei et al., 2020) by creating opportunities for collaboration. However, technology needs to be sophisticated and capable of allowing effective communication channels between employees or even between organizations (Clarke & Cooper, 2000). Collaboration is a technological dimension of effective knowledge management. Organizations must invest in a comprehensive technology that supports different types of knowledge and communication (Gold et al., 2001). In many projects, the absence of suitable information systems is a major obstacle to the success of knowledge management initiatives (Ajmal, Helo, & Kekäle, 2010). Hence, information systems need to include collaborative features that allow users to communicate and exchange knowledge. CQ is defined as a system's ability to enable collaboration between users by enhancing communication and interaction (Urbach et al., 2010). However, few studies have examined the collaboration quality of information systems (Hambali, 2020). Because this research focuses on sharing knowledge in an IT-mediated context and no study has considered CQ before (Chapter 2), it would be useful to hypothesize that in e-government systems CQ is an important aspect of social capital which has an effect on KSB, so that:

H5: *Collaboration quality of e-government systems has a significant positive impact on KS behaviour in e-government systems.*

In addition, only a few studies have examined the effect, along with social capital variables, of quality dimensions on knowledge sharing in an IS model. In this regard, both trust and system quality have been found to significantly influence knowledge sharing in research collaboration by faculty members (Tan, 2016; C. N. L. Tan & S. Md. Noor, 2013). Another study found that trust mediates the relationship between KMS quality and knowledge sharing (Muhammad & Abdul, 2017). However, these studies considered information systems as supporting knowledge-sharing tools in organizations, not mediums through which the behaviour occurs. Furthermore, they failed to examine the impact of CQ. This research argues that when e-government systems are endowed with more collaborative features, CQ will allow more

opportunity for users to interact with each other within the systems – thereby supporting their social networking and knowledge sharing (Bhatti et al., 2018). Thus, it is more likely that CQ in e-government systems enhances social capital factors to increase KSB in the systems. This study therefore hypothesises the following:

H6a: *Collaboration quality of e-government system significantly moderates the relationship between social ties and knowledge sharing behaviour in e-government systems.*

H6b: *Collaboration quality of e-government system significantly moderates the relationship between trust and knowledge sharing behaviour in e-government systems.*

H6c: *Collaboration quality of e-government system significantly moderates the relationship between shared vision and knowledge sharing behaviour in e-government systems.*

H6d: *Collaboration quality of e-government system significantly moderates the relationship between shared language and knowledge sharing behaviour in e-government systems.*

Figure 24 shows the research model and its various relationships.

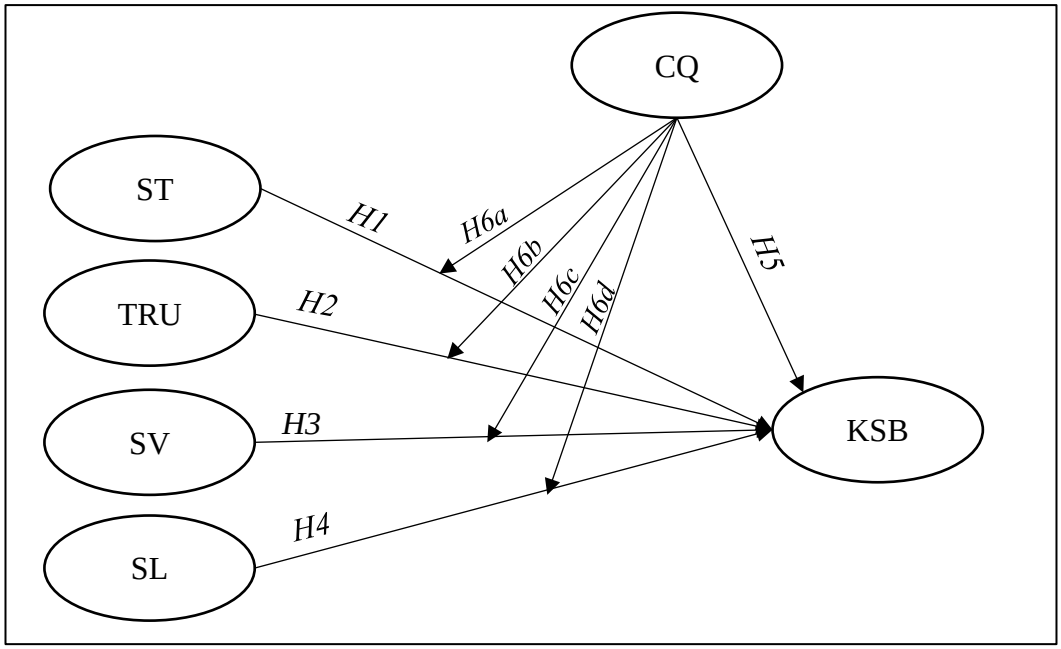

Figure 24: The hypotheses of the research model and their relationships.

3.3. Summary of the chapter

This chapter has set out two main parts. First, it provided a background to the fields within the scope of the topic. Second, it described the research model that will allow the research questions to be systematically addressed.

4 Research Methodology

To answer research questions, a detailed research plan is needed. The plan needs to set out appropriate methods by which the research questions can be scientifically answered. A researcher will need to align his or her chosen methods with the research questions and the available resources, e.g., their ability to carry out the research, budget, and timeframe (Saunders et al., 2016). Thus, appropriate method for each research needs to be set out. The present chapter describes the methodology chosen for the research.

4.1. Research approach

There are three approaches to theory development i.e., deduction, induction, and abduction. The deductive approach involves collecting data to test an existing theory: a researcher may put forward a tentative idea, review existing literature, then specify conditions or settings under which the theory is to be tested. She or he then tests the theory by analysing the collected data and compares results with the theory's propositions. If the results are not consistent with the theory, the theory is either rejected or modified to restart further examination. If the results are consistent then the tested theory is supported as being accurate and viable (Saunders et al., 2016). The inductive approach involves collecting data to explore a phenomenon to generate a new theory. Induction usually builds theory using a conceptual approach which provides a new understanding of how people interpret their world. The third approach is abduction which is a combination of both deduction and induction approaches. Abductive research collects data to explore a phenomenon, theme or topic to generate a new or change an existing theory. It begins with observation of a surprising fact and then uses an existing plausible theory to explain how it occurred (Saunders et al., 2016). Hence, abduction offers only tentative conclusions (Koskela, Paavola, & Kroll, 2018).

The thesis used social capital theory to test its impact on knowledge-sharing behaviour in e-government systems which are now a new setting of research, and the results can be compared with those reported in prior studies. The subsequent recommendations help to develop the theory and practical outcomes. Hence, the adopted research approach here is deduction which moves from theory to data (Creswell & Creswell, 2018; Saunders et al., 2016).

4.2. Research design

Three common approaches chosen for the design of a research program are quantitative, qualitative, and mixed-method methods (Creswell & Creswell, 2018; Saunders et al., 2016). The quantitative method is distinguished from the qualitative in using numerical data that is usually collected using questionnaires or similar quantitative experiments and analysed using statistics or graphs. In comparison, the second uses non-numeric data such as words, images, and videos, which are usually collected using techniques like interviews and observations, and analysed by categorical methods (Saunders et al., 2016). Both quantitative and qualitative research designs have their advantages and disadvantages (M. Rahman, 2017). However, the mixed-method approach offers the advantages and strengths of both the qualitative and qualitative methods (Fetters, Curry, & Creswell, 2013). Moreover, the elements of both methods incorporated in the mixed method tend to neutralise their biases and weaknesses (Creswell & Creswell, 2018). However, a researcher needs to set up suitable strategies (a design) for the chosen approach. Such a strategy sets out the procedures that can be used to achieve the objectives of the research. In summary, a research strategy is the plan used to answer the research questions (Saunders et al., 2016), and the plan for this research is a mixed method approach.

The mixed-method research approach involves collecting both quantitative and qualitative data and using both numerical and non-numerical data analysis procedures. The approaches are complementary, in that one of the mixed approaches is designed to add insights that the other one has missed. In other words, quantitative data might be able to explain the qualitative data and vice versa. Furthermore, they are integrated in such a way so that one can evaluate the validity of the other (Creswell & Creswell, 2018).

Mixed-methods research can be conducted in three primary ways. Each way dictates how the quantitative and qualitative phases are combined. The three mixed methods are convergent, sequential explanatory, and sequential exploratory. The last two are described as sequential because the two phases are conducted one after the other.

- *Convergent mixed methods:* are also called concurrent triangulation design (Saunders et al., 2016). In this form, both the quantitative and qualitative aspects are investigated separately but concurrently. Researchers collect and

analyse both phases but compare and interpret them together. The aim here is to obtain a comprehensive analysis of the research problem (Creswell & Creswell, 2018).

- *Sequential exploratory mixed methods:* This first begins with the qualitative phase to explore the perception of participants. The qualitative data is analysed and then used in a second quantitative phase. An example is that a researcher might conduct interviews to explore a research population, then, depending on the results reached, they develop instruments that are then used in the second quantitative phase (Creswell & Creswell, 2018).
- *Sequential explanatory mixed methods:* Contrary to the second method, this begins with the quantitative phase, including data collection, analysis, and interpretation. It is then followed by the second qualitative phase, which is built on the results of the first phase. Here, the second phase provides explanation to the quantitative data (Creswell & Creswell, 2018).

This research used the third approach, sequential explanatory mixed methods.

4.2.1. Justification of the research design

The mixed-method approach was chosen in this research mainly because of its consistency with 'critical realism philosophy', which the research adopted. Such a philosophy looks at the reality behind observable events, meaning that the experiences represent "some of the manifestations of the things in the real world". Hence, it seeks to understand the social structure in which a phenomenon has been investigated (Saunders et al., 2016). Thus, to understand an employee's knowledge sharing behaviour within an e-government system requires consideration of where the behaviour occurred. This research looks at the behaviour inside e-government systems as one facet of the total knowledge sharing behaviour in public organizations. A mixed-method approach aims to understand the reality behind the knowledge sharing behaviour in an IT-mediated context through collecting qualitative data in the second phase.

The review showed that some social capital factors might be weaker in an IT-mediated context than in a non-IT context. While quantitative data might say whether a specific phenomenon occurs or not, qualitative research can look more deeply and explain why it does (Terrell, 2012). Thus, triangulating the outcomes of the research was another

reason to choose this design – it minimizes any bias in the research and improves the validity of the results (Greene, Caracelli, & Graham, 1989).

Explanatory mixed-method research is common when the literature in the field is strong quantitative orientation, so that research starts with quantitative data (Creswell, 2009, p. 211). Thus, it is better to start with a quantitative phase and then provide further explanations from a second qualitative phase. This design suited the research problem well since social capital and the knowledge sharing domain were already strongly oriented to the quantitative works (see section 2.6). The researcher, for example, did not need to develop new instruments as they already existed in the literature. Instead, he was only required to adopt the instruments and use them in the context of e-government systems and then follow up with a second qualitative phase for deeper explanations.

4.2.2. Study population

When collecting information from every unit in a given population is impracticable, sampling is a crucial aspect of data collection (Saunders et al., 2016). Full data collection is impractical because there is only limited time and resources (Thomas, 2017). When adopt a sampling technique, a researcher should consider not only her or his own research context and objective, but also cost, time, location, and everything else that may hinder the conduct of a research project (Etikan, Musa, & Alkassim, 2016). The first step to take when sampling is to determine the research target population, which will be a subset of the population. The target population needs to be consistent with the research objectives and the sample should reflect the nature of the wider population being described (Saunders et al., 2016)

This research aims to examine, based on social capital theory, the effect of quality of collaboration on knowledge-sharing behaviour in public sector agencies who use e-government systems in Saudi Arabia. The sample population for this thesis consists of Saudi public servants, and specifically, those who are covered by the Saudi Civil Service Act and who fully (or partly) access e-government systems to execute their work and deliver services to clients (whether internal or external). The reason to limit the coverage to those under the above-stated law was to differentiate them from those who serve in the armed forces. This increases the homogeneity in the research sample, since the military is different from the civil sector in many ways. Moreover, most

government business is delivered and processed by public servants. There are currently 429,060 administrative employees who work in the Saudi public service (*Civil Service Figures for the Fiscal Year 2016*, 2016), and it would be impossible to include all of them in this study. So the researcher had to choose suitable sampling techniques to select a sample population and approach them. The following sections explain the research methodology that was devised for both stages (quantitative and qualitative) of this research project.

4.3. Methods employed in phase 1

This section discusses the methodology adopted in the first quantitative phase. It discusses sampling and data collection techniques, pilot study and data analysis method.

4.3.1. The phase 1 sampling

The sampling technique here was a volunteer-based one, known as self-selection sampling. In the technique, the participants themselves make the decision to volunteer in a study. They may decide to participate because they feel it is their responsibility and a good opportunity to fulfil the objectives of the research (Saunders et al., 2016). This self-selection voluntary sampling technique was used, and employees who were working in any Saudi public sector agency and who access e-government systems made the decision about whether to participate in this study.

In terms of sample size, rules of thumb are commonly used. For example, to determine sample size 300 cases is suggested as adequate when conducting factor analysis (Tabachnick, Fidell, & Ullman, 2007). It is also recommended that sample size should not be less than 100 cases (J. F. Hair, Anderson, Tatham, & Black, 1995). Notably, accuracy is not linked with having more sample cases (Bryman, 2011b; Daniel, 2011; Saunders et al., 2016). The minimum sample size for this study was calculated by taking confidence level = 95%, margin of error = 5%, response distribution = 50%, and population size = 429,060 (*Civil Service Figures for the Fiscal Year 2016*, 2016). These numbers were put in the following formula:

$$n = \rho\% \times q\% \left(\frac{z}{e\%}\right)^2 = 50 \times 50 \left(\frac{1.96}{5\%}\right)^2 = 384.16$$

$$Then\ \ the\ ajusted\ minimum\ sample\ size\ n^1 = \frac{384.16}{1 + \left(\frac{384.16}{429{,}060}\right)} = 383.82 \approx 384$$

$$n^a = \frac{383 \times 100}{60} = 640$$

where 1.96 is the *z*-value associated with a 95% certainty (Z-table), 60% is the estimated response rate (Al-Muhanna, 1995), and n^a is the actual sample size required for the study (Saunders et al., 2016).

4.3.2. Quantitative data collection technique

Surveys are a widely used method for testing research hypotheses (Brancato et al., 2006), and they have been deemed an appropriate method for identifying people's opinions, attitudes, and beliefs on particular issues or phenomena (Privitera, 2019). The use of online surveys in the social and behavioural sciences has grown considerably since 1995 (Stieger & Reips, 2010). The advantages of using an online survey include covering a large population and offering unlimited access to a broad geographical region. Online surveys are useful because they are inexpensive, attractive, flexible, encourage a quick response, anonymous, convenient, and fast to conduct and analyse (Bryman, 2016). Due to the large number of the research population, and its distribution on all the kingdom of Saudi Arabia, an online survey technique was an attractive option for collecting the quantitative data.

4.3.3. Data collection plan

The plan was to pass the survey link to the trainees at a Saudi host firm which is involved with the main study target population. One of the host firm's main activities is to enhance the effectiveness of public sector administration workers from all government agencies in the country, providing them with education and training. The firm aims to make them more competent in terms of their responsibilities and administrative duties in order to promote national economic development. The host firm's trainees are public administration/service officials from different departments or agencies, and they enrol voluntarily in short training seminars which usually take 2 to 5 days. At its main centre and branches, the firm trains 2500 to 3500 people every semester week. The firm offers a wide range of training programs, making it a suitable place to access the research population. However, the survey link was also distributed through social networks.

4.3.4. A pilot study

A pilot study was used to test if there were any issues that might undermine the reliability or process of the actual survey. It could pick up any linguistic weaknesses such as grammatical and punctuation errors, misspellings, ambiguous sentences, phrases, etc. The pilot study is discussed in section 5.3.

4.3.5. Data Analysis method

Structural Equation Modelling (SEM) is increasingly used in a variety of research disciplines (Hooper, Coughlan, & Mullen, 2008). SEM has the ability to examine multiple relationships between independent variables (IVs) and dependent variables (DVs), and can explain real-world phenomena (J. F. Hair, 2014). It also can assess the reliability and validity of variables using multi-item measures (Bollen, 1989). In this regard, both covariance-based SEM (CB-SEM) and variance-based partial least squares (SEM-PLS) are two complementary approaches that have emerged in the field (Tenenhaus, 2008). In the opinion of Hair Jr, Matthews, Matthews, and Sarstedt (2017), a researcher should first understand how the two approaches differ in order to decide which one is appropriate for her or his research. CB-SEM assumes that analysis is based only on common variance in the dataset (specific, and error variance are removed from analysis), whilst PLS-SEM calculates all variance (common, specific, and error) from IVs which help to predict the variance in the DV(s). In other words, CB-SEM is a common factor model method, while PLS-SEM is a composite model method (Hair Jr et al., 2017). In this research, the choice of CB-SEM or PLS-SEM was dictated by the collected data, and this is discussed in section 5.7.1.

4.4. Methodology employed in phase 2

As stated earlier, this research took a mixed method sequential explanatory approach. As the quantitative phase was conducted first, the second qualitative phase was an in-depth exploration of the first phase's outcomes. It examined non-numerical and non-statistical considerations which might help to reach a better understanding of the issue – what is the impact of social capital on knowledge-sharing behaviour in the context of e-government systems in Saudi Arabia?

4.4.1. Using of semi-structured interviews

The researcher chose interviews as the data collection technique to collect information during this phase. Interviews are the most common technique in qualitative studies as they enable rich and detailed data to be collected. Different types of interviews can be employed: structured, unstructured, or semi-structured (Williamson & Johanson, 2017). Interviews can be conducted individually or on a group basis, the latter being further divided into group interview, focus group, or discussion group (Saunders et al., 2016).

In a structured interview, a researcher pre-plans the list of questions and asks each participant the same list of questions in the same order. In other words, it is a kind of questionnaire-managed interview (Williamson & Johanson, 2017), known as a 'quantitative research interview' (Saunders et al., 2016). This strategy allows the researcher to concentrate on the research topic and compare interviewees' answers (Alsaawi, 2014). Further, it can be used when the participants are unable to deal with questionnaires, as may happen with aged people or young children (Williamson & Johanson, 2017). However, using this method, researchers may not be able to gather in-depth information about the research topic (Alsaawi, 2014).

Conversely, unstructured interviews give participants the opportunity to discuss topics or themes that were not considered by the researcher, so the directions may be unpredictable. No pre-prepared list of questions is used, and what happens is that a participant generates the next question depending on the nature of his or her response (Williamson & Johanson, 2017). Such an interaction is closer to a conversation in which the researcher interrupts participants as little as possible (Alsaawi, 2014). This does not mean, however, that the interview is non-directed because the researcher needs to make sure participants stay focused on the research problem (Y. Zhang & Wildemuth, 2009). This type of interview usually returns huge amounts of in-depth information, so it is very much preferred in phenomenological studies and interpretive paradigms (Alsaawi, 2014; Williamson & Johanson, 2017; Y. Zhang & Wildemuth, 2009). In the information systems discipline, it can be useful for system developers when a new design feature is unknown (Williamson & Johanson, 2017).

Semi-structured interviews are more flexible than structured ones. Researchers prepare a list of questions but he or she often asks prompt questions to gather as much

information as possible on a research topic. Interviewers use certain prompt questions and direct interviewees' responses to the issues that are relevant (McIntosh & Morse, 2015). This second phase of the present study employed semi-structured interviews as the data collection strategy. This type of interview has developed over the last three decades to be used not only as a research strategy, but also as an independent research method; it is now used extensively in multiplicity of disciplines (McIntosh & Morse, 2015). Semi-structured interviews are especially used when there is sufficient objective knowledge about a phenomenon or subject, but subjective knowledge is missing or scarce. Moreover, it the most common type of interview when quantitative and qualitative research methods are combined (McIntosh & Morse, 2015). This situation applies to this study, as the SLR showed that most prior studies on social capital and knowledge sharing were quantitative whereas very few were qualitative (see 2.6). Thus, semi-structured interviews were considered appropriate for this thesis in order to gather in-depth information on the research question. Qualitative studies on the research topic are needed because e-government systems in the public sector have not been investigated before, which makes this this type of interview suitable for explaining the results of the first quantitative phase.

4.4.2. Study sampling

Since this study investigated the Saudi public sector, the target population consisted of public servants who utilized e-government systems to deliver services to the beneficiaries. This population was the same as that targeted in the first phase of this research. It was important to stick with one population in the two phases as the second phase aimed to elucidate the results of the first. An important factor was that the data collection was conducted during the COVID-19 pandemic when many countries (including Australia) closed their borders to control the spread of this dangerous and highly contagious virus. When COVID-19 struck, the researcher was in Australia, and so he was unable to go to Saudi Arabia to conduct in-person interviews. This made access to the participants more difficult, so two more volunteer sampling techniques (i.e. self-selection and snowball) were deemed the best way to cope with this situation (Saunders et al., 2016). Consequently, a recruitment letter was distributed through social networks, from which participants could decide to take part in the study by contacting the researcher. As well as interviewing those people, the researcher then asked them to refer other possible participants who belonged to the research

population. In this way, the 'snowball' technique encouraged participants to introduce others. The pandemic also necessitated conducting the interview remotely, and for this reason interviews were conducted either online or over the phone.

In terms of sample size, for qualitative research there is no fixed number of interviews or cases, and when reviewing qualitative research studies only rough estimates are given. In qualitative research, sample size depends on how the study has been designed (Creswell & Clark, 2017). Here, sample size was meant to satisfy two objectives: first, to collect sufficient information so that the research questions could be fully answered; and second, to reach a point of saturation beyond which no more data or themes emerge (Guest, Bunce, & Johnson, 2006). In this case, the researcher did not stop collecting data when he had enough information; instead, he kept collecting more data until no more new information was found.

4.4.3. Interview analysis

Thematic analysis (TA) was chosen to analyse the data during this stage. TA is commonly used as a way to identify and organize patterns (themes) appearing in qualitative data. It offers an accessible and flexible way of systematically processing, coding, and analysing qualitative data and then linking it with theoretical propositions (Cooper et al., 2012). Further, it can also be used when inductive or deductive data analysis is required (Cooper et al., 2012; Saunders et al., 2016).

TA can be conducted in various ways, and it is important to specify the TA method used in evaluating research. For this reason, the six-step approach to thematic analysis recommended by Braun and Clarke (2006) was employed. The steps involve becoming familiar with the data, generating initial codes, searching for themes, reviewing potential themes, defining and naming themes, and producing the report. Braun and Clarke (2006) explain what these six steps mean:

- *Becoming familiar with the data:* researchers need to become immersed in the data by reading transcripts of the interviews several times. They should also watch the video or listen to an audio recording. It is recommended to take notes throughout this step.
- *Generating initial codes:* codes are the basic unit of thematic analysis. They determine the features and character of the data. Codes provide a kind of

summary about parts of data and can reflect a semantic or latent level of meaning.

- *Searching for themes:* themes are second order collections of initial codes grouped according to their similarities. Themes should be directly linked to the research question(s) and relevant to the topic being covered.
- *Reviewing potential themes:* themes need to reflect the full data set and the relationships within it, so this step ensures that themes provide a convincing and complete picture of the codes and the data. The review process may result in merging, splitting, or discarding certain themes.
- *Defining and naming themes:* definitions should be provided about themes and sub-themes. Researchers need to determine the research story that refers to a specific theme. Each theme should focus on one related thing and not overlap with others, and it must address the research question.
- *Producing the report:* this step involves the researcher providing a complete and final story about the topic being explored. The story should be clear to the reader and convincing in the conclusions it reaches. Researchers need to provide sufficient evidence for the themes and show the validity, coherence, and logic of their research.

4.5. Chapter summary

This chapter discussed the research approach and design. The approach adopted here was mixed-methods, and the design was chosen to be sequential explanatory mixed methods. It was chosen for its suitability with the research's aim and objectives. Such a design contains two phases: an initial quantitative phase followed by an explanatory qualitative one. The chapter discussed the details of the methodologies adopted in both phases, including the study population, sampling, data collection techniques, and data analysis.

5 Quantitative Phase

As mentioned in the previous chapter (section 4.2), this research used sequential explanatory mixed methods containing two research phases – a quantitative phase followed by a qualitative phase. The quantitative phase examined the impact of social capital on knowledge sharing behaviour in e-government systems, a context which has not been investigated before. The second qualitative phase seeks to explain the findings of the first quantitative phase.

This chapter sets out the first quantitative phase. It discusses in detail the steps and methods employed. It starts with development a survey, conducting a pilot study, the main data collection, data screening, and descriptions. It also discusses data analysis and hypothesis testing. Subsequently, it discusses the results, asks explanatory questions, and, finally, states the limitations of this phase.

5.1. Survey development

This aspect describes the survey strategy to collect data from the target population. Using a questionnaire is the most common way to collect quantitative data within business and management research. A questionnaire might be either self- or interviewer-completed. The chosen style depends on the characteristics of the sample – such as sample size, types of questions, length of questionnaire, characteristics of participants, etc. (Saunders et al., 2016). Here, a self-completed questionnaire was used as it fitted the sample well. The following sections describe its design.

5.1.1. Questionnaire design

This study aimed to examine the impact of social capital and knowledge sharing in e-government systems. The research questionnaires were created based on the literature collected on social capital and knowledge sharing. The researcher used online and hardcopy questionnaires to collect data and test the research hypotheses. This research required special wording because of the absence of feedback from online questionnaires so that the surveys were concise, relevant, logical, and did not elicit negative views from respondents (Lavrakas, 2008). Therefore, careful attention was given to the clarity and precision of wording and that it was straightforward in terms of what was being asked.

5.1.1.1. Style of the questions

The questions asked in the questionnaire were on a Likert scale and were multiple-choice. Regarding the Likert scale questions, up to 5 points were awarded to the respondents depending on how strongly they agreed or disagreed with the statements. More specifically, the scale was 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = strongly agree, and 5 = strongly agree. This type of scale was originally devised by Rensis Likert in 1932. The Likert scale measures how much people agree or disagree with an opinion. The scale can be built in different ways so there is no wrong way to answer the questions but it must have at least five response categories (Allen & Seaman, 2007). The Likert scale was employed in this thesis for its ease in coding and operation, and the fact that it is capable of evaluating people's attitudes, behaviours, and views (Burns & Groves, 1997).

5.1.1.2. Measurements

The constructs used in this research were measured using questions modified from previous studies. When formulating the research questions, Bryman (2016) proposed using questions from previous studies that had already been considered valid and reliable. Closed-ended questions used in the research were tailored from what previous studies documented. Closed-ended questions are easy to answer and assess, and several items for each construct can be used to assure validity and reliability (Carmines & Zeller, 1979). Single item constructs are unsuitable because they cannot offer the best representation of a construct (Churchill J, 1979). Multi-item constructs minimize the extraneous effects of individual items, making it possible to remove any idiosyncrasies by other items to produce a consistent and valid measure (Davis, Bagozzi, & Warshaw, 1989). Therefore, five indicators were allotted to each construct (except social ties, which possessed six). All items were extracted and adopted from the literature except for a few which were specifically developed (Appendices A-2, A-3, and A-4). The measures adopted were chosen and modified to suit the context of this research.

5.1.2. Questionnaire sections

The questionnaire was divided into two main parts: first, the information sheet, and second, the survey questions. The latter contained three sections depending on the type

of data being collected. The three topics were social capital, e-government system, and general questions. The following subsections illustrate these themes in more detail.

- *Information sheet*

The information sheet conveys a first impression for respondents and may affect the decision to participate in the research study. Thus, the information sheet needs to be clear and concise so that respondents know what the study is actually about. The information sheet in this study was divided into three main parts. In the introduction, the researcher identified himself and invited the participants to answer the survey. He went on to describe the aim of the research and provided a brief description of e-government systems. Subsequently, he described the target population (in underlined bold font) and then gave the estimated time required to answer the survey. This was followed by a section on participants' rights, the applicable research ethics, and an invitation to participants to make comments on any issues that may require clarification. The last part of the information sheet contained the contact addresses, phone numbers and email addresses of the researcher, the supervisor, and members of the Curtin University Human Research and Ethics Committee.

- *Section 1: Questions about social capital*

Section 1 addressed the three social capital dimensions – structural, cognitive, and relational. Following the literature review, the three social capital dimensions were represented as four factors: social ties (ST) represented the structural dimension and trust (TRU) represented the relational dimension, while the cognitive dimension was represented by two factors – shared language (SL) and shared vision (SV). Each factor contained five items except (ST), which incorporated six. All measurements of social capital were on a Likert scale – adopted from H. H. Chang and Chuang (2011); C. M. Chiu et al. (2006); Chow and Chan (2008); Huang (2009); Lefebvre et al. (2016); Tamjidyamcholo, Bin Baba, Tamjid, and Gholipour (2013) – and this is shown in Appendix A-2.

- *Section 2: Questions about the most frequently used e-government system*

Section 2 addressed items about the most e-government system used. The elements measured two factors: Collaboration Quality (CQ) and Knowledge Sharing Behaviour (KSB). CQ is an independent variable while KSB is the dependent variable. Both factors had five items, also measured on a Likert scale. CQ was adopted from Cidral

et al. (2018); Saghapour et al. (2018); Urbach et al. (2010), while KSB from Chow and Chan (2008); Reychav and Weisberg (2010); Tamjidyamcholo et al. (2013); X. Zhang, De Pablos, and Zhou (2013), and is shown in Appendix A-3.

- *Section 3: General questions*

Section 3 included six multiple choice general questions relevant to the research. The respondents were required to disclose information about their age, gender, education background/qualification, experience, required knowledge of current job, and the type of organization they work for. The objective of this section was to collect demographic data about the people in the sample and give an understanding of the nature of the study population.

The first general question was about gender, and here the researcher gave participants three choices, with the third being "Prefer not to say". This option was added to provide participants with the opportunity, for personal or professional reasons, not to disclose their gender. For the second question about age, all possible ages were covered (from 18 to more than 60 years old). The third question was about education level.

The fourth question was about the required specialist knowledge that the job required. The aim was to find out which level of knowledge the research sample had. A question about experience was also asked to determine each participant's level of experience in his or her current workplace, because this study wanted to look at the intra-organizational effect of social capital on knowledge sharing behaviour. The last question was about the type of organization. This question aimed to get an indication of the diversity of public sector agencies in the research sample, and the different types were adopted from The Maturity of Governmental Services Report issued by the National Committee for Digital Transformation in Saudi Arabia (*Services Maturity Index 2019*, 2019).

At the end of the questionnaire, the researcher thanked the respondents for their cooperation. He also offered to send a research brief of the findings to everyone interested (Appendix A-4).

5.1.3. Survey translation

The questionnaire was developed in English and then translated into Arabic to fit the context being investigated. The translation process involved the back translation (BT)

technique, which is the preferred strategy in cross-cultural research (Brislin, 1970). The BT stages as suggested by (Bernard, 2011) were adopted here. Firstly, the researcher translated the original English questionnaire into Arabic. Secondly, the Arabic version was sent to a NAATI-certified translator to translate it back into English. NAATI is the National Accreditation Authority for Translation and Interpreters, a non-profit body which is the only one authorized to issue certifications to people working as translators in Australia ("NAATI, Who we are," 2020). Finally, after the researcher received the back-translated copy, he compared it with the original English version to make sure they were linguistically equivalent and there was no substantial difference between them. Once the translation had been done, the questionnaire was ready for the piloting process.

5.2. Ethical considerations of the survey

Ethical considerations arise in all fields of research and vary depending on the topic being investigated. For example, before contacting individuals to collect data, some research requires access to a particular community, while in other contexts this is not required (Orb, Eisenhauer, & Wynaden, 2001). Ethical standards require a researcher to obtain consent of all participants, give clear explanations of study parameters, give assurances that identities and privacy will be protected, and provide confidentiality, etc. (Creswell & Clark, 2017). The right of any participant to withdraw from a study at any time must be assured as well (Sapsford & Jupp, 2006).

Ethics was one of the most important aspects of this study. The researcher addressed various ethical issues to maintain the participants' rights and protect them from any possible harm. Curtin University examines ethical considerations as part of its research protocols, so acquiring ethics approval for the research was mandatory. The Curtin University Human Research Ethics Committee formally approved the ethics application of the study on 27/8/2019. Further, to avoid any possible conflict of interest, a request to access participants was submitted to the host firm as most data was collected from it (information about the host firm is provided in section 4.3.3).

For the survey, the researcher did not ask sensitive questions or any that might violate the participant's privacy or disclose their identity. The ethical issues of the study were included in the survey information sheet. The participants were assured that their participation was totally voluntary, and that they could withdraw from the research

without providing reasons or explanations (Alghamdi, 2017; Sapsford & Jupp, 2006). Anonymity and privacy were assured as well, and it was made clear that any publication based on the data provided would only report results at the aggregate level. Moreover, they were informed that the data will be kept confidential and secure at Curtin University for 7 years after the research's completion and will then be destroyed. They were also provided with contact information of the manager of the ethics office and the research integrity unit at the university if they wished to discuss any concerns they had. Email addresses of the researcher and his supervisor were provided as well (Appendix A-5).

5.3. Pilot study

This section discusses the pilot study. It includes developing two versions of the survey (one in which the items were ordered and another with them randomized). It shows how data for the pilot study was collected analysed and then discusses the pilot study's outcomes.

5.3.1. Instrument testing: ordered or randomized questions

Answers respondents give to a questionnaire are significantly affected by the order in which the questions are presented, an effect called question order bias (Boyle, Welsh, & Bishop, 1993). Randomizing the construct items helps to disguise the purpose of measurements and reduce the chance of common method bias (Kline, Sulsky, & Rever-Moriyama, 2000; Schriesheim, Kopelman, & Solomon, 1989). If a respondent's answer is affected by previous questions, then the position of an item in a questionnaire will influence the information retrieved from memory and provide a specific context that may disturb the correlation between variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, randomizing items will create more effort and so may affect the response rate, validity (Schriesheim et al., 1989), and reliability (Podsakoff et al., 2003).

However, randomizing items does not always decrease the reliability of answers. For example, Schell and Oswald (2013) conducted a study on personality measurement. They examined the impact of question order on reliability, measurement equivalence, and scale–level correlations. The researchers used three forms of the same survey, i.e. cycled, random, and grouped, and the reliability of the forms was roughly equal. In an older study, Schriesheim et al. (1989) found no noticeable statistical difference

between using grouped surveys and randomized surveys. To investigate this issue, the researcher prepared two survey formats, one with ordered items and one with random items, and the objective of the pilot study was to see if randomizing the questions affected the response rate or not.

5.3.2. Pilot data collection

The researcher contacted the director of the research and studies centre at the host firm (see section 4.3.3), requesting permission to collect data from the host firm's trainees. Both versions of the survey were uploaded to Qualtrics.com, which offers a friendly interface with a wide range of tools that make it possible to set up an online survey (Barnhoorn, Haasnoot, Bocanegra, & van Steenbergen, 2015). Then anonymous links were generated for each of these two versions and the links were passed on to the trainees. Data were collected from October 2nd, 2019, to October 23rd, 2019. The objective was to gather at least 50 acceptable responses for each survey format. Once the required number of responses was attained, the collecting process was stopped.

The link of the ordered items survey was accessed by 111 participants; 76 of them answered the survey with less than 5 missing values (representing a response rate of 68%). At the same time, the link to the randomized survey was accessed by 107 participants, of whom 55 answered it with less than 5 missing values (a response rate of 51%). Both the randomised and grouped versions had a satisfactory completion rate (above 50%), and so both could be used in the study without jeopardizing the responses.

5.3.3. Pilot data analysis and discussion

To investigate the data, the researcher used the Statistical Package for Social Sciences (SPSS) software version 25, with both samples merged into one data set. To distinguish between ordered items and mixed items, a variable was created called "survey type". Survey type was given two values: 1 if the case belonged to the ordered item questionnaire, or 2 if it was randomized.

5.3.3.1. Normality of data distribution

The researcher used two formal normality tests to check the normality of the data. Kolmogorov–Smirnov and Shapiro–Wilk tests for all items in both versions were

conducted. Razali and Wah (2011) consider that Shapiro–Wilk (which achieves good power with a sample size of more than 50 cases) is a more powerful test to measure data distribution compared to Kolmogorov–Smirnov, Lilliefors, and Anderson–Darling. However, the powers of these tests are related to sample size which should not be less than 30. In this pilot study, the total valid cases amounted to 76 for the ordered questionnaire and 55 cases for the randomized version.

In the null hypothesis the sample is assumed to be normally distributed, so that the Shapiro–Wilk test (and Kolmogorov–Smirnov) should be greater than 0.05 to accept the hypothesis. Conversely, the sample is not normally distributed in the alternative hypothesis, and the test values will be less than 0.05. In this regard, both Kolmogorov–Smirnov and Shapiro–Wilk tests were performed, and the results indicated that both surveys were not normally distributed (see Appendix A-12).

5.3.3.2. Difference between the ordered and randomized surveys

The independent-sample *t*-test examines if there is a significant difference between the mean of two samples. Here such a test can be used to see whether there is a statistically significant difference in responses between the two survey versions. To do so, it is essential to check both samples to see if they meet the *t*-test assumptions. The assumptions of the *t*-test are normality of data distribution, homogeneity of variance, and independence of observations (Boneau, 1960).

As demonstrated in the previous section, the data were not normally distributed which means that the *t*-test assumption of normality of data distribution was violated. Therefore, a *t*-test was in this case not the right approach to use. In such a situation, a Mann–Whitney *U*-test is the alternative non-parametric test usually used when data does not meet the *t*-test assumptions (Milenovic, 2011). A Mann–Whitney *U*-test can alternatively be used when assumptions of the *t*-test are violated. It is a non-parametric method comparing differences between the median of two sets of data and does not assume the normality distribution of data (Milenovic, 2011).

Consequently, independent-sample Mann–Whitney *U*-test was run to determine if there were differences in the responses to the survey items between the ordered and randomised versions. The test was run on all 6 constructs in the research model: social ties (ST), trust (TRU), shared vision (SV), shared language (SL), collaboration quality (CQ), and the dependent variable knowledge sharing behaviour (KSB). In addition to

the two items of the marker variable. All of them were measured in 33 items in total. Therefore, each of these 33 items was included in the test. The test run resulted in non-significant differences in the distributions of respondents to all these items except five of them: TRU4, SL4, SL5, SV2, and KSB4. The asymptotic significance values for these five items were less than 0.05 (TRU4 = 0.048, SL4 = 0.013, SL5 = 0.008, SV2 = 0.017, and KSB4 = 0.001). Table 10 shows the Mann–Whitney U-test results concerning these 5 items, while the complete result of the test is showed in Appendix A-13.

Table 10: Mann-Whitney U test results for 5 different survey's items (at sig. level of 95%).

Survey item	Mann–Whitney *U*-tests	Z	Asymptotic Sig.
TRU4	2492.000	1.978	0.048
SV2	2538.000	2.396	0.017
SL4	2592.500	2.475	0.013
SL5	2593.500	2.662	0.008
KSB4	2792.500	3.467	0.001

In addition, a one-way ANOVA test was run to add more assurance about the two samples. The test detected significant differences at level of 95% in six items as in Table 11 (the results for all items are shown in Appendix A-14).

Table 11: One-way ANOVA test results for 6 different survey's items (at sig. level of 95%).

Item	Sum of Squares	Mean Square	F	Sig.
ST2	4.044	4.044	4.765	0.031
TRU4	4.781	4.781	3.965	0.049
SV2	6.263	6.263	5.809	0.017
SL4	6.332	6.332	5.926	0.016
SL5	2.997	2.997	5.912	0.016
KSB4	13.293	13.293	11.445	0.001

In comparison between the results of both tests, it is vivid that both results were close. The ANOVA test agreed with the Mann–Whitney *U*-tests in the five items. Moreover, the significance values of the tests for items are convergent in most items. However, the ANOVA test detected one more significant difference between the two samples in item ST2.

From these results the researcher concluded that both versions could be used in the study as there was no significant difference in most of them. Overall, since the response rates in both versions were consistent and no great significance was detected between them, the researcher chose the version with the random items for use in the main study. This choice eliminated any possible question order bias and reduced the chance of common method bias.

5.3.3.3. Improved online survey design

Additionally, the researcher personally sent the format of the ordered items to three people who already belonged to the sample population. One was an expert with a post-graduate degree qualification and research experience. The researcher also sent the second (randomized) survey form to three other people already recruited, one of them again being an expert. These six people were asked to answer the survey and provide any comments or opinions they had. The six people (two experts and four participants) who offered positive comments on both survey versions stated that they were clearly set out and easy to answer. However, they did wonder why some questions were asked in the negative (reversed items). Interesting comments about some questions were given which helped the researcher refine them. After the pilot study was over, and considering the feedback from the experts and the participants, the researcher improved, paraphrased, and grammatically corrected some of the items. The survey was also re-formatted to make it clearer and easier to answer.

The online copy of the final questionnaire was again placed on Qualtrics.com. The questionnaire was carefully designed so that fonts (styles, sizes), colours, and contrasts between text and background were suitable. Participants were not compelled to answer all questions; they had the freedom to skip questions. The reasoning here is that forcing participants to answer items on an online questionnaire increases the dropout rate and reduces the quality of the data (Décieux, Mergener, Neufang, & Sischka, 2015). A recent study found that forcing answers is not well received and any such responses are questionable (Sischka, Décieux, Mergener, Neufang, & Schmidt, 2020).

5.4. Main data collection

A total of 656 responses were collected during the period from November 3, 2019, to January 2, 2020. Data was collected at the host firm as well as outside it, so that 573 responses (87%) were collected from the host firm while 83 responses (13%) came

from outside it. The reason to collect outside was to not restrict data collection to the host firm. After the survey link was permanently closed, the researcher deleted every record that had more than 2 missed items. In other words, only participants who answered at least 96% of the survey were accepted.

5.4.1. Procedure of data collection

After data collection approval had been gained from the host firm (see section 4.3.3), the researcher contacted its branches directors, asking them to distribute the survey link to their trainees. The link was distributed to the trainees between November 3, 2019, to January 2, 2020.

A total of 851 trainees registered in 36 courses received the survey link. Up until December 3, 2019, responses from males were much more prevalent, with only a small batch of data coming from females (the ratio being 292:18). The reason for this was the difficulty that the researcher faced in contacting and coordinating with the firm's female staff due to the customary separation of the firm's male and female branches. Therefore, on December 3, 2019, the researcher again contacted the female branches asking for the link to be distributed once again, and at the same time he sent a parcel containing 230 hard copies of the survey form to the firm's female branches in Riyadh. These copies were in 10 envelopes to be distributed during 10 training courses. On January 1, 2020, the parcel was returned with a total of 190 copies: there were 68 blank copies, 42 incomplete or not valid for analysis, and 80 complete copies. With the 80 complete copies, the total number of female responses rose to 278. To sum up, 1081 trainees from the host firm were invited to answer the survey, of which 573 responses were received (a response rate of 53%).

In addition to collecting data from the host firm, the researcher used online social networks to distribute the survey link to the target population. The link was distributed to Saudi Arabian communities on social networks. A total of 182 responses was collected from the 18th to 29th November 2019. The number of responses accepted was 83 (a response rate of 44.5%).

5.4.2. Difference between both samples

As the data was collected from two different sources (the host firm = 573 cases, and social networks = 83 cases), it was preferred to check if there was a difference between

sample collected from both sources. Again, an independent-sample Mann–Whitney *U*-tests was run on both sample sets (see Appendix A-15). The result of the test showed no significant differences between both samples except KSB5. Therefore, both were equivalent and could be used. Hence, both were used making a total of 656 before data cleaning.

5.5. Data cleaning

The data cleaning process aims to increase the quality of data by removing inconsistencies and errors (Rahm & Do, 2000). Data cleaning and testing assumptions are in the best interests of the research (Osborne, 2013), because incorrect or unreliable conclusions could result from an analysis based on missing or ambiguous data (Chu, Ilyas, Krishnan, & Wang, 2016). Data cleaning should be designed according to the requirements of the specific analysis strategy (Krishnan, Haas, Franklin, & Wu, 2016). Therefore, the data of this research was cleaned before analysis and some further examinations were done to ensure that all data was reliable.

5.5.1. Missing data

This research accepted participants who answered at least 96% of the survey questions. This means that no more than two missing pieces of data were accepted. Analysis showed that 576 of 656 cases had no missing data, while 64 had 1 missing value, and 16 had 2 missing values. Figure 25 shows the missing data in the whole dataset.

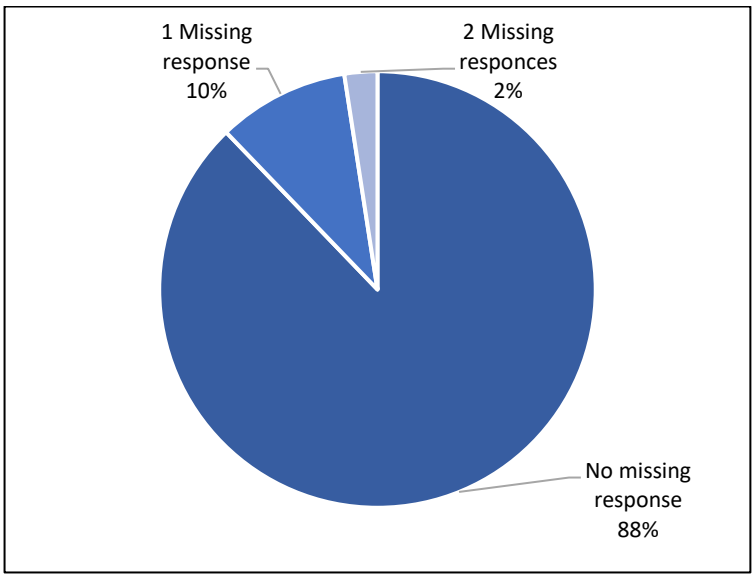

Figure 25: Missing data in the whole dataset.

Missing data was dealt with as follows. First, missing values were marked as missing in SPSS and then Cronbach's alpha for the constructs calculated. Second, Case Mean Substitution was used as an imputation technique to deal with the missing data. In such a technique, the mean of items representing a model construct are ascribed to the missing values for that construct (Fox-Wasylyshyn & El-Masri, 2005). These procedures were applied for each case separately so that this method recognized differences across cases and produced very similar scores provided by a participant to a determined subject (Parent, 2012). The reverse coded items were taken into consideration (instead of the original reverse items) so as to reflect the actual answers participants gave.

Then the researcher compared Cronbach's alpha test before and after applying case mean substitution to see if such a method was appropriate for the data. The outcome showed that data reliability was slightly higher when missing data were marked as missing in the analysis than data after mean substitution. This may be due to the use of eight reversed coded items in the survey. Consequently, the researcher chose to mark missing data as missing values rather than applying case mean substitution because this achieved the best reliability.

5.5.2. Unengaged responses

This step aimed to find those participants who did not pay enough attention while answering the questionnaire. Some participants had a tendency to give the same answer to all questions or all questions concerning one topic. This style of response is known as 'straightlining' or non-differentiation, and can cause systematic measurement error (Loosveldt & Beullens, 2017). In this study, six reversed items were used in six of the research model's constructs: social ties, trust, shared language, shared vision, collaboration quality, and Knowledge sharing behaviour. The researcher considered a response to be an example of straightlining if a participant gave the same answer to all questions for the same construct. However, as these constructs are measured on a 5-point Likert scale, answering '3' to all questions in a construct was not counted as straightlining.

Conversely, it is tricky when doing such an examination manually and there is the chance of making human mistakes, especially with a sample size as big as that used in this study. The researcher used Microsoft Excel to develop functions that counted

straightlining responses from a participant. The number of straightlining mistakes is summarized in Table 12.

Table 12: Number of straightlining responses.

Number of straightlining responses	0	1	2	3	4	5	6	8
Number of Cases	483	111	44	10	1	2	1	4

Given the length of the survey and the randomization of the items, the researcher decided it was reasonable to deal with this kind of response. At most, two straightlining answers per case were accepted, but otherwise the case was omitted. Consequently, a total of 18 cases were omitted and the remaining total of 638 represented the final clean data. Figure 26 depicts the percentage of straightlining responses in the final dataset.

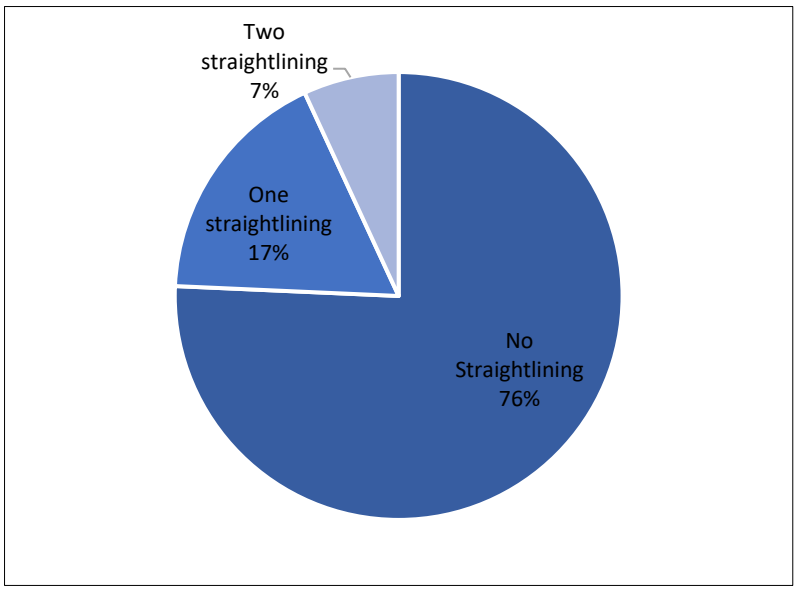

Figure 26: Percentage of straightlining responses in the final dataset.

5.6. Description of the sample

Table 13 and Figure 27 show the gender of the participants.

Table 13: Gender of participants.

Gender	Frequency	Percent
Male	364	57.1
Female	270	42.3
Prefer not to say	4	0.6
Total	**638**	**100**

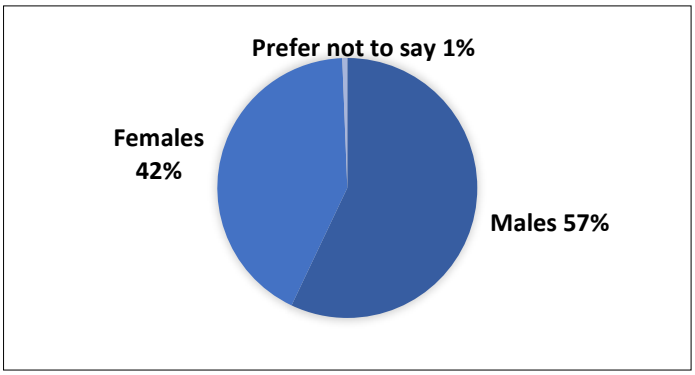

Figure 27: Gender of participants.

Table 13 shows that the percentage of male participants was 56.6%, whereas females amounted to 42.8%. This finding was close to the percentage of public sector female employees in Saudi Arabia which has been estimated as 40.5% ("Labour Market, Third Quarter 2019," 2019). It should be noted that 0.6% of participants did not disclose their gender. In Saudi Arabia, the collection of data from women is a challenge (Alghamdi, 2017), yet the high percentage of female participants in this study was made possible by how the researcher collected data.

Table 14 and Figure 28 show that people in the 30–49 age cohort made up the bulk of the sample (79.6%), with the highest number between 30 and 39 years (n = 280, 43.9%). Meanwhile the older cohort aged from 40 to 49 years old comprised 35.7% with n = 228. This result was close to actual figures for public sector workers in Saudi Arabia, where it is 39.9% for those 30 to 39 years old, and 43.5% for those 40 to 49 years ("Labour Market, Third Quarter 2019," 2019). The data also showed two other cohorts, those aged 20 to 29 (6.4%) and 50 years or older (13.6%). The similarity between the ages of the sample and the ages of the population at large indicate that the

data collection method was appropriate and that the sample reflected the actual age distribution of the population.

Table 14: Age variation in the sample.

Age	Frequency	Percent
From 20 to 29 years	41	6.4
From 30 to 39 years	280	43.9
From 40 to 49 years	228	35.7
50 years or more	87	13.6
Missing	2	0.3
Total	**638**	**100**

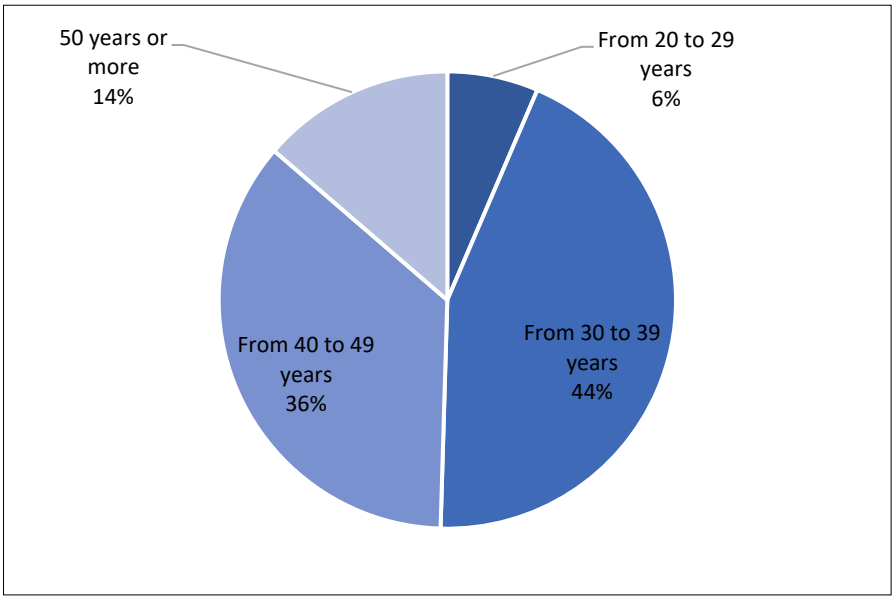

Figure 28: Age variation in the sample.

Looking at education level, Table 15 and Figure 29 show that more than half the participants (57%) had a Bachelor's degree, while 27.7% had no university qualification (a diploma or less). Further, 14% of the sample had higher degrees (13.6% Master's and 0.6% Doctorate).

Table 15: Education levels of the participants.

Education level	Frequency	Percent
Secondary school or less	76	11.9
Diploma	101	15.8
Bachelor's degree	368	57.7
Master's degree	87	13.6
Doctorate	4	0.6
Other	2	0.3
Total	**638**	**100**

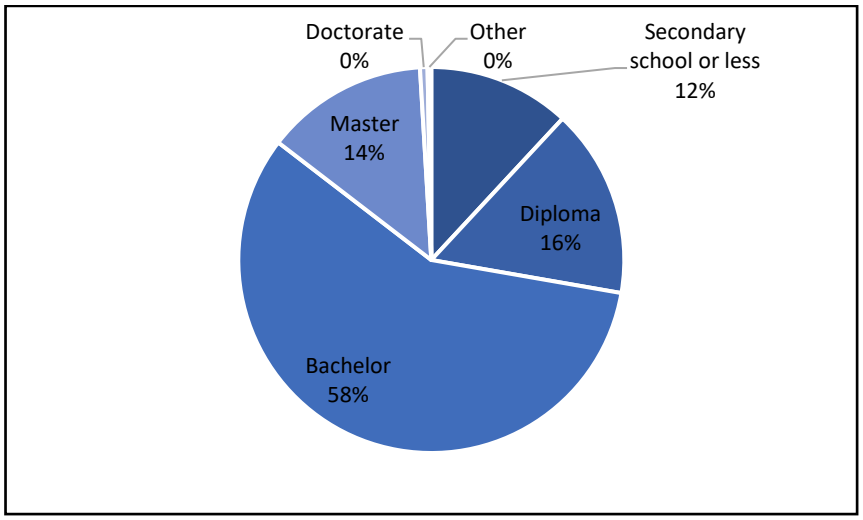

Figure 29: Education levels of the participants.

Participants were also asked to specify the level of knowledge required for their jobs. Table 16 and Figure 30 summarise these aspects.

Table 16: Level of knowledge required for the participants' jobs.

Required knowledge	Frequency	Percent
Not at all	5	0.8
A little	80	12.5
Quite a lot	383	60.0
Very much	164	25.7
Missing	6	0.9
Total	**638**	**100**

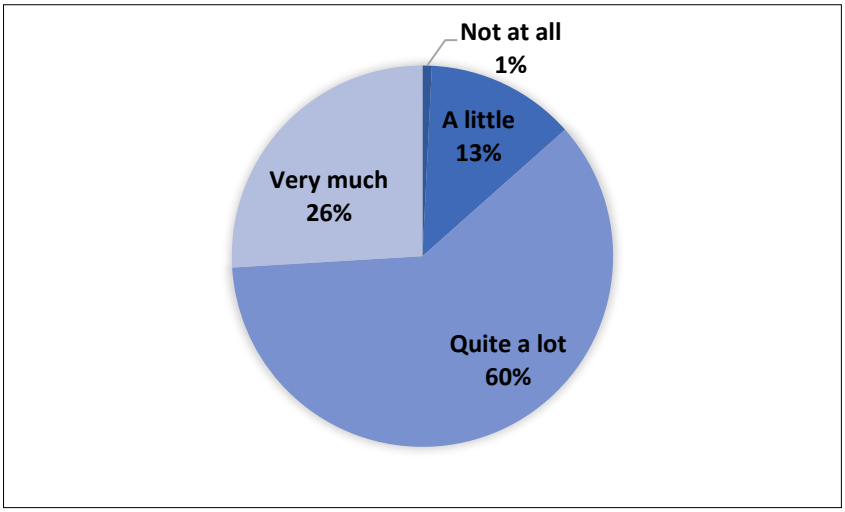

Figure 30: Level of knowledge required for the participants' jobs.

This data show that most participants (*n* = 383, 60%) required a good standard of knowledge to do their jobs responsibly, while around one-quarter (*n* = 164, 26%) needed to have a high level. Some participants needed either only a little knowledge (*n* = 80, 12.5%) or no knowledge at all (*n* = 5, 0.8%) to execute their duties. Those people may be doing jobs as simple as data entry or something similar. This result indicates that more than 85% of respondents required significant amounts of knowledge to do their jobs. This high level of knowledge in the research sample suggests that measurement of knowledge sharing behaviour may be a realistic goal, and give good insight into social capital theory.

Regarding work experience, Table 17 and Figure 31 indicate that most participants (*n* = 415, 65%) had worked at their current organization less than 15 years. The cohort who had worked from 5 to less than 10 years constituted the largest, with *n* = 169 (26.5%). The result indicates that respondents had various levels of work experience. With such a variety, this might allow insight into the development of social capital over time in the participants' organizations.

Table 17: Work experience at current jobs.

Experience	Frequency	Percent
Less than 5 years	101	15.8
From 5 to less than 10 years	169	26.5
From 10 to less than 15 years	145	22.7
From 15 to less than 20	89	13.9
From 20 to less than 25	63	9.9
From 25 to less than 30	42	6.6
30 years or more	27	4.2
Missing	2	0.3
Total	**638**	**100**

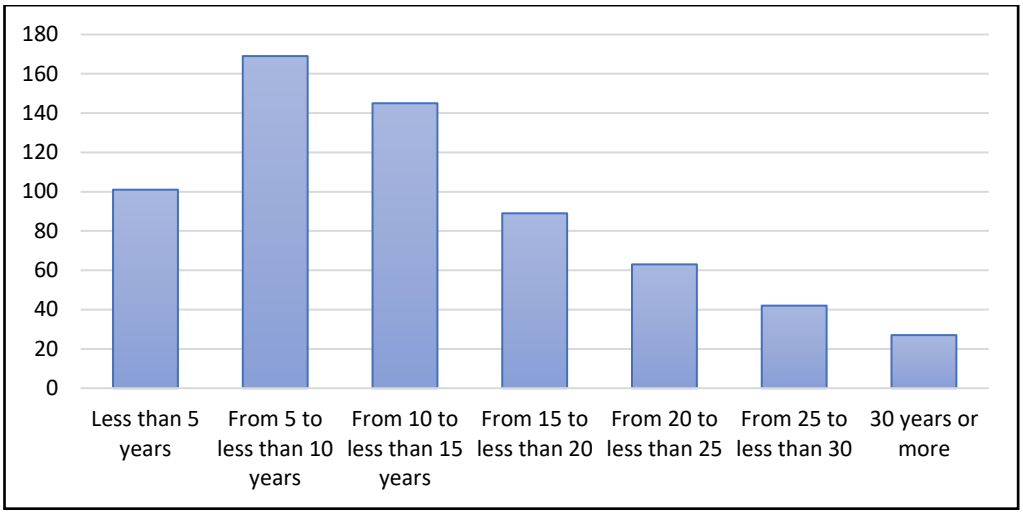

Figure 31: Work experience at current jobs.

Table 18 and Figure 32 show the type of organization where the participants worked. The figures show that about 60% of data was collected from people working in ministries (*n* = 268, 42%) or universities (*n* = 113, 17.7%). Ministries are the prestige government agencies in Saudi Arabia; there are 25 of them and they have branches throughout the country, as was evident during the data collection phase ("Gov. Agencies Directory," 2020). Universities are also widely distributed, with 29 of them in 13 provinces ("Government Universities List," 2020). A large number of responses were also collected from other entities (*n* = 69, 15%). Other types of government departments were not listed here – centers, funds, chambers, associations, committees, institutions, banks, etc. The results also show small cohorts which are presidencies, diwans, and councils (*n* = 8, 1.3%). The country has only 6 presidencies, 5 diwans, and 7 councils ("Gov. Agencies Directory," 2020) and these entities do not necessarily have branches in different regions. This explains why only a few responses were collected from them.

In summary, it is evident from this demographic analysis that this sample achieved a good level of diversity which was an acceptable reflection of the actual population..

Overall, it is evident from this demographic analysis that this sample achieved a good level of diversity and an acceptable reflection of the actual study population.

Table 18: Types of organizations in the sample.

Organization type	Frequency	Percent
Ministry	268	42.0
University	113	17.7
General Authority	36	5.6
Hospital	33	5.2
Municipality	27	4.2
General Directorate	23	3.6
General Corporation	20	3.1
Governorate	13	2.0
Presidency	5	0.8
Diwan	2	0.3
Council	1	0.2
Other Entity	96	15.0
Missing	1	0.2
Total	**638**	**100**

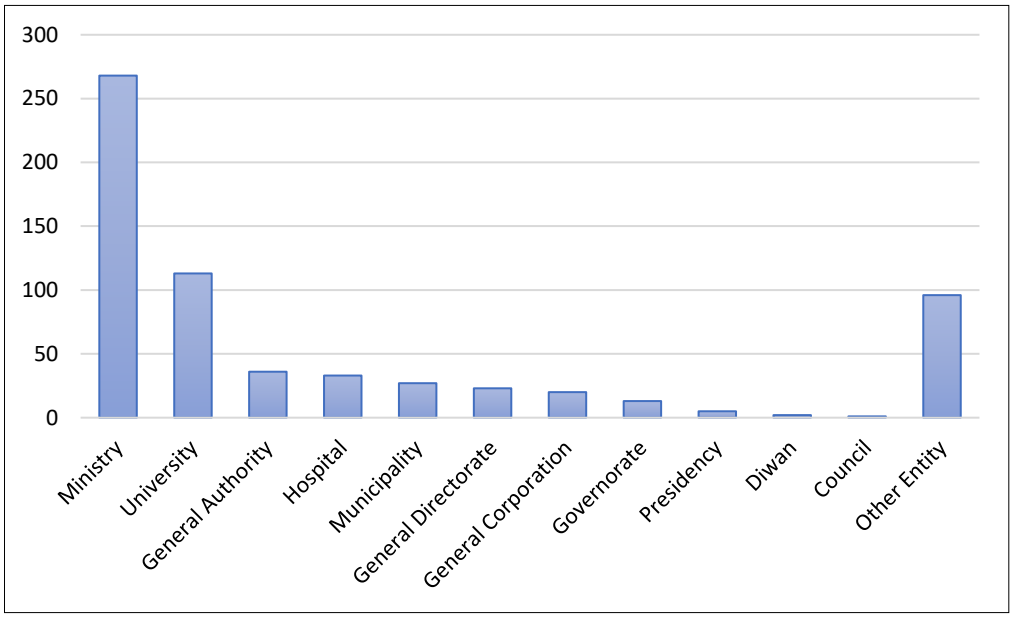

Figure 32: Types of organizations in the sample.

5.7. Data analysis

This section presents the data analysis using PLS-based SEM, which took place in two stages: assessment of the measurement model and assessment of the structural model. The section begins with a justification for using PLS-based SEM. It then discusses the assessment of the measurement model, including a discussion of its convergent and discriminant validities. After that, the issue of common method variance is discussed after which two versions of the research model are introduced. Lastly, the results of the assessment of structural model for both versions of the model are discussed (Figure 33).

5.7.1. Using PLS-SEM as a data analysis method

The PLS-SEM technique was introduced in 1966 by Herman Wold who later refined it in 1982 and 1985 (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). PLS-SEM has only few identification issues and can work with small and large samples, and simultaneously can handle formative and reflective constructs (J. F. Hair, Ringle, & Sarstedt, 2011). It is also used in different research areas including management information systems (J. F. Hair, Ringle, & Sarstedt, 2013).

J. F. Hair et al. (2011) and J. Hair, Hollingsworth, Randolph, and Chong (2017) put forward a rule of thumb for selecting between CB-SEM or PLS-SEM. In this study PLS-SEM was chosen for the inferential analysis for the following reasons:

- PLS-SEM is preferred when identifying key target constructs. Here it proved suitable for identifying the key driver constructs among the three social dimensions (ST, TRU, and SV) and the quality of collaboration (CQ) within e-government systems and knowledge sharing behaviour (KSB) of people working in such systems.
- PLS-SEM is preferred when the data is not normally distributed. It was set out that the data in this study was not normally distributed (see Appendix A-16), so PLS-SEM proved to be the more suitable tool (J. F. Hair, Hult, Ringle, & Sarstedt, 2017; J. F. Hair, Risher, Sarstedt, & Ringle, 2019).
- The SLR (section 2.6) showed that PLS-SEM appears to be the most popular data analysis approach in the literature. Further, it has recently become more popular in many methodological developments (J. Hair et al., 2017). In

addition to its high degree of statistical power which allows it to be more likely to identify relationships as significant (J. F. Hair et al., 2019). Thus, it has the capacity to make strong comparisons and adds to the rigor of research outcomes.

In PLS-SEM, a research model is assessed sequentially in two stages, namely the measurement model and then the structural model. The first one is also called the outer model while the other is called the inner model. The relationships between exogenous latent variables (indicator variables) and endogenous latent variables (research model constructs) occur in the measurement model, while the relationships between the endogenous latent variables (path coefficients) are displayed in the structural model (J. F. Hair et al., 2017). Figure 33 shows the two PLS-SEM stages that were employed in this thesis. The following sections discuss the two stages of PLS-SEM.

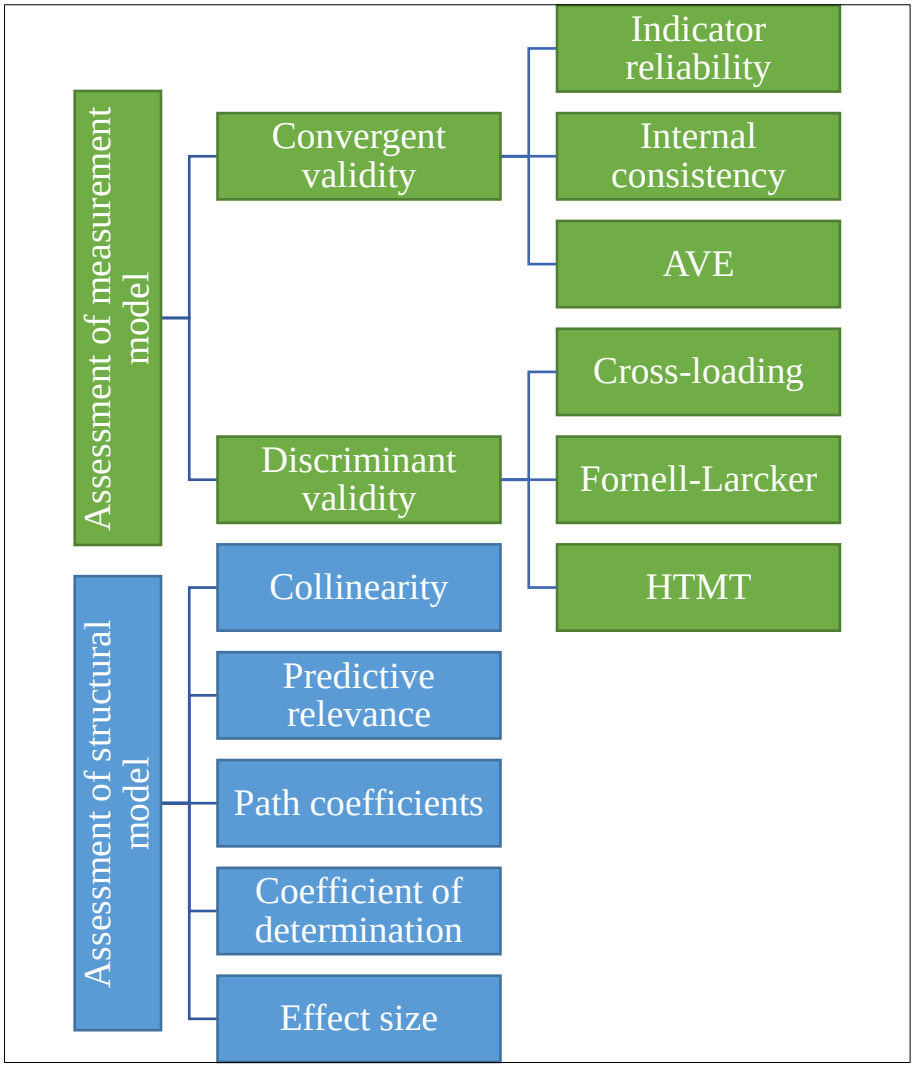

Figure 33: The two-stages of PLS-SEM.

5.7.2. Assessment of measurement model

Measurement assessment is the first step in evaluating PLS-SEM and should meet all the required criteria before proceeding to assess the structural model (J. F. Hair et al., 2019). Measurement assessment here was conducted in two main steps: (1) convergent validity, and (2) discriminant validity. In this respect, both steps provide evidence for construct validity (Hubley & Zumbo, 1996). This section provides background about the steps of the assessment of measurement model, followed by the results of each step.

- *Convergent validity*

Convergent validity is the degree to which indicators correlate positively with their assigned construct. This means that those indicators which measure a specific construct should have a high common ratio of variance (J. F. Hair et al., 2017; J. F. Hair et al., 2019). Convergent validity is established by estimating indicator reliability, internal consistency, and Average Variance Extracted (AVE). These are explained in more detail below.

  - *Indicator reliability*

Indicator reliability is associated with the absolute loading value of an indicator (J. F. Hair et al., 2011). The factor loading value measures the correlation strength between indicators and factors, or in other words, indicates the extent to which an indicator contributes to the factor. So when an indicator has a larger factor loading this means it has contributed more to representing the factor (Henseler, Hubona, & Ray, 2016; Yong & Pearce, 2013). The reliability of all indicators should be considered when assessing the measurement model, and each indicator should achieve an absolute loading value of more than 0.70. However, loading values from 0.4 to 0.7 may be retained in case an indicator plays a role in maintaining the composite reliability and validity of the factor (J. F. Hair et al., 2019). Table 19 depicts the indicators deleted during this step, and in what follows more details are being given about them.

In this research, social ties, trust, and shared vision were the three constructs that represented the three dimensions of social capital – structural, relational, and cognitive. The impact of social capital on knowledge sharing behaviour was tested along with the quality of collaboration in e-government systems. The proposed model consisted of six main endogenous latent variables, these being: social ties (ST), trust (TRU),

shared language (SL), shared vision (SV), collaboration quality (CQ), and the dependent variable, knowledge sharing behaviour (KSB). Each endogenous latent variable (construct) was measured by 5 reflective exogenous latent variables (indicators), except ST which had 6.

SmartPLS software package (v.3.3.3) was used to perform the PLS-SEM analysis (Ringle, Wende, & Becker, 2015). SmartPLS has a user-friendly graphical interface that makes it possible to simply create the research model and then run the PLS algorithm (J. F. Hair et al., 2011). The proposed model was set up and the PLS calculation was done with the preferred settings of path weighted scheme equal to a maximum of 300 iterations and a stop criterion of 10^7 (J. F. Hair et al., 2011; J. F. Hair et al., 2019).

The calculation revealed that 6 items (ST5, ST6, TRU4, SV5, CQ3, and KSB4) loaded below 0.4, which was less than the minimum acceptable factor loading (J. F. Hair et al., 2011). Thus, all these low-loading factors were deleted (see Table 19).

Table 19: Deleted low-loading factors (shaded cells).

Construct	Items	Loading	*t*-value	Cronbach's alpha	CR	AVE
Social ties (ST)	ST1	0.714	17.900	0.574	0.733	0.341
	ST2	0.711	16.577			
	ST3	0.497	7.813			
	ST4	0.769	23.952			
	ST5	0.359	4.416			
	ST6	0.248	2.851			
Trust (TRU)	TRU1	0.737	23.934	0.779	0.848	0.542
	TRU2	0.837	44.294			
	TRU3	0.800	35.277			
	TRU4	0.387	6.276			
	TRU5	0.821	43.623			
Shared vision (SV)	SV1	0.771	28.871	0.718	0.80	0.498
	SV2	0.814	29.336			
	SV3	0.817	34.597			
	SV4	0.752	22.622			
	SV5	0.017	0.335			
Shared Language (SL)	SL1	0.576	8.774	0.500	0.707	0.331
	SL2	0.611	9.627			
	SL3	0.501	6.115			
	SL4	0.444	5.266			
	SL5	0.709	10.792			
Collaboration quality (CQ)	CQ1	0.801	48.352	0.775	0.850	0.554
	CQ2	0.856	59.730			
	CQ3	0.270	4.760			
	CQ4	0.819	46.577			
	CQ5	0.808	35.543			
Knowledge sharing behaviour (KSB)	KSB1	0.767	24.506	0.658	0.782	0.458
	KSB2	0.653	16.590			
	KSB3	0.829	51.836			
	KSB4	0.110	2.577			
	KSB5	0.757	33.044			

Then factor loadings between 0.40 and less than 0.70 were checked to see if they affected validity of the constructs (CR). In this regard, ST3, SL1, SL3, and SL4 (which were loaded 0.497, 0.576, 0.501, and 0.444, respectively) were deleted. Only two indicators assigned to SL remained – SL2 and SL5. It is generally preferable to use four indicators whenever possible; however using three items is acceptable but using less than three should be avoided (J. F. Hair, 2014). Nevertheless, a two-item construct can be used in some studies if the correlations between variables are more than 0.7 (Yong & Pearce, 2013). The last was not fulfilled in the model as the two remaining indicators, SL2 and SL5 were insufficient to represent the construct (SL) in the research model. Hence the construct SL was removed from the analysis. Due to deletion of SL, no results were then available for hypothesises H4 and H6d.

On the other hand, the HTMT value between CQ and KSB was 0.952, which exceeded the threshold of 0.90 (Gold et al., 2001; J. F. Hair et al., 2017). Such a value indicates a discriminant validity issue between the two variables. One possible solution is to decrease the HTMT value between the two constructs by eliminating the indicators that are highly loaded on the opposite construct (J. F. Hair et al., 2017). In this way, KSB5 was deleted, which reduced HTMT to an acceptable value of 0.879.

The results of this step are shown in Table 20. It highlights information about the SEM-PLS assessment measurement model. It shows the loading values of indicators on their assigned constructs and the *t*-values of the indicators. Also shown here are Cronbach's alpha, CR, and AVE of each construct.

As can be seen in Table 20 , the factor loading values fell between 0.743 and 0.852, meaning that all indicators met the loading threshold value of >0.7, establishing their reliability (J. F. Hair et al., 2011; J. F. Hair et al., 2019).

Table 20: SEM-PLS assessment of measurement of the research model.

Construct	Items	Loading	*t*-value	Cronbach's alpha	CR	AVE
Social ties (ST)	ST1	0.743	18.026	0.638	0.805	0.580
	ST2	0.755	18.764			
	ST4	0.786	22.102			
Trust (TRU)	TRU1	0.741	21.086	0.817	0.878	0.644
	TRU2	0.844	41.169			
	TRU3	0.812	35.281			
	TRU5	0.809	32.140			
Shared vision (SV)	SV1	0.769	26.832	0.804	0.871	0.628
	SV2	0.828	36.081			
	SV3	0.816	33.164			
	SV4	0.753	22.508			
Collaboration quality (CQ)	CQ1	0.797	45.462	0.842	0.894	0.679
	CQ2	0.849	53.000			
	CQ4	0.832	53.065			
	CQ5	0.818	38.154			
Knowledge sharing behaviour (KSB)	KSB1	0.808	31.616	0.712	0.839	0.635
	KSB2	0.727	21.200			
	KSB3	0.852	49.506			

- *Internal consistency*

Internal consistency indicates to what extent a factor is being measured by all its indicators. It is essential to determine the internal consistency of research constructs before conducting tests on data, as this will confirm validity (Tavakol & Dennick, 2011). Some alternative indicators of scale reliability have been used to report internal consistency. Cronbach's alpha, for example, is one of the most commonly used tools to report multiple-item constructs (Eisinga, Te Grotenhuis, & Pelzer, 2013), but it is not the first choice when PLS-SEM is used as it generally underestimates the internal consistency. This is because of its sensitivity to the number of items in a scale, which makes it a more conservative measure (J. F. Hair et al., 2017; J. F. Hair et al., 2011; Henseler et al., 2016). Composite reliability (CR), on the other hand, is more suitable for PLS-SEM as it makes no assumption that all indicators are equally reliable (J. F. Hair et al., 2011). That is, it does consider the different outer loadings of the indicators (J. F. Hair et al., 2013).

Table 20 shows that CR values for all constructs were between 0.805 and 0.894 – that is, they had satisfactory CR values between 0.70 and 0.90 (J. F. Hair et al., 2017; J. F. Hair et al., 2011) and so they were internally consistent.

- *Average Variance Extracted (AVE)*

AVE refers to the degree to which indicators of the same factor correlate with each other – that is to say, the indicators "share a high proportion of variance in common" (J. F. Hair, 2014). The AVE value of a latent variable should be more than 0.50 to ensure that the latent variable explains the majority of its indicator's variance (J. F. Hair et al., 2011; Henseler et al., 2016).

AVE values shown in Table 20 confirm that all constructs explain more than 50% of their indicator's variance – because all AVE values are more than 0.50 (J. F. Hair et al., 2011; Henseler et al., 2016). These statistics provide evidence that the research model had reached an acceptable level of convergent validity.

- *Discriminant validity*

Discriminant validity reflects the degree to which the conceptual constructs in a research model are distinct from each other, which means that the correlation between two constructs should not be too high (J. F. Hair, 2014). This is achieved when the loading of an indicator on its assigned construct is more than its loading on the remaining constructs of the model (J. F. Hair et al., 2017). Researchers use various criteria to detect discriminant validity, notably a cross-loading matrix, the Fornell–Larcker criterion, and the Heterotrait–Monotrait Ratio (HTMT) (Gholami, Sulaiman, Ramayah, & Molla, 2013; J. F. Hair, 2014; J. F. Hair et al., 2011). In what follows, these three criteria are reported.

- *Cross-loading matrix*

A cross-loading matrix makes it possible to check that the loadings of indicators on an associated latent construct are higher than the loadings on all the other constructs in a research model (J. F. Hair et al., 2011). The preferred way to detect and report cross-loadings is to use a table with indicators in rows and latent variables in columns (J. F. Hair et al., 2017). This criterion is considered to be somewhat more liberal than other types of criteria (J. F. Hair et al., 2011). Table 21 shows a cross-loading matrix in which each indicator has been loaded onto its assigned construct in a way that is higher than other possible constructs. Thus, it provides some evidence for discriminant validity.

Table 21: Cross-loading matrix.

	CQ	KSB	SV	ST	TRU
CQ1	0.797	0.554	0.279	0.319	0.295
CQ2	0.849	0.569	0.279	0.282	0.317
CQ4	0.832	0.594	0.298	0.312	0.278
CQ5	0.818	0.536	0.318	0.290	0.288
KSB1	0.552	0.808	0.172	0.224	0.204
KSB2	0.475	0.727	0.193	0.220	0.188
KSB3	0.601	0.852	0.275	0.315	0.248
ST1	0.260	0.226	0.371	0.743	0.359
ST2	0.266	0.241	0.509	0.755	0.397
ST4	0.305	0.264	0.403	0.786	0.348
SV1	0.291	0.242	0.769	0.417	0.508
SV2	0.287	0.217	0.828	0.488	0.626
SV3	0.320	0.222	0.816	0.504	0.578
SV4	0.212	0.160	0.753	0.350	0.451
TRU1	0.230	0.164	0.496	0.350	0.741
TRU2	0.336	0.264	0.623	0.479	0.844
TRU3	0.255	0.213	0.509	0.322	0.812
TRU5	0.309	0.205	0.565	0.377	0.809

- *Fornell–Larcker criterion*

This approach was first proposed by Fornell and Larcker (1981). It assesses whether or not a construct has more common variance with its associated indicators than it has with all the other constructs in the research model. It calculates the square root of each construct's AVE value and compares it with the correlations in the remaining constructs. The discriminant validity of a construct is established when the square root of a construct increases (J. F. Hair et al., 2017). Table 22 shows the Fornell–Larcker criterion within the data, and this analysis gives further evidence for discriminant validity. It shows that each construct has more variance in common with its associated indicators than with other constructs.

Table 22: Fornell–Larcker criterion.

	CQ	KSB	SV	ST	TRU
CQ	0.824				
KSB	0.684	0.797			
SV	0.356	0.27	0.792		
ST	0.365	0.321	0.561	0.761	
TRU	0.357	0.269	0.688	0.482	0.803

- *Heterotrait–Monotrait ratio (HTMT)*

As an alternative assessment method of discriminant validity, HTMT was developed based on the multitrait–multimethod matrix (Henseler et al., 2016; Henseler, Ringle, & Sarstedt, 2015). It estimates the true correlation between two variables by calculating "the mean of all correlations of indicators across constructs measuring different constructs" (J. F. Hair et al., 2017). Even though cross-loadings and the Fornell–Larcker criterion are frequently used in applied research, neither of them cannot measure discriminant validity in a reliable way. HTMT is a more reliable criterion and its use is recommended (J. F. Hair et al., 2017; Henseler et al., 2015). HTMT has higher sensitivity and is a stricter procedure for detecting discriminant validity compared with the other two approaches. The HTMT approach makes it a suitable tool for ensuring that there are no issues with the measurement model (Ab Hamid, Sami, & Mohmad Sidek, 2017).

Table 23 shows HTMT ratios, and it is evident that all values stayed under the threshold of 0.90 (Gold et al., 2001; J. Hair et al., 2017), which confirms discriminant validity. Finally, the results of the PLS algorithm calculation indicate that the research has satisfied the SEM measurement model.

Table 23: Heterotrait–Monotrait (HTMT) ratios.

	CQ	KSB	SV	ST	TRU
CQ					
KSB	0.879				
SV	0.426	0.347			
ST	0.496	0.470	0.774		
TRU	0.424	0.343	0.834	0.660	

As a summary, Table 19 shows the values before the assessment of the research model steps while Table 20 shows values after the process had been done. Table 24 lists the reported values of convergent and discriminant validity, and it can be seen that the recommended thresholds have been met. That is, the research model has received acceptable measurements, and so it can be said that it is valid and reliable.

Table 24: Employed PLS-SEM thresholds in the analysis.

PLS-SEM stage	Step	Employed threshold	Source
Assessment of measurement model	Indicator reliability	Loading value > |7|	(J. F. Hair et al., 2011)
	Internal consistency	Composite reliability (CR) between 0.70 and 0.90	(J. F. Hair et al., 2017); (J. F. Hair et al., 2011)
	Average Variance Extracted (AVE)	>0.50	(J. F. Hair et al., 2011) (J. F. Hair et al., 2017)
	Cross-loadings	An indicator's loading on its assigned construct must be higher than its loadings on all remaining constructs	(J. F. Hair et al., 2011)
	Fornell–Larcker criterion	Each construct has more common variance with its associated indicators than with other constructs	(J. F. Hair et al., 2017).
	Heterotrait–Monotrait ratio (HTMT)	< 0.90	Gold et al. (2001); J. Hair et al. (2017)
Assessment of structural model	Collinearity assessment	VIF <5	(J. F. Hair et al., 2017); (J. F. Hair et al., 2011); J. F. Hair et al. (2019)
	Predictive relevance	Q^2 >0	(J. F. Hair et al., 2017); (J. F. Hair et al., 2011)
	Path coefficients	Critical *t*-value = 1.96 at the 5% significance level	(J. F. Hair et al., 2017)
	Coefficient of determination	R^2 = large (0.67), moderate (0.33), and low (0.19)	(Chin, 1998)
	Effect size f^2	f^2= large (0.35), medium (0.15), and small (0.02)	(Cohen, 2013)

The following sections discuss common method variance and provide an assessment of the structural model.

5.7.3. Common method variance

When collecting self-reported data from different sources there is always the risk that the data may suffer from issues like consistency and social desirability, and this is where common method variance (CMV) may be helpful (H. Liang, Saraf, Hu, & Xue, 2007). In addition, sometimes the data might be affected by how it was collected, such as time, location, and media. Such a risk is called common method variance, which reflects systematic variance among the constructs of a research model. Here, the variance arises from the method of measurements, not from the theoretical constructs which the measures represent (Tehseen, Ramayah, & Sajilan, 2017).

CMV can be controlled by using two approaches: procedural and statistical remedies. Procedural remedies are employed before the data is collected, while statistical remedies are applied afterwards (Tehseen et al., 2017). This research used multiple remedies, which is highly recommended to minimise the possibility of CMV (S. J. Chang, van Witteloostuijn, & Eden, 2010). First of all, it involved two carefully designed versions of the piloted questionnaire – one which contained ordered items and the other random-ordered items. It was decided to use the random-ordered questionnaire to collect data (see section 5.3.1), and this was a procedural remedy to decrease CMV (Kline et al., 2000; Schriesheim et al., 1989). Secondly, two statistical CMV remedies were also employed: Harman one-factor analysis and a full collinearity test.

Harman one-factor analysis is commonly used to examine the occurrence of CMV in research (S. J. Chang et al., 2010). In this test, a factor analysis procedure is run for all items measuring every construct in the research model. A study should not carry any concerns about CMV if "no single factor emerges and accounts for majority of the covariance" (Tehseen et al., 2017). SPSS v.27 software was used to conduct a Harman one-factor analysis for all items from each construct in the questionnaire. The output revealed that the first unrotated factor captured 20.38% of the variance in the dataset, which means that the variance was considerably below 50% (see Appendix A-17). Thus, the test concluded that the study had no CMV issue (Tehseen et al., 2017).

The second statistical remedy was the full collinearity test, which calculates variance inflation factors (VIFs) for all latent variables in a research model. A CMV issue is

said to occur if one of the VIF values for any latent construct is greater than 3.3 (Kock, 2015; Kock & Lynn, 2012).

The test was conducted in SmartPLS, and Table 25 shows that the values of all VIF values for each latent variable in the research model were less than 3.3. Hence, this result indicates that there are no concerns about CMV in the research model.

Table 25: VIF values for the latent variables.

	CQ	KSB	SV	ST	TRU
CQ		1.222	2.013	2.027	2.01
KSB	1.138		1.894	1.886	1.899
SV	2.195	2.199		1.96	1.524
ST	1.559	1.556	1.395		1.551
TRU	1.969	1.985	1.371	1.962	

5.7.4. Assessment of the structural model

After confirming the reliability and validity of the constructs measured in the first step, the next step was to assess the structural model. In this step the ability of the research model to predict relationships between constructs was examined. This was done sequentially: first a collinearity assessment, then a path coefficient, a coefficient of determination, effect size, and predictive relevance (J. F. Hair et al., 2017; J. F. Hair et al., 2011).

- *Collinearity assessment*

When evaluating measurement models in PLS-SEM, not only should collinearity assessment be applied: there is also the need to ensure that there is no significant level of collinearity between the independent variables. This step is important because the estimation of parameters in PLS-SEM maximizes the explained variance of the dependent variables – which is different from the parameter estimation in CB-SEM, where the focus is on minimizing the differences between covariance matrices (J. F. Hair et al., 2017). Here, the variance inflation factor (VIF) was calculated for each exogenous construct by applying a cut-off value of less than 5 (J. F. Hair, 2014; J. F. Hair et al., 2017; J. F. Hair et al., 2011).

Evaluation of the structure model began by assessing collinearity for the exogenous latent variables – i.e., ST, TRU, SV, and CQ. Table 26 shows that all the variables had

VIF values less than 5, which means that no significant level of collinearity existed between them and the dependent variable KSB.

Table 26: Collinearity test VIF.

IV	VIF
Collaboration Quality (CQ)	1.222
Shared Vision (SV)	2.199
Social Ties (ST)	1.556
Trust (TRU)	1.984

- *Predictive relevance (Q^2)*

Examining Stone–Geisser's Q^2 value (Geisser, 1974; Stone, 1974) gives an indication of a model's predictive relevance. The rationale of this measure is to systematically omit some data and then reprocess model estimation to observe whether the model can accurately predict the omitted data or not. SmartPLS calculates Q^2 based on the prediction error through an iterative process called Blindfolding. Q^2 is calculated for each endogenous latent variable and when the Q^2 value for a particular variable is larger than zero, it means that the path model has established predictive relevance for this variable (J. F. Hair et al., 2017; J. F. Hair et al., 2011).

Consequently, Blindfolding calculations were run. The omission distance was set at D = 10 as it is better to choose a number between 5 and 10 because when the number of valid observations is divided by the omission distance, it results in non-integer number (J. F. Hair et al., 2017; J. F. Hair et al., 2011). Table 27 shows the constructs with the sum of the squared observations (SSO), the sum of squared prediction error (SSE), and the Q^2 value of KSB which is calculated as (1−SSE/SSO). Since Q^2 is larger than zero (0.296), it has been established that the research model has predictive relevance.

Table 27: Construct Cross-validated Redundancy.

	SSO	SSE	Q^2
Collaboration quality	2552	2552	
Knowledge sharing behaviour	1914	1346.929	**0.296**
Shared vision	2552	2552	
Social ties	1914	1914	
Trust	2552	2552	

At this point, since the assessments showed that the research model was unlikely to have any serious issues regarding collinearity or the ability to predict KSB, the research hypotheses were tested by estimating the path coefficient.

- *Testing two versions of the research model*

Two versions of the research model were used in this analysis. The first examined the effect of social capital alone on KSB, while the second one was as same as model version 1 but with the addition of CQ. The reasons for undertaking such a process were as follows. First, most prior work has not made a clear distinction between IT-mediated and non-IT mediated knowledge sharing; therefore, since this research aimed to investigate social capital in an IT-mediated context, it is necessary to examine CQ. Second, the impact of social capital on KSB has not been investigated in the context of e-government systems. Hence, the best approach is to examine the impact of the theory on behaviour and then introduce CQ into the picture. This procedure is intended to detect if the collaborative features within an IT-mediated context affect behaviour. Moreover, it also helps to show how the theoretical impact of social capital changes when CQ is considered. Figure 34 and Figure 35 show the two version of the research model.

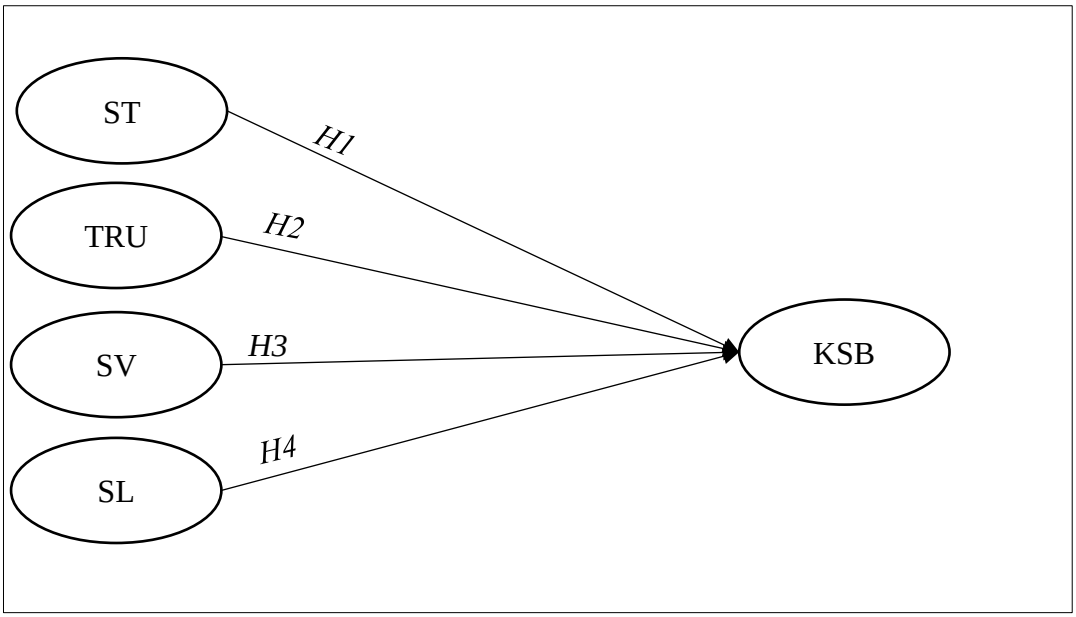

Figure 34: The research model version 1.

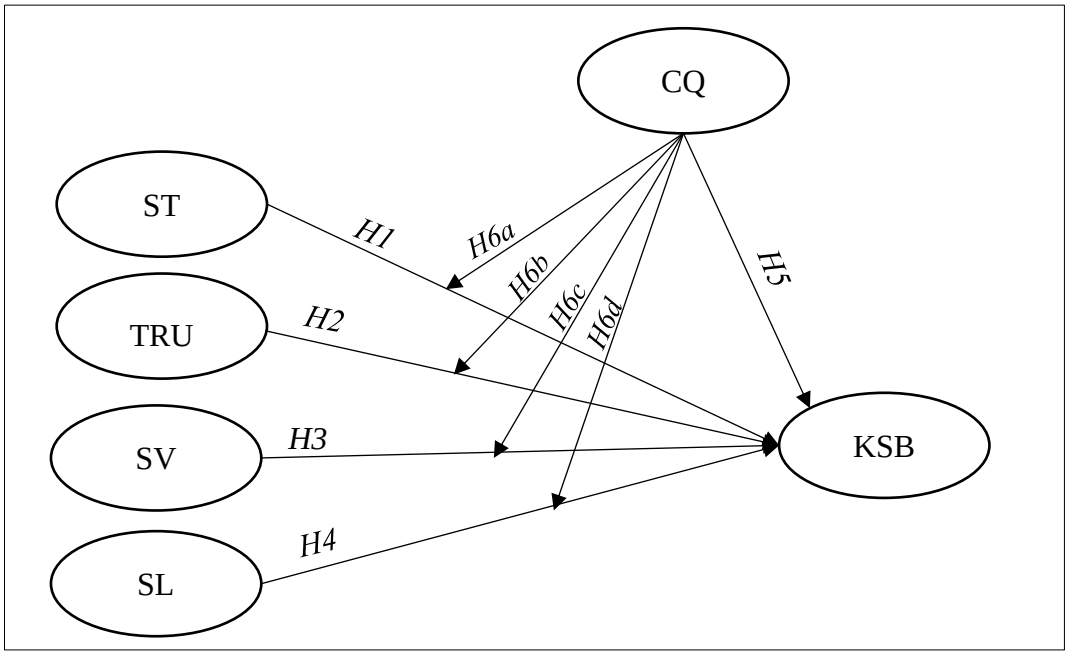

Figure 35: The research model version 2.

- *Structural model path coefficients*

This step presents the outcomes of the hypothesized relationships. The values of path coefficient are standardized between −1 and +1. The relationships become strongly positive when they are close to +1 while a strong negative relationship is evident when it is close to −1. A nonparametric two-tailed *t*-test serves to calculate *t* using 1.96 as critical value at the 5% significance level.

Here, a complete bootstrapping process was run for both models with subsamples = 5,000 as recommended by Hair et al. (2016) and Hair et al. (2011) at a significance level of 5%.

In model version 1, the result (Table 28 and Figure 36) showed that both ST (β = 0.233, *t*-value = 4.549, p = 0.000) and TRU (β = 0.113, *t*-value = 2.088, *p* = 0.037) were significantly related to KSB. On the other hand, SV (β = 0.066, *t*-value = 1.124, and *p* = 0.261) had no significant relationship with KSB.

Table 28: PLS structural results for model version 1 (** = p<1%, * = p<5%).

Relationship	Path Coefficient β	Standard Error	*t*-value	*p*-value	Sig.
ST →KSB	0.233	0.051	4.549	0.000	Supported **
TRU → KSB	0.113	0.054	2.088	0.037	Supported *
SV→ KSB	0.066	0.059	1.124	0.261	Not supported

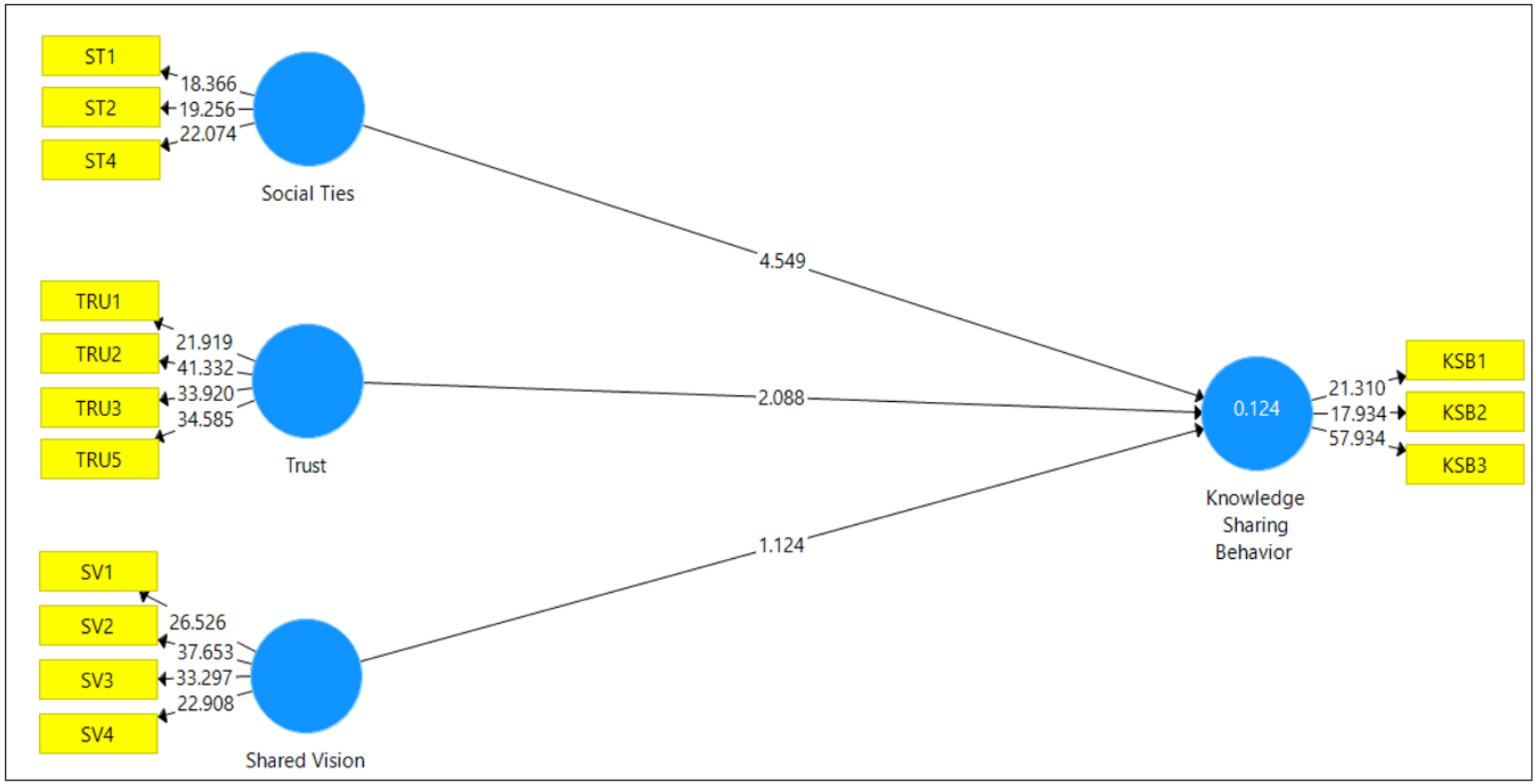

Figure 36: Path coefficient estimation for model version 1.

Regarding results of model version 2 (Table 29 and Figure 37), only ST between the social capital's variables was significantly related to KSB (β = 0.102, *t*-value = 2.589, p = 0.010). At the same time the other two social capital variables TRU (β = −0.010, *t*-value= 0.224, p = 0.823) and SV (β = −0.016, *t*-value = 0.359, and p = 0.720) were not supported. As stated in section 5.7.2, the variable SL failed to satisfy the requirements of the factor analysis process, so it was deleted from the model. Hence, the results of hypotheses concerning SL (i.e., H4 and H6d) are not available. Most notably, CQ was the most significant dependant variable related to KSB in the research framework (β = 0.671, *t*-value = 19.606, p = 0.000).

Table 29: PLS structural results model version 2, (** = p<1%, * = p<5%), M = moderating effect.

Relationship		Path Coefficient β	Standard Error	*t*-value	*p*-value	Sig.
H1	ST →KSB	0.102	0.039	2.589	0.010	Supported *
H2	TRU → KSB	-0.010	0.043	0.224	0.823	Not supported
H3	SV→ KSB	-0.016	0.046	0.359	0.720	Not supported
H4	SL→ KSB	n/a (SL did not pass the EFA)				
H5	CQ → KSB	0.671	0.034	19.606	0.000	Supported **
H6a	M. CQ on (ST→KSB)	0.077	0.047	1.633	0.103	Not Supported
H6b	M. CQ on (TRU →KSB)	-0.010	0.043	0.224	0.823	Not supported
H6c	M. CQ on (SV →KSB)	0.056	0.061	0.916	0.360	Not supported
H6d	M. CQ on (SL →KSB)	n/a (SL did not pass the EFA)				

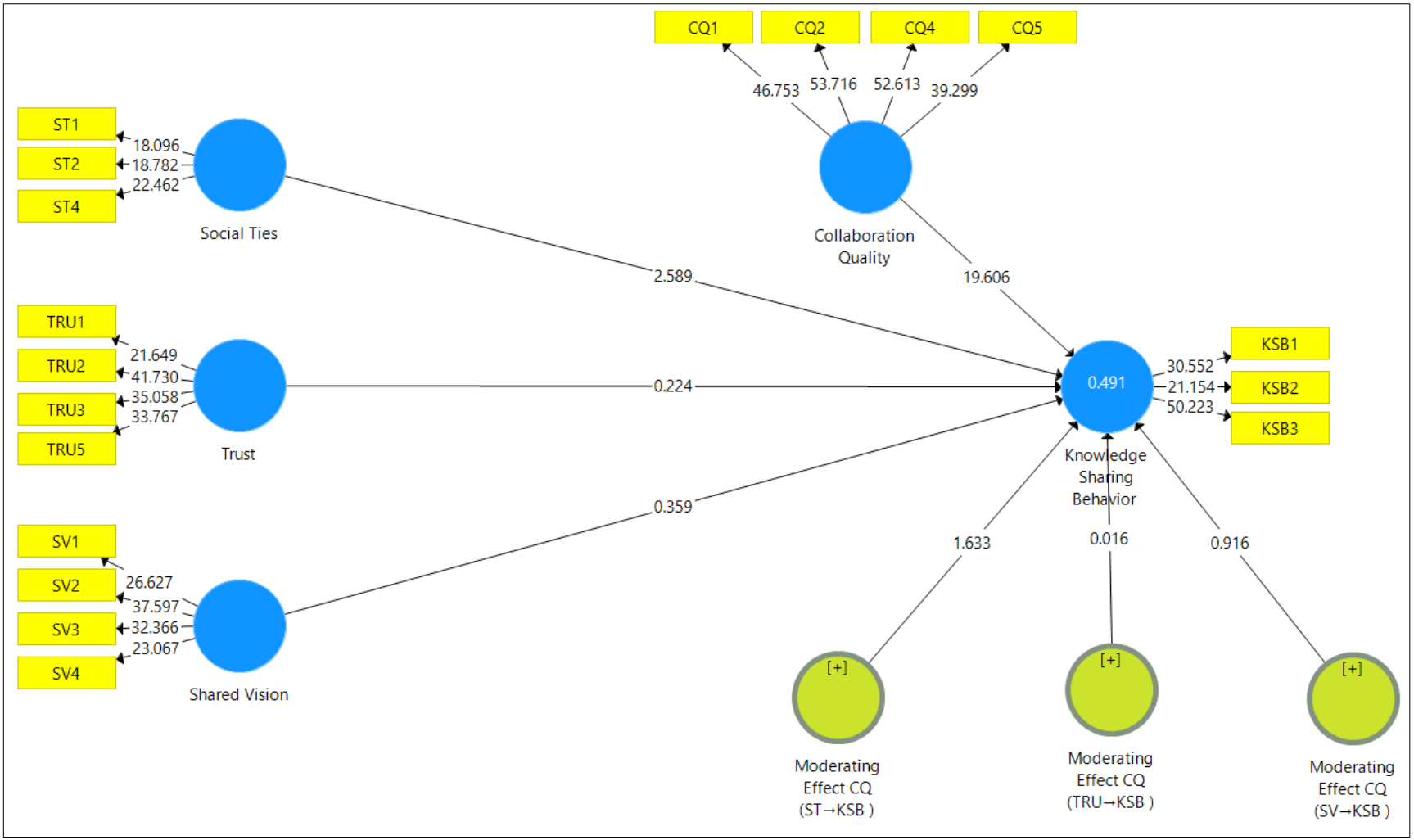

Figure 37: Path coefficient estimation for model version 2

Regarding the moderating paths in model version 2, SmartPLS offers three moderation calculation methods: product indicator, orthogonalizing, and two-stage. The first method was not suitable with the research model as it can only be used with formatively measured constructs (J. F. Hair et al., 2017). The moderating effect of CQ on the arrows between social capital's variables and KSB were tested using the two-stage approach. Such an approach is universally applicable and recommended due to its statistical power compared with the orthogonalizing approach (J. F. Hair et al., 2017). Notably, the moderating effect was introduced even for the insignificant relationships (i.e. TRU→KSB and SV→KSB) since moderating effect is usually tested when finding inconsistent or unexpectedly weak paths (Baron & Kenny, 1986). The interaction of CQ with the relationship ST→KSB was $\beta = 0.077$, *t*-value = 1.633, and *p*-value = 0.103. While the moderation effect of CQ on the relationships TRU→KSB, and SV→KSB were ($\beta = -0.010$, *t*-value = 0.224, $p = 0.823$) for the first and ($\beta = 0.056$, *t*-value = 0.916, $p = 0.360$) for the second relationship. Overall, the outcome of moderating paths test indicated that CQ did not moderate the three paths of the three social capital variables.

- *Comparing path coefficients in both research models*

Table 28 and Table 29 show the results for the relationships tested in model version 1 and model version 2 respectively. It has disclosed that social capital's impact on KSB considerably changed when CQ was considered in model version 2. In particular, the study showed that the relationship ST→KSB is positively supported in both versions. However, the impact of ST on KSB was stronger in model version 1 ($\beta = 0.233$, *t*-value = 4.549, $p = 0.000$) than model version 2 ($\beta = 0.102$, *t*-value = 2.589, $p = 0.010$).

Furthermore, the results revealed that TRU positively influenced KSB in model version 1 ($\beta = 0.113$, *t*-value = 2.088, $p = 0.037$), but it retained no significant effect in model version 2 where $\beta = -0.010$, *t*-value = 0.224, and $p = 0.823$. The relationship SV→KSB emerged as the weakest path among the other three paths in model version 1. It was not supported in either in version 2 of the research model, i.e. $\beta = 0.066$, *t*-value = 1.124, and $p = 0.261$ in model version 1 while $\beta = -0.016$, *t*-value = 0.359, and $p = 0.720$ in model version 2. The relationship CQ→KSB was shown only in model version 2 and had the strongest path ($\beta = 0.671$, *t*-value= 19.606, $p = 0.000$).

- *Coefficient of determination (R^2) and effect size (f^2)*

Coefficient of determination is commonly reported in research because it measures the degree to which a research model can predict endogenous variables. If the value of R^2 ranges between 0 and 1 and is close to 1, this suggests more combined accuracy of all the independent variables on the dependent variable. Numerically, it has been suggested that values of 0.67, 0.33, and 0.19 represent R^2 values which are large, moderate, and low, respectively (Chin, 1998).

Effect size f^2, on the other hand, represents the effect of a specific independent variable on a dependent variable. It can be estimated by calculating R^2 twice. First, calculation of R^2 includes all independent variables ($R^2_{included}$), and second, calculation R^2 again but excluding the effect of a variable whose f^2 is being calculated ($R^2_{excluded}$). After that, the following calculation (J. F. Hair et al., 2017) is employed:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

Cohen (2013) suggested that an independent variable has a small, medium, and large effect on a dependent variable when its f^2 is 0.02, 0.15, and 0.35, respectively.

In model version 1, the results showed that the coefficient of determination R^2 was 0.124, which is below the low level of 0.19 suggested by Chin (1998). Furthermore, the effect size values for ST in model version 1 were at a low level (f^2 = 0.045), while the remaining TRU and SV had very low values of 0.009 and 0.003, respectively, respectively, (Table 30).

Table 30: R^2 and effect sizes in model 1.

R^2	Effect size f^2	
0.124	ST	0.045
	TRU	0.009
	SV	0.003

Regarding the result in model version 2, R^2 was at a moderate level of 0.491 (Chin, 1998). However, effect size values in model version 2 showed that both TRU and SV had no effect size (f^2 = 0.000) and a very low value of 0.013 for ST whereas CQ had a large effect (f^2 = 0.691).

The interaction paths were all at low levels as well. In particular, the moderating paths of CQ on (ST→KSB), CQ on (TRU→KSB), and CQ on (SV→KSB) had effect sizes

of 0.010, 0.000, and 0.003, respectively. The results of R^2 and effect sizes in model version 2 are shown in Table 31.

Table 31 R^2 and effect sizes in model 2.

R^2	Effect size f^2	
0.491	ST	0.013
	TRU	0.000
	SV	0.000
	CQ	0.691
	Moderating: CQ on (ST →KSB)	0.010
	Moderating: CQ on (TRU →KSB)	0.000
	Moderating: CQ on (SV →KSB)	0.003

When comparing R^2 and effect sizes in both research models, it is notable that when CQ was considered in model version 2, R^2 drastically changed from a low level to a moderate level of 0.491 (Chin, 1998). Moreover, the values of f^2 for social capital variables became even lower when CQ was inserted in model version 2. At the same time, CQ had the most effect on KSB. Overall, it was clear that CQ was the most influential construct in the research model. In summary, the PLS-SEM analysis concluded that both hypotheses H1 and H5 were accepted, while H2, H3, H6a, H6b, and H6c were rejected.

5.7.5. Importance-performance map analysis

Importance-performance map analysis (IPMA) is an additional tool that extends the standard PLS-SEM results reporting of path coefficient estimates. It aims to determine the exogenous latent variable that has a relatively high influence on a target endogenous variable. It also identifies those variables that have relatively poor performance. IPMA rescales the latent variable score which in turn facilitates a comparison with other latent variables measured on different scale levels (for example 5-point Likert and 7-point Likert scales). All variables, therefore, will take on values of performance between 0 and 100. A variable that represents the highest performance in a research model takes the value 100 and vice versa (J. F. Hair et al., 2017). In terms of importance of the exogenous latent variable, it is determined by the total effect of the driver variable on the endogenous latent variable.

After calculating the performance and importance scores of the exogenous latent variables, the importance-performance map can be generated. On this kind of map, when the performance of an exogenous variable increases by one unit, the effect of the

variable on the endogenous latent variable will increase by the size of the driver variable's unstandardized total effect (J. F. Hair et al., 2017). Hence, the area of improvement can be identified and subsequently addressed with marketing or management activities (Hock, Ringle, & Sarstedt, 2010). Figure 38 below shows IPMA of the research model calculated by Smart-PLS.

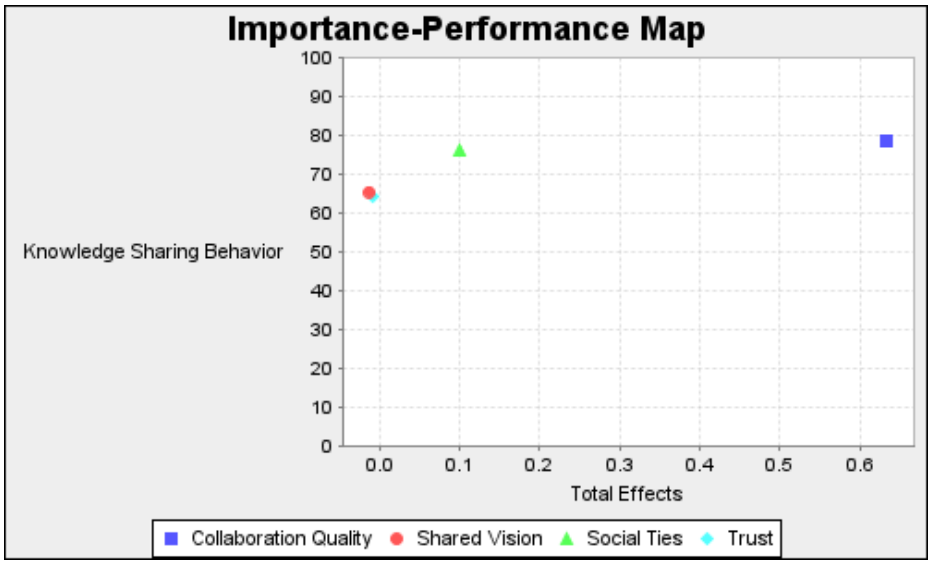

Figure 38: Importance-performance map.

As is shown in the figure, the horizontal x-axis represents the importance score (total effect) of the variables on KSB whilst the vertical y-axis represents the performance of the research model's constructs. It can be seen that CQ is located on the upper right area which indicates two things: high importance and high performance. Such a location represents opportunities for gaining or sustaining a superior level of CQ (Streukens, Leroi-Werelds, & Willems, 2017). In other words when the performance of CQ increases by one, the impact of it on KSB will increase by 0.691 (Table 31). Looking at the map again, social capital variables i.e., ST, TRU, and SV represent high performance but have a lower effect because they are located on the upper left-hand side area which means they are considered important to the respondents. Thus, at a managerial level, more attention should be paid to this area since the variables of social capital are the key elements for improvement (Streukens et al., 2017).

5.7.6. Control variables

Cross-sectional studies should use an appropriate data collection strategy to reduce the likelihood of alternative explanations. Further, using the control variable is another technique to avoid competing for explanations (Rindfleisch, Malter, Ganesan, &

Moorman, 2008). In addition to the careful procedure employed to collect data, this research used gender, age, education level, and experience. These control variables are used in the literature on knowledge sharing (Jiang & Hu, 2016; C. Yang & Chen, 2007).

The control variables were all categorical variables, so subsequently all categories were tested to detect any possible differences in the dataset. SmartPLS offers the non-parametric multi-group analysis (MGA) to examine differences between groups within a population in two identical research models (Matthews, 2017). PLS-MGA compares all bootstrap estimates in the first group with their equivalent bootstrap estimates in the second group. It further compares an enormous number of bootstrap estimates. Measurement invariance should be established to increase rigor of the MGA outcomes; otherwise the likelihood of measurement error would be a major concern (J. F. Hair et al., 2017). The guideline for running MGA in PLS-SEM as suggested by Matthews (2017) was employed. It includes steps that should be done sequentially. The first step is to generate the data groups and confirm the statistical power of their sizes. The second step is to conduct the measurement invariance of composite models (MICOM) which contains a three-step process, i.e. (i) configural invariance, (ii) compositional invariance, and (iii) composite equality. The first step is to identically treat data and retain the same basic factor structure across all groups. The second process is performed if the original correlation is not smaller than 5% quantile, which otherwise the MICOM test fails.

The third MICOM step takes one of three options: full, partial or no invariance. Full invariance is achieved when the values of both mean original difference and variance original difference fall between the 2.5% and 97.5% boundaries. Meanwhile it is a partial invariance if only one of the two falls between the boundaries (2.5% and 97.5%). The no invariance case results when neither mean nor variance original difference falls between the boundaries. The no invariance case means MGA cannot proceed while full and partial invariance are both accepted. After the MICOM test pass, the third step is to run and interpret permutation results in which differences across groups in terms of level of significance should be less than 5%.

In this thesis, demographic data regarding gender, age, education, experience, and required knowledge was collected. Hence, measurement invariance was checked for all MGA runs. Only gender and age confirmed the statistical power and MICOM test

while education level, work experience, and required knowledge did not pass the MGA procedures and data treatments did not work with them. In this scenario, MGA is not recommended (Matthews, 2017).

In regard to gender, the size of the male group was n=364 while the female group was n=270, so they were both large enough to perform the MGA as recommended (Cohen, 1992; Matthews, 2017). The MICOM test was run after configural invariance (step 1) was established by using identical indicators, data treatment and algorithm criteria (Matthews, 2017; Sarstedt, Ringle, & Hair, 2017).

Table 32: MICOM step 2, Compositional invariance result (Male-Female).

	Original Correlation	Correlation Permutation Mean	5.00%	Permutation p-Values
KSB	0.999	0.998	0.995	0.432
ST	0.987	0.99	0.971	0.281
TRU	0.988	0.993	0.982	0.155
SV	0.996	0.993	0.982	0.635
CQ	1.000	0.999	0.998	0.893
M. CQ on (ST→KSB)	1.000	1.000	1.000	
M. CQ on (SV→KSB)	1.000	1.000	1.000	0.298
M CQ on (TRU→KSB)	1.000	1.000	1.000	

Table 33: MICOM step 3 part 1, mean original difference (Male-Female).

	Mean - Original Difference (Female - Male)	Mean - Permutation Mean Difference (Female - Male)	2.50%	97.50%	Permutation p-Values
KSB	0.019	0.000	-0.159	0.157	0.815
ST	-0.043	0.001	-0.156	0.158	0.602
TRU	-0.179	0.001	-0.156	0.157	0.023
SV	-0.077	0.001	-0.156	0.157	0.339
CQ	0.029	0.000	-0.158	0.159	0.711
M. CQ on (ST→KSB)	0.038	0.001	-0.17	0.173	0.672
M. CQ on (SV→KSB)	-0.021	0.002	-0.169	0.17	0.811
M CQ on (TRU→KSB)	0.035	0.001	-0.185	0.182	0.706

Table 34: MICOM step 3 part 2, variance original difference (Male-Female).

	Variance - Original Difference (Female - Male)	Variance - Permutation Mean Difference (Female - Male)	2.50%	97.50%	Permutation p-Values
KSB	-0.143	-0.003	-0.287	0.279	0.336
ST	0.249	-0.002	-0.283	0.281	0.079
TRU	0.141	0.000	-0.225	0.221	0.217
SV	0.084	-0.001	-0.217	0.209	0.456
CQ	-0.134	-0.003	-0.301	0.286	0.382
M. CQ on (ST→KSB)	0.175	-0.016	-0.790	0.769	0.687
M. CQ on (SV→KSB)	-0.165	-0.005	-0.556	0.545	0.569
M CQ on (TRU→KSB)	0.033	-0.007	-0.611	0.592	0.922

Table 32 shows that the compositional invariance between males and females is established since the original correlation is greater than 5%. Meanwhile, Table 33 and Table 34 show both part 1 and part 2 of MICOM step 3 respectively. They indicate that both mean original and variance original differences for KSB, ST, SV and CQ fall between 2.5% and 97.5%. Therefore, there is full invariance between male and female for them. However, mean original difference for trust = -0.179 which does not fall between the 2.5% and 97.5% boundaries (Table 33). At the same time the variance original difference for trust scored 0.141 and fell between the boundaries (Table 34). Hence, the third process step of the MICOM test resulted a partial invariance between males and females.

Overall, the MICOM test result suggested that MGA for males and females would be reliable (Matthews, 2017). Consequently, an MGA test was executed, and it showed that the impact of ST is significantly different between males and females, i.e. p-Value = 0.017 (Table 35).

Table 35: MGA for males and females in the data set.

	Path Coefficients-diff (Male - Female)	p-Value original 1-tailed (Male vs Female)	p-Value new (Male vs Female)
ST -> KSB	0.191	0.009	0.017
TRU -> KSB	-0.004	0.522	0.955
SV -> KSB	-0.131	0.917	0.166
CQ -> KSB	-0.072	0.84	0.320
M. on CQ (ST→KSB) -> KSB	0.049	0.309	0.618
M. CQ on (SV→KSB) -> KSB	-0.065	0.701	0.598
M. CQ on (TRU→KSB) -> KSB	0.047	0.311	0.623

Table 36 and Table 37 show model run results for both male and female groups, respectively. The results indicate there is no difference between males and females except in the relationship between ST and KSB. Specifically, the results indicated a positive significant relationship (β= 0.197, *t*-value= 3.723, *p*= 0.000) for the male group while no significant relationship (β= 0.006, *t*-value= 0.092, *p*= 0.926) was evident for the female group.

Table 36: Model run for the male group.

Relationship	Original Sample	Sample Mean (M)	Standard Error	*t*-value	*p*-value
ST -> KSB	0.197	0.202	0.053	3.723	0.000
TRU -> KSB	-0.011	-0.004	0.062	0.180	0.858
SV -> KSB	-0.056	-0.052	0.064	0.877	0.381
CQ -> KSB	0.605	0.604	0.05	12.068	0.000
M. on CQ (ST→KSB) -> KSB	0.085	0.07	0.073	1.171	0.242
M. CQ on (SV→KSB) -> KSB	0.056	0.053	0.088	0.631	0.528
M. CQ on (TRU→KSB) -> KSB	0.014	0.002	0.075	0.182	0.856

Table 37: Model run for the female group.

Relationship	Original Sample	Sample Mean (M)	Standard Error	*t*-value	*p*-value
ST -> KSB	0.006	0.017	0.061	0.092	0.926
TRU -> KSB	-0.007	-0.001	0.07	0.101	0.920
SV -> KSB	0.075	0.075	0.07	1.07	0.285
CQ -> KSB	0.677	0.663	0.055	12.313	0.000
M. on CQ (ST→KSB) -> KSB	0.036	0.036	0.071	0.505	0.613
M. CQ on (SV→KSB) -> KSB	0.12	0.118	0.085	1.419	0.156
M. CQ on (TRU→KSB) -> KSB	-0.033	-0.028	0.073	0.461	0.645

Referring to the control variable of age, the variation of age in the dataset was set out into four groups which are from ages of twenties (n=41), thirties (n=280) , forties (n=228), and from fifty years old and older (n=87), Table 14. Only the two larger age cohorts (thirties and forties) were controlled while the remaining two cohorts were not due to size-related issues or MICOM test fail. Again, the same MGA procedure was followed between the two groups.

Table 38: MICOM step 2, Compositional invariance result for age groups.

	Original Correlation	Correlation Permutation Mean	5.00%	Permutation p-Values
ST	0.995	0.985	0.953	0.737
TRU	0.996	0.993	0.981	0.596
SV	0.982	0.992	0.978	0.089
CQ	0.999	0.999	0.998	0.285
KSB	0.997	0.998	0.994	0.224
M. CQ on (ST→KSB)	1.000	1.000	1.000	0.401
M. CQ on (SV→KSB)	1.000	1.000	1.000	0.090
M CQ on (TRU→KSB)	1.000	1.000	1.000	0.187

Table 38 shows that the compositional invariance is established between ages from 30-39 and ages from 40-49 since the original correlation is greater than 5%.

Table 39: MICOM step 3-part 1, mean original difference (age groups).

	Mean - Original Difference (Age 30-39 - Age 40-49)	Mean - Permutation Mean Difference (Age 30-39 - Age 40-49)	2.50%	97.50%	Permutation p-Values
KSB	-0.178	0.003	-0.179	0.175	0.049
ST	-0.051	-0.002	-0.172	0.173	0.550
TRU	-0.240	-0.001	-0.181	0.169	0.006
SV	-0.149	-0.001	-0.167	0.165	0.082
CQ	-0.184	0.003	-0.176	0.176	0.037
M. CQ on (ST→KSB)	0.154	-0.004	-0.189	0.191	0.106
M. CQ on (SV→KSB)	0.146	0.001	-0.204	0.209	0.166
M CQ on (TRU→KSB)	0.096	0.002	-0.196	0.187	0.314

Table 40: MICOM step 3-part 2, variance original difference (age groups).

	Variance - Original Difference (Age 30-39 - Age 40-49)	Variance - Permutation Mean Difference (Age 30-39 - Age 40-49)	2.50%	97.50%	Permutation p-Values
KSB	0.272	-0.012	-0.326	0.306	0.105
ST	0.205	0.007	-0.288	0.296	0.155
TRU	0.227	0.006	-0.236	0.262	0.079
SV	0.224	-0.001	-0.230	0.239	0.063
CQ	0.283	-0.010	-0.344	0.299	0.083
M. CQ on (ST→KSB)	0.702	0.010	-0.764	0.815	0.090
M. CQ on (SV→KSB)	0.458	-0.010	-0.700	0.670	0.211
M CQ on (TRU→KSB)	0.200	-0.017	-0.604	0.572	0.525

Table 39 and Table 40 show the two parts of MICOM step 3 between ages from 30-39 and ages from 40-49. The tables indicate full invariance between the two groups for the variables KSB, ST, and SV. While partial invariance for TRU and CQ that scored mean original differences -0.240 and -0.184 respectively did not fall between 2.5% and 97.5% boundaries (Table 39). Hence, there is partial invariance between the two age groups, and then the assumptions of the MICOM test are established.

Since the MICOM test was satisfied, an MGA test was run for the two age groups. The results (Table 41) showed that age wields no significant influence on the research model.

Table 41: MGA for age 30-39 and age 40-49 in the data set.

	Path Coefficients-diff (Age 30-39 - Age 40-49)	p-Value original 1-tailed (Age 30-39 vs Age 40-49)	p-Value new (Age 30-39 vs Age 40-49)
ST -> KSB	0.117	0.090	0.180
TRU -> KSB	-0.022	0.588	0.825
SV -> KSB	0.008	0.469	0.938
CQ -> KSB	-0.119	0.950	0.100
M. on CQ (ST→KSB) -> KSB	0.186	0.051	0.102
M. CQ on (SV→KSB) -> KSB	-0.018	0.550	0.900
M. CQ on (TRU→KSB) -> KSB	-0.181	0.922	0.155

In conclusion of section 5.7, data analysis was carried out using SmartPLS software. The two stages – assessment of the measurement model and assessment of the structural model – were discussed in detail. The model scored satisfactory measurement levels. Then assessment of the structural model was conducted on two versions of the research model. Again, comparison between results of both versions was provided. Finally, IPMA and control variables analysis were set out.

5.8. Discussion of phase 1

This study has investigated the impact of social capital parameters – social ties, trust, and shared vision – and collaboration quality on knowledge sharing in e-government systems in Saudi Arabia. The three parameters represent the three dimensions of social capital (structural, relational, and cognitive). The cross-sectional data were collected from Saudi public servants in various governmental organizations using an online survey, and the data was analysed using a PLS-SEM approach.

Predictions about how social capital affects knowledge sharing behaviour have been tested in previous studies. However, this study considered only that literature which dealt with the impact of social capital in an intra-organizational setting. Here, the interest was to classify the intra-organizational literature into two main groups: those which studied knowledge sharing behaviour via information systems (IT-mediated context) and those which did so in a non-IT mediated context, such as in organizations or team settings. This classification was adopted because most researchers had not previously considered it (C. C. Liu, Liang, Rajagopalan, Sambamurthy, & Wu, 2011). In addition to this distinction, the study also investigated the theory in e-government systems that are essentially mandatory in Saudi public organizations, (see Chapter 2).

5.8.1. Versions of the research models

Two versions of the research model were tested using SmartPLS software. The research variables were combined in two different ways to see if there were any substantial difference in outcomes. Model version 1 tested the direct effect of social ties, trust, shared vision, and shared language on KSB. Model version 2 added one more variable: the impact of collaboration quality (CQ) on KSB, testing CQ's role on the relationship between the social capital variables and KSB.

5.8.2. Discussion of the results of the research hypothesis

This section discusses the results of hypothesis testing. Discussion of the hypotheses led to a group of explanatory questions. These questions possibly explain the results of the current phase. In a second qualitative phase (Chapter 6), these questions are used as qualitative research questions. The two phases are linked by the explanatory questions (section 6.1).

5.8.2.1. Discussion of H1

The first hypothesis in this research was about social ties. It stated that 'social ties have a significant positive impact on KS behaviour in e-government systems. The construct of social ties has been tested in many previous studies. In this research, social ties represent the structural dimension of social capital and refer to the extent to which social relationships allow communications and interactions between employees, which then facilitates the transfer of knowledge between them. The results showed that social ties had the most significant impact on KSB in e-government systems (compared with the other two social capital variables: trust and shared vision).

In the literature, social ties have been found to have an apparent effect on knowledge sharing – either in non-IT contexts (Amayah, 2013; Kang & Hau, 2014; C. N.-L. Tan & S. Md. Noor, 2013; Y. H. Tsai et al., 2017) or in IT contexts (Chai & Kim, 2012; C. M. Chiu et al., 2006; C. P. Hsu, 2015; Hu & Randel, 2014; Kwahk & Park, 2016; G. Li & Li, 2010; H. Liu et al., 2014). In team setting, they significantly impact KSB as well (García-Sánchez et al., 2019; Mueller, 2012). Hence, the findings from the current study support those from previous studies, including those conducted in IT-mediated contexts. There is therefore obvious consistency between the results here regarding ST and the literature. It can be said that employees are inclined to share more knowledge in e-government systems if they develop good workplace relationships. This is a simple interpretation of the data.

However, there are other considerations involving CQ that the data does not directly reveal. Unexpected complexities arose when CQ was introduced into the research framework, two versions of the research model were tested, and the results were compared. Testing of the relationship in both research models showed that ST was the only social capital variable that retained a significant impact on KSB when CQ was introduced into model version 2. Even though the relationship with KSB became less strong, it is essential to delve deeper into why ST was the only social capital construct played such a significant role in model version 2.

If the research had not introduced CQ into the research framework, the result might have been just a confirmation of the results of prior studies. The results of both models appear to indicate this. However, it just saying that this work is broadly consistent with prior works does not go far enough, and that brings the second phase into focus.

The first phase generally concludes that ST among employees is the most important social capital factor that drives knowledge sharing in e-government systems – because it was the only variable that retained a significant relationship with KSB in model version 2. However, this research employed a sequential explanatory mixed method, and crucially that allows the underlying reason to be investigated in phase 2. Thus, the second phase of the research is to investigate why ST was significant in model version 2.

To understand the reason, it should explain how ST relates to KSB in e-government systems. To do so it was necessary to investigate more about social ties in the Saudi public sector. The data showed that employees seem to make use of their social relationships when sharing knowledge during their work tasks on e-government systems. Given that the public sector is different from the private sector in various respects, other possible considerations might affect what we know about social capital. Investigating the nature of the public sector and the e-government system, it is also worth investigating how the relationship occurs and what role CQ plays in making the relationship less intense. When the answers are found, the reason will become clear.

This is the motivating point of the research and might give a deeper understanding of social ties and KSB in the context of e-government systems. Such an understanding will help public sector organizations better understand their employees' behaviour toward knowledge sharing. They will then be able to construct better e-government systems and devise more effective strategies to encourage employees to share knowledge in those systems. These aspects are investigated in the next qualitative stage of this research. To sum up, from the results of the quantitative study, the first qualitative research question was distilled: How do social ties influence KSB in e-government systems?

5.8.2.2. Discussion of H2

Hypothesis 2 focuses on the impact of trust on KSB. It assumes that 'trust has a significant positive impact on KS behaviour in e-government systems'. The impact of trust on knowledge sharing has been extensively tested in previous research. Trust has been defined in different ways in the literature depending on the aspect of trust being tested. Nevertheless, the most common description used within social capital is that trust is the expectation of positive behaviour from others despite the possibility of them

behaving maliciously. This definition was adopted here, and the results showed that trust statistically drives KSB in e-government systems (Model version 1), which is compatible with previous research in various settings. For illustration, many researchers conclude that trust significantly impacts knowledge sharing in organizational settings (Ansari & Malik, 2017; Y. Choi, 2016; Ho et al., 2010; M. H. Hsu & Chang, 2014; Kang & Hau, 2014; M. S. Rahman, Daud, Hassan, & Osmangani, 2016; Rosendaal & Bijlsma-Frankema, 2015; Rutten, Blaas-Franken, & Martin, 2016; C. N.-L. Tan & S. Md. Noor, 2013; Y. H. Tsai et al., 2017; H. K. Wang, Tseng, & Yen, 2012; W. T. Wang, 2016; Yasir & Majid, 2017). Trust has also been found to be an influential variable impacting knowledge sharing in team settings (J. H. Choi & Scott, 2013; M. H. Hsu & Chang, 2014; G. Li & Li, 2010; C. P. Lin, 2007; Mooradian et al., 2006; Mueller, 2012; M. H. Rahman, Moonesar, Hossain, & Islam, 2018). Moreover, in IT-mediated settings (such as virtual communities, wikis, and virtual teams), trust affects knowledge sharing as well (Chen & Hung, 2010; O. K. Choi & Cho, 2019; C. P. Hsu, 2015; M. J. J. Lin et al., 2009; H. Liu et al., 2014; Nelson & Cooprider, 1996; Y. Yan et al., 2014; Yen, Tseng, & Wang, 2015).

Despite the studies that have confirmed the importance of trust in promoting KSB, some others have found it to be not such a significant driver of knowledge sharing. For instance, Liou et al. (2015) concluded that, among Facebook users, trust between members is not the a factor that affects information sharing behaviour. Also, for members of a professional online learning community, Tseng and Kuo (2010) proposed a self-regulation model to explain the impact of social capital and social cognitive factors on KSB and found that an individual's perception of trust does not directly affect knowledge sharing. The outcomes of these two latter studies were not sufficiently strong to provide general understanding of the role of trust, since they both suffered sample limitations: the first one involved students aged 16 to 25 years, and the other involved teachers enrolled in a single specific online e-learning system. Generally, however, prior studies suggest some kind of consensus that trust is a strong driver of knowledge sharing. A potential drawback here is that the consensus may have led some researchers to justify their inconsistent findings instead of testing the underlying assumptions.

These general trends might not be strong enough to conclude that there is a definite impact of trust on knowledge sharing, especially when very little research has looked

at the difference between the impact of trust in non-IT and IT mediated contexts. To illustrate the difference, trust has been found more critical in non-IT settings than in IT ones (C. C. Liu et al., 2011). It is not clear why an IT-mediated context makes such a difference to the impact, however this study adds empirical evidence as to why IT features have a role in the connection between trust and knowledge sharing. In this study, the relationship between trust and KSB was no longer significant when CQ was considered (model version 2). This result is surprising and raises questions around how the impact of trust varies depending upon the perceived level of risk (M. S. Rahman, Osmangani, Daud, Chowdhury, & Hassan, 2015). For example, trust in social networks might not be as important in professional contexts such as e-government. So, the question remains, why is trust not significant when CQ is inserted into model version 2? Perhaps the impact of trust on KSB in an e-government context might be different. The statistics did not indicate whether the change in the relationship was from CQ itself or from something else. Either way, why did the change take place? This point raises the second qualitative research question in this sequential explanatory research: What are the considerations related to the impact of trust on KSB in e-government systems?

5.8.2.3. Discussion of H3

Similarly to the first two hypotheses, the third one states that 'shared vision has a significant positive impact on KS behaviour in e-government systems'. In this regard, among the three social capital constructs used here, shared vision (SV) is the one that has been least investigated in previous studies. SV refers to the common aspirations and goals an employee aspires to achieve with other colleagues. The analysis gave the result that SV does not impact KSB in e-government systems. This result was not surprising as previous works have found no effect of SV on IT-mediated KSB (C. M. Chiu et al., 2006; C. P. Hsu, 2015; G. Li & Li, 2010). Conversely, in non-IT mediated contexts, it does impact KSB (Goswami & Agrawal, 2019; T. W. Tang et al., 2015; Y. H. Tsai et al., 2017). Compared with the outcomes of previous studies, this result indicates that SV might be more influential when knowledge is shared in non-IT settings such as face-to-face communication.

At the same time, SV might seem less important when knowledge is shared via IS. The question here is why SV has a negligible effect in IT-mediated settings? C. M. Chiu et

al. (2006) found that, in a virtual professional community, SV significantly affected the quality of knowledge sharing but negatively affected the quantity of knowledge. The researchers provided a plausible interpretation: that when people cognitively share the same vision and goals, they concentrate on quality of knowledge rather than just quantity. However, such an interpretation does not seem valid when speaking about an e-government system environment. In e-government, employees are more responsible for what they share and might not share knowledge if they are unsure about it – because the quality of their work depends on such knowledge. That is, when employees are at work, they know their superiors are able to assess their work quality and so employees share only what they perceive as good quality knowledge. They also might share knowledge to confirm that they have made the right decision to solve a workplace issue. However, in non-IT settings (or even other voluntary-use KMS, such as discussion platforms), sharing knowledge might be less inhibited. For example, an employee in a non-IT setting may be inclined to share low-quality knowledge, and other employees may pass on and even discuss that piece of knowledge with less concern that their work outcomes will be affected. By way of contrast, in an e-government system, there is no room for mistakes and thus the likelihood of sharing low quality knowledge will be low.

The interpretation provided by C. M. Chiu et al. (2006) touches a major point. It seems rational, but when talking about e-government systems there is another angle that should be looked at. The researcher just argued that sharing only high-quality knowledge is an essential aspect of the knowledge sharing process in e-government systems, and employees will not share low-quality knowledge to do their formal work. The context of e-government systems makes the quality of knowledge a prerequisite for the appearance of sharing behaviour, and is therefore given by default. Thus, this argument provides no justification for why knowledge quality is different in the context of e-government systems. It is concluded that the interpretation of C. M. Chiu et al. (2006) is probably unsuitable in the context of this study. However, it is also hard to defend the assumption and conclude this part of the study.

Therefore, further investigation should be carried out to answer why SV did not affect the behaviour of employees to share knowledge and what was its role. Moreover, there are also questions like how SV might be made more influential? Were there some things related to e-government systems themselves or in environments of

organizations, or other concerns that employees had? It is hard to reach certainty about this issue based on current data. The literature is still too scant to provide a clear picture. The evidence from scarce prior research indicates that SV might be less influential in IT-mediated contexts, but this is not enough to give an answer in an e-government system context.

Thus, to understand the role of shared vision the sequential explanatory methodology adopted here might be suitable for collecting further information to fill this knowledge gap. The results of the second phase of this work might also draw a road map for future research. The qualitative stage of this research might be suitable for reaching a better understanding of the impact of shared vision on KSB in e-government systems. Consequently, the third qualitative research question should be: What is the role of shared vision in influencing KSB in e-government systems?

5.8.2.4. Discussion of H4

The fourth relationship hypothesised in the research was the impact of shared language on knowledge sharing behaviour. No result is available for H4 as the construct SL statistically failed during the data analysis, specifically the factor analysis step. A multidimensional scale must have a minimum of three items loaded significantly on it (Raubenheimer, 2004), however, this criterion was not satisfied in the SL condition as three of its five items were omitted due to their low loadings (see section 5.7.2). Moreover, in PLS-SEM, using less than three items should be avoided (J. F. Hair, 2014). Therefore, SL failed at the statistical level and was omitted from the analysis.

At the theoretical level, the research framework was, as mentioned before, built on the work of Nahapiet and Ghoshal (1998), who divided social capital into three interrelated dimensions: structural, relational, and cognitive (see section 03.1.2.3). Based on this division, three critical variables of social capital could be used to represent the three dimensions of social capital: social ties, trust, and shared vision (Aslam et al., 2013; Cao et al., 2016; C. P. Hsu, 2015; Koranteng et al., 2019; Razzaque, 2020a; Y. H. Tsai et al., 2014). Therefore, no theoretical issue was associated with the omission of SL.

5.8.2.5. Discussion of H5

H5 states that 'Collaboration quality of e-government systems has a significant positive impact on KS behaviour in e-government systems. The result of H5 showed that CQ had the most significant positive relationship with KSB in the research model. Such a result was understandable since KSB in an IT-mediated context would require some CQ. The surprising side of the results was that the three social relationships became weaker in model version 2 than in version 1. Most notably, the significant impact of trust in model version 1 disappeared. As mentioned earlier, in most prior studies the consensus was that trust is an influential factor on KSB. This study might therefore have been considered consistent with previous studies and further confirmation of the critical role of trust in generating KSB in e-government systems (model version 1). But with the appearance of CQ (model version 2) a question was raised about the role of social capital, especially trust. Was trust an influential factor of KSB in an IT-mediated context, specifically in e-government systems?

However, a possible interpretation of the vanishing of the trust relationship is that information systems simply document what users do. Thus, employees might not need to trust each other when sharing knowledge in an IT context. The possible reason might be that employees knew that their names would be tagged along with their contributed knowledge. Hence, the possibility of others taking advantage of their knowledge would be lower. This reason might also illustrate why the use of IT is more useful in knowledge sharing when the level of trust between team members has not yet developed (Y. Choi, 2016). Therefore, rather than trust being the key factor, the collaborative features embedded within information systems might be critical to knowledge-sharing behaviour in an IT-mediated context. This argument is not far from the outcome of a study conducted by Styhre (2008), who argued that social capital is a substitute for the lack of formal procedures required to share knowledge. The easy collaborative features allow employees to conveniently share knowledge to demonstrates their work quality and at the exact time protect themselves from being vulnerable (since the system allows formal sharing of knowledge).

Even though this interpretation may well be true, it does not apply to social ties. The decrease of the ST relationship with KSB is still unclear. When systems have features allowing knowledge sharing, the more likely situation is that ST becomes more related

to KSB, not less. When CQ is higher, it will enable more interactions through the system, and hence more knowledge sharing. The results, however, told a rather questionable story. Comparing the results of ST and TRU in both research models, the researcher perceived that there might be some factor in this phase that had not yet been uncovered. There may have been something going on which the statistics could not identify.

The researcher wondered how social capital got weaker in model version 2. Further investigation needs to be carried out to answer the question: Should CQ be the major influential factor on KSB in an IT-mediated context, not social capital? It seems there may be valuable information hidden behind this question. Thus, further investigation of these points might give a better understanding of social capital and KSB. Hence, the first results of this study raise a need for a further explanation for the impact of collaborative features in e-government systems and why social capital, especially trust, became weaker in their relationship with KSB. The researcher argued that understanding CQ impact would explain this lapse in social relationships in model version 2. The qualitative phase could well be crucial in explaining this change. Hence, the fourth research question will be: Why was CQ more influential than social capital on KSB in e-government systems?

5.8.2.6. Discussion of H6a, H6b, and H6c

Unlike what the researcher expected, data showed that CQ did not moderate the relationship between the three social capital relationships and KSB. Specifically, speaking of the path between ST and KSB, it was surprising that there was no moderating effect on it because it was the only significant path that stayed significant after inserting CQ in model version 2. Logically, as ST was positively related to KSB, higher CQ should positively moderate the relationship because employees would use collaborative features to share more knowledge using their social relationships. Contrarily, the unavailability of the features should make employees unable to share knowledge in the systems even if they possess strong social ties. Considering the strong relationship between CQ and KSB, the result raised a question mark about how CQ relates to KSB. It was unclear how CQ could have this effect while not being able to have a moderating influence. The question that emerges after such a result is how can CQ be enhanced to play a positive moderating role in the research model?

Knowing the mechanism of CQ would add to our understanding of how technological aspects interact with social factors and how they reflect on behaviour. Moreover, it would open up an avenue for public sector organizations to develop their e-government systems in the right way. They would know more about how to make their systems more encouraging of KSB.

Because this research adopted a mixed methods approach, there was a chance to answer this question and explain the result in the light of the perception of the employees themselves, not guessing explanations from the researcher. The employees' explanations would answer how social capital could become such an influential factor on KSB. This applies not only to e-government systems; it might also expand our understanding of other IT-mediated settings. Therefore, the second phase seeks to answer the question: How does CQ affect the relationship between SC and KSB?

5.8.3. Limitations of phase 1

Phase 1 in this research suffered some limitations, and part of them are theoretical. The first theoretical limitation is that the research framework was based only on social capital theory. Integration of social capital with other behavioural approaches – such as the Theory of Reasoned Action (TRA) (Ajzen, 1980) or the Theory of Planned Behaviour (TBP) (Ajzen, 1991) – might give new insights. Secondly, only the main three social capital variables used to represent the theory. It might be valuable to investigate other variables. Expansion so as to test other constructs – such as network diversity, identifications, norms, etc. – might explain the relationship between social determinants and knowledge sharing behaviour in more detail.

Another limitation involved the context of e-government systems. The knowledge-sharing behaviour of employees might be different in other kinds of systems such as KMS. Thus, comparing differing contexts might add to our understanding of the topic. Lastly, even though cross-sectional studies have advantages, they also suffer disadvantages which limit their results (Levin, 2006). Longitudinal research projects would no doubt enrich the literature.

5.9. Chapter summary

This chapter dealt with the first phase of this sequential explanatory mixed methods research. It was a quantitative study in which the research model was statistically tested. The chapter began by discussing the development of the survey and the

associated ethical considerations. It then discussed the pilot study in which two versions of the survey were tested. After that, details were provided about data collection and screening procedures, and was followed by a simple description of the data.

The next part involved data analysis using PLS-SEM in which two versions of the research model were tested. The last part discussed the results of hypothesis testing. Then, qualitative research questions for the second phase were asked to further explain the results of the model testing. Finally, the limitations of the first phase were highlighted.

6 Qualitative Phase

This chapter describes the second phase of the sequential explanatory research in which explanations are sought for the results of the first quantitative phase. The research questions in this phase derive from discussion of the first quantitative phase in subsection 5.8.

6.1. Research questions

The discussion of the first quantitative phase helped establish six research questions for the second phase, specifically to explain the statistical results:

Qualitative-RQ 1. How do social ties influence KSB in e-government systems?

Qualitative-RQ 2. What are the considerations related to the impact of trust on KSB in e-government systems?

Qualitative-RQ 3. What is the role of shared vision in influencing KSB in e-government systems?

Qualitative-RQ 4. Why was CQ more influential than social capital on KSB in e-government systems?

Qualitative-RQ 5. How does CQ affect the relationship between SC and KSB?

6.2. Method of the second phase

As set out in see 4.4.1, this phase adopted a qualitative approach involving semi-structured interviews with Saudi public servants who used e-government systems. Self-selection and snowballing were the two volunteer sampling techniques employed during this phase. The interview questions focused on participants' experiences (Seidman, 2019) and followed the normal conventions of conversation. (Castillo-Montoya, 2016). For analysing the data, thematic analysis – as mentioned in section 4.4.3 – was adopted using the steps suggested by Braun and Clarke (2006). To maintain the rigor of the research, the researcher followed well defined criteria before and during the interviews – such as an interview guide, ethical considerations, establishing rapport, and so on.

6.3. Interview guide

An interview guide was prepared to ensure the same thematic approach was applied in all interviews and ethical considerations were adhered to (Qu & Dumay, 2011). A recruitment letter was distributed to potential participants through social networks. The letter included brief information about the researcher, the topic, target population, expected time of the interview, the researcher's name and email, and a link to the participant information sheet (PIS). The PIS (Appendix A-7) was created on Qualtrics.com; it included all information that respondents needed to consider before taking part in the study. Information included the researcher, the topic, definition of e-government systems, benefits of the study, how to participate, information about the interview, possible associated risks, participants' rights, and contact information.

At the end of the PIS, a short electronic form was provided where participants could enter their contact details (i.e. name, email, and mobile number), and two 'Yes/No' questions asking whether they were public sector employees, and whether their jobs included working on e-government systems. After the researcher received the contact details, he contacted them and arranged interviews. Date, time, and method of call had to be determined for each interview. At the time of interview, the researcher called the participants. The calls begun with an icebreaking technique which encouraged them to ask whatever they wanted to know before starting the interview. After that, they were provided with a link to the consent form and were asked to sign it. The consent form was also created on Qualtrics.com. Participants had to write their names, indicate 'yes' or 'no' to be interviewed and audio-recorded, interview date, and then electronically sign in the signature area of the form (Appendix A-8).

6.4. Interview ethical considerations

One of the researcher's responsibilities was to obtain ethical clearance before pursuing the study topic and interviewing people (Creswell & Clark, 2017; Williamson & Johanson, 2017). This study involved gathering data from public sector employees who have the rights to privacy, discretion, and protection; it is not enough to just simply follow professional association guidelines (Creswell & Clark, 2017). For this reason, the researcher reviewed the Executive Regulations for Human Resources in the Civil Service issued by the Saudi Ministry of Human Resources and Social Development to ensure participants experienced no conflict with their workplace

obligations. Details of the participant information sheet have already been given, but what can be added here is that people could give consent to having their interviews audio-recorded for analysis and could retain their anonymity. Their identities were not disclosed and names were substituted with codes. The participant information sheet clearly stated that taking part was voluntary with no obligations to answer all the interview questions. Moreover, they had the rights to withdraw from the interview at any point without providing any reason, and the freedom to ask any question either before, during, or after the interview. Because a research plan needs to be reviewed by the institutional review board (Creswell & Clark, 2017), an ethics approval application was submitted to the Curtin University Human Research Ethics Committee.

6.5. Language of interviews and translation

Interviews were conducted and transcribed in Arabic, since the researcher is a Saudi native and speaks the language. Arabic was chosen for two reasons. First, it is the mother tongue in Saudi Arabia, which helped participants feel comfortable and easily express themselves in the interviews (Albloushi et al., 2019). Second, conducting interviews in Arabic avoided a possible sample bias in selecting only those who spoke English.

Nevertheless, researchers face challenges when an interview-based study involves different languages. When interviews are conducted in one language and reported in another language there are a number of translation-related issues (Birbili, 2000). The researcher needs to transfer the original language's meanings, connotations, and nuances to the reporting language. The researcher needs to explicitly discuss translation-related issues and how they might affect the research (Feldermann & Hiebl, 2020; Temple, 1997).

In this research no translation of the data took place throughout the analysis except for statements or quotes once the analysis was completed. Analysing data in a second language may increase the risk of distorting meanings and decrease the validity of people's answers, so it is recommended to adhere to the original language that a researcher natively speaks "as long and as much as possible" (Van Nes, Abma, Jonsson, & Deeg, 2010). Moreover and most importantly, analysing data in the source language preserves the cultural context of the data and retains authenticity, which is a

key quality of the analysis (Filep, 2009). Therefore, the translations which took place in this research involved conveying meanings, connotations, and nuances to the reader.

Gaining conceptual equivalence in the write-up language is the main difficulty when studies involve translation work. However, such an issue cannot be completely solved as two languages always lack direct lexical equivalence. For this reason, many scholars suggest that translation efforts should focus on conceptual equivalence, not lexical equivalence (Birbili, 2000). In this regard, translation may take place in a literal or free style (Filep, 2009). Free translation involves reconstructing the source statements to preserve meanings and connotations, while in a literal translation there is a word-by-word translation of the source statements.

Literal translation gives more justice to the utterance of participants, helping to better understand the thinking of the original speaker. However, it might also reduce the readability of the text and lose meanings and connotations. In such a situation, the reader needs to give more effort to interpreting the literally translated text, and this might lead them to a misunderstanding. On the contrary, free translation involves some changes in the structure of source statements to make them easier for the reader of the reporting language. Filep (2009) suggests using free translation rather than literal translation when source quotations are complicated and may lead to misinterpretations. Hence, free translation should focus more on conceptual equivalence. Whether meanings are comparable depends on the skill of the researcher or translator.

In this context, a proficient understanding of the source language might not be enough. Intense knowledge of the participant's culture is also needed to convey the cultural connotations to the reader (Birbili, 2000). In this research, the researcher is intimately aware of Saudi culture as he is a Saudi who well understands the spoken dialect. Therefore, he was eligible to perform the translation of the quotations. Moreover, he used both types of translation styles. Literal translation was used when the meaning of the quotation was precise and the translated text would be easy to understand, and at the same time, the meanings and cultural connotations were preserved. He also used free translation when the literal translation was unsuitable for quotations – when the translated texts were complicated and hard to read, or meanings were at risk of being lost (Filep, 2009). This approach aimed to mirror the cultural contexts and meanings of quotations while keeping them as close as possible to the original Arabic. The researcher used the participants' words as much as he could. He used footnotes to

explain some cultural aspects of Saudi speech and did not change inaccurate terms spoken by the participants, leaving it to the reader to grasp the true meaning.

As well as using these precautions, the researcher used the back translation technique to ensure the translations were good enough to retain meanings, connotations, and nuances (see section 5.1.3). He sent a sample of around 25% of the translated quotations to a professional NAATI translator ("NAATI, Who we are," 2020) for translation back into Arabic. The researcher then compared the meanings between the original data and the back-translated sample. Both were convergent, with no changes in meanings. It was therefore concluded that the translations were good.

6.6. Overview of interviewees

A total of 15 semi-structured interviews were conducted between 15th November 2020 and 11th March 2021. Eleven people were recruited via social networks through a recruitment letter that included a link to the participant information sheet. Four people were reached through the snowball technique. All interviews took place online due to the Covid-19 pandemic. The interviewees comprised 13 males and 2 females from 12 different public sector ministries and other agencies. They worked at different jobs and levels such as manager, supervisor of a unit or department, administrative employee, and faculty member. The education levels of participants were 3 diplomas, 6 Bachelors, 4 Masters, and 2 doctoral degrees. They also had a variety of employment experiences ranging between 3 and 28 years. Most of them had worked both before and after e-government systems were introduced. The sample therefore had different attitudes and experiences which produced a broad understanding of social capital according to employees and managers. Table 42 summarizes the demographic data of participants.

The average time for each interview was 48 minutes, and as stated earlier, the interview guide was followed and all interviews were conducted in Arabic. Afterwards, the researcher transcribed all the interviews using headphones and typed them into MS-Word. Transcription time was from 8 to 10 hours per interview.

Table 42: Demographic data of participants.

Participant	Gender	Education	Job type	Experience in years
1	Male	Postgraduate	Administrative	10
2	Male	Bachelor	Administrative	17
3	Male	Diploma	Administrative/ clerical	19
4	Male	Bachelor	Administrative	14
5	Male	Bachelor	Junior manager	3
6	Male	Bachelor	Middle manager	8
7	Female	Postgraduate	Administrative	5
8	Female	Master	Faculty member	13
9	Male	Postgraduate	Executive manager	20
10	Male	Postgraduate	Senior manager	12
11	Male	Diploma	Administrative	26
12	Male	Bachelor	IT employee	14
13	Male	Postgraduate	Administrative	10
14	Male	Bachelor	Junior manager	28
15	Male	Diploma	Administrative\clerical	10

6.7. Establishing rapport

When the interviews began the first step was to establish a level of rapport with participants. Rapport refers to the process of building a sense of trust and comfort that is allows free flow of information between interviewer and interviewees (Spradley, 1979; Wolgemuth et al., 2015), and then provide accurate information (Garbarski, Schaeffer, & Dykema, 2016). The rapport process model of ethnographic interviewing was employed. It has four sequential steps: apprehension, exploration, cooperation, and participation (Spradley, 1979). Even though the interviewees already had the information sheet (PIS), the researcher again explained the topic to them orally together with a definition of e-government systems, and then offered them the chance to ask whatever they wanted before starting recording. Most participants had not fully read the information sheet, so some of them had concerns about privacy. To dissipate apprehension, the researcher read the PIS to them so that they understood what the conditions were. Reading it to them was important for it meant that the participants were relieved when they realised that their concerns had already been addressed on the sheet and that the researcher had reassured them that their privacy would be maintained. For example, two of the participants asked that their organizations not be disclosed, even though the PIS had already mentioned that publication of the organization's names would not take place. The researcher asked the interviewees to ask any questions any time during the process (either before, during, or after the

interview). After that they were asked to sign the consent to interview form, which was sent and signed electronically. The researcher did not record discussions from the very beginning because rapport had to be established at this level first. This technique worked well.

When the recordings began, the researcher asked some grand tour questions such as: "Can you tell me about the e-government system you use most frequently in your organization?". Other questions were asked such as the type of work they do on the systems (Leech, 2002). Such questions offered an insight into how e-government systems function in Saudi Arabia. Another benefit of this question was making sure that employees were talking about e-government systems and not other types of systems. For example, participant 7 offered to talk about another KMS system which was not the focus of this study:

> *"If you were asking, about the system for experience reciprocity and exchanging stuff, we have a system that specializes in this. For example, each employee can offer a piece of information or share it. He can send a video clip, or for example has gotten to know about a new program, he could provide some background about it and so on. Everyone can enter and see the system organized according to subject. For example, you would like to see about the subject of management or statistics and so on. Everyone has knowledge about one of those subjects; he or she can share it even if it was not in the scope of the work". (Participant 7).*

In such a situation, the researcher got her to talk about e-government systems. He then asked her about the difference between this KMS and the e-government system, and she responded:

> *"Umm, I feel that both systems are independent… That means that in one I will share information about a subject, while in the other one I will share other subjects. In this [the e-government system] I will share subjects related to finance and so on while in the other [the voluntary system] it will involve broader subjects which could be finance, banks, or more". (Participant 7).*

At this point, the researcher asked her to focus on the e-government system, not the KMS, and so the participant knew exactly what she was being asking about. This example illustrates one of the techniques that the researcher used during the interviews to increase the validity of the data.

Some participants had no concerns about privacy issues, so they did not need reassurance at the beginning, while others took more time to feel relaxed about privacy. Generally, preparing participants before starting to ask them core questions took around 15 to 20 minutes. This time was used to help build rapport with the participants.

6.8. The sample and data saturation

In terms of sample size in qualitative research, there is no agreement on a specific number of interviews required. Overall, samples of qualitative data are normally small (Marshall, 1996) because it is high intensity in nature, which usually makes sizes of 2 to 20 enough (Todd & Benbasat, 1987). In this regard, scholars use the saturation point to stop collecting data. The concept of saturation initially came from grounded theory research (Creswell & Creswell, 2018) and even though it has become universal (Fusch & Ness, 2015), there is no agreed justification for saturation (Francis et al., 2010), and no one-size method fits all research (Fusch & Ness, 2015). Nonetheless, many researchers take it that saturation is the point at which there are no further themes emerging and data starts replicating with no new ideas or insights (Bowen, 2008; Creswell & Creswell, 2018; Fusch & Ness, 2015; Glaser, 1967).

In this research, the researcher continued conducting the interviews until no new themes were added and data started repeating itself. After the thirteenth interview, the researcher did not learn anything new, so he was convinced that the saturation point was reached. Specifically, about half of the open codes appeared for the first time in the first interview. The codes continued appearing throughout data collection until they stopped by the end of the thirteenth interview and no more codes were added in a further two interviews. Hence, the data saturation point had been reached. Figure 39 below shows the numbers of new codes appearing in successive interviews.

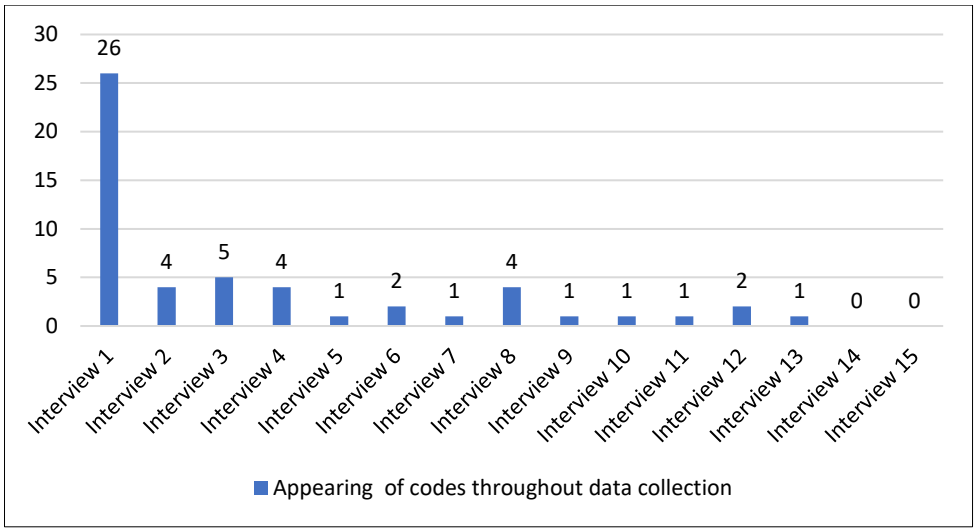

Figure 39: Appearance of new codes through the data collection process.

6.9. Difficulties associated with data collection

Data collection was associated with some difficulties. For example, the Covid-19 pandemic meant that all information was collected online and not in person, which has implications for the response rate to the interview invitation. Specifically, the in person response rate is generally higher than online (Curasi, 2001). Some participants did agree to be interviewed, but when the researcher contacted them back to arrange a time, they asked for a delay and later lost interest. After two reminders, they were deleted from the list of potential interviewees and not contacted again.

Another issue associated with conducting interviews online was poor call quality. Doing an online call requires a good internet connection but this was not always available. During some of the calls the researcher and participant struggled to hear each other. In some cases, the researcher ended up having to call them on their telephone. Even though a telephone helped to overcome the lack of suitable connection in some cases, there were extra costs involved. It should be noted that no video interviews took place. All were audio and the phone was used only when participants did not have any other online connection.

One unanticipated issue arose in that the consent form was queried by some participants. A feeling of insecurity arose when participants were asked to sign the interview consent form. They had been previously assured that neither their names nor their organization's identity would be published, but were then later asked to write down their names and sign. The researcher then explained that the research was approved by HREC in the university and the consent form would not be published.

One cautious participant asked for a few minutes to call the HREC, and when he got an answer, he signed the form. Moreover, male researchers encounter certain cultural challenges when interviewing women from Saudi Arabia. The culture is somewhat unique and might cause problems if not understood (Alattas & Kang, 2016). Women's responses to the recruitment letter were fewer than men due to religious reasons and traditional rules of life that govern Saudi people. There are gender separation policies in place, and so male researchers struggle collecting data from Saudi females to the extent that some researchers have ended up only collecting data from males (Al-Majed, Murray, & Maguire, 2001) while others avoid direct interaction and find other ways with less direct interactions, such as by phone (Al-Othaimeen, 2003). In Saudi Arabia, most public sector organizations separate their branches along gender lines which lowers the chance to get referrals to female participants using the snowball technique. The researcher was able to conduct only two interviews with women.

6.10. Qualitative data analysis

Data analysis was conducted concurrently with data collection. This approach is important to test the fit between the collected data and the analysis (Green et al., 2007), and also helps to determine the point at which data collection should stop (Tow, Venable, & Dell, 2015). When participants reported some new interesting areas, the researcher asked questions about them (Williams, 1988). For example, the first phase did not investigate trust in management, but when some participants seemed to be concerned about issues of trust, questions about trust in management were asked in the following interviews.

Data transcripts of in-depth interviews are naturally rich, multifaceted, and unstructured, and need much more effort to analyse. Transcribing, and then chunking texts into meaningful parts and drawing a complete picture of the story behand the data is time consuming and complex (Halcomb & Davidson, 2006). Some software packages such as NVivo, HyperRESEARC, ATLAS, and N6 help researchers to analyse such kinds of data instead of handling it manually (Richards & Richards, 1991; Saunders et al., 2016) which claim to enhance the rigor of data analysis (Richards & Richards, 1991). Here, NVivo Pro 12 was used to analyse the interviews as it has a large range of features to electronically deal with the data and code them. One technical issue encountered was that the software does not work well with texts in languages written from right to left such as Arabic. This issue affected some other features. For

example, selecting Arabic texts was difficult in NVivo and margins tended to disappear as well. The researcher solved the issue by entering all data files in PDF format and used region selection instead of text selection. Another issue was the copy/ paste function of Arabic text in NVivo. The software pastes it in unreadable reversed letters. In general, the software was much less flexible with the Arabic language but it was able to help in coding and organizing the data.

As stated previously, the six-step approach to thematic analysis suggested by Braun and Clarke (2006) was adopted. The first step was to get familiar with the data. It is recommended to read the entire data set at least once before commencing coding. Here, the researcher collected the data himself so he had some knowledge of it (Braun & Clarke, 2006). After that, he did the transcription, and then reviewed the interviews by listening to the audio recordings and making corrections. Notes were taken about the data, including about how participants uttered some statements and what they meant by certain expressions. This procedure helped the researcher become familiar with the data and prepare for the next steps.

The coding process itself was conducted through four steps: open coding, focused coding, axial coding, and aggregating into dimensions (Figure 40). The first step involved generating initial codes which summarized the parts of data and reflected a semantic or latent level of meaning. Gioia, Corley, and Hamilton (2013) suggest the need to achieve analysis rigor and here the first order analysis aimed at coding "faithfully to informant terms" (Gioia et al., 2013) by employing an inductive approach – one where codes and themes aligned closely to the content of the data (open coding) from bottom to top (Cooper et al., 2012). The second step was focused coding (Charmaz, 2006; Samuel & Peattie, 2016) and this makes it possible to reduce some initial codes to fewer codes. In other words, it is a process of coding the coded data. Focused coding usually requires a longer process and may result in developing new sets of codes, but it helps researchers develop greater insights (Saunders et al., 2016). To reiterate, this study is the second phase of a sequential explanatory research program and its aim is to explain the results of the first quantitative phase. Thus, focused coding concentrated on providing the prescribed analytical framework (Charmaz, 2006).

After the codes were generated, the researcher searched for themes to be grouped into codes, which depends on directly linking the research questions to the topic being

covered, and ultimately the hypotheses of the first phase (Braun & Clarke, 2006). In this regard, the second recommendation by Gioia et al. (2013) was followed. Axial coding was employed to group themes according to their similarities and differences, keeping theoretical knowledge in mind (Gioia et al., 2013). These authors further recommended distilling the second order themes into higher order themes, known as "aggregate dimensions", which was the fourth step. Figure 40 shows the coding steps used in this study.

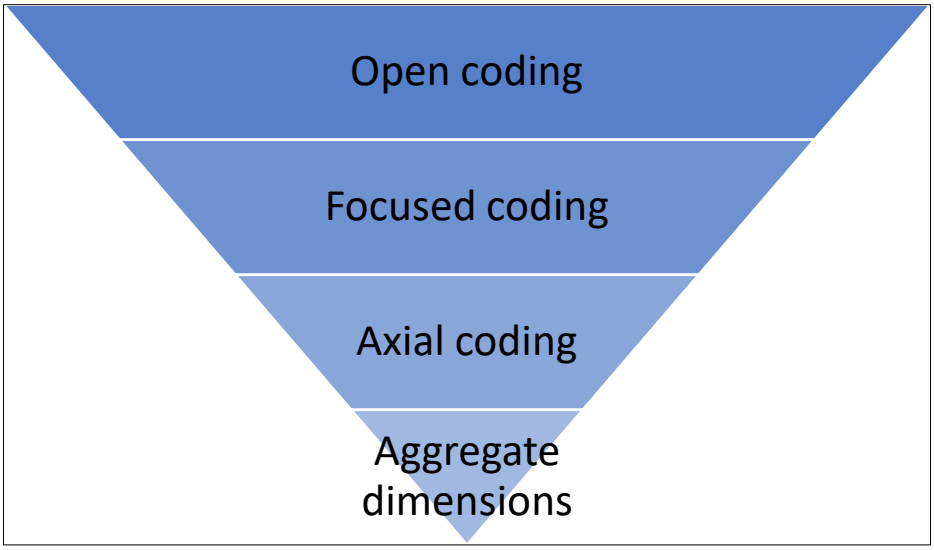

Figure 40: The four steps of the data coding process.

Qualitative data analysis usually requires moving forward and backward through the body of data, which means data coding and analysis can be started at the data collection stage (Braun & Clarke, 2006). Such a technique was applied to help review codes several times during the data collection process. Before undertaking the next step, the analysis was reviewed at two levels. The first review was where all the data extracts were read again to make sure they had been collated into their right themes. This resulted in some changes in theme names, moving some themes from first to second order. The second review involved the entire data set. All data was reread again to ascertain the validity and reliability of themes, and check if anything had been missed for coding (Braun & Clarke, 2006).

6.11. Validity and reliability of interviews

While there are debates about whether validity and reliability in qualitative research are applicable or not, the need for assessing qualitative measures still stands (Golafshani, 2003; Morse, Barrett, Mayan, Olson, & Spiers, 2002; Pandey & Patnaik, 2014). In this sense, any qualitative research should take into account validity and reliability to ensure the accuracy and credibility of findings (Creswell & Clark, 2017). Consequently, many works provide some check lists or recommendations to measure the validity and reliability of qualitative research or to enhance their rigor (Creswell & Clark, 2017; Gioia et al., 2013; Kirk, Miller, & Miller, 1986; Long & Johnson, 2000). Validity in qualitative research means that the findings are trustworthy, while reliability means that there is consistency of procedures in handling data. Various validity and reliability approaches were followed in this phase (Creswell & Clark, 2017). To achieve validity here, the researcher used the following approaches:

- Triangulation of data source: themes here were established from the perspectives of different participants to enhance the coherence of themes (Creswell & Clark, 2017).
- Clarification of possible bias: it is recommended to provide a clarification about how the outcomes of a study are being shaped by the background of the researcher, such as culture, gender, and so on. Such self-reflection is a part of good qualitative research (Creswell & Clark, 2017). This approach was adopted here and to provide an honest narrative of possible bias. As an example, the researcher explicitly pointed out that conducting only two interviews with females is a possible gender bias which limits the results.
- Presentation of conflicting information: researchers need to discuss data that contradicts their chosen themes. Such a discussion reflects more credibility of real life and indicates more validity (Creswell & Clark, 2017). Any contradictory information is acknowledged and used to interpret the findings.
- Peer debriefing: involving a person other than the researcher to review and discuss the study will enhance the accuracy of the findings (Creswell & Clark, 2017). A highly experienced professor was involved in reviewing the methods and procedures employed in this phase. She was not from the research committee and was chosen for her experience in conducting qualitative

research and efforts as a reviewer in many high-quality management journals. She is an internationally recognised expert with vast experience in both public and private sectors in different countries around the world. She enjoys teaching experience of both graduate and undergraduate levels with longstanding experience of doctoral supervision and examination. She has also obtained many scholarly, teaching, and funding awards. Most importantly, qualitative research methods is a focused interest of her scholarly career. Here, the researcher discussed the methods he employed and data analysis and coding process steps with her. The feedback and recommendations she gave the researcher enhanced the rigor of the data analysis method and the quality of the themes extracted.

In terms of reliability, details of procedures were documented to show the consistency of the accepted approaches. Further, the researcher kept reviewing the transcripts and listening to sound recordings to review the voice tones of some of the answers. Such techniques helped the researcher to establish how themes were linked. Moreover, codes were reviewed continually during the data analysis process to ensure no change was evident in their definitions (Creswell & Clark, 2017). The researcher spent considerable time and effort doing this until the final coding list was reached. Such precautions indicate a suitable level of reliability in this study.

6.12. Data coding process

The coding process took a lot of time: it began when the first interview was conducted in November 2020 and ended with the last one in July 2021. As mentioned above, four types of coding were applied to the data: open, focused, axial, and aggregation coding (Figure 40). The four steps are discussed in more detail below.

6.12.1. Open (initial) coding

The first coding step was open codes (initial coding). Two approaches can be used here: inductive and deductive. When using the inductive approach, all possible meanings of data should be considered and can lead to a large number of codes. For the deductive approach, a researcher starts coding by applying a theoretical framework based on the literature and applying it to his or her data. The use of a purely inductive approach is more suitable with very exploratory research; however, it is time-consuming and researchers can use their research questions as a guide for coding the

data. On the other hand, the use of a purely deductive approach is tricky when the literature-based coding list is insufficient (Saunders et al., 2016).

Neither purely inductive or purely deductive approaches were appropriate for this study. This study is not an exploratory research – it is a sequential explanatory study – and its framework (research model) is based on the social capital literature. No adequate framework of codes was available due to scarcity of the qualitative social capital literature (section 2.6) in the specific areas (research questions) this study aimed to investigate. Thus, instead of employing one approach, a mixed coding approach was embraced (Saunders et al., 2016). The constructs from the research model were used to deductively code data. Moreover, inductive coding was necessary to not miss what participants meant in their statements. The research questions were used to help focus on which data should be coded. Some examples of open codes are provided in Table 43.

Table 43: Some examples of open codes.

Participant	Text segment	Code
Participant 8	*"Let me go back to the personal relationships, the information would not differ, and now I'm talking about myself. No difference in the quantity of information I provide because I feel this is work regardless of whether I know my colleague or not".*	No impact of ST on knowledge donating
Participant 13	*"The personal motivation to answer the queries is that your name frequently occurs in the ministry. You get somewhat a known name. This is the only motivation".*	Recognition
Participant 7	*"We are tied to a certain number of words which we cannot exceed".*	Not enough space

Overall, the process of open coding resulted in a number of codes (53) which reflected the interviewees' opinions and comments. The final code list is shown in Table 44.

Table 44: The open codes list.

Open codes list					
1	No impact of ST on knowledge donating	2	Impact of ST on knowledge seeking	3	ST and personality of colleague
4	ST increases timing of knowledge sharing	5	Sharing K regardless of trust in colleague	6	Documentation
7	Trust in colleagues is important	8	Fear of repercussions	9	Management indifference
10	Tolerance to mistakes	11	Management attention to employees	12	SV with collaboration
13	SV with incentives	14	No CQ available	15	Not enough space
16	Lack of accessibility	17	Redundancy	18	Ineffective notifications
19	Ineffective archive	20	No instant chatting	21	No voice comments
22	No KS templates	23	No knowledge feedback	24	Writing comments
25	Attachments	26	Sharing work within a transaction	27	Assigning tasks
28	Tools for confidential knowledge	29	Discussion board	30	Sending queries to colleagues
31	Video and voice share	32	Effective archive	33	Forward copies of transactions
34	Importance of CQ	35	Delivering K in a clearer manner	36	CQ and workload
37	Reusing stored knowledge	38	Preference to share K in e-government	39	Avoiding potential issues
40	Individual intellectual contribution	41	Recognition	42	Mandatory use
43	Abbreviation	44	Formal style	45	Knowledge relevance
46	Knowledge accuracy	47	Face-to-face	48	Phone
49	Email	50	WhatsApp	51	Competition style
52	Training	53	Supportive equipment	54	

Brief descriptions of these codes with the number of participants and quantity of statements are provided in Appendix (A-18).

6.12.2. Focused coding

Focused coding is a process of coding the initially coded data (Saunders et al., 2016) in order to develop more specific codes (Giles, de Lacey, & Muir-Cochrane, 2016). Researchers need to use their insights about the data and this means using “theoretical sensitivity and reflexivity” (Giles et al., 2016) to evaluate which initial codes should be more focused. Importantly, open codes with large amounts of data do not necessarily become focused codes. The focus coding process involves recategorizing data to fit fewer codes which can answer the research questions. In this sense, focused

coding usually results in less codes but with larger units of data allocated to them (Saunders et al., 2016).

All the data was recoded again during the focused coding process and other parts of data were moved, reorganized, and recoded. This was a time-consuming phase as it required coding all the data from beginning to end (Saunders et al., 2016). The following tables and the comments under them illustrate how the process was executed.

Table 45: Focused code "ST increases quality of knowledge".

Open codes	Focused code
ST and personality of colleague	ST increases quality of knowledge
ST increases timing of knowledge sharing	

Table 45: A group of interviewees agreed that their relationships with others had helped them to put knowledge in forms that fitted the personalities of their colleagues. Another participant added that she provides knowledge in a timely manner to her close colleagues but not others. Here the two themes “ST and personality of colleague”, and “ST increases timing of knowledge sharing” were recoded under “ST increases quality of knowledge”.

Table 46: Focused code "Sharing regardless of trust in colleague”.

Open codes	Focused code
Sharing knowledge regardless of trust in colleague	Sharing knowledge regardless of trust in colleague
Documentation	

Table 46: Several participants shared their knowledge in e-government systems without considering whether they trusted their colleagues or not. At the same time, they confirmed that e-government systems had the ability to document everything. Thus, the theme “Documentation” was recoded under the theme “Sharing knowledge regardless of trust in colleague”.

Table 47: Focused code "Low trust in management".

Open codes	Focused code
Fear of repercussions	Low trust in management
Management indifference	

Table 47: Some participants were concerned about being questioned or penalized by management for mistakes when using e-government systems. The data was coded as “Fear of repercussions”. The second code “Management indifference” included information given by two other people who were disgruntled because their management ignored their needs or suggestions. The data from the two themes was combined into one: “Low trust in management”.

Table 48: Focused code "High trust in management".

Open codes	Focused code
Tolerance to mistakes	High trust in management
Management attention to employees	

Table 48: Unlike the previous focused theme, the other group stated that their management will likely understand their mistakes and try to correct the mistakes rather than blaming them. Further information indicated that the managers were open to opinions and understand employees’ concerns. This data was recoded “High trust in management”.

Table 49: Focused code "Low CQ".

Open codes	Focused code
No CQ available	Low CQ
Not enough space	
Lack of accessibility	
Redundancy	
Ineffective notifications	
Ineffective archive	
No instant chatting	
No voice comments	
No KS templates	
No knowledge feedback	

Table 49: During the interviews, participants talked about shortcomings in their e-government systems which obstruct KSB. They further talked about some collaborative features that should be available in their e-government systems. All the missing collaborative features are shown in the table. All these codes obviously reflect

low levels of communication between users of e-government systems. They were all recoded as “Low CQ”.

Table 50: Focused code "High CQ".

Open codes	Focused code
Writing comments	High CQ
Attachments	
Sharing work within a transaction	
Assigning tasks	
Tools for confidential knowledge	
Discussion board	
Sending queries to colleagues	
Video and voice share	
Efficient archive	
Forward copies of transactions	

Table 50: Participants talked, on the other hand, about some prominent collaborative features they use more often. Such features play a crucial role in knowledge sharing inside e-government systems. They were all recoded within the new focused code “High CQ”.

Table 51: Focused code " Other benefits of CQ".

Open codes	Focused code
Delivering K in a clearer manner	Other benefits of CQ
CQ and workload	

Table 51: Interviewees told stories about how CQ could not only help them to share knowledge, but also can solve issues like heavy workloads. Hence, the code “Other benefits of CQ” became a focused code reflecting the influence of CQ on other aspects of knowledge sharing.

Table 52: Focused code "Personal benefits".

Open codes	Focused code
Avoiding potential issues	Personal benefits
Individual intellectual contribution	
Recognition	

Table 52: Three main reasons were given by participants for their willingness to share knowledge via e-government systems. Those reasons return direct benefits to the employees. They were recorded in the focused code “Personal benefits”.

Table 53: Focused code "Knowledge quality in e-government".

Open codes	Focused code
Knowledge relevance	Knowledge quality in e-government
Knowledge accuracy	

Table 53: Interviewees informed that they would not share knowledge in e-government systems unless it was relevant and accurate. It was reasonable to recode those codes as “Knowledge quality in e-government”.

Table 54: Focused code "Formality".

Open codes	Focused code
Formal style	Formality
Abbreviation	
Mandatory use	

Table 54: Participants stated that working on the systems is mandatory, and there is no other way to accept work outside the systems. Additionally, responses indicated that a formal tone should be used when sharing knowledge via e-government systems. This knowledge should be abbreviated and emerged due to the nature of formal government transactions being executed. Then, the focused code “Formality” was formed to include the three initial codes.

Table 55: Focused code "Support needed for outside systems".

Open codes	Focused code
Training	Support needed for outside systems
Supportive equipment	

Table 55: Some participants talked about supportive factors that were not directly related to the systems but would encourage sharing knowledge in e-government systems. The first was the need to train employees on how to use the systems. Meanwhile the other was some supportive equipment to make knowledge sharing in e-government systems easier. Those data were coded as “Support needed for outside systems”.

In the end, the number of initial codes was shortened from 53 to 24 focused codes, which meant a 55% reduction. The final focused codes – first order themes – are shown in Table 56.

Table 56: List of focused codes.

	Focused code		Focused code
1	No impact of ST on K donating	2	Impact of ST on K seeking
3	ST increases knowledge quality	4	Sharing knowledge regardless of trust in colleague
5	Trust in colleagues is important	6	High trust in management
7	Low trust in management	8	Shared vision with collaboration
9	Shared vision with incentives	10	Low CQ
11	High CQ	12	Importance of CQ
13	Other benefits of CQ	14	Reusing stored knowledge
15	Preference to share K in e-gov systems	16	Personal benefits
17	Formality	18	Knowledge quality in e-gov
19	Face-to-face	20	Phone
21	Email	22	WhatsApp
23	Competition style in e-gov	24	Support needed for outside systems

The descriptions of the focused codes are also provided in Appendix (A-19).

6.12.3. Axial coding

There is a process of clustering open/initial codes to create categories/concepts, and then looking for relationships between the latter (Kendall, 1999; Saunders et al., 2016). The row data is transferred into the "theoretical constructions of social processes". (Glaser 1978: cited in Kendall 1999). Axial coding gives the categories greater explanatory power by answering WH questions about a phenomenon's consequences (Strauss & Corbin 1998: cited in Duchscher & Morgan 2004). The final focused list was categorized by sorting items into second order themes considering the research questions. Then relationships between those themes were addressed and verified against the collected data.

Axial coding was done on the focused codes listed in Table 56. The codes were grouped according to their relationships. The information in each code was identified and then grouped into a higher-level category. 10 axial codes were formed: (Impact of ST, TRU in colleagues, TRU in management, Other considerations with SV, Availability of CQ, Impact of CQ, KS inside systems, KS outside systems, E-government context, and Other findings). Table 57 lists and describes the 10 axial codes.

Table 57: The step of axial coding.

Axial code	Focused codes	Relationship
(1) Impact of ST	- No impact of ST on K donating - Impact of ST on K seeking - ST increases knowledge quality	These three focused codes are related in the influence of ST on KSB in e-government systems
(2) TRU in colleague	- Sharing K regardless of trust in colleague - Trust in colleagues is important	Two levels of trust were mentioned by participants. The first level was Trust in colleague which in some cases was important while was not in others
(3) TRU in management	-High trust in management -Low trust in management	The second level of trust referred to trust in management. Some cases informed low trust in their managers while others did the opposite
(4) Other considerations with SV	- SV with collaboration - SV with incentives	Collaboration and incentives were two factors on which participants focused when they were asked about SV. Hence, both were grouped as other considerations with SV
(5) Availability of CQ	- Low CQ - High CQ	Participants informed both low and high collaborative features. These two codes were grouped as availability of CQ in the systems
(6) Impact of CQ	- Importance of CQ - Other benefits of CQ	The two themes reflect the high impact of CQ in e-government systems
(7) KS outside systems	- Face-to-face - Phone - Email - WhatsApp	Four ways through which participants used to share knowledge outside the e-gov systems
(8) KS inside systems	- Reusing stored knowledge - Preference to share K in e-gov systems - Personal benefits	The reasons why participants were willing to share knowledge inside the systems and how knowledge is being reused or reshared
(9) E-gov context	- Formality - K quality in e-government	These two themes reflect some aspects of KS in e-gov systems specifically
(10) Other findings	- Competition style in e-gov - Support needed for outside systems	These two codes were information about some subject that participants had risen during the interviews. They are not in the research model scope but would be useful for drawing some recommendations

6.12.4. Aggregate dimensions

The last step in coding data procedure was to aggregate axial codes into domains. Here, the theoretical research model was used and five aggregated dimensions emerged (i.e., social ties, trust, shared vision, collaboration quality, and knowledge sharing behaviour). Table 58 shows these five dimensions with their second and first order themes.

Table 58: Grouping the axial codes into domains.

Domain	Axial code (second order theme)	Focused (first order themes)
1 Social ties	Impact of ST	No impact of ST on Knowledge donating
		Impact of ST on Knowledge seeking
		ST increases knowledge quality
2 Trust	TRU in colleague	Share regardless of trust in colleague
		Trust in colleagues is important
	TRU in management	High trust in management
		Low trust in management
3 Shared vision	Other considerations with SV	SV with collaboration
		SV with incentives
4 Collaboration quality	Availability of CQ	Low CQ
		High CQ
	Impact of CQ	Importance of CQ
		Other benefits of CQ
5 Knowledge sharing behaviour	KS outside systems	Face-to-face
		Phone
		Email
		WhatsApp
	KS inside systems	Reusing stored knowledge.
		Preference to share K in e-gov
		Personal benefits
	E-gov context	Formality
		Knowledge quality in e-government

6.13. Findings from interviews

The thematic analysis covered everything that the participants talked about. Some themes were not presented because they were outside the scope of the research area.

6.13.1. Social ties

This is the first aggregate dimension of the findings. To understand the role of ST and how they could influence KSB in e-government systems, it was important to ask participants questions about how their social ties influenced them to share more

knowledge with colleagues. One second order theme "Impact of ST" was created based on their answers.

6.13.1.1. Impact of ST

The first quantitative phase resulted in social ties being the only social capital variable that kept its significant relationship with the dependent variable knowledge sharing behaviour in both versions of the research model (section 5.8.2.1). However, this phase revealed a more profound understanding: the impact of social ties differs depending on whether the behaviour is a proactive donating of knowledge or seeking knowledge from colleagues. Participants shared their knowledge inside e-government systems regardless of how strong the social ties were. At the same time, they sought knowledge from their closer colleagues rather than others. Their responses showed that ST does not influence the proactive behaviour but does when participants need some help from others. ST influences knowledge seeking behaviour. In addition, some participants said that their relationships helped to provide knowledge in preferred styles. Therefore, three first order themes were formed under this second order theme: no impact of ST on proactive KSB, impact of ST on knowledge seeking, and ST increases knowledge quality. Figure 41 shows the hierarchy of the coding process. In the vertical rectangle, the first aggregation dimension (Social Ties) is written. The horizontal rectangle shows the second-order theme (Impact of ST), and finally, the oval shapes show the first-order codes[2].

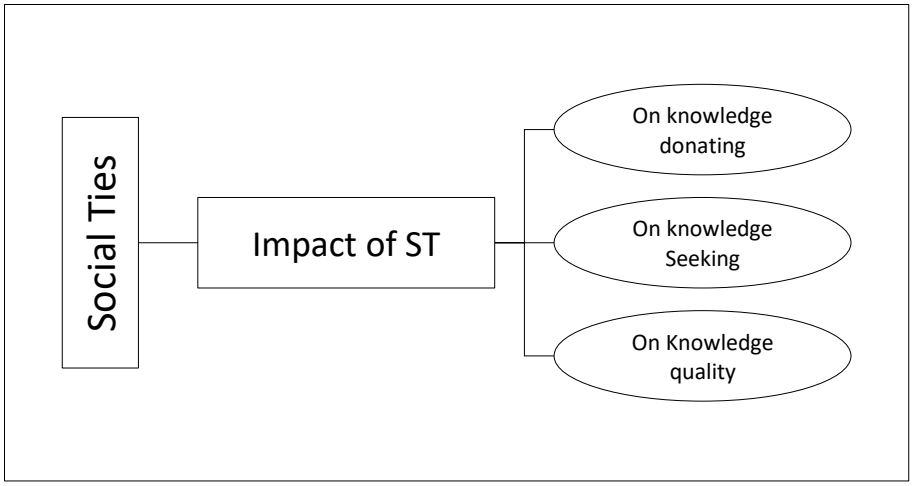

Figure 41: The domain of social ties.

[2] The similar figures which follow are set out in the same way for the other domains.

- *No impact of ST on knowledge donating*

The participants shared knowledge with colleagues regardless of how strong ST was. The strength of ST exerted no influence on their behaviour – either proactive knowledge sharing or the quantity of knowledge. Further, any weakness of ST did not compromise the quantity of knowledge. Note that the effect is on the behaviour of knowledge seeking (as will be demonstrated in the forthcoming theme). The following are some statements highlighting what this means:

> *"Speaking for myself, if someone needs help, I would help her, regardless of whether she is a friend or a colleague of mine." (Participant 7).*
>
> *"Neither the strength of the relationship nor the employee's experience matters… No, it does not matter whether I know this person or have a friendship or relationship with him". (Participant 10).*
>
> *"Let me go back to the personal relationships, the information would not differ, and now I'm talking about myself. No difference in the quantity of information I provide because I feel this is work regardless of whether I know my colleague or not". (Participant 8).*

However, Participant 4 responded similarly, but with an exception:

> *"Personally, no, I will give comments that are required to execute a specific task, and it does not matter if he is a close colleague or not. However, sometimes you need to be discreet with some employees with whom your relationships are not strong enough". (Participant 4).*

He explained this because he works in an environment that has a low level of trust. Thus, his response was not purely related to ST, and he responded later when asked about trust:

> *Participant 4: "Yes, 100% important [trust]. For sure, trust and good relationships. I have clarified that". (Participant 4).*

Based on this theme, ST does not affect the donating side of knowledge sharing. However, its impact will be clarified in the following theme.

- *Impact of ST on knowledge seeking*

Participants revealed another influential facet of social ties on knowledge sharing behaviour in e-government systems. They said that when some knowledge is needed,

they prefer to ask colleagues with whom they have strong ST. The following responses are examples of knowledge seeking behaviour via the systems:

> *"Usually, the one who does privately contact you through the system itself, he is the one who knows you personally". (Participant 13).*
>
> *"For instance, when I explain to him a matter related to security and safety, I give him my observations, so then he helps me with his experience and his position in the workplace. So, the relationship has a key role in the workplace". (Participant11).*
>
> *"If the situation requires that he needs more details according to my relationship with him, I will help him more". (Participant 12).*

- *ST increases knowledge quality*

Three participants stated that having strong social ties does not mean more knowledge being shared (as illustrated in the theme "No impact of ST on knowledge donating"). They instead said that the impact would depend on the personalities of the knowledge recipients. For example, some employees may like information to be in some specific style or at a minimum level of writing quality. Hence, participants share knowledge in the way each colleague prefers. The awareness of such personal preferences was formed through social ties. Participants said that they evaluate their colleagues' personal preferences depending on the relationships with them:

> *"Yes, it is different depending on the relationship. The guys in our workplace are not at the same level… Some have improved themselves while others do not want to do so… Thus, as you know, it is up to the person himself. Who you deal with depends on how much you know him", (Participant 14).*
>
> *"Actually yes [it depends on the relationship] … any person who persuades me that he desires to help himself, I will motivate him and give him everything he wants. While for someone else who is always not contented and so on, I will treat him as he wants… it is true, it depends on this relationship". (Participant 9).*
>
> *"When you have such an over-practical colleague who is very tied by policies as if they were the holy Quran[3], I would be forced to be cautious with him even though I know him on a personal level. Such matters have happened and still do. So, it will not be a difference in the amount of knowledge, but the difference might be in the type of knowledge itself. Let me give you a more realistic example. I have peers with whom I have*

[3] Muslims use extreme caution with the holy Quran to make sure they do not distort what it means when they quote it. The participant meant to show how obliged her colleague felt to respect policies.

relationships in the workplace but not outside. Even though we do not visit each other outside the workplace, they are still very flexible to work with. Such colleagues, I provide them with the work "X & Y" [knowledge] in my own way. However, if it were with that practical person…, I would give him the X & Y in the way he wants. This literally is what I mean". (Participant 8).

Another aspect of knowledge quality can be influenced by ST as well. Due to the strength of social ties, participant 8 cares more for the timing of knowledge she shares. The reason is to allow her close colleagues to finish their tasks before deadlines. So she works hard and pushes herself to prepare information and send it earlier even though she is not required to do so:

"For example, when there is a lot of pressure at the end of the semester, I say that personal relationships make a difference at such times. I pressure myself to complete my tasks faster and then send them to those with whom I have a personal relationship. I try to give him more time, so he would be able to finish his tasks before the deadline. But if I did not know him, I would finish my task as usual without putting more pressure on myself to give him time. However, the amount of information I give would not be different". (Participant 8).

6.13.2. Trust

In the first phase trust was significantly related to KSB in model version 1; however, it was no longer significant in the second version when CQ was considered (section 5.8.2.2). It is noteworthy that the first phase examined trust only in colleagues. Nevertheless, this second phase revealed that trust in management should not be ignored, as will be illustrated here. Therefore, the interview questions about trust were coded into four focused codes from which two second-order themes were created. The first second-order theme is "Trust in colleague", while the other is "Trust in management". Both were grouped under the aggregate dimension of trust, as shown in Figure 42. Next, the two second-order themes are presented.

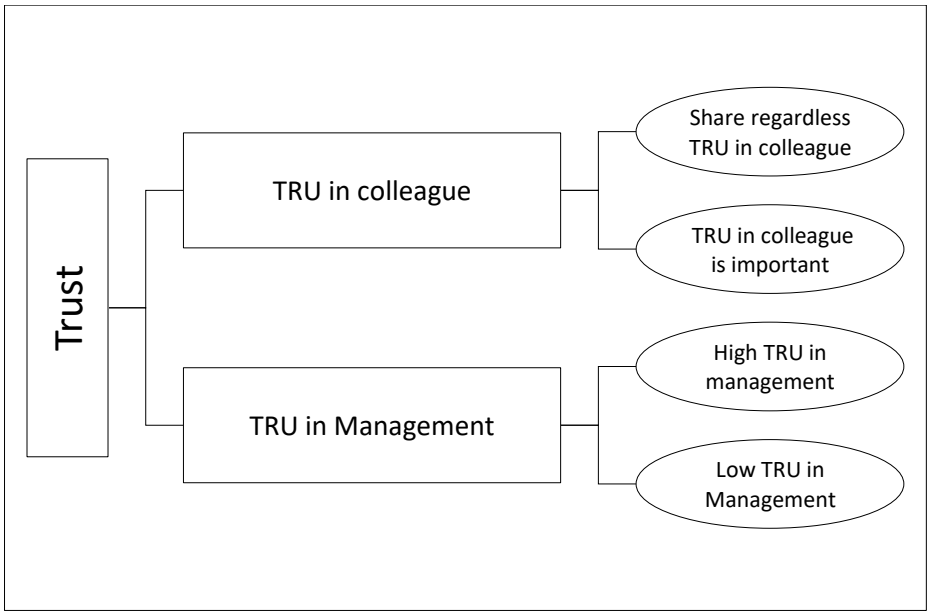

Figure 42: The domain of trust.

6.13.2.1. Trust in colleague

When interviewees were asked about trust, they gave two main answers. The first group said that trust in colleagues was not important in e-government systems when they share knowledge. They share without considering trust in the recipient. The second group, conversely, said that they do not share knowledge if they do not trust the recipient. Consequently, the answers were coded under two first-order themes: sharing knowledge regardless of trust in the colleague, and trust in colleagues is important.

- *Sharing knowledge regardless of trust in colleague*

A group of participants agreed that when they share knowledge in e-government systems, they do not need to trust the recipient. They had no concerns about sharing colleagues even when they do not trust them. The following remarks were about trust when sharing knowledge via e-government systems:

> *"No, no, the scientific information does not need trust, no difference. I'm not talking about giving out my account information [username and password]. That is something different. However, concerning scientific information, I will answer anyway if I'm sure about my level of knowledge". (Participant 13).*

> *"If I have something to share within the system, I will share it even if I do not trust her. Ultimately, the system protects you." (Participant 7).*

"It [trust] is not important because nothing is confidential. Nothing is sensitive. Information is for everyone." (Participant 12).

A group of participants provided a further reason why trust was not important when they contact their colleagues inside the systems. It is because e-government systems document everything and information cannot be changed. Thus, they had no fear when they shared knowledge inside the systems because the default documentation feature in the systems was a substitute for trust:

"Look, the electronic system has now provided us with a quantum leap. Everything is now documented, which is like trust. Trust exists by default because your knowledge, instructions, or any other actions are all being documented." (Participant 2).

"Trust outside the system is more important because any piece of information you provide inside the system is 100% your responsibility, and being retained and cannot be removed." (Participant 5).

"No, it [trust] is not necessary because everything is documented and clear whether I trusted him or not. Writing [in the system] would be kept and it never changes." (Participant 1).

- *Trust in colleague is important*

In contrast to the previous theme, another group of participants claimed that trust in the knowledge sharing process via e-government systems was important. Specifically, they required trust in their knowledge recipients. The information collected in this regard led to the formation of this contrary theme:

"Yes, trust must exist. To give him complete information and an explanation of the situation, you must trust him." (Participant 11).

"Yes, trust is an essential thing. Conversely, distrust causes a considerable delay in work. Many transactions between two parties where there is no trust between them keeps things in abeyance. Those [transactions] that are supposed to take a week [to finish] might take months! Such an issue is a reality that I see." (Participant 4).

"Trust [in colleague] is very important thing." (Participant 9).

Two participants stated that they would stop sharing knowledge with colleagues they trusted if untrusted ones could access their information.

> *"Distrust of the recipient could prevent others from knowing something they are supposed to know. They have not heard it because of that responsible person [her manager] or the recipient [her distrusted colleague]. They have not heard it because of the mistrust." (Participant 8).*

> *"Of course, I will be discreet, and absolutely I will look for another way to do what I want without letting him know. You must find a solution how to explain it [the transaction] without letting him know." (Participant 4).*

6.13.2.2. Trust in management

The researcher noticed that when participants were asked about trust, they talked about their management even though the researcher did not ask them about this. Some participants seemed to trust their management while others did not. Trust in management seemed a major concern when employees share knowledge in the systems. It might be more relevant than trust in colleagues when sharing knowledge in e-government systems. Participants who trusted their management seemed more willing to share knowledge in the systems even with colleagues they did not trust. On the contrary, other participants who did not trust in their management seemed less willing to share knowledge, and if they did share knowledge, they only shared it with trusted colleagues.

As was pointed out earlier in Table 47, trust in management was coded low if participants had a fear of repercussions or their management did not care about them. Conversely, trust in management was coded high if participants had a positive perspective toward their management, represented by tolerance to employees' mistakes and caring of them Table 48.

Trust in management was one of the most important concerns when sharing knowledge via e-government systems. The interviewees' responses were coded depending on their trust in management. One group reported a high level of trust compared to the other group. Therefore, two first-order themes were grouped under this second-order theme, namely "High trust in management" and "Low trust in management".

- *High trust in management*

In this theme, participants noted a degree of trust between themselves and their management. They had less fear about making mistakes. They anticipated that their management teams would understand, so the mistakes would be corrected and they would learn from their experience. They had no fear that if they provided wrong opinions their management would correct them, and they would then learn from that.

> *"I might make mistakes as well. Writing stuff gives me the chance for others to correct my mistakes. When I give him [a colleague] information over the phone, there will be no reviews about what was said, so we both might be mistaken. So, I would give my opinion [inside the system], which might be either accepted or rejected by management… I might miss something, but others might add valuable information. So, the deputy general manager will have all that information so he can judge opinions well…" (Participant 1).*

> *"Because the level of understanding is different from person to person, and two people can understand the wording of the question differently. The information he gives me might not be clear and I give it the wrong meaning. In such a situation, the management corrects me by giving me the right information." (Participant 13).*

> *"The employee uses the system daily, finishes tasks, and solves issues. However, sometimes he might come across some complicated issues he cannot solve. In such situations, management usually tolerates and tries to understand it." (Participant 12).*

Trust in management was not only linked to their tolerance of mistakes, but participants also trusted their managers would act properly and take their suggestions seriously:

> *"At the same time, management listens to employees' opinions to know what problems we face. If we needed some external support from some other suppliers, management contacts them to solve the issue." (Participant 12).*

> *"They thoroughly study your suggestions, which is a good thing that our organization has. But employees in some other organizations may fear being questioned and ordered to prove what they have said, which might make them very defensive. For this reason they refrain from sharing information." (Participant 1).*

- *Low trust in management*

As stated earlier, a group of participants had a low level of trust in their managers, based on the fear of being blamed or punished for something wrong. Participants described their workplace as a cautious environment and they needed to be careful about writing something on the systems:

> *"Sometimes, there is some reticence about a specific decision, or about some explanation of a transaction. The employee may have some fear of being held accountable or punished for what he explains. For this reason, many employees use vague sentences because they do not want to document something specific that might reflect on themselves." (Participant 4).*

> *"As I just told you, sometimes a person has fears regarding the systems. When he is not sure about his information, he becomes afraid that it might be recorded against him. The meaning is, because of you wrote it then you would be responsible. Such a situation is terrifying in the system." (Participant 6).*

> *"Because management will use formal procedures for everything. It does inform you about policies, while colleagues may help you achieve your tasks… Your colleague might give you information, experience, but management is pretty formal." (Participant 11).*

Sometimes low level of trust in management means workers will stop sharing knowledge if they perceive their managers do not care enough about issues. Participant 8 was upset because she had often made suggestions to her manager, but nothing happened, so she lost her trust in that manager:

> *"My trust in this manager was shaken and so I gave very little information. So, when I am asked to share insights again… since my trust disappeared, I am not willing to give any more because nothing changes. Just the same thing that I have said will be repeated, so I will never say more than I need to." (Participant 8).*

Overall, a pattern became evident in the domain of trust. All participants who said they trusted their management said, at the same time, they do not care whether they trust their colleagues or not when sharing knowledge. They share even with untrusted colleagues. Conversely, participants who had lower trust in their management did not share knowledge in the systems unless they trusted their colleagues.

6.13.3. Shared vision

In the first qualitative phase, shared vision was the weakest social capital variable. It did not significantly relate to the dependent variable KSB. Therefore, this phase aimed to explain the role of shared vision in knowledge sharing inside e-government systems.

The data collected from the interviews supplies the reason for this weak influence of SV. Here, participants' responses were very much alike when they were asked to talk about their experiences regarding shared vision. They agreed they had some common visions, but focused on other factors to illustrate why they shared knowledge and worked to reach their visions. In a way, shared vision in their answers appeared like a compass to determine the direction they should go, but other things influenced their behaviour to share knowledge. For this reason, only one second-order theme was used under the domain shared vision, which is "Other considerations with shared vision".

6.13.3.1. Other considerations with shared vision

Considerations of shared vision were represented in two first-order themes in which respondents' comments on SV could be categorised. First, "SV with collaboration", which contained comments about collaboration being the reason they worked and shared knowledge to reach the vision, and second "SV with incentives", which contained comments that sharing was to gain the incentives associated with achieving their visions (Figure 43). The incentives might be monetary, promotion, or even getting high periodic performance evaluations.

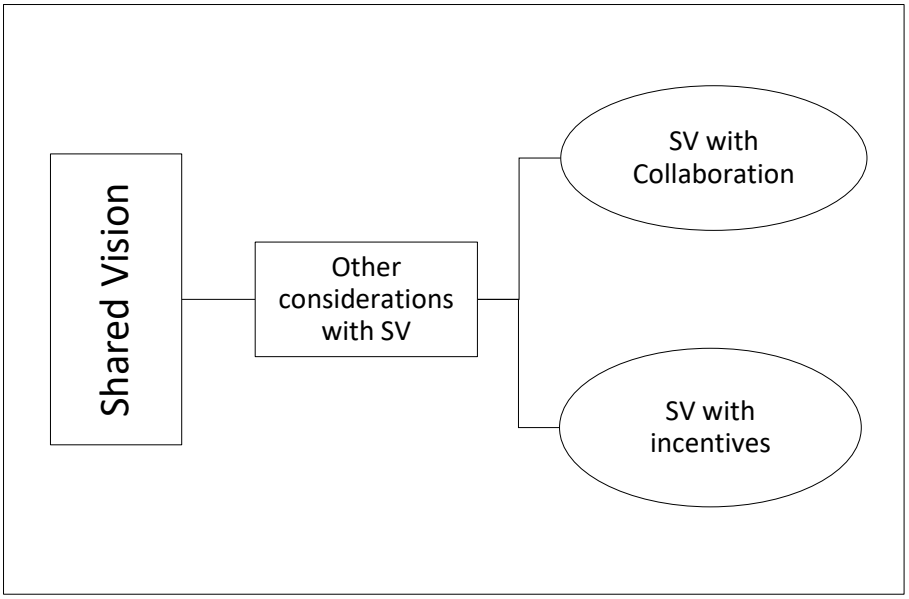

Figure 43: The domain of shared vision

- *Shared vision with collaboration*

Participants gave examples of visions they shared with their colleagues in the workplace. Some of them explained how they collaborated and shared knowledge to help each other achieve their visions. They mentioned that collaboration between them was the critical factor that helped them reach or keep moving toward their common goal.

When Participant 12 was asked about shared vision, he said that their shared vision was represented in a competition on the provincial level between the IT units located in those provinces. Each unit challenged the others to have the best performance:

> *"Given that our IT department is located in the [name of the province], there is competition in terms of performance… There is a challenge between our unit and the other units… So, if anyone needs some knowledge to solve a specific issue, we solve it together. We collaborate with each other to achieve a specific goal and compete with other units." (Participant 12).*

Another example was from the experience of participant 1. He said they had some unsolved transactions, which might consume up to four years to solve. Their manager gave them a list of those unsolved transactions and asked them to solve at least 75% before the end of the second month:

> *"I would like to tell you something… the result was that we had already finished all the transactions, except four of them, before even the second month had arrived. We had achieved all this because of the collaboration between us." (Participant 1).*

He further explained how they had collaborated to achieve this common goal:

> *"For example, I had a transaction related to a hospital, and knew that a colleague of mine would visit the same hospital to solve another transaction. So, to save time, I sent him my transaction via the system asking for some information from the hospital. The transaction was assigned to his username. Then he went and sought the information I needed. Then, he entered the information in the system [attached it within the transaction] and assigned the transaction back to me." (Participant 1).*

Another experience was told by participant 2. They used onerous procedures to do work. So, they had a vision to improve the work procedures. In this way, all parties collaborated and shared knowledge to update the workflow:

> *"We tried to share and make requests to update the current tools and methods in the work system. We tried to develop it to reach a better situation. The sharing was done to achieve the desired goal. All cities were connected through the electronic systems where internal correspondence took place between us. This would not have been done without sharing information by all parties." (Participant 2).*

- *Shared vision with incentives*

The subject of incentives and its link to knowledge sharing in e-government systems were evident in the interviews. While investigating the impact of incentives was not originally part of this research, it kept appearing in some participants' comments. Concerning shared vision, one group of participants indicated that they were looking for rewards they receive when they share knowledge and achieve the common vision. Incentives might be monetary, promotion, or even getting high periodic performance evaluations:

> *"The goal to which we aspire always has its specific reasons. So, why does an employee work and achieve? Sometimes the annual evaluation becomes one of the motivations. And other measurements that are used in organizations motivate employees to reach the goal and then generally achieve the vision of the organization." (Participant 2).*

Even though participant 7 shared a vision with her colleagues, she stopped sharing knowledge to achieve it. The reason was she did not get promoted even though she was looking for it:

> *"It is true that we have a common principle [vision] and we want to achieve it. But then we see someone who does not work and does not share but still gets promoted, whilst you do share and work well but have never been promoted. For this reason, our performance falls away. An employee would not be enthusiastic about sharing." (Participant 7).*

Likewise, the response of participant 4 was not free of resentment because he did not get what he was expected in the way of rewards:

> *"There are no such goals in the public sector because there are no incentives to make an employee strive for such a goal." (Participant 4).*

6.13.4. Collaboration quality

CQ is the domain that reflects what participants said about collaborative features in their e-government systems. Two second-order themes were grouped under this domain. The first was "Availability of CQ" which includes low and high CQ, while the second was "Impact of CQ", (Figure 44).

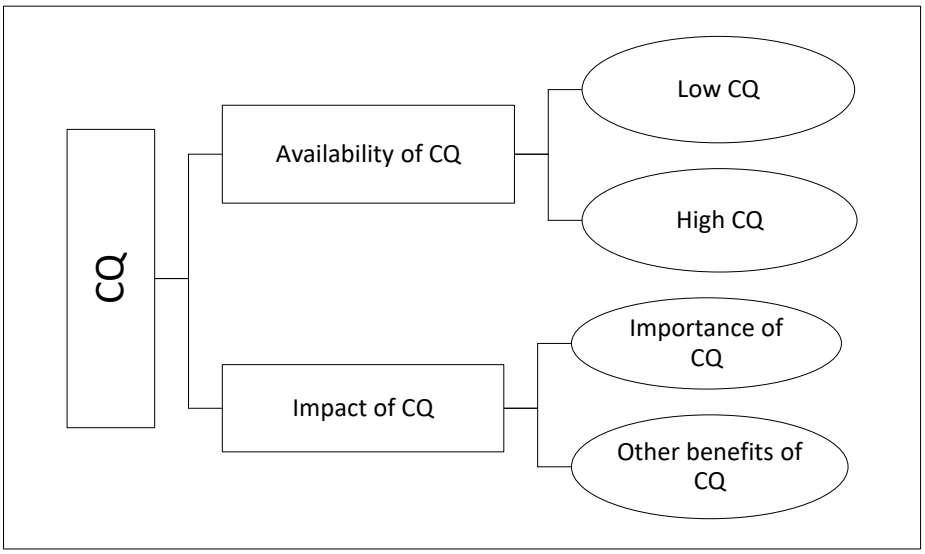

Figure 44: The domain of collaboration quality

6.13.4.1. Availability of CQ

Two first-order themes collated under this second-order theme are "Low CQ" and "High CQ". CQ features which are reported as available useful features in knowledge sharing were classified as "High CQ", while others that represent poor collaboration or as much lacking features were classified as low CQ. Some features that were available and helpful were seen by other participants as desirable. Hence, both low and high CQ themes demonstrate features that illustrate the ways in which employees share knowledge in e-government systems.

- *Low CQ*

This theme demonstrates that various CQ features were not available to participants. In this regard, most participants indicated shortcomings in features that affected their ability to share knowledge. For example, two participants stated that their e-government systems did not have any CQ at all, even when writing comments. They could not share their knowledge; they could only finish procedures on the system. They wanted definite CQ features to share knowledge:

> *"There is no contact through the system in any way." (Participant 3).*
>
> *"It is excellent and supposed to be available. If I were able to correspond with the employee within […] program, it would have been good." (Participant 3).*
>
> *"We don't have this, only transactions transformation." (Participant 15).*

The typical way to share knowledge via e-government systems was leaving comments within transactions. Other participants had such a feature but space for comments was insufficient:

> *"We face some issues which are a weakness in the system itself, and the organization is working to improve it. Those issues are like when I send a transaction, it does not allow me to write many words because the system has only limited space…" (Participant 1).*
>
> *"One of the difficulties is that you do not have enough space to express what you want to express. You need to have enough space." (Participant 10).*
>
> *"We are tied to a certain number of words which we cannot exceed." (Participant 7).*

Another shortcoming in CQ was lack of access to other's data put on the e-government systems. This issue means that knowledge is stored in the systems, but other workers cannot see it. Participants' inaccessibility to information prevented them from learning from each other:

> *"In the past [before the e-gov. system], the colleague could view your transactions, but now you cannot give him the password to your email or the system on which you work. This somewhat limits the information." (Participant 11).*

"When searching, we are only allowed to search within our transactions – only the manager of the department who can search all transactions in the whole department but not outside it. So, when I need something, I need to contact the headquarters in Riyadh and this an example of centralization." (Participant 1).

Such inaccessibility not only hindered knowledge sharing, but also hugely affected efficiency in the workplace, such as doing the same transaction or procedure twice or maybe more, which wasted time:

"Sometimes we get a duplicate transaction. We may receive complaints from multiple sources, but all relate to the same problem. So, I conclude that a specific complaint has already been solved or is still being solved. I ask them to link them to the previous one to stop any duplication in the work." (Participant 1).

Some participants said that they had no access to their colleagues' transactions where they could obtain the knowledge. Their organizations did not give them access because they wanted to keep work confidential:

"They justify [not giving access to colleagues' work] by the fact that transactions are confidential because our work is secret in nature." (Participant 1).

In this sense, some participants could not obtain knowledge on the systems because of some confidential transactions. Participant 11, for example, had not been given access to all of his colleagues' work because 10% of the work was confidential:

"Because your work on the system is 10% confidential and 90% ordinary. So, when searching, suddenly he may view those confidential files…", (Participant 11).

It should be mentioned here that some other participants had a feature that allows them to limit access to knowledge where necessary (see the later section on High CQ).

Absence of effective notifications in the systems was another shortcoming. Several said that they needed to notify each other during the knowledge sharing process. Sometimes notifications were limited to the computer screens and were not available elsewhere. For example, participant 12 stated that he and his colleagues could work

outside their offices and might need some urgent information. Thus, they needed to notify each other and so required effective notification tools:

> *"As I told you, somewhere at work or in a different department, the computer is not in front of me. My colleague might have to ask me about something important and urgent. For example, asking about a weird programming message the first time he gets it. He might need to send a photo of the message via WhatsApp to get an answer quickly. We are looking to refine the program [the system], which is currently in the developing stage. It is a beautiful program but needs more development, to be like an application. By then, we will forget about WhatsApp." (Participant 12).*

In some other cases, an application on a mobile device was available but did not work as employees needed. Participant 13, for example, had an application connected to the system but when it closed, the notification did not work. The result was that he and his colleagues continued using WhatsApp. This illustrates how employees are driven to collaborate using external channels outside the reach of the government agency when the collaboration quality of e-government systems is low:

> *"Notification speed. If you were writing on the application while he [the colleague] turned it off, no notification will reach him like in WhatsApp. [WhatsApp] is faster." (Participant 13).*

Some participants commented on the difficulty retrieving stored or archived transactions in the system. When knowledge was needed it was difficult to find. A group of interviewees commented on finding transactions manually inside the systems, which wastes time:

> *"Unless the employee himself logs in to the system and explores transactions." (Participant 4).*
>
> *"When you finish a task, the system archives it and then it becomes invisible… When we finish work, the transaction disappears from the list." (Participant 12).*

Another issue related to retrieving knowledge. If knowledge had been shared in some way within the system, employees could look it up; or another staff member could look it up, if they had to take over the task. However, if effective archiving tools were unavailable then employees had to find their own solutions, such as relying on

memory, to retrieve previous transactions in the systems. Of course, not all employees have the ability to recall what has been done previously:

> *"If someday I was absent or did not remember or know that the solution was already in the system, some employees have a sharp memory and remember the transactions and restore it." (Participant 10).*

> *"It is true that the documentation is important, but I usually remember my work. I do not forget fast." (Participant 12).*

Participants reported some features they wanted in their e-government systems to make sharing of knowledge better, such as instant chatting, because in some cases they require knowledge fast. The app they used was WhatsApp. The following are examples of this feature:

> *"I say that it is supposed to be at least inside the branch that we should be given a chat platform for employees to use themselves. We already use this via WhatsApp. It is supposed to be embedded within the system… at least they should give us the ability to chat. We already do that via WhatsApp, so why not in the system?" (Participant 1).*

> *"I suggest that the system evolve to be a platform working on iPhone or Android… also a chat screen available inside the maintenance system or chat group which would make it easy for us to discuss topics, transfer knowledge, and share ideas." (Participant 12).*

Ability to share voice comments was a desired feature. This feature is another kind of chatting which could help employees who have difficulty expressing their ideas in writing.

> *"Something like chat [is needed], and if it is a voice chat, it would be much better." (Participant 15).*

> *"The difficulty could be that the employee did not understand what I meant or something that I did not clarify enough. So, he needs to paraphrase the question. It [the system] is supposed to be developed to allow voice comments. Thus, when something has not been clarified, the voice could be used and the clarification would be better." (Participant 12).*

Some desired features were noted by participants which would help them share knowledge more easily. Participant 8 suggested having knowledge-sharing templates in the system:

> *"If they added a shared template the load would be somewhat lightened." (Participant 8).*

Participant 10 suggested adding a feedback tool to the system, as he needed to know how much his knowledge helped a recipient. Such a feature would help him to understand his colleagues thoughts and ideas better:

> *"Sometimes, I share knowledge with only one person, so if I knew the impact, I would share it with the rest. If I knew the impact, I might not share it because, for example, it is already known to them or my information was not true. Do you understand me?... Such an impact is important, important." (Participant 10).*

- *High CQ*

This theme highlights the collaborative features that are embedded within e-government systems and how participants use them. Here, various ways in which knowledge is shared in e-government systems will be reported. This theme helps to understand how different CQ features are used by system users. One of the most mentioned CQ features was writing comments, or a space to share opinions within the transactions. Participants use the comments areas to write their opinions, solutions, instructions, etc. When transactions are sent, a worker's colleagues can read and use that knowledge to complete transactions.

> *"In the system, I can write, within the transaction itself, instructions or information." (Participant 1).*

> *"There is a text field available for all users. Before I forward anything, I can write to him about what he needs… I can choose one or write in the field an instruction, or anything I want him to know about the transaction." (Participant 10).*

Attaching files to electronic transactions was another feature through which participants shared knowledge. They attach knowledge and share it in the systems:

"You can add comments inside the system, attach files… You can attach photos, files, text, and anything." (Participant 5).

Such feature may also add some flexibility to the knowledge sharing process in e-government systems. Sometimes, employees received hard copies of transactions, so they could scan them and then share them in e-government systems:

"There is a little flexibility. For example, the report I receive from an organization might be a hard copy. So, when I get back to the office, I scan it and then it is converted to a PDF file that I attach to the transaction." (Participant 1).

Working together on the same task was one way to facilitate knowledge sharing in e-government systems. When more than one employee handles a transaction, they will be able to share their thoughts about it. Some participants talked about such a feature in their systems:

"Sometimes, the problem is related to two organizations, so I research one part and instruct the other part to be researched by someone else and determine which things should be researched." (Participant 1).

"It sometimes happens that one of the computers malfunctions, and I receive the task, but I might discover it is not in my specialty… In this case, I assign the task to another colleague and then we start collaborating; I write to him, and he writes to me in the comments." (Participant 12).

The need to share knowledge in e-government systems but the low CQ might lead employees to use other available features in the knowledge-sharing process. As an example, the feature of assigning tasks might be used. Some e-government systems allow employees to assign their transactions to other colleagues. When a colleague accepts the transaction to be assigned to him, they will become responsible.

This feature allowed participant 1 to assign transactions to his colleague, asking for assistance when faced with difficulty. In such a situation, the helper colleague accepted the assignment. When he received the transaction, he added the needed information and assigned it back to participant 1. Such feature was helpful in facilitating knowledge sharing via e-government systems:

"So, to save time, I sent him my transaction via the system asking for some information from the hospital. The transaction was assigned to his username. Then he went and sought the information I needed. Then, he entered the information in the system [attached it within the transaction] and assigned the transaction back to me." (Participant 1).

In the previous section on Low CQ, some organizations did not give employees access to each other's work because of confidential transactions. But some participants had a feature that allowed them to control access, or mark transactions as confidential. Sometimes employees do not want to share knowledge with everyone, only those who require information. Such a features makes it possible to hide details of a transaction from everyone:

"For example, we have a system that allows us to do the procedure confidentially. You have the choice to do it secretly where no one can see it unless it is those people who are selected to do so." (Participant 4).

"When you send a transaction through the system, you can select the recipient, so there would be one person who one can read it but others cannot." (Participant 6).

Unlike writing comments and inserting attachments, some CQ features were not stated often, but their help with KSB was noted. A discussion board was one feature available in the e-government system that participant 12 used. It helped him discuss solutions and even share tutorial links about specific problems:

"I write to him and he writes to me in the comments. The collaboration between us helps to solve the issue. This is very similar to internet forums." (Participant 12).

"Even I can download it [knowledge] from YouTube and post it in the discussion so that he can watch it." (Participant 12).

Participant 13 used another feature which allowed him to send a query directly to another colleague. However, because the feature was only available as a one-to-one operation, the participant – when he needs help – sends the same question to multiple colleagues and then compares answers:

"The questioner can send it to you and at the same time send the same question to other ten [colleagues]. He always sees and compares the answers. Then he chooses the most common answer." (Participant 13).

Some participants had very useful and desirable features. For instance, participant 13 could send audios which both participants 12 and 15 wanted:

> *"There is a writing facility. I can even do a video or audio; I mean there is more than one choice." (Participant 13).*

Some participants had difficulty in retrieving stored transactions in the system, and participant 1 related that he had suitable archiving tools:

> *"The best thing about the system is that anything you want, you find it stored in the system. You just enter the transaction number or its name to find anything you need. You can see it complete with all details and in an easy way." (Participant 1).*

Some features were used as solutions if other features were unavailable. For example, participant 1 had no access to his colleagues' transactions and his colleagues had no access to his work as well. However, Participant 1 used another CQ feature that helped him overcome this shortcoming, which is transaction copy sending. Thus, he sends Carbone Copies of his transactions to colleagues to read:

> *"Because our work is confidential, which means that my colleagues cannot see what I have done, except the general manager who has access to my transactions. However, if I want my colleagues to see my transactions, I have a feature to send them copies of the transactions for acknowledgment purposes. This [solution] can be done through the system. It is the way in which I can let them see the transactions." (Participant 1).*

Overall, the two themes, Low CQ and High CQ, showed how employees use collaboration features to share knowledge inside e-government systems. Further, they gave some examples of features they needed and what they could do if some features were unavailable.

6.13.4.2. Impact of CQ

Under this theme, the impact of CQ is discussed as two points. The first is the importance of CQ on KSB while the other refers to other benefits of CQ:

- *Importance of CQ*

Under this first-order theme, respondents indicated that CQ influences their knowledge-sharing behaviour in e-government systems. Many have shared knowledge

but due to the unavailability of collaborative features, they shared information outside the systems. They agreed that e-government systems are suitable media for sharing knowledge, but they need more collaborative features. This theme highlighted the extent to which CQ was crucial in promoting KSB:

> *"Yes, but it needs to be updated and include more features." (Participant 7).*
>
> *"If the system had enabled that, I would have no issue but the system did not allow it." (Participant 9).*
>
> *"The quality of the system does make much difference. If the system were flexible and its quality were high, I would be interested in writing [sharing], but if the system made me tired, I would start feeling bored, and the motivation [to share] would decrease with time, and then I would give a little." (Participant 8).*

- *Other benefits of CQ*

Other benefits of CQ, not directly related to influencing their sharing behaviour, were noted. Participants said that CQ could be helpful in other ways, such as delivering knowledge in a clearer way. It helps a knowledge recipient to understand the situation better:

> *"I've figured out that as much as the features and tools increased and became more focused, it would be better for the recipient. And it would be quicker to understand, especially when you want to transfer a new thing to someone for the first time… Thus the tools should improve as this would be better for the recipient." (Participant 10).*
>
> *"Yes, it is a good process. Previously you used to talk over the phone. You dial the extension of the employee and then talk with him. But now you can show him some files through the program, and you can see him. This has added a big advantage for the employees." (Participant 2).*
>
> *"But if I send him [through the system] a letter [transaction] and wrote at the bottom the information, he would know that information was related to the subject... the information is clearer and more accurately transferred." (Participant 15).*

Other participants noted cases where the type of task involves more time and requires more procedures to complete, which worsens the workload for e-government systems. However, availability of suitable CQ features might solve the problem. For example, a task might require lots of data entry, but doing it in handwriting would be faster and

easier. In such situation a participant might do it on their own convenient way then attach the work within the electronic transaction. Thus, certain collaborative features might mitigate some long work procedures. Participant 1 recounted such an experience:

> *"If I wanted to judge the system, I would say that not everything that is done in the system means that it is better. For example, some things related to inventory… For illustration, I was assigned an inventory of 600 cars at one of the governmental organizations. If I had taken a sample of those 600 cars, it would be easy. But entering information in the system such as plate number, model, manufacturing year, color, who has reserved it, receiving date, and date of delivery, the manual work for all the cars would be better regarding time and so on. We have solved this issue: manually scanning and attaching it to the system. This way is the currently available solution." (Participant 1).*

Because the system of participant 3 had a very low CQ, he needed to share knowledge regarding transactions outside the system, using email for example, which cost him more effort and time. It would have been much easier for him if the system had allowed him to write his comments within the transactions.

> *"For me, it would be much different regarding work effort, it would have been faster if it was done within the system. But if I have to get out of the system to write a letter or respond to an enquiry, it would take time and effort." (Participant 3).*

This quotation from participant 3 shows the need for good CQ in e-government systems and how low CQ can cost employees more effort and find other ways to share knowledge outside the systems.

6.13.5. Knowledge sharing behaviour

This aggregate dimension represents the dependent variable KSB of the first phase. KSB includes information about what the participants said about their sharing behaviour in e-government systems. Participants talked about two situations: sharing knowledge within e-government systems, and outside the system. Two second-order themes belong under this aggregate dimension, "Knowledge sharing inside the systems" and "Knowledge sharing outside the systems". One more second-order theme – e-government systems context – also emerged. It encompasses the

considerations that employees take into account when they share knowledge in an e-government system. Figure 45 shows the themes in this domain.

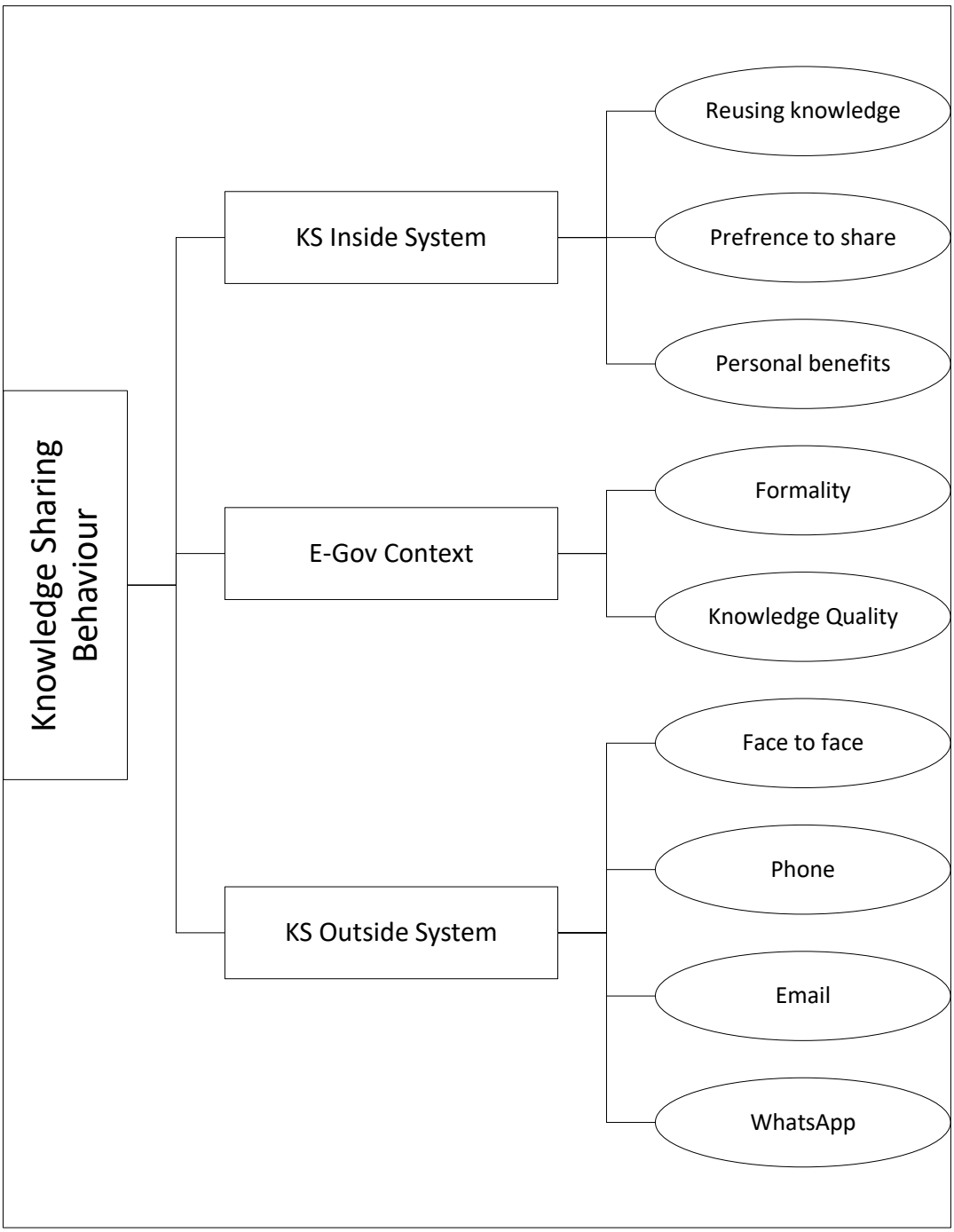

Figure 45: The domain of knowledge sharing behaviour.

6.13.5.1. Knowledge sharing inside systems

This theme includes information about knowledge sharing in e-government systems. Participants were more interested in sharing knowledge within the systems than outside them. They listed several personal benefits from sharing knowledge inside; the knowledge was not only used to solve current workplace issues, but it might also be returned and reshared to solve other future problems. This second-order theme will be discussed through three first-order ones: reusing stored knowledge in the systems, preference to share inside systems, and personal benefits of sharing knowledge within e-government systems.

- *Reusing stored knowledge*

Knowledge in e-government systems is used not only for current tasks or transactions, but also for employees to learn how to deal with similar issues in the future. Knowledge inside the systems might be returned and reshared:

> *"The good thing is that we can go back to the previous solutions." (Participant 10).*

> *"Even with the steps we do either via email or the system in which transactions are done, we retain them because we return to them later." (Participant 5).*

This theme illustrates why some participants needed the systems to have effective archival tools (see the theme "Low CQ" earlier). It also supports that e-government systems should not only be used for executing work but also for knowledge sharing.

- *Preference to share knowledge inside systems*

Most participants agreed that knowledge sharing inside e-government systems is preferred. They were willing to stop sharing outside the e-government systems if the systems offer the collaborative features they need. They had other reasons why they prefer sharing knowledge inside the systems: some said that systems save time and effort, while others said that the system could help to reach more colleagues. They could also remind others about work. These reasons are illustrated in the following:

> *"Look, the best method for me is the system because it is faster than sharing information face-to-face. Mainly, you know, meetings consume time, and some departments are very distant from each other." (Participant 11).*

"For example, you meet a group of two, three, or four people, but inside the system you can share information with so many more." (Participant 5).

"If it [knowledge sharing process] were in the system, it would have been better for me." (Participant 15).

He further explained the reason why he preferred knowledge sharing inside the system to sharing orally outside it:

"Because the conversation is oral, he may forget [what I have told him], but it will be better if he opens the system and sees the conversation or the comment." (Participant 15).

- *Personal benefits*

In addition to the reasons provided in the previous code for the preference for sharing inside the systems, participants revealed some other direct personal benefits they get when doing so – avoiding potential issues, individual intellectual contribution, and recognition.

Avoiding potential issues is provided by the way in which e-government systems document every single word written, which can help protect employees against repercussions. An example of potential issues that employees may encounter with e-government systems is conflict with managers about instructions and processes. Managers might forget what they had said to their subordinates, but with the systems employees felt safe from such problems:

"However, with the current system, he could not deny it anymore because he has to instruct electronically through the system, which makes me not to get into a conflict with the manager about the instructions…" (Participant 1).

Such potential issues might not always happen between managers and employees; it might also happen between employees themselves:

"The best way is to get the information through the system because it proves that you have given him information… you disclaim your responsibility because you instructed him and explained what he had to do." (Participant 5).

Another personal benefit was documentation of individual intellectual contribution. A group of employees stated that when they find a solution to an issue or provide an idea or suggestion to management, they need to document their contributions. Sharing knowledge inside e-government systems makes this possible for them, and then no one else can claim the contributions:

> *"The system preserves your right to the idea and information you have provided." (Participant 5).*
>
> *"It is fine when it is in the system because it [knowledge] is recorded. Ultimately, it will be known that it was yours", (Participant 7).*

The third personal benefit was the desire to be recognized by management. A group of participants stated that sharing knowledge inside e-government systems helps them build a good profile. They build reputations as active and valuable employees to the senior management:

> *"I was important to him [the new manager] through the memos that I used to write [inside the system], my writing style, and my comprehension of the regulations." (Participant 1).*
>
> *"The benefit is that more than one person has used your work as a reference. After that, the final result will go to the governor [the general manager], who will know that your work was good. It does depend on things like this." (Participant 7).*
>
> *"The personal motivation in answering the queries is that your name gets mentioned frequently at the ministry. Your name becomes known. This is the only motivation." (Participant 13).*

6.13.5.2. E-government context

This second-order theme includes information about some behavioural aspects that appeared as a consequence of e-government systems. Those aspects were grouped into two first-order themes: "Formality" and "Quality of knowledge".

- *Formality*

E-government systems are formal channels through which services are delivered to people in the community. They have some attributes that might make them different from other KMS. E-government systems are mandatory-use, and because the formal

work is conducted through them, knowledge needs to be written in a formal style and abbreviated.

Participants said that the use of e-government systems was essential to execute the work. All tasks integrated into the systems have to be done through the systems, not elsewhere. Transactions cannot be even received from customers outside the systems.

> *"It must be submitted through the electronic system to get the required service." (Participant 10).*
>
> *"It is definitely compulsory. We have started using it since the twelfth month." (Participant 4).*
>
> *"All the departments in the organization have been ordered to use it in the correspondence process, whether internal or external." (Participant 2).*

In such formal channels, employees cannot write whatever they want. Instead, they need to write concisely in a highly organized style. Sometimes they face some difficulty in deciding what to write. They need to focus more on the knowledge itself and make it as short as they can:

> *"Usually, when you send orders [transactions] electronically, you try to shorten the information as much as you can…" (Participant 5).*
>
> *"Not everything should be put in the system… I usually do my writing on a transaction, abbreviate and minimize instructions and even attachments as much as I can." (Participant 1).*

The issue was not always limited to writing in short or concise phrases but also related to the style in which knowledge is supposed to be shared. Two participants stated that they wanted to share knowledge, but the formal tone they needed to use when working on the systems discouraged sharing. Arabic can also be written in a colloquial style which makes it easier to communicate than writing formally. They sought an additional space where they could be free from using formal language. Writing in a formal style tires employees and inhibits knowledge sharing:

> *"If I would share information outside the system... it might not make any difference to me, but when I share in the system, the wording needs to be coherent because they may want to reply to it." (Participant 8).*
>
> *"I had no problem writing the knowledge I have in the system... but I do not want to be forced to write it in a managerial language. I want to write*

it in an easy colloquial way. This is the issue with the system because everything will stay in it, so you have to take this into account before you write." (Participant 6).

The participant suggested an additional space where they could be free from using formal language:

"Because there were no features in the system making it possible to write such information. If there, for example, was an appendix within the transaction in the system, you could add information to such an appendix. But in the system, everything must be written as a formal transaction." (Participant 6).

The last quotation indicates how CQ might help overcome many difficulties in sharing knowledge in the system.

- *Knowledge quality in e-government*

Participants said that they shared only relevant and accurate information in the systems. These two aspects of quality were spoken of as considerations for putting knowledge into the systems:

"I don't send anything unless I feel it is required." (Participant 1).

"Ultimately, I will share work information, and the information that benefits the team or the organization… but sharing without any real outcome or value, I will not share." (Participant 2).

"But inside the system, you give him what you are sure about 100%, and the thing should be clear and direct." (Participant 5).

The reason for such caution was most likely that e-government systems are work-related systems which means inaccurate information might directly impair outcomes. This was illustrated by participant 7:

"If I have enough understanding [about a subject], it is okay I share, but – as I told you – if I do not have enough experience, I do not like to say anything because it might impair their decisions." (Participant 7).

6.13.5.3. Knowledge sharing outside systems

Participants noted four ways in which they shared knowledge outside e-government systems: face-to-face, over the phone, email, and WhatsApp. Such methods were used in two ways. The first was to complement knowledge sharing within the systems, like discussion of work details. The second was as a substitute method for sharing knowledge inside the systems. In the first, employees discuss details or sometimes confirm what was written on the systems. It seems that the complementary way is used when there were some details they could not be put in the systems, and they used it when there was a need for it, like when a colleague asked for further clarifications. In such cases, people used face-to-face and phone calls to share knowledge:

> *"Usually, when you send orders electronically, you try to shorten the information as much as you can… But if he makes a phone call asking for more information about the subject, I will explain to him and let him know this way." (Participant 5).*

> *"Also, he calls my office to ask me about what is required from him in the transaction." (Participant 6).*

The second way was normally employed when systems did not have suitable CQ features. In such cases, participants shared knowledge outside the system because doing it inside the system was impossible. They used outside channels like face-to-face, phone calls, and email as substitutes for sharing inside the systems:

> *"If the system allowed this, it wouldn't have been a problem [to share inside the system instead of oral sharing], but the system did not allow it." (Participant 9).*

> *"In such a situation, I have to talk with my manager and ask him to search for it himself. This is because he can search all the transactions." (Participant 1).*

> *"For example, the manager asks me to notify him when I complete the transformation or the return. I do this by calling him, saying that the process has been accomplished." (Participant 3).*

> *"If I could correspond with an employee in the […] program itself, it would be good. So then, how do I correspond with him about some transaction? It is done through email, which is separate from the […] program. If it were done through the program, it would be a very excellent feature." (Participant 3).*

These quotations indicate the crucial role of CQ to allow knowledge sharing inside the systems.

A group of participants mentioned WhatsApp and the features it offers. Such features were the ability to contact anyone anywhere, instant chatting, effective notification tools, and sharing of voice and photos. These CQ features make WhatsApp a useful substitute channel. It might be used especially when employees need to work outside their offices but do not have access to the systems:

> *"Yes, we need WhatsApp in case I was outside or in another office. However, at the end we use the system to document and to get the manager's acknowledgement about our work on this task." (Participant 12).*

Sometimes people used WhatsApp due to the absence of a specific CQ feature they needed. For example, participant 13, who previously mentioned he used WhatsApp because he needed effective notification tools:

> *"I usually get the answer [from WhatsApp], then paraphrase it and send it through the system." (Participant 13).*

Participant 1 used WhatsApp because he needed instant chatting, which was not available on his system:

> *"I always go back to WhatsApp whenever I need it [the knowledge saved in the WhatsApp's conversations]. It would be easier if it was in the system because my phone might get damaged, but the system would never suffer this." (Participant 1).*

6.13.6. Other findings

This section is the last part of the findings. It is a collection of miscellaneous findings that didn't fit elsewhere. Such information is outside the research framework's scope but still worth mentioning. It falls into three themes: competition style in e-government systems, the influence of systems implementation, and support needed for outside the systems.

- *Competition style in e-government systems*

Interviewees agreed that competition exists in their workplace, and most of them stated it did not inhibit sharing knowledge. They were willing to share knowledge with colleagues even if they were rivals:

> *"Yes, there is competition. But does it affect the amount of knowledge? I feel the answer is no, umm, again, no." (Participant 8).*
>
> *"Usually, you provide him with what he wants when he asks, even with competition existing between you both… thus, my answer is: I do not think competition makes a difference." (Participant 5).*
>
> *"If I know [when I have knowledge], I have no issue in sharing it with people." (Participant 6).*

However, two employees said that competition led to hiding knowledge outside the system. They stop sharing or may hoard knowledge until they share it inside e-government systems. The most important thing was to document their knowledge in the systems first because they were concerned about rivals who might plagiarize it or take credit for it. Apparently, the personal benefit of documenting intellectual rights (a previous theme) overcomes the danger of competition in e-government systems:

> *"There is something else; if I have a rival colleague and have finished my work and sent it [in the system], it would not be a problem to tell all people after that… The most important thing is to reach it first, and then I tell the others. When it comes to competition, I honestly say that I have some selfishness here." (Participant 9).*
>
> *"Humm…, for me, there was no problem before, but later I felt that it did. I mean, there is fierce competition between the girls. It is really (really) much competition there. A girl might take your knowledge and then claim that she thought of it herself. She might use your knowledge during meetings without referring to you. Given this common situation, I have become more discreet now." (Participant 7).*

The researcher then asked her how about sharing in the system, she responded:

> *"It is okay in the system because it records things. Ultimately, it will be known that it was yours." (Participant 7).*

Therefore, competition had a negative effect on knowledge sharing, but sharing knowledge inside the systems disables this negative impact because systems formally

record who has shared the knowledge and no one else can take credit for it. This was also explicitly mentioned by participant 1:

> *"So why do I retain the information for myself? On the contrary, sharing will distinguish me from the competition…" (Participant 1).*

- *Support needed for outside systems*

Some participants mentioned two things that they required outside the systems. If those needs were available, sharing knowledge inside the systems would be easier for them. Training was the first need. Participants sometimes worked with colleagues who did not know how to use the systems properly. Such a situation makes knowledge sharing difficult not only for untrained people, but also for those who deal with them. One participant mentioned this problem, while another was not so sure about what feature he got in the system:

> *"First of all, having people who understand the system. People who are eligible to work with the system because some people have inconsistent abilities with the system. This issue is one of the difficulties we have." (Participant 11).*

> *"Maybe there is such a feature, but we do not use all the features because there are so many tasks to deal with, so we are busy trying to finish them… Maybe there is a feature to search for in the archive." (Participant 12).*

A second need was having to transfer knowledge into the systems. Sometimes employees might have a hard copy of a document. When they need to share it, they need to convert them into digital copies, which is a time-consuming process. Participant 11 had difficulty putting knowledge into the system to share. Because he did not have a scanner, he needed to do certain steps to share knowledge:

> *"So I have to find another way. For example, I take a picture of the transaction using my phone. Then send [upload] it to WhatsApp and add [download] it to the computer to attach it after that. So much time is wasted in this situation." (Participant 11).*

6.14. Limitations of phase 2

As with all studies, potential limitations need to be acknowledged. The first was that the radical changes in organizations and workplaces during the Covid-19 pandemic could have somehow influenced the answers. As much as possible, the researcher took

this issue into account, trying to minimise responses being coloured by the events. The second limitation was the difficulty in conducting interviews with women. Having just two women interviewed out of fifteen means an imbalance between men's and women's perspectives. Other studies might consider these two limitations in the future.

6.15. Chapter summary

This chapter has presented the whole second qualitative phase of this research. It began with stating the qualitative research questions that arose from discussion of the previous phase. After that, it discussed details of the data collection procedure followed by an outline of the data analysis method. Afterwards, the findings from the semi-structured interviews were reported. Lastly, the chapter closed with the phase's limitations.

7 Discussion and Research Conclusion

This last chapter contains two main parts. The first part is a discussion of the results from both phases. The research questions (section 1.3) are revisited and answered, and further discussion of the other findings from the second phase (section 6.13.6) is also provided. The second part is a conclusion where the theoretical and practical implications are set out. Afterwards, the limitations of the research and future research directions are addressed, and finally there is a summary of the whole thesis.

7.1. Revisiting the research questions

This section provides the answers to the research questions raised in section1.3. As stated in Chapter 1, this research aimed to investigate the impact of social capital on knowledge sharing behaviour in e-government systems. The research questions were posed in section 1.3 as a framework for the research objectives. The five research questions are listed below, and the answers to them are provided through the results of both phases. The results from phase 1 are presented first, followed by the explanatory answers provided in phase 2.

7.1.1. Answer to RQ 1

The first research question was "What is the impact of social ties on knowledge sharing behaviour in e-government systems?". In the first phase, ST was the only social capital variable significantly related to KSB, a finding emerging from both versions of the research model. The question that needed to be answered was why ST was strong enough to keep its significant relationship with KSB in model 2. It is suggested that understanding why ST is related to KSB in e-government systems gives the explanation. That is, to explain the result, we need to answer the Qualitative-RQ1 question: "How do social ties influence knowledge sharing behaviour in e-government systems?"

Knowledge sharing behaviour takes two forms: donating knowledge or seeking it (H. H. Chang & Chuang, 2011; C. M. Chiu et al., 2006). In this regard, the outcomes of the interviews found a difference between knowledge donating and knowledge seeking. ST does not influence knowledge donating: employees usually share the same amount of knowledge whether they have strong social ties with the knowledge recipients or not. That is, ST has no effect on proactive knowledge sharing in e-

government systems. This means that when employees share knowledge, they do so without considering the strength of their relationships with their colleagues. However, ST might influence knowledge sharing by encouraging employees to seek knowledge from others in e-government systems. For example, when an employee needs some help with some work issues, they will prefer to ask close colleagues and not others. In this sense, the sharing behaviour in e-government systems increases when colleagues ask for assistance. Conversely, if employees do not have such social ties, then seeking knowledge will be more limited.

Another effect of ST emerged in the interviews. Social ties help employees know more about each other. Depending on how long they have known each other, employees will know more about each other's personalities and what they prefer. For example, some employees might prefer to get the full details while others prefer brief versions. Moreover, some might like knowledge to be written in outline style, while others might like it as a narrative. Employees discover such preferences through their social ties, and then share knowledge in the style or quantity that others prefer. It can be said that knowledge is of a higher quality when it is provided in the shape or form that recipients like. Nevertheless, if they have weak social ties, they share knowledge in the usual way without putting much effort into shaping the knowledge into the recipients' preferences. Moreover, ST can also improve the quality of knowledge in another way. There was some evidence that the strength of ST affects sharing knowledge in a more timely manner, so that employees might even rush to provide knowledge in a timely manner to those well known to them. This result is theoretically supported, as timeliness is a structural dimension of social capital; ST helps organizations communicate more quickly and gain organizational advantages (Hazleton & Kennan, 2000).

A number of works have accepted the idea that strong ST means more social interactions, and hence knowledge sharing is more likely (W. Tsai & Ghoshal, 1998). In this research, no impact of ST was found on knowledge donating behaviour. The interpretation might be that the interactions inside e-government systems are unlike those outside, such as face-to-face interactions. It is likely that the procedures for performing tasks inside the systems promote who interacts with whom. Hence the transfer of knowledge would not be as great as with face-face interactions.

In e-government systems, employees use their social ties to access other actors' resources (knowledge). Thus, having strong social ties means having the access, however it does not mean sharing. The picture of how access is made to others' knowledge is incomplete. Here, sharing knowledge depends on the behaviour of knowledge-seeking which is the actual use of ST (N. Lin & Dumin, 1986). In other words, employees fail to get the knowledge they need if they do not properly use their ST. In e-government systems, employees take advantage of their social ties to ask for knowledge from close colleagues. This use of ST explains the positive relationship between ST and KSB in both versions of the research models. Nevertheless, if they do not have many close colleagues (because ST is low), then they are less likely to ask for knowledge, and therefore have less KSB.

The relationship between ST on knowledge quality was not investigated in phase 1. However, it did appear during the interviews. Some prior studies have investigated the impact of ST on knowledge quality. Here, knowledge quality was defined as the "nature and helpfulness of content" (H.-H. Chang & Chuang, 2011), and was further adopted from DeLone and McLean (2003), who determined the attributes of system information quality. The attributes of accuracy, timeliness, ease of understanding, completeness, relevance, and consistency were adopted here to measure knowledge quality (Chiu et al., 2006).

However, this study has added to the literature about how ST can increase the quality of knowledge, and this was apparent in terms of ease of understanding. For example, ST might lead to knowledge being provided to the recipient in their preferred style. Such a factor can increase the use of knowledge (Poston & Speier, 2005), and so personalization of knowledge is another level of quality. Furthermore, it was found that the more two individuals shared interests in common, the stronger were the social ties between them (Feld, 1981). Hence, the preferred-style knowledge they share is reflected by aspects of their social ties.

7.1.2. Answer to RQ 2

The second research question in this research was: "What is the impact of trust on employees' knowledge sharing behaviour in e-government systems?".

In the first phase, it was found that trust had a significant positive relationship with KSB. However, when CQ was inserted into research model version 2, the relationship

was not significant. Therefore, Qualitative-RQ3 was asked in phase 2 to explain situations related to the impact of trust. So, the explanatory question was "Qualitative-RQ2: What are the considerations related to the impact of trust on KSB in e-government systems?".

The interviews revealed that, in e-government systems, trust in colleagues does not entirely reflect the role of trust in KSB. Another level of trust is staff having trust in management and not just trust in colleagues. When trust in management is high, trust in colleagues will not be so important. However, trust in colleagues might be influential and considered by employees if trust in management becomes low.

In a non-IT context, Mooradian et al. (2006) concluded that two factors – fear of losing one unique value and documentation of knowledge – mediate the relationship between trust in management and knowledge sharing within and between teams. In other words, trust in management affects KSB within and between teams by reducing fear and improving documentation of knowledge. In addition, the study emphasized the importance of acknowledging the active role of employees in the knowledge sharing process when documenting their knowledge. These results are similar to the findings in this research (considering the different context, of course). The interviews revealed that employees obtain their own benefits when they share knowledge in e-government systems. The benefits were documentation of their individual intellectual contribution, avoiding potential issues, and recognition (section 6.13.5.1). Hence, the documentation of the knowledge in e-government systems, which appears by default, ensures that their contributions are acknowledged. Further, they want to get their contributions recognised by management and distinguish themselves from other employees. Such benefits are essential for knowledge sharing because employees need empathetic recognition. Otherwise, they tend to hoard knowledge (Ruppel & Harrington, 2001).

Therefore, as long as they benefit from their knowledge, the level of trust in colleagues does not influence their KSB. The benefits are enough to eliminate the worry about the untoward behaviour of colleagues. The benefits can even influence the behaviour to share knowledge with rival colleagues, which means that employees might share knowledge in order to prove their superiority over rivals. That is, in an e-government system, trust in colleagues might be unnecessary so long as trust in management was high.

On the other hand, if trust in management is low, employees might be afraid to document their knowledge (Renzl, 2008), and trust in colleagues begins to affect behaviour. In such a situation, an employee might not share knowledge even with people he trusts because of mistrust about others on the system. This situation might not apply in non-IT knowledge sharing, where employees usually have more control with whom they share. This explanation agrees with the work of Ruppel and Harrington (2001), who stated that a trust culture is essential for knowledge sharing on an intranet.

It should be noted here that participants mentioned two dimensions of trust in management: management tolerance to mistakes and their attention to employees. Tolerance of mistakes means employees become concerned about sharing their knowledge in e-government systems if they believe that management understands their faults. As an example, they might mistakenly share wrong information or fail to solve some work issues. They would then not be fearful if they trusted that their management would not try to take action against them. Instead, management might try to correct the mistake, so employees learn something new instead of being blamed or punished. This research highlights that a fault-tolerant environment helps to create intellectual capital (Nahapiet & Ghoshal, 1998). On the other hand, however, if the relationship between employees and management is governed by doubt, employees will refrain from sharing knowledge in e-government systems. Thus, the research concludes that fear of repercussions negatively affects sharing (Boey, 2020). This dimension of trust was consistent with the adopted definition.

The second dimension of trust was the level of management's attention to employees. Employees might not share knowledge in e-government systems if their management does not care about their needs or suggestions. When management does not respect their words and pays no attention to their employees, employees might stop sharing knowledge because no one hears them. Trust, as stated before, is a complicated concept that has multiple levels. The management literature usually describes trust in management in terms very close to this second dimension, in which there are two aspects: faith in the intention of management and confidence in its ability (McCAULEY & Kuhnert, 1992). Kerkhof, Winder, and Klandermans (2003) further divided the concept into six perceptions: reliability, honesty, meeting obligations, telling the truth, fulfilling promises, and performing no misleading acts. This research

has helped determine the dimensions of trust employees have in management in the knowledge sharing domain.

7.1.3. Answer to RQ 3

The third question asked in this research was: "What is the impact of shared vision on knowledge sharing behaviour in e-government systems?" In phase 1, SV had no significant relationship with KSB in both versions of the research model and was the weakest path in the model. The discussion of the result (section 5.8.2.3) led to the question Qualitative-RQ4 in the second phase: "What is the role of shared vision in influencing knowledge sharing behaviour in e-government systems?". The answer from the interviewees is that SV is not the only factor influencing KSB. Participants raised two other factors when they were asked about SV: the first concerned incentives while the other involved collaboration.

Employees might have a shared vision, and agree on the importance of reaching it, but not necessarily have enough enthusiasm to take action. However, when the achievement of a shared vision is associated with incentives, employees are more likely to take action and share knowledge – in order to achieve that vision and gain the benefits from the associated incentives. In such a situation, incentives might have more influence on employee behaviour than shared vision. It should be noted here incentives should be fair – unfair incentives tend to result in employees hoarding and not sharing their knowledge.

Many studies have concluded that rewards and incentives are drivers of knowledge sharing in organizations (Haesebrouck, Van den Abbeele, & Williamson, 2021; Siemsen, Balasubramanian, & Roth, 2007; Yue Wah, Menkhoff, Loh, & Evers, 2007), particularly with regard to IT-mediated knowledge sharing (N. Wang, Yin, Ma, & Liao, 2021). This research has noted the importance of rewards and incentives in driving KSB in e-government systems, agreeing with the literature in this regard. Further, it has highlighted the importance of investigating how the role of SV can change if incentives are conditional upon achievement of the organization's vision.

The other factor referred to is collaboration. The results showed that employees might not need incentives if they have a collaborative culture. In this situation, employees collaborate and share knowledge just to achieve the vision. Thus, the influence on behaviour comes from the collaboration, while the vision controls the direction of their

collaboration. Put another way, employees might not necessarily share knowledge if they only have the same vision; they also need a higher level of collaboration to work together and share knowledge in order to achieve their vision. Simply, employees will be more likely to move toward achieving the vision if they are collaborators. If they are not, incentives associated with the vision are needed in order to motivate them.

This research concludes that a vision which employees share might not be enough to translate their willingness to achieve it into actual behaviour – basically because some people prefer a free ride and enjoy the results from collaborating with others (Dyer & Nobeoka, 2000). On the contrary, collaboration which is rooted in an organization is more likely to influence the behaviour of employees (Bock, Kankanhalli, & Sharma, 2006). It is the solution to the free-riding problem (Amad, Aïssani, Meddahi, & Boudries, 2013) and makes employees less concerned about cost and even incentives (Kankanhalli, Tan, & Wei, 2005). This result does not underestimate the role of a shared vision in encouraging collaboration in an organization. SV, however, needs at least one of the two factors to be available for it to have an impact on KSB. The availability of both, of course, provides even better encouragement for employees to share knowledge.

Overall, the results of phase 1 indicated that SV was not as important as other aspects of social capital. Meanwhile, respondents in phase 2 indicated that, for SV to have an impact, organizations need incentives and a culture that encourages collaboration. Thus, both research phases did not find anything conclusive about SV, and the reason was the absence of collaboration and incentives in the research model. Consequently, further research into this area is called for.

7.1.4. Answer to RQ 4

The fourth research question was related to shared language: “What is the impact of shared language on employees’ knowledge sharing behaviour in e-government systems?” However, the variable “Shared language" did not survive during the factor analysis process in the first quantitative phase (see section 5.8.2.4). Therefore, no answer to RQ4 is available in this research. Further research might be able to investigate it in more detail.

7.1.5. Answer to RQ5

The fifth research question (RQ5) was: “What is the impact of collaboration quality of e-government systems on knowledge sharing behaviour in the e-government systems?” The first phase found that the relationship between CQ and KSB was the strongest (most positive) path in the research model. Generally, all social capital variables – ST, TRU, and SV – became much less influential when CQ was inserted into the model. Therefore, the Qualitative-RQ4 was: “Why was CQ more influential than social capital on KSB in e-government systems?”

The interviews confirmed the importance of CQ. All participants agreed that without CQ, they would not be able to share knowledge via e-government systems. They showed willingness to put their knowledge into the systems and to have more collaborative tools. Collaborative tools could make interactions within the system easier (Lacosta & Thomas, 2020), increasing the knowledge captured inside the systems and raising the intellectual assets of an organization.

On the other hand, the main reason for sharing outside of the systems was the unavailability of CQ. Generally, if CQ was low, employees will share knowledge outside the systems. Thereby, CQ might be the ‘border line’ between sharing knowledge inside and outside e-government systems. This research found that CQ was a way by which social capital could impact KSB. In other words, the influence of social capital on KSB in the systems does not go beyond the borders of CQ. Thus, the qualitative data confirmed the statistics in phase 1. It showed how CQ completed the picture and reflected the real impact of social capital on KSB in the systems. This result clearly explains why CQ was the variable most strongly related to KSB in the research framework.

7.1.6. Answer to RQ 6

One of the objectives of this research was to investigate how collaborative features embedded within e-government systems interact with social capital to influence KSB. So, the sixth and last research question was: “What is the role of CQ in its interaction with social capital?”.

Referring to the first phase, the moderating effect of CQ on the relationships between the three social capital variables and KSB were tested (section 5.7.4). It was expected that CQ would significantly moderate the relationships between social capital

variables and KSB. However, the results showed no such relationship. This unexpected consequence needed to be explained in Qualitative-RQ5: "How does CQ affect the relationship between SC and KSB?"

Knowledge and technical skills can be enhanced when systems are designed to meet the real needs of their users (Zeraati, Molavi, & Navimipour, 2020). In this regard, the interviews revealed that the impact of CQ was not exclusively related to various collaborative features available in the systems. More importantly, CQ aligned more closely with what the employees needed. The needs of employees for collaborative features vary depending on the tasks and the nature of their work. For example, if a group of employees work outside their offices, they still need to access the system and they do so through applications installed on their mobile phones. This means that if employees need to perform a certain task both inside and outside the system, the system needs to have suitable in-built collaborative features for sharing knowledge.

At the same time, a system with high CQ does not necessarily ensure that employees share knowledge inside it, even if their social capital allows them to do so. When employees are motivated to share knowledge by factors like social capital, and a specific needed feature is unavailable, they tend to share outside the system using other channels offering that particular feature. Then, system characteristics represented by its CQ and task characteristics (task-technology fit) will be important in supporting sharing knowledge in e-government systems. The perceived system fit increases the system's utilisation and performance (El Said, 2015; Goodhue & Thompson, 1995).

Interviews gave examples of how the influence of social capital on KSB could take place outside systems (instead of inside them) if required collaborative features were not available. For example, participants in phase 2 mentioned some vital collaborative features they need embedded within e-government systems in order to share knowledge. One of the most wanted features was messaging between users inside the systems. The messages allow employees to share and seek knowledge from each other inside the system – in other words, using social capital inside the system to share knowledge. The most frequent reason for using WhatsApp instead of e-government systems was the unavailability of a similar feature in existing e-government systems.

Some participants said that even though the systems they worked on offered messaging between employees, they did not use them – because there was ineffective notification

of message delivery or access was exclusively via a computers screen. They did not use the system messaging feature because it did not fill their needs. Instead, they used WhatsApp because it offers the features they need; they chose to use their social capital to seek knowledge from their colleagues via WhatsApp (i.e., outside the system). Thus, the second phase explained that CQ could play a role between social capital and KSB inside the systems only if it satisfies employees' needs, and not just because it was rated as being high.

Overall, the research concluded that the possible influential role of CQ on the relationship between social capital and KSB depends on the extent to which CQ matches the system users' needs.

7.1.6.1. Revisiting the research model

Even though the explanation in phase 2 was rich and perhaps adequate, the researcher sought further confirmation of the role of CQ. The qualitative study provided a plausible explanation for the quantitative phase, and the quantitative results were consistent with what the interviewees said. But to confirm the qualitative findings regarding the quantitative data, the research model was revisited.

This time, when the researcher examined the research model, he compared the difference between high and low CQ. What is the practical result of CQ being high or low? For example, was the issue just the variety of collaborative features, or their alignment with employees' needs (as second phase revealed)? A multi-group analysis (MGA) was conducted to see what effect there was on KSB when CQ was high or low (see appendix A-20).

The result of the MGA showed that there were no significant differences between high and low CQ in the research model. Low CQ did not affect the relationship between social capital and KSB, nor did high CQ. The convergence of CQ's effect on both groups could be due to the lack of measuring the fit of collaborative features within CQ. This revisitation supported the phase 2 outcome, confirming the importance of considering the fit of the features as a dimension of CQ. Overall, the two phases were symmetrically consistent, reflecting the rigour of the methods employed in the research.

7.2. Discussion of other findings

As stated earlier in section 6.13.6, in the second phase a number of other findings were extracted from the interviews. However, the most notable was the finding concerning competition in the workplace.

A range of studies have indicated that knowledge can be used as a kind of power in the hands of employees, increasing the tendency of employees to hoard knowledge for themselves rather than sharing it with workmates (Schepers & Van den Berg, 2007). Employees might use their knowledge to outclass others with higher work quality, distinguishing themselves in comparison with their rivals. The literature indicates that knowledge sharing tends to become less in organizations that emphasize individual competition (S. Wang & Noe, 2010). That is, sharing means losing distinctive advantages (Fengjie, Fei, & Xin, 2004; Schepers & Van den Berg, 2007). On the other hand, employees will be more likely to share knowledge if they see more benefits in sharing compared to the cost of sharing (B. Gupta, Joshi, & Agarwal, 2012; Z. Yan, Wang, Chen, & Zhang, 2016). Consequently, organizations are advised to employ strategies to dilute the negative impact of competition. Suitable strategies are supporting long-term commitment, building trust, increasing reciprocity, and setting up incentives and rewards (Ghobadi & D'Ambra, 2011; Semerci, 2019), and these can help organizations create a knowledge-friendly culture (Bechina & Bommen, 2006).

In this context, the findings from the qualitative phase indicated that competition in the workplace did not decrease KSB in e-government systems. The reason was that employees prefer to share knowledge inside the systems rather than outside due to certain advantages. First, they are able to document their individual intellectual contribution so no one else can plagiarise or steal their words and ideas. Second, use of e-government systems avoids possible issues with a managers' instructions or what a colleague said. The third benefit is congruent with Z. Yan et al. (2016): keeping their contributions in the public eye and gaining recognition for good work. Thus, sharing knowledge in e-government systems gives employees more benefits than costs, so they are more willing to share, even with rivals. The conclusion here is that sharing knowledge in e-government systems allows organizations to overcome the negative effects of competition on KSB.

7.3. Research contribution and recommendations

This research investigated the impacts of social capital (in the form of social ties, trust, and shared vision) and collaboration quality on knowledge sharing behaviour in e-government systems. The research began with a systematic literature review in which some gaps and weaknesses in the literature were identified. The research framework was designed to fill some of these gaps. As a result of the rigorous process of undertaking each research stage, valuable theoretical and practical implications have been derived.

The carefully taken research steps allowed rational and consistent results to be obtained. The significance of the research emerges through its contributions to management theory and practice. Moreover, the research outcomes shed light on some areas of research that still need more investigation, and some promising future research directions are suggested. In what follows, several theoretical and practical implications as well as methodological contributions are provided.

7.3.1. Theoretical implications

Based on the results and discussions, several theoretical implications are addressed here. First, the systematic literature review detected some weaknesses in the literature (sections 2.9.1). Most prior work has largely discussed and interpreted findings without considering the difference between IT and non-IT contexts. The research here focused on this point, and its SLR identified 71 relevant papers. When those papers were sorted in terms of IT and non-IT contexts, results of testing of the social capital variables became more consistent. In addition, this difference was carried through to the two research phases, and the results added more evidence that the effect of social capital differed between IT and non-IT settings. It is concluded that scholars should take such differences into account in their work. This would help systematize the literature and increase consistency in research outcomes. The underlying theory would therefore be built on sturdier pillars.

The research further examined how social capital interacted with the system's collaborative features to affect knowledge sharing behaviour. For this, the construct CQ was introduced, and it proved valuable as bringing out a crucial role in the theoretical model. CQ was shown to play an essential role in fostering knowledge sharing behaviour in the systems. It also highlighted other roles of social capital and

gave deeper understanding of the impact of theory on knowledge sharing. Indeed, the research highlighted the risk of obtaining ambiguous results if CQ is ignored. For example, if this work had failed to investigate CQ, it might have simply relied on just the results of research model version 1 (in the first phase) and concluded with a confirmation of the existing literature. Instead, when studying knowledge sharing in IT contexts, it is crucial to consider CQ as a critical factor, as this research demonstrated. This implication is not just limited to social capital but applies to other knowledge-sharing enablers as well.

The explanatory mixed-method approach came up with in-depth explanations about how the three social capital factors (social ties, trust, and shared vision) affect knowledge sharing behaviour. Looking at social ties as a construct, it appeared to influence knowledge-seeking, but not knowledge-donating. In fact, it might bear no relationship with knowledge-donating for the reason that official work processes limit interactions in e-government systems. Scholars may need to investigate this process further in different systems. Another impact of social ties was detected: social ties become stronger when social interactions become more numerous. Social interactions always exist in some ways in an organization, and these allow employees to learn more about each other's personalities. The awareness so acquired allows them to provide knowledge in the recipient's preferred style, meaning that knowledge is shared at a higher level of quality. This impact of knowledge quality represents a new understanding of the construct, and it is suggested that researchers should investigate this point in greater detail.

In its first quantitative phase this research investigated trust in colleagues, following a path similar to most prior studies. Uniquely, however, the second qualitative phase revealed that trust in colleagues was not the only factor controlling the actual level of trust. In the context of an e-government system, trust in management can sometimes be more important. Researchers might need to study how those various types of trust interact to influence knowledge sharing through systems in organizations. Thus, depending on the type of trust, different results could be found.

Regarding shared vision, nothing conclusive about SV was found in the research. However, the second phase did find some theoretical areas that need more investigation. It was found here that, by itself, SV might not trigger KSB. Instead, it might become interact with at least one of other existing factors in organizations:

incentives and collaboration. Incentives could no doubt motivate employees' to act, while shared vision might steer their behaviour. Together, both shared vision and incentives could drive behaviour. At the same time, without incentives the presence of a shared vision might not have much effect, as an employee may prefer free-riding rather than collaborate to achieve the vision. Therefore, a collaborative culture could, with shared vision, play a vital role in increasing KSB. Because collaboration culture and incentives had not been included in the research model, further research on this area is needed. Compared with social ties and trust, shared vision was a lesser researched variable (Chapter 2). Hence, the implication for research is that there is a high need for more investigations of shared vision, incentives, and collaboration.

Overall, these insights about the three main constructs of social capital add to our understanding of social capital theory, and the research strongly recommends further investigate of these aspects.

Turning to the Saudi Arabian context of e-government systems, in the country's public sector such systems are essential (mandatory use) systems. This means that work outside the systems is not allowed. It appeared that participants were more cautious when sharing knowledge in the systems because they did not want to share low-quality knowledge. Moreover, they behaved positively and shared knowledge even if there was competition between them. This behaviour was unlike many prior studies which concluded that competition had a negative impact on knowledge sharing. Because the systems were mandatory, and their work had to be formal and was monitored by their management, the employees behaved somewhat differently. These factors might vary from one system to another. At the very least, however, the research here advises that the level of compulsion in such systems should be considered.

Some methodological implications also need to be addressed. The systematic review showed that the literature in qualitative and mixed-method research is deficient in certain areas (section 2.6). The majority of prior works are quantitative, which is not satisfactory, and is not enough to give a convincing picture. This research has directed more effort to studying what is going on through its use of two rigorous sequential stages, and this has made it possible to increase the literature's dimensions. The explanatory mixed-method approach has given new insights about the effect of social capital on knowledge sharing behaviour, as well as a deeper understanding of social

ties, trust, and shared vision (sections 7.1.1, 7.1.2, and 7.1.3). This research advises researchers to triangulate the literature by employing different research methods.

The research has confirmed previous recommendations that the public sector still needs further investigations into knowledge management. The systematic literature review found that only 6 percent of social capital / knowledge sharing studies have been conducted in the public sector (sector 2.6). The research has helped to fill this need by investigating the Saudi Arabian public sector, and recommends more efforts focused on social capital and knowledge sharing in the sector.

In another contribution of this study, most studies of e-government have looked at the demand side, and are still in the adoption stage, especially in Saudi Arabia. However, this research took the bold step of investigating social capital and knowledge-sharing behaviour in e-government systems in the country. It drew the attention to the importance of utilising e-government not only in the delivery of e-services but also in providing organizational learning. However, the behaviour of knowledge sharing in such scenarios has not been well researched, and this study is one of the first to do so.

7.3.2. Practical implications

This research attempted to investigate how social capital in public sector organizations interacts with the collaboration quality to influence knowledge sharing behaviour in e-government systems.

Regarding the feasibility of developing e-government systems so as to foster intra-organizational knowledge sharing, this research noticed some encouraging reasons to think so. First of all, employees showed a willingness to share their knowledge inside the systems. In addition to learning from knowledge sharing, they saw benefits to themselves personally when they shared knowledge in the systems. These personal benefits represent a motivation for using the e-government context, such that employees tend to be more willing to promote themselves in the systems. To achieve these benefits, they will share knowledge even with rival colleagues. Therefore, e-government systems create an environment where organizations might easily gain advantages from competition between employees as well as the ability to build a knowledge-friendly culture. There is an opportunity for organizations to take advantage of this situation.

The quality of knowledge employees share in e-government systems is more likely to be higher if it is directly relevant to work issues and is accurate. In such cases, users of the e-government systems would be more likely to directly apply the knowledge they learn to their currently assigned work. Thus, knowledge shared in e-government systems might be more important than knowledge shared in voluntary use systems.

The research concluded that knowledge sharing in e-government systems could be a primary avenue for employees to solve work issues, coordinate tasks, and execute transactions with less effort and time. However, if the collaboration quality is low they are unable to exchange such knowledge, and the contribution of social capital would be missing if collaborative features are not embedded in the system. In such cases, there is a risk of taking away the contribution of social capital in e-government systems. Social capital is a valuable intangible asset in organizations (Diefenbach, 2006) and it should be fully exploited to achieve the interests of the organizations.

Therefore, it is vital to integrate suitable collaborative tools into e-government portals. Such tools facilitate communication and collaboration between users. Most importantly, the research found that the collaborative tools need to be aligned with the employees' needs – the features must fit the way in which employees share knowledge and conduct tasks. Increasing collaboration quality without considering the nature of the functions and employees' needs means that there is no guarantee that employees will fully utilise the systems for knowledge sharing. Thus, system developers and knowledge workers in public organizations need to look at how knowledge is shared in order to provide the right useable features.

During phase 2, specifically section 6.13.4.1, participants talked about collaborative features they most used, or wished they had, in e-government systems so as to be able to best share knowledge with their colleagues. Here, the most highly requested features should be mentioned.

First of all, effective archiving tools were found to be an essential feature of e-government systems. If communication features are embedded within the systems employees are able to share knowledge directly inside them. Participants said they often needed to request information from colleagues or retrieve and reshare previous transactions already stored within the systems. At the same time, some other participants were unable to do so because the systems had no effective archiving tools.

Hence, they had to search manually or recall the details of previous transactions, which was not an effective solution. Therefore, a practical archive with suitable search tools are essential to facilitate recovery of knowledge (Abdullah et al., 2008; Lacosta & Thomas, 2020). Without such tools, knowledge can get lost, and employees cannot learn from experience.

Even if an e-government system is supplied with an effective archive, some employees may not be able to locate the knowledge they need because they do not have access to their colleagues' assigned transactions. This issue was a notable obstacle preventing employees from being able to learn from each other. The issue also affects formal or confidential information, even though not all information needs to be confidential. To improve the situation, public organizations might need to classify their transactions to determine which transactions should be shared between employees. Moreover, the research found that instant messaging was the most wanted feature as it facilitates knowledge sharing and makes it quicker and easier (Lacosta & Thomas, 2020). Such a feature is usually not available in e-government systems, in which case employees are forced to use WhatsApp to share knowledge.

Collaboration quality is not necessarily used to exchange knowledge directly. Supportive features like notifications are also involved. Effective notification tools within systems are essential to obtain knowledge quickly from colleagues. For example, having access to the system through an employee's mobile device was important, especially for those who need to conduct tasks outside their office. When they are out of the office, contacting them through their mobile devices would not be enough if notifications did not work well. Effective notification features should enable employees to instantly reach others wherever they are. Moreover, the most used feature to share knowledge in e-government systems was the comment fields within transactions, but sometimes there was insufficient space. So limited space within transactions is another issue that organizations might consider to support knowledge sharing in e-government systems. The formality of transactions might be one reason for the space limit. But on the other hand the formality requirement itself forces some employees to use the organization's formal tone. Some employees face difficulties communicating in formal language, and they prefer to use colloquial social language. Therefore, it would be worthwhile if organizations could provide extra space for knowledge-sharing purposes within transactions. Such a space should be informal; in

that way, employees might share knowledge at their convenience and add extra details if needed.

Most importantly, the analysis found that unavailability of the right collaborative features was a primary reason for sharing knowledge outside the systems, such as face-to-face, over the phone, or through a shadow IT like WhatsApp. As a result, organizations lose the opportunity to capture and transfer the knowledge to other employees – perhaps those in different branches or those who have not yet joined the organization. System developers should know what packages contain the collaboration features that their employees need.

Moreover, neglect of CQ has led employees to share knowledge via other social networks, which could raise some other issues. Sharing knowledge in shadow information technology or third-party networks makes the official information, which is quite often private and confidential, less secure. For example, if an employee left the organization, or the device on which they kept the information gets lost, the organization's loses control on the information. Even though the app provided valuable assistance to the employees and organizations (Mallmann, Maçada, & Oliveira, 2016), no guarantee of the data's privacy can be maintained, since privacy terms can be changed at any time. For example, on January 4th, 2021, WhatsApp made a considerable change to its privacy policy terms. The main change was to share users' data with its parent company, Facebook ("WhatsApp Privacy Policy," 2021). All users except those in the European region had to accept the new policy by February 18th, 2021 or lose access to their accounts. The company did emphasise that users' privacy would be maintained, that messages and calls would be end-to-end encrypted, and that no one outside of the chat would access it (even WhatsApp itself). However, even with such assurances, the policy update caused millions of users to download other alternative applications (Kleinman, 2021). In Saudi Arabia, the ministry of finance warned their employees not to use WhatsApp to share work information ("The financial ministry warns... More privacy on alternative apps," 2021). This concern over privacy is not new; some corporations ban social networks from their system devices (Reid, 2018). Also, some countries have different reasons to ban WhatsApp, other than privacy and security (Chakravarti, 2021). Nevertheless, using WhatsApp to overcome missing collaborative features was notable. Such an issue is not limited to one specific social network; instead, the problem could arise again, placing governmental

organizations in dilemmas over privacy and security. It is not a good strategy to warn employees or ban shadow ITs without providing employees with alternative solutions. As mentioned, employees will be more likely to use shadow ITs to exchange knowledge when no suitable formal channels are available (Mallmann et al., 2016). The popularity of using WhatsApp at work was due to its flexibility and speed in transferring knowledge. Moreover, it supports searching, and easily allows the sharing of text, voices, photos, videos, and locations. Overall, e-government developers and knowledge workers should consider these reasons in deciding how to support knowledge sharing in e-government systems. They need to balance the risks and benefits.

Additionally, the research found that the limited technical skills of employees might hinder knowledge sharing in e-government systems. Training should be a continuous process to help employees function effectively. It is vital to have employees well trained on the systems as it improves organizational performance levels (Zeraati et al., 2020).

Other managerial and organizational arrangements were found essential to improve knowledge sharing. First of all, employees need to be able to trust their management in order to share knowledge with fewer worries. When the relationship between employees and management is governed by blame and punishment, employees will respond by stop sharing knowledge on the system. They might even keep their valuable suggestions to themselves because they fear repercussions. Therefore, management should build trust with employees and care about their needs. If employees feel that their management is open and supportive, they are more likely to share knowledge.

Another managerial recommendation is that it is important to build a collaborative culture. Such a culture encourages employees to collaborate and share knowledge in order to achieve a shared vision. If employees agree to achieve a shared vision, it becomes unnecessary to collaborate and share knowledge in order to achieve such a vision. But if an organization lacks collaboration, incentives might help make employees work toward a shared vision. However, a shared vision associated with awkwardly designed incentives might negatively influence knowledge sharing behaviour. Hence, managers should ensure that incentives are fairly designed to encourage each employee to be involved in the knowledge sharing process. However, working to build a collaborative culture is the better solution.

In summary, this section has provided some key recommendations for organizations to benefit from social capital and enhance knowledge sharing behaviour in e-government systems.

7.4. Limitations and directions for future research

No study can cover everything; and there are always blind spots which limit a study. This research project suffered some limitations, too. First, the research examined social capital in terms of social ties, trust, and shared vision, and other social capital enablers such as identification, shared language, obligations, and so on were left for future research. Another limitation relates to the theoretical framework of the study. The framework was based on social capital, while other critical behavioural theories, like the theory of planned behaviour (Ajzen, 1991) and the theory of reasoned action (Ajzen, 1980), were neglected. Future studies could expand the theoretical framework by integrating different theories. The results of this research were limited to the context of e-government systems, and section 6.13.5.2 listed some aspects which might make the context somewhat different. Future studies could apply the analysis to other types of information systems. Comparative studies of mandatory-use and voluntary-use systems would be valuable as well. The research indicates that future work might be able to control the level of compulsion. Additionally, it was mentioned that knowledge could be tacit or explicit (section 3.1.1.3), and that this research did not differentiate between the two types of knowledge sharing. Other work has investigated tacit knowledge sharing (Aslam et al., 2013; Hu & Randel, 2014; C. P. Lin, 2007), and it would be interesting to apply this research to the difference between explicit and tacit knowledge sharing.

Control variable analysis (section 5.7.6) indiciated significant difference between males and females. In addition, data failed to control some other variables i.e. education level, required knowledge, and experience. Future studies might more investigate these variables. Likewise, the research did not examine the skill level of the employees; such a factor might play a role in the knowledge sharing process. For context, some studies have investigated the role of ability on trust (Mayer et al., 1995). The knowledge-sharing behaviour of a low ability employee might be different from one with a higher ability. Therefore, future studies might consider or control the skill of employees within the research framework.

At the methodological level, this research employed explanatory mixed-method research with rigorous procedures throughout the research phases. However, the self-reported data in this research might present a limitation. Hence, other research methodologies and strategies are recommended for future works.

Social factors are generally more influential than economic factors since, in collectivist nations, social factors tend to increase relationships (B. Gupta et al., 2012). Arguably, Saudi Arabia is more likely to be a collectivist nation. While this study was conducted in one country described as collectivistic, future research might need to be applied in different countries. Further, comparative studies between collectivistic and individualistic nations would be interesting (B. Gupta et al., 2012). Finally, the research had made several theoretical contributions about social capital and collaboration quality on knowledge sharing behaviour in e-government systems (section 7.3). Future studies could consider the theoretical underpinnings of the research and compare results among different information systems.

7.5. Thesis summary

This research aimed to understand how social capital and collaboration quality influence knowledge sharing behaviour within e-government systems. The study took place in Saudi Arabia, where e-government has reached a sophisticated level of maturity and where the government has invested considerable resources. The project examined the demand-side of e-government by studying the intraorganizational knowledge sharing behaviour of public sector employees.

A systematic literature review and a bibliometric analysis of social capital and knowledge sharing were performed to determine the gaps and weaknesses in the literature. Subsequently, a theoretical framework was constructed based mainly on social capital theory. Research hypotheses were also developed. The research employed sequential explanatory mixed methods to triangulate data and answer the research questions. The study was conducted in two phases: the first adopted a quantitative approach, while the second phase involved a qualitative study.

This first qualitative phase used carefully designed methods. The survey was developed from prior studies, and started with a pilot study that enabled the researcher to improve the instruments. Data was collected from Saudi public sector employees who used e-government systems in their work. Steps were taken to minimize possible

bias in the data – actions such as reversing the survey items, randomizing the items, and looking to identify disengaged responses. A PLS-based SEM was then used to analyse the data. The research model was assessed using SmartPLS, which showed that the data was reliable and valid. After that, the relationships in the framework were tested, including two versions of the research model. Assessments were made based on differences in outcomes between the two versions. Then, qualitative research questions were asked to explain the results of the first phase.

The second qualitative phase used semi-structured interviews with a recruitment of people from the study population. Steps were taken to ensure the validity and reliability of the qualitative data. The analysis called for substantial time and effort, and was revised multiple times to ensure that the data was processed in the best possible way. The data confirmed the results of the first phase and uncovered some novel theoretical aspects of social capital. The quantitative data was also revisited to confirm some of the qualitative data. The outcomes between both phases were consistent in both directions, reflecting well on the validity of the research. Based on the results, some implications for research and practitioners were provided and valuable pointers for future research are given.

In concluding this work, the researcher believes it has opened up fresh opportunities for research. Future studies are required to confirm the findings which add to a growing body of work about social capital and knowledge sharing.

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Appendices

A-1. List of the relevant papers in social capital and knowledge sharing literature

	Author/s	Research aim/issue	Variable/s investigated	KS context
1	C. M. Chiu et al. (2006)	To investigate factors influencing KS in virtual communities.	ST TRU SV	IT
2	Styhre (2008)	How social capital is mobilized when unanticipated events occur.	Interviews	Non-IT
3	H. H. Chang and Chuang (2011)	To investigate impacts of social capital and individual motivations on KS.	ST TRU	IT
4	Yen et al. (2015)	To examine impact of guanxi, trust, and norms on KS	TRU	Non-IT
5	Mooradian et al. (2006)	To link agreeableness and propensity to trust to knowledge sharing via interpersonal trust.	TRU	Non-IT
6	C. P. Lin (2007)	Considering organizational commitment and trust as two critical mediators to evaluate KS.	TRU	Non-IT
7	Seonghee and Boryung (2008)	Investigate the role of critical factors in organizational culture in KS.	TRU	Non-IT
8	Staples and Webster (2008)	Examining trust, task interdependence and virtualness on KS.	TRU	-
9	M. J. J. Lin et al. (2009)	Discussion the determinants of members' knowledge sharing.	TRU	IT
10	G. Li and Li (2010)	Examining social capital impact on KS.	ST TRU SV	IT
11	Tseng and Kuo (2010)	Self-regulatory mechanisms on KS	TRU	IT
12	Chen and Hung (2010)	Factors influencing Knowledge contribution and donation	TRU	IT
13	Huang (2009)	Impact on team performance considering KS and group cohesiveness.	ST TRU	Non-IT
14	Chai et al. (2011)	Factors influencing KS between bloggers.	ST TRU	IT
15	Chai and Kim (2012)	To test Knowledge contribution using a socio-technical approach.	ST	IT
16	H. K. Wang et al. (2012)	To examine impact of guanxi, trust, and norms on knowledge sharing.	TRU	Non-IT

	Author/s	Research aim/issue	Variable/s investigated	KS context
17	Ho, Kuo, and Lin (2012)	Modelling the relationships among trust, identification, and KM systems quality on KS.	TRU	IT
18	Mueller (2012)	To understand KS between project teams	Interviews	Non-IT
19	Tseng and Kuo (2011)	Examining cognition, and interpersonal relationships on knowledge contribution.	ST	IT
20	Amayah (2013)	Investigating KS in public sector organizations	ST TRU	Non-IT
21	J. H. Choi and Scott (2013)	To examen social capital, use of SNSs, KS, and eWOM.	TRU	IT
22	C. N. L. Tan and S. Md. Noor (2013)	To examine KM enablers on KS and research collaboration.	TRU	Non-IT
23	T. T. Kim et al. (2013)	To examine KM enablers on knowledge collecting and donating as well as organizational performance	Structural SC Relational SC Cognitive SC	Non-IT
24	H. Liu et al. (2014)	Investigating the impacts of social capital, host firm management practices, and technological factors on K contribution.	ST TRU	IT
25	M. H. Hsu and Chang (2014)	To explore impact of trust, uncertainty on KS	TRU	Non-IT
26	Y. Yan et al. (2014)	To explore difference between K seeking and K contribution.	TRU	IT
27	Y. H. Tsai et al. (2014)	To integrate social capital and positive effective tone.	ST TRU SV	-
28	Hu and Randel (2014)	To model social capital and extrinsic incentives, and team innovation.	Structural SC Relational SC Cognitive SC	Non-IT
29	Kang and Hau (2014)	Examining recipient's perspective on multi-level using social network and social capital theories.	ST TRU	Non-IT
30	M. S. Rahman and Hussain (2014)	To inspect the impact of motivation, trust, and reward on KS between students.	TRU	Non-IT
31	T. W. Tang et al. (2015)	To test how social capital enhances service innovation through KS	ST TRU SV	Non-IT

	Author/s	Research aim/issue	Variable/s investigated	KS context
32	L. Zhang and Cheng (2015)	To examine the role of social capital in the effect of knowledge leadership on KS	Social capital	Non-IT
33	C. P. Hsu (2015)	To model benefits and risks of social capital influence online KS.	ST TRU SV	IT
34	Rosendaal and Bijlsma-Frankema (2015)	To test the effects of several team features on knowledge sharing within teams of primary school teachers.	TRU	Non-IT
35	Jain, Sandhu, and Goh (2015)	Modelling of organizational climate and trust influencing knowledge donating and collecting.	TRU	Non-IT
36	Yao et al. (2015)	To investigate relationships linked social capital, team learning and e-loyalty.	SC	IT
37	S. Lee et al. (2015)	To expand the theory of KS by using social capital theory in ISD project context.	SC	Non-IT
38	Havelka (2019)	To test SC and KS on o team performance on information technology (IT) course projects.	ST	Non-IT
39	Y. Choi (2016)	To test SC on KS with considering IT interaction.	TRU	Non-IT
40	Rutten et al. (2016)	To explore high versus low trust situations on knowledge sharing.	TRU	Non-IT
41	Tan (2016)	To investigate the impact of KS enablers among academics.	TRU	Non-IT
42	W. T. Wang (2016)	To examine personal and environmental factors on KS.	TRU	Non-IT
43	Liou et al. (2015)	To explore social capital and individual factors on KS between websites/members.	TRU	IT
44	M. S. Rahman et al. (2016)	Investigating KS among the non-academic staff of private higher learning institutions.	TRU	Non-IT
45	Kwahk and Park (2016)	To explain KS and job performance within enterprise social media environments.	ST	IT

	Author/s	Research aim/issue	Variable/s investigated	KS context
46	Y. H. Tsai et al. (2017)	To examine KS in cross-culturally organizational behaviour contexts.	ST TRU SV	Non-IT
47	Muhammad and Abdul (2017)	To examine the mediating role of trust in the relationship between knowledge management enablers.	TRU	Non-IT
48	Ansari and Malik (2017)	To test emotional intelligence and trust on KS.	TRU	Non-IT
49	Allameh (2018)	To test an integrated model focusing on the drivers and consequences of intellectual capital.	Structural SC Relational SC Cognitive SC	Non-IT
50	Sangmook Kim (2018)	To test SC in the public sector.	TRU	Non-IT
51	M. S. Rahman, Mannan, Hossain, Zaman, and Hassan (2018)	Investigating KS between academic staff of higher learning institutions.	TRU	Non-IT
52	M. H. Rahman et al. (2018)	To examine organizational culture impact on KS.	TRU	Non-IT
53	García-Sánchez et al. (2019)	To analyse the role of SC within academic research teams and its influence on KS	ST TRU	Non-IT
54	O. K. Choi and Cho (2019)	Investigating KS in virtual teams.	TRU	-
55	Chai and Kim (2010)	To analyse the relationship between trust and bloggers' knowledge sharing practices.	TRU	IT
56	Goswami and Agrawal (2019)	To investigate the influence of shared goals and hope on KS.	SV	Non-IT
57	Evans, Anthony, and Chun Wei (2012)	To investigate shared language and shared vision on KS.	SV	Non-IT
58	Park and Lee (2014)	To analyse dependence and trust in knowledge sharing in information systems projects.	TRU	Non-IT
59	(Almadhoun, Dominic, & Woon, 2011)	To investigate security, privacy, and trust in SNSs.	TRU	IT
60	Pinjani and Palvia (2013)	To test diversity, mutual trust on knowledge sharing among GVTs.	TRU	Non-IT

	Author/s	Research aim/issue	Variable/s investigated	KS context
61	Usoro et al. (2007)	To investigate the role of trust in KS in the context of VC.	TRU	IT
62	Nguyen, Ngo, Bucic, and Phong (2018)	To developing and test a model of coopetition in cross-functional KS.	SV	Non-IT
63	Koranteng et al. (2019); Nguyen et al. (2018)	To investigate how students' online social networking relationships affect KS.	ST TRU SV	IT
64	Aslam et al. (2013)	To test relationship between SC and KS, and how KS impacts academic performance	ST TRU SV	Non-IT
65	Al-Alawi et al. (2007)	To analyse the role of certain factors in organizational culture in the success of KS.	TRU & interviews	Non-IT
66	Cao et al. (2016)	To explore influence of social media on work performance.	ST TRU SV	Non-IT
67	Sharabati (2018)	To investigate knowledge sharing via social networks between students.	TRU	IT
68	Kmieciak (2020)	To assess vertical and horizontal trust on knowledge donating and knowledge collecting.	TRU	Non-IT
69	Hooff and Huysman (2009)	To explore how the process of knowledge sharing could be managed.	Structural SC Relational SC Cognitive SC	Non-IT
70	Yen, Tseng, and Wang (2014)	To examine how guanxi influences knowledge sharing via trust.	TRU	Non-IT
71	De Clercq, Dimov, and Thongpapanl (2013)	To explore mediating role of internal knowledge sharing in the relationship between trust and goal congruence	TRU SV	Non-IT

A-2. Measurements of social capital variables

Construct	Measurement wording	Source
Social Ties (ST)	**ST1:** I have close social relationships with employees of my workplace. **ST2:** I spend a lot of time interacting with employees of my workplace. **ST3:** I know employees of my workplace on a personal level. **ST4:** I have frequent communication with some employees of my workplace. **ST5:** In general, I have no good relationships with employees of my workplace (reversed). **ST6:** I have lengthy discussions with my colleagues of workplace.	Huang (2009), H. H. Chang and Chuang (2011), C. M. Chiu et al. (2006), Chow and Chan (2008).
Trust (TRU)	**TRU1:** Employees of my workplace will not take advantage of others even when the opportunity arises. **TRU2:** Employees of my workplace will always keep the promises they make to one another. **TRU3:** Employees of my workplace show a great deal of integrity. **TRU4:** I can not rely on those with whom I work in my workplace (reversed). **TRU5:** Overall, employees in my workplace are very trustworthy.	C. M. Chiu et al. (2006), H. H. Chang and Chuang (2011), Huang (2009).
Shared vision (SV)	**SV1:** Employees of my workplace and I agree on what is important at work. **SV2:** Employees of my workplace and I share the same ambitions and vision. **SV3:** Employees of my workplace and I are enthusiastic about pursuing same things. **SV4:** Employees of my workplace and I care about the same issues. **SV5:** Employees of my workplace and I have completely different goals towards the network (reversed).	W. Tsai and Ghoshal (1998), Chow and Chan (2008), Lefebvre et al. (2016).
Shared language (SL)	**SL1:** Employees in my workplace use similar language. **SL2:** Employees in my workplace can communicate on the same ‘wavelength’. **SL3:** Employees in my workplace use common vocabulary to understand each other easily. **SL4:** Shared language among the employees does not facilitate understanding in my workplace (reversed). **SL5:** I can always understand completely what a person means when he or she is talking in my workplace.	Lefebvre et al. (2016), Tamjidyamcholo et al. (2013), Evans, Anthony, et al. (2012).

A-3. Measurements of collaboration quality and knowledge sharing behaviour

Construct	Measurement wording	Source
Collaboration quality (CQ)	**CQ1:** This e-government system enables easy and comfortable communication with my colleagues. **CQ2:** This e-government system supports effective and efficient sharing of information with my colleagues. **CQ3:** This e-government system does not enable a comfortable storing and sharing of files and documents with my colleagues (reversed). **CQ4:** This e-government system supports an effective interaction with my colleagues within the system itself. **CQ5:** This e-government system has a wide range of features to support collaboration (developed item).	Urbach et al. (2010), Cidral et al. (2018), Saghapour et al. (2018).
Knowledge sharing behaviour (KSB)	**KSB1:** I provide my knowledge in this e-government system at the request of other employees of my organization. **KSB2:** I frequently share work reports and official documents in this e-government system with employees of my organization. **KSB3:** I frequently share knowledge based on my experience in this e-government system with employees of my organization. **KSB4:** I frequently share knowledge based on my expertise in this e-government system with employees of my organization. **KSB5:** When I find solutions to work problems, I frequently share them via this e-government system with employees of my organization (reversed).	Chow and Chan (2008), X. Zhang et al. (2013), Reychav and Weisberg (2010), Tamjidyamcholo et al. (2013).

A-4. Measurements of the survey's general questions

Construct	Measurement wording	Source
General questions	**G1:** What is your gender? ○ Male ○ Female ○ Prefer not to say **G2:** What is your age? ○ 18-19 years ○ 30-39 years ○ 50-59 years ○ 20-29 years ○ 40-49 years ○ 60 years or more **G3:** What is your highest level of education? ○ Diploma ○ Master ○ Other ○ Bachelor ○ Doctorate **G4:** How much does your job require specialist knowledge? ○ Not at all ○ Quite a lot ○ A little ○ Very much **G5:** How long have you worked in your current organization? ○ Less than 5 years ○ From 15 to less than 20 ○ 30 years or more ○ From 5 to less than 10 years ○ From 20 to less than 25 ○ From 10 to less than 15 years ○ From 25 to less than 30 **G6:** What type of organization do you work at? * ○ Ministry ○ Presidency ○ University ○ General Authority ○ Diwan ○ General Directorate ○ General Corporation ○ Governorate ○ Hospital ○ Council ○ Municipality ○ Other entity	**Services Maturity Index 2019* 2019)

A-5. English survey

Curtin University

Participants Information Sheet

I am a Doctor of Business Administration research student at Curtin University, Management School. This questionnaire relates to the thesis component of my research.

You are invited to take part in this study. Before you decide to participate in this study, it is essential that you have a clear idea about this research and why it is being conducted. Please, carefully read the following:

E-government refers to delivering governmental e-services to the beneficiaries by utilization of web-based technologies and information communication technologies (ICT). Employees of governmental organizations have started using these systems to receive and process transactions online. Most previous e-government studies in Saudi Arabia have been conducted from the perspective of citizens. This study, however, will consider employees' opinions about knowledge sharing behaviour in such systems and to raise the level of utilization of it.

This questionnaire should be answered only by administrative employees working in Saudi public sector and whose jobs involve the use of e-government systems to deal with transactions online. This questionnaire will take about 10 minutes to complete. I highly appreciate your time to participate in this study and your part will contribute to the success of this research.

Participation in this study is completely voluntary and it is your choice whether to participate or not. If you decide to participate, you will still have freedom to change your mind and withdraw at any point without providing a reason. All data you provide here will be anonymous, and the information we collect in this study will be kept under secure conditions at Curtin University for 7 years after the research is published and then it will be destroyed. Moreover, any publication based on this data will only report result at aggregate level.

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number **HRE2019-0572**). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint you may contact the Ethics Officer on **(08) 9266 9223** or the Manager, Research Integrity on **(08) 9266 7093** or email hrec@curtin.edu.au

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Section 1: Please indicate your opinion about the following statements by selecting the scale which best represent your opinion:

Item	Statement	Strongly agree				Strongly disagree
1	I have close social relationships with employees of my workplace.	1	2	3	4	5
2	Employees of my workplace will not take advantage of others even when the opportunity arises.	1	2	3	4	5
3	Employees in my workplace use similar language.	1	2	3	4	5
4	Employees of my workplace and I agree on what is important at work.	1	2	3	4	5
5	I spend a lot of time interacting with employees of my workplace.	1	2	3	4	5
6	Employees of my workplace will always keep the promises they make to one another.	1	2	3	4	5
7	Employees in my workplace can communicate on the same 'wavelength'.	1	2	3	4	5
8	Employees of my workplace and I share the same ambitions and vision.	1	2	3	4	5
9	I know a number of employees of my workplace on a personal level.	1	2	3	4	5
10	Employees of my workplace show a great deal of integrity.	1	2	3	4	5
11	Employees in my workplace use common vocabulary to understand each other easily.	1	2	3	4	5
12	Employees of my workplace and I are enthusiastic about pursuing same things.	1	2	3	4	5
13	I have frequent communication with some employees of my workplace.	1	2	3	4	5
14	I can not rely on those with whom I work in my workplace.	1	2	3	4	5

15	Shared language among the employees does not facilitate understanding in my workplace.	1	2	3	4	5
16	Employees of my workplace and I care about the same issues.	1	2	3	4	5
17	In general, I have no good relationships with employees of my workplace.	1	2	3	4	5
18	Overall, employees in my workplace are very trustworthy.	1	2	3	4	5
19	I can understand completely what an employee of my workplace means when he or she is talking.	1	2	3	4	5
20	Employees of my workplace and I have completely different goals towards the network.	1	2	3	4	5
21	I have lengthy discussions with employees of my workplace.	1	2	3	4	5

Section 2: Statements about the most used E-government system

Please think about the most frequently e-government system that you use at your work, then answer the questions in this section based on this specific system.

Item	Statement	Strongly agree				Strongly disagree
1	This e-government system enables easy and comfortable communication with my colleagues.	1	2	3	4	5
2	When I find solutions to work problems, I frequently share them via this e-government system with employees of my organization.	1	2	3	4	5
3	This e-government system supports effective and efficient sharing of information with my colleagues.	1	2	3	4	5
4	I frequently do not share knowledge based on my expertise via this e-government system with employees of my organization.	1	2	3	4	5
5	This e-government system has a wide range of features to support collaboration among colleagues.	1	2	3	4	5
6	This e-government system supports an effective interaction with my colleagues within the system itself.	1	2	3	4	5
7	I provide my knowledge via this e-government system at the request of other employees of my organization.	1	2	3	4	5
8	In general, e-government systems help to provide better level of customer service.	1	2	3	4	5
9	This e-government system does not enable a comfortable storing and sharing of files and documents with my colleagues.	1	2	3	4	5
10	I frequently share work reports and official documents via this e-government system with employees of my organization.	1	2	3	4	5
11	In general, e-government systems improve reliability of service.	1	2	3	4	5

12	I frequently share knowledge based on my experience via this e-government system with employees of my organization.	1	2	3	4	5

Section 3: General Information about you:

Please answer the following questions by choosing the right answers that apply to you:

1. What is your gender?

○ Male
○ Female ○ Prefer not to say

2. What is your age?

○ 18-19 years ○ 30-39 years ○ 50-59 years
○ 20-29 years ○ 40-49 years ○ 60 years or more

3. What is your highest level of education?

○ Diploma ○ Master ○ Other
○ Bachelor ○ Doctorate

4. How much does your job require specialist knowledge?

○ Not at all ○ Quite a lot
○ A little ○ Very much

5. How long have you worked in your current organization?

○ Less than 5 years ○ From 15 to less than 20 ○ 30 years or more
○ From 5 to less than 10 years ○ From 20 to less than 25
○ From 10 to less than 15 years ○ From 25 to less than 30

6. What type of organization do you work at?

○ Ministry ○ Presidency ○ University
○ General Authority ○ Diwan ○ General Directorate
○ General Corporation ○ Governorate ○ Hospital
○ Council ○ Municipality ○ Other entity

Your response has been recorded.

Thank you again for your participation in this study.

If you wish to get a copy of the result, please email me at:

saleh.alsindi@postgrad.curtin.edu.au

Saleh Alsindi

A-6. Arabic survey

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معلومات عن الدراسة

أنا طالب دكتوراه في جامعة كيرتن باستراليا، قسم الإدارة. هذه الاستبانة تمثل جزء من الإطار العملي لبحث الدكتوراه الذي أقوم به.
أنت مدعو للمشاركة في هذه الدراسة من خلال الإجابة على أسئلة هذه الاستبانة. من الضروري قبل أن تقرر المشاركة أن يكون لديك تصوراً واضحاً عن هذا البحث وأهميته. لذلك أرجو أن تقرأ التالي بعناية:

الحكومة الإلكترونية تعني إيصال الخدمات الحكومية الإلكترونية للمستفيدين من خلال تقنية الشبكات وتقنيات الاتصالات والمعلومات. إن موظفي الجهات الحكومية بدؤوا يستخدمون هذه الأنظمة في استقبال وتنفيذ المعاملات على الإنترنت. وأغلب الدراسات التي تمت على أنظمة الحكومة الإلكترونية في السعودية قد اهتمت بأخذ وجهات نظر المواطنين، لكن هذه الدراسة تهدف إلى استقصاء آراء الموظفين حول سلوك مشاركة المعرفة في هذه الأنظمة وكذلك إلى رفع مستوى الاستفادة منها.

هذه الاستبانة موجهة فقط إلى الموظفين الإداريين في القطاع العام السعودي الذين تتضمن وظائفهم استخداماً لأنظمة الحكومة الإلكترونية في التعامل مع المعاملات على الإنترنت.

قد تستغرق الإجابة على هذه الاستبانة عشر دقائق وإني أقدر كثيراً وقتك و مشاركتك التي لها دور أساسي في إنجاح هذا البحث.
المشاركة في هذه الدراسة تطوعية بشكل كامل ولك الاختيار بالمشاركة أم لا، وفي حالة قررت المشاركة فإن لك الحرية في تغيير رأيك والانسحاب في أي لحظة بدون تقديم أعذار.

إن جميع البيانات التي تقدمها ستكون مجهولة الهوية وأي نشر يعتمد على هذه البيانات سوف يكون فقط على المستوى الكلي للمشاركات. كما أن كل ما نجمعه من معلومات في هذه الدراسة سيتم حفظه في وضع آمن في جامعة كيرتن لمدة سبع سنوات من نشر البحث وبعد ذلك سيتم مسحه وإتلافه.

إن لجنة أخلاقيات البحوث الإنسانية بجامعة كيرتن (HREC) قد وافقت على إجراء هذه الدراسة (موافقة رقم/HRE2019-0572). فإذا كنت ترغب في مناقشة الدراسة مع شخص ليس طرفاً مباشراً فيها حول أي أمور تتعلق بإجراءها أو حقك كمشارك، أو إذا كنت ترغب بتقديم شكوى سرية يمكنك الاتصال على مسؤول الأخلاقيات على الرقم (0892669223)، أو بمدير نزاهة البحوث على الرقم (0892667093). أو عبر البريد الإلكتروني: hrec@curtin.edu.au

معلومات التواصل

الباحث:

صالح السندي
جامعة كيرتن- غرب استراليا
البريد الإلكتروني: saleh.alsindi@postgrad.curtin.edu.au

المشرف على البحث:

استاذ مساعد/ بيتر دل
قسم الإدارة بجامعة كيرتن
البريد الإلكتروني: P.T.Dell@curtin.edu.au

إذا كنت ترغب في المشاركة في هذه الدراسة اضغط على الزر أدناه لبدء الاستبيان:

←

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القسم الأول: الرجاء تحديد رأيك بدقة حول العبارات التالية من خلال اختيار المعيار الأنسب.

1- لديَّ علاقات اجتماعية وثيقة مع الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

2- الموظفون في جهة عملي لن يستغلوا الآخرين لمصلحتهم حتى لو سنحت لهم الفرصة بذلك.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

3- الموظفون في جهة عملي يستخدمون لغة متماثلة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

4- أنا والموظفون في جهة عملي نتفق على ما هو ضروري بشأن العمل.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

5- أقضي الكثير من الوقت في التفاعل مع الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

6- الموظفون في جهة عملي سيحافظون دوما على الوعود التي قطعوها فيما بينهم.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

7- الموظفون في جهة عملي يتواصلون مع بعضهم بنفس الأسلوب.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

8- أنا والموظفون في جهة عملي نتشارك نفس الرؤية والطموح.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

9- أعرف عدداً من الموظفين في جهة عملي على المستوى الشخصي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

10- الموظفون في جهة عملي لديهم قدر كبير من النزاهة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

11- الموظفون في جهة عملي يستخدمون مفردات شائعة بينهم ليفهم بعضهم البعض بسهولة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

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12-أنا والموظفون في جهة عملي لدينا حماس لتحقيق نفس الأشياء.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

13- أنا على تواصل متكرر مع بعض الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

14- لا يمكنني الاعتماد على زملائي الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

15- اللغة المشتركة بين الموظفين لا تسهل الفهم في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

16-أنا والموظفون في جهة عملي نهتم في نفس القضايا.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

17- بشكل عام، لدي علاقات غير جيدة مع الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

18- بشكل عام، الموظفون في جهة عملي جديرون بالثقة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

19- بإمكاني أن أفهم تماماً ما يعنيه موظف ما في جهة عملي عندما يتحدث.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

20- أنا والموظفون في جهة عملي لدينا أهدافاً مختلفة تماما تجاه شبكتنا الاجتماعية كموظفين.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

21- لديّ نقاشات مطولة مع الموظفين في جهة عملي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

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القسم الثاني: عبارات حول نظام الحكومة الإلكترونية الأكثر استخداماً لديك:

- الرجاء الإجابة على أسئلة هذا القسم بناءً على أكثر نظام حكومة إلكترونية تستخدمه في عملك وذلك من خلال اختيار أنسب معيار يمثل رأيك حول العبارات التالية بدقة.

1- نظام الحكومة الإلكترونية هذا يتيح تواصلا سهلا ومريحاً مع زملائي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

2- عندما أجد حلولاً لمشاكل العمل، فإني أشارك فعلياً هذه الحلول مع موظفي منظمتي خلال نظام الحكومة الإلكترونية هذا.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

3- نظام الحكومة الإلكترونية هذا يدعم كفاءة وفعالية مشاركة المعلومات مع زملائي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

4- في نظام الحكومة الإلكترونية هذا، عادةً لا أشارك المعرفة المبنية على مهاراتي وذلك مع موظفي منظمتي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

5- نظام الحكومة الإلكترونية هذا فيه العديد من الخصائص لدعم التعاون بين الزملاء.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

6- نظام الحكومة الإلكترونية هذا يدعم كفاءة التفاعل مع زملائي داخل النظام نفسه.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

7- في نظام الحكومة الإلكترونية هذا، أقدم فعلياً ما لديّ من معرفة وذلك عند الطلب من قبل الموظفين الآخرين في منظمتي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

8- تساعد نظم الحكومة الإلكترونية بشكل عام على توفير مستوى خدمة عملاء أفضل.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

9- نظام الحكومة الإلكترونية هذا لا يتيح تخزين ومشاركة الملفات والوثائق مع زملائي بشكل مريح.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

10- في نظام الحكومة الإلكترونية هذا، أشارك فعلياً تقارير العمل والوثائق الرسمية مع موظفي منظمتي.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
○	○	○	○	○

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11- تعمل نظم الحكومة الإلكترونية بشكل عام على تحسين موثوقية الخدمة.

موافق بشدة | موافق | محايد | غير موافق | غير موافق بشدة

12- في نظام الحكومة الإلكترونية هذا، أشارك فعلياً المعرفة المبنية على خبرتي وذلك مع موظفي منظمتي.

موافق بشدة | موافق | محايد | غير موافق | غير موافق بشدة

القسم الثالث والأخير: معلومات عامة عنك:

- يرجى الإجابة على الأسئلة الستة التالية عن طريق اختيار الإجابات الصحيحة التي تنطبق عليك:

1- الجنس:

ذكر | أنثى | أفضل عدم الإجابة

2- العمر:

من 18 إلى 19 سنة | من 20 إلى 29 سنة | من 30 إلى 39 سنة | من 40 إلى 49 سنة | من 50 إلى 59 سنة | 60 سنة أو أكثر

3- ماهو أعلى مستوى تعليمي حصلت عليه؟

الثانوية أو أقل | دبلوم | بكالوريوس | ماجستير | دكتوراه | أخرى

4- كم مقدار المعرفة المتخصصة اللازمة لأداء مهام وظيفة كوظيفتك؟

لا شيء | القليل | الكثير نوعا ما | الكثير جدا

5- كم سنة عملت في منظمتك الحالية؟

أقل من 5 سنوات | من 5 إلى أقل من 10 سنوات | من 10 إلى أقل من 15 سنة | من 15 إلى أقل من 20 سنة | من 20 إلى أقل من 25 سنة | من 25 إلى أقل من 30 سنة | 30 سنة أو أكثر

6- ما نوع المنظمة التي تعمل فيها؟

وزارة | هيئة | مؤسسة عامة | مجلس | رئاسة | ديوان | إمارة | أمانة | جامعة | مديرية عامة | مستشفى | اخرى

لقد تم تسجيل إجابتك.

شكراً مرة أخرى على تعاونك و مشاركتك في هذه الدراسة.

ملاحظة: إذا كنت مهتماً في الحصول على نسخة من نتائج الدراسة، آمل مراسلتي على بريدي الإلكتروني

saleh.alsindi@postgrad.curtin.edu.au

صالح السندي

A-7. English participant information sheet (PIS) for phase 2

Curtin University

PARTICIPANT INFORMATION STATEMENT

HREC Project Number:	HRE2020-0651
Project Title:	*The Impact of Social Capital and Collaboration Quality of E-Government Systems on Knowledge Sharing Behavior in Saudi Arabia*
Chief Investigator:	Saleh Alsindi. PhD student, School of Management
Version Number:	1
Version Date:	29/10/2020

Who is the researcher and what is the study about?

I am a higher degree research student at Curtin University and currently undertaking a PhD in the field of Management - Information Systems. My research topic is the impact of social capital and the quality of collaboration in e-government systems on knowledge sharing behaviour and job satisfaction in Saudi Arabia. This study investigates the opinions of public sector employees concerning aspects of e-government systems by conducting interviews with them.

What are e-government systems?

E-government refers to delivering government services online or electronically so that people benefit by being served through web-based technologies and information communication technologies (ICT). Employees of government organizations have started using these systems to receive and process transactions online. Most previous e-government studies in Saudi Arabia have been conducted from the perspective of citizens. This study, however, will consider employees' opinions about knowledge sharing behaviour in such systems and aims to raise their level of usage.

Benefits of the study

Knowledge is an intangible source of power, influence and authority in an organization. Sharing knowledge in organizations helps employees to learn from each other and then increase their ability to solve work-related problems, enhance job performance and thereby improve job satisfaction. This study aims to investigate how social life in organizations and the way e-government systems are designed encourage employees to share knowledge through these systems.

Your participation in this study will help to develop e-government systems in Saudi Arabia so that employees and the public sector organizations they work in will benefit from them.

Why are you being asked to take part in this study?

You have been asked to take part in this project because you are a public sector employee. Your job must include using an e-government system because the interview will be basically based on the use of such systems.

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How can you participate in this study?

You can participate by consenting to be interviewed which should take between 30 and 60 minutes. It will be over the phone or online according to what is convenient to you. If you do wish to take part, please kindly contact the researcher to arrange for an interview.

What is the nature of the interview?

The interviewee will be put at ease so that there is no risk or embarrassing questions being asked. Briefly, you will be asked some questions about how your social relationships with your colleagues encourage you to share knowledge via the e-government systems. We will talk about some topics such as social relationships, trust, communication channels and so on specifically in the workplace. There will be some other questions related to features of the e-government system you use at work and how those features could help to facilitate knowledge sharing.

Are there any risks, side-effects, or inconveniences from participating in this study?

There are no foreseeable risks from taking part this research project. I have been careful to make sure that the interview questions do not cause you any distress. However, if you feel anxious about any of the questions you do not need to answer them.

What are your rights and how will your information be protected?

- The interview is completely voluntary.
- You are not obligated to answer all questions.
- You have the right to ask questions - before, during, and after the interview.
- You have the right to withdraw from the interview at any point without providing any reason.
- The answers you provide will be anonymous, and any information the researcher collects will be treated as confidential and used only in this project.
- The interview will be audio recorded for analysis purposes only, but it will not be recorded if that is your wish.
- There will be no video recording during the interview.
- The information collected will be re-identifiable which means that any identifying information on any data or taken notes will be removed and replaced with a code, thus, there will be no publishing of any information that may disclose either your identity or the organization you work at.
- All collected information including interview notes, recordings, and scripts will be kept under secure locked conditions at Curtin University for 7 years after the research is published and then it will all be destroyed.
- Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HRE2020-0651). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a

confidential complaint you may contact the Ethics Officer on +618 9266 9223 or the Manager, Research Integrity on +618 9266 7093 or email hrec@curtin.edu.au

Contact information

My contact information is documented below; you can email me if you have any question.

Note that you need to consent to be interviewed by signing the consent form and email it back to the researcher. Press here to download a copy of the consent form.

If you would like to take part in this study, please go to the NEXT page to provide the researcher with your contact information.

Please feel free to contact me if you have any questions.

I am looking forward to your cooperation as it will help in this study being successful.

Researcher

Saleh Alsindi
PhD candidate
Management School, Curtin University
Australia
Email: saleh.alsindi@postgrad.curtin.edu.au

Research Supervisor

Prof/ Peter Dell
Curtin Business School
Curtin University
Email: P.T.Dell@curtin.edu.au

Interview Registration Form

Please fill this form out and the researcher will contact you soon to arrange a convenient date and time for the interview.

Please enter your name *

Please enter your email address *

Please enter your phone number

Are you a public sector employee?

- ○ Yes
- ◉ No

Do you use at least on of e-government systems in your workplace?

- ○ Yes
- ○ No

Send

A-8. English participant consent form (phase2)

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HREC Project Number:	**HRE2020-0651**
Project Title:	*The Impact of Social Capital and Collaboration Quality of E-Government Systems on Knowledge Sharing Behavior in Saudi Arabia*
Chief Investigator:	Saleh Alsindi. PhD student, School of Management
Version Number:	*1*
Version Date:	29/10/2020

- I have read, *(or had read to me in my first language),* the information statement version listed above and I understand its contents.
- I believe I understand the purpose, extent and possible risks of my involvement in this project.
- I voluntarily consent to take part in this research project.
- I have had an opportunity to ask questions and I am satisfied with the answers I have received.
- I understand that this project has been approved by Curtin University Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007).
- I understand that there will be no video recording during the interview, however audio recording will be taking place only if I consent below.
- I understand I will receive a copy of this Information Statement and Consent Form.

☐ I do	☐ I do not	consent to you using any data I provided before withdrawing from the study, if relevant

☐ I do	☐ I do not	consent to being audio-recorded

Participant Name	
Participant Signature	
Date	

Declaration by researcher: I have supplied an Information Letter and Consent Form to the participant who has signed above.

Researcher Name	Saleh Alsindi
Researcher Signature	
Date	

A-9. Arabic participant information sheet (PIS) for phase 2

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معلومات حول الدراسة

رقم مشروع البحث: HRE2020-0651
عنوان البحث: أثر رأس المال الاجتماعي وجودة التعاون لأنظمة الحكومة الالكترونية على سلوك مشاركة المعرفة في المملكة العربية السعودية
التاريخ: 29/10/2020

تعريف بالباحث والدراسة:
أنا طالب دراسات عليا بجامعة كيرتن، أعمل على التحضير لنيل درجة الدكتوراه في تخصص نظم المعلومات الإدارية. موضوع بحثي هو أثر رأس المال الاجتماعي وجودة التعاون لأنظمة الحكومة الالكترونية على سلوك مشاركة المعرفة في المملكة العربية السعودية. هذا البحث يستقصي آراء موظفي القطاع العام السعودي من خلال إجراء المقابلات معهم.

تعريف بأنظمة الحكومة الإلكترونية:
الحكومة الالكترونية تعني إيصال الخدمات الحكومية الالكترونية من خلال الشبكات وتقنية الاتصالات والمعلومات. إن موظفي الجهات الحكومة بدأوا يستخدمون هذه الأنظمة في استقبال وتنفيذ المعاملات على الانترنت. وأغلب الدراسات التي تمت على أنظمة الحكومة الإلكترونية ف السعودية قد اهتمت بأخذ وجهات نزر المواطنين لكن هذه الدراسة تهدف إلى استقصاء آراء الموظفين حول سلوك مشاركة المعرفة في هذه الأنظمة مما يؤدي إلى رفع مستوى الاستفادة منها.

تعريف بأنظمة الحكومة الإلكترونية:
الحكومة الالكترونية تعني إيصال الخدمات الحكومية الالكترونية من خلال الشبكات وتقنية الاتصالات والمعلومات. إن موظفي الجهات الحكومة بدأوا يستخدمون هذه الأنظمة في استقبال وتنفيذ المعاملات على الانترنت. وأغلب الدراسات التي تمت على أنظمة الحكومة الإلكترونية ف السعودية قد اهتمت بأخذ وجهات نزر المواطنين لكن هذه الدراسة تهدف إلى استقصاء آراء الموظفين حول سلوك مشاركة المعرفة في هذه الأنظمة مما يؤدي إلى رفع مستوى الاستفادة منها.

فوائد الدراسة:
تعتبر المعرفة مصدر قوة غير ملموس في المنظمات. لذلك فإن سلوك مشاركة المعرفة في تلك المنظمات يساعد الموظفين على التعلم من بعضهم البعض مما يزيد قدرتهم على حل مشاكل العمل وزيادة اداءهم الوظيفي. هذه الدراسة تهدف إلى استيضاح إلى أي مدى أن يؤدي كلاً من الحياة الاجتماعية في المنظمات وكذلك تصميم أنظمة الحكومة الالكترونية من جعل الموظفين أكثر استعداداً لمشاركة المعرفة خلال هذه الأنظمة.
إن مشاركتك في هذه الدراسة ستساعد على تطوير أنظمة الحكومة الالكترونية في السعودية مما يعكس فائدة أكبر للموظفين والمنظمات الحكومية على حد سواء.

لماذا أنت مدعو للمشاركة في هذه الدراسة؟
أنت مدعو للمشاركة لأنك موظف في القطاع العام السعودي. ينبغي أن يكون عملك متضمناً لاستخدام أحد أنظمة الحكومة الالكترونية لأن أسئلة المقابلة ستكون مبنية على الاستخدام لهذه الأنظمة.

كيفية المشاركة في هذه الدراسة:
بامكانك المشاركة من خلال الموافقة على المقابلة والتي ستتراوح مدتها بين 30 إلى 60 دقيقة. ستتم المقابلة من خلال الهاتف الجوال أو باستخدام أحد التطبيقات التي تتيح الاتصال الصوتي عبر الانترنت وذلك حسب المناسب لك. إذا كنت ترغب بالمشاركة، الرجاء التواصل مع الباحث للترتيب للمقابلة.

كيف ستكون المقابلة؟
المقابلة ستكون ميسرة بدون طلب معلومات سرية أو محرجة. باختصار سوف تسأل بعض الأسئلة حول إلى أي مدى قد تشجعك علاقاتك الاجتماعية داخل المنظمة أن تشارك معرفتك مع زملائك خلال أنظمة الحكومة الالكترونية، سنتحدث عن مواضيع كالعلاقات الاجتماعية، الثقة، الأهداف المشتركة، أساليب التواصل وما إلى ذلك. كذلك سنتحدث عن خصائص نظام الحكومة الالكترونية التي تستخدمه وإلى أي مدى هذه الخصائص قد تسهل عليك عملية مشاركة المعرفة.

هل هناك أي مخاوف أو آثار جانبية أو إحراجات من المشاركة في هذه الدراسة؟
لا توجد مخاوف متوقعة من المشاركة في هذا المشروع البحثي. لقد تم الحرص على أن تكون الأسئلة الواردة في المقابلة لا تسبب أي إحراجات. ومع ذلك إذا شعرت بعدم الراحة حيال أي من الأسئلة، فلك الحق بالامتناع عن الإجابة.

ماهي حقوقك كمشارك؟ وكيف ستتم حماية معلوماتك؟
- المشاركة في الدراسة أمر تطوعي ولك كامل الاختيار في ذلك.
- لا يلزم الإجابة على جميع الأسئلة.
- لك الحق في الاستيضاح وطرح الأسئلة قبل، أثناء، وبعد المقابلة.
- لك الحق في الانسحاب من المقابلة في أي وقت بدون تقديم أعذار.
- الأجوبة التي تقدمها ستكون مجهولة المصدر وأي معلومات يجمعها الباحث ستعامل بسرية تامة وسوف تستخدم فقط لأغراض هذه الدراسة.
- سيتم أخذ موافقتك لتسجيل المقابلة صوتيا لغرض التحليل فقط، ولن يكون هناك تسجيل إذا كنت لا ترغب بذلك.
- لن يوجد تسجيلاً مرئياً للمقابلة.
- المعلومات التي سيتم جمعها سيتم تشفيرها بمعنى أنها لن تقرن باسم صاحبها وأي معلومة أو ملاحظة من الممكن أن تدل على صاحبها سيتم حذفها واستبدالها برمز، وبهذا لن يكون هناك أي نشر لأي معلومة قد تدل على هويتك أو هوية المنظمة التي تعمل بها.
- كل المعلومات التي سيتم جمعها بما في ذلك الملاحظات، التسجيل- إن وجد- نصوص التحليل سيتم حفظها بشكل آمن برقم سري في جامعة كيرتن لمدة سبع سنوات بعد نشر البحث ومن ثم سيتم إتلافها.
- إن لجنة أخلاقيات البحوث الإنسانية بجامعة كيرتن (HREC) قد وافقت على إجراء هذه الدراسة (موافقة رقم HRE2020-0651). فإذا كنت ترغب في مناقشة الدراسة مع شخص ليس طرفاً مباشراً فيها حول أي أمور تتعلق بإجرائها أو حقك كمشارك، أو إذا كنت ترغب بتقديم شكوى سرية يمكنك الاتصال على مسؤول الأخلاقيات على الرقم (+61892669223) أو بمدير نزاهة البحوث على الرقم (+61892669223). أو عبر البريد الالكتروني herc@curtin.edu.au.

معلومات الاتصال:
معلومات التواصل مدونة أدناه، بإمكانك مراسلتي إذا كان لديك أية استفسارات.

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يرجى ملاحظة أنه ينبغي أن توافق على أن تتم مقابلتك من خلال التوقيع على نموذج الموافقة وسيرسله لك الباحث لاحقاً.
إذا كنت ترغب في المشاركة، الرجاء التسجيل من خلال الانتقال للصفحة التالية لتزويد الباحث بمعلومات التواصل معك.

الباحث:
صالح بن محمد السندي
مرشح لدرجة الدكتوراه
كلية الإدارة- جامعة كيرتن بغرب استراليا
البريد الالكتروني
saleh.alsindi@postgrad.curtin.edu.au

المشرف على البحث:
استاذ مشارك: بيتر ديل
كلية الإدارة- جامعة كيرتن بغرب استراليا
البريد الالكتروني: P.T.Dell@curtin.edu.au

←

الرجاء تعبئة النموذج التالي ليتواصل معك الباحث بشأن الترتيب للمقابلة.

* الرجاء كتابة اسمك

* الرجاء كتابة بريدك الإلكتروني

* الرجاء كتابة رقم الهاتف

هل أنت موظف حكومي؟

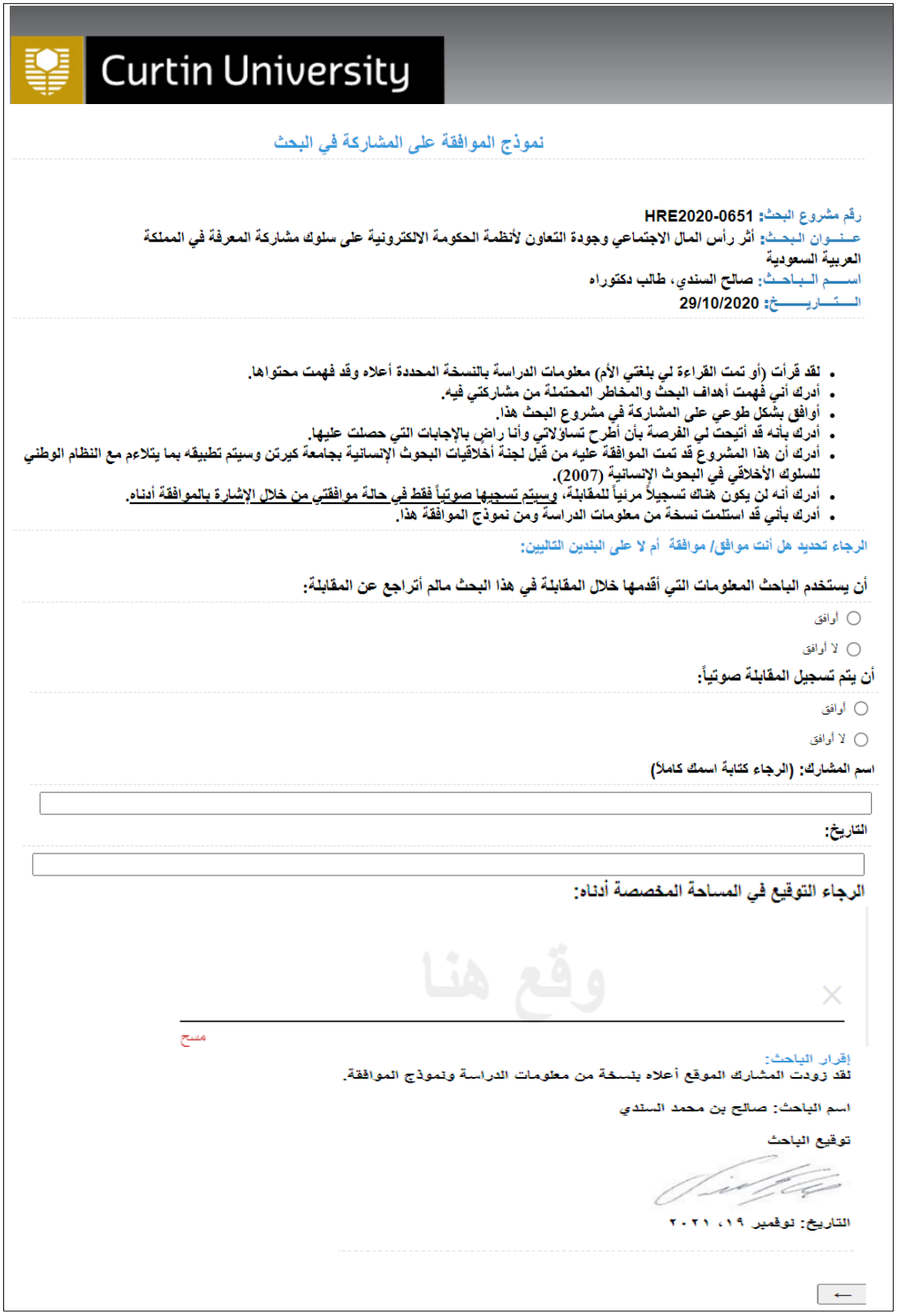
- نعم
- لا

هل تستخدم على الأقل واحداً من أنظمة الحكومة الإلكترونية في مجال عملك؟

- نعم
- لا

←

A-10. Arabic participant consent form (phase2)



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نموذج الموافقة على المشاركة في البحث

رقم مشروع البحث: HRE2020-0651
عنوان البحث: أثر رأس المال الاجتماعي وجودة التعاون لأنظمة الحكومة الالكترونية على سلوك مشاركة المعرفة في المملكة العربية السعودية
اسم الباحث: صالح السندي، طالب دكتوراه
التاريخ: 29/10/2020

- لقد قرأت (أو تمت القراءة لي بلغتي الأم) معلومات الدراسة بالنسخة المحددة أعلاه وقد فهمت محتواها.
- أدرك أني فهمت أهداف البحث والمخاطر المحتملة من مشاركتي فيه.
- أوافق بشكل طوعي على المشاركة في مشروع البحث هذا.
- أدرك بأنه قد أتيحت لي الفرصة بأن أطرح تساؤلاتي وأنا راضٍ بالإجابات التي حصلت عليها.
- أدرك أن هذا المشروع قد تمت الموافقة عليه من قبل لجنة أخلاقيات البحوث الإنسانية بجامعة كيرتن وسيتم تطبيقه بما يتلاءم مع النظام الوطني للسلوك الأخلاقي في البحوث الإنسانية (2007).
- أدرك أنه لن يكون هناك تسجيلاً مرئياً للمقابلة، وسيتم تسجيلها صوتياً فقط في حالة موافقتي من خلال الإشارة بالموافقة أدناه.
- أدرك بأني قد استلمت نسخة من معلومات الدراسة ومن نموذج الموافقة هذا.

الرجاء تحديد هل أنت موافق/ موافقة أم لا على البندين التاليين:

أن يستخدم الباحث المعلومات التي أقدمها خلال المقابلة في هذا البحث مالم أتراجع عن المقابلة:

○ أوافق
○ لا أوافق

أن يتم تسجيل المقابلة صوتياً:

○ أوافق
○ لا أوافق

اسم المشارك: (الرجاء كتابة اسمك كاملاً)

التاريخ:

الرجاء التوقيع في المساحة المخصصة أدناه:

وقع هنا

مسح

إقرار الباحث:
لقد زودت المشارك الموقع أعلاه بنسخة من معلومات الدراسة ونموذج الموافقة.

اسم الباحث: صالح بن محمد السندي

توقيع الباحث

التاريخ: نوفمبر ١٩، ٢٠٢١

←

A-11. First ten publications in both clusters 1 and 2

First: cluster 1, Size=2,988 publications

	Authors	Title	Source	Year	Cit. score
1	nahapiet, j; ghoshal, s	social capital, intellectual capital, and the organizational advantage	academy of management review	1998	1459
2	hansen, mt	the search-transfer problem: the role of weak ties in sharing knowledge across organization subunits	administrative science quarterly	1999	852
3	levin, dz; cross, r	the strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer	management science	2004	554
4	reagans, r; mcevily, b	network structure and knowledge transfer: the effects of cohesion and range	administrative science quarterly	2003	517
5	inkpen, ac; tsang, ewk	social capital, networks, and knowledge transfer	academy of management review	2005	484
6	yli-renko, h; autio, e; sapienza, hj	social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms	strategic management journal	2001	328
7	burt, rs	structural holes and good ideas	american journal of sociology	2004	306
8	kale, p; singh, h; perlmutter, h	learning and protection of proprietary assets in strategic alliances: building relational capital	strategic management journal	2000	263
9	subramaniam, m; youndt, ma	the influence of intellectual capital on the types of innovative capabilities	academy of management journal	2005	178
10	mcfadyen, ma; cannella, aa	social capital and knowledge creation: diminishing returns of the number and strength of exchange relationships	academy of management journal	2004	175

Second: cluster 2, Size=1,773 publications

	Authors	Title	Source	Year	Cit. score
1	wasko, mm; faraj, s	why should i share? examining social capital and knowledge contribution in electronic networks of practice	mis quarterly	2005	480
2	chiu, cm; hsu, mh; wang, etg	understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories	decision support systems	2006	389
3	kankanhalli, a; tan, bcy; wei, kk	contributing knowledge to electronic knowledge repositories: an empirical investigation	mis quarterly	2005	330
4	hsu, mh; ju, tl; yen, ch; chang, cm	knowledge sharing behaviour in virtual communities: the relationship between trust, self-efficacy, and outcome expectations	international journal of human-computer studies	2007	199
5	chow, ws; chan, ls	social network, social trust and shared goals in organizational knowledge sharing	information & management	2008	170
6	gold, ah; malhotra, a; segars, ah	knowledge management: an organizational capabilities perspective	journal of management information systems	2001	142
7	abrams, lc; cross, r; lesser, e; levin, dz	nurturing interpersonal trust in knowledge-sharing networks	academy of management executive	2003	141
8	de long, dw; fahey, l	diagnosing cultural barriers to knowledge management	academy of management executive	2000	134
9	nonaka i; toyama, r; konno, n	seci, ba and leadership: a unified model of dynamic knowledge creation	long range planning	2000	130
10	lee, h; choi, b	knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination	journal of management information systems	2003	112

A-12. Normality tests for the ordered and randomized surveys

Tests of Normality							
Survey Type		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Ordered	ST1	.297	73	.000	.760	73	.000
	ST2	.248	73	.000	.797	73	.000
	ST3	.274	73	.000	.833	73	.000
	ST4	.277	73	.000	.807	73	.000
	ST5	.271	73	.000	.863	73	.000
	ST6	.229	73	.000	.895	73	.000
	T1	.173	73	.000	.899	73	.000
	T2	.257	73	.000	.866	73	.000
	T3	.279	73	.000	.810	73	.000
	T4	.315	73	.000	.845	73	.000
	T5	.228	73	.000	.825	73	.000
	SL1	.283	73	.000	.855	73	.000
	SL2	.253	73	.000	.884	73	.000
	SL3	.281	73	.000	.839	73	.000
	SL4	.305	73	.000	.839	73	.000
	SL5	.306	73	.000	.746	73	.000
	SV1	.297	73	.000	.754	73	.000
	SV2	.264	73	.000	.842	73	.000
	SV3	.253	73	.000	.827	73	.000
	SV4	.248	73	.000	.873	73	.000
	SV5	.262	73	.000	.846	73	.000
	CQ1	.360	73	.000	.703	73	.000
	CQ2	.334	73	.000	.739	73	.000
	CQ3	.236	73	.000	.893	73	.000
	CQ4	.260	73	.000	.841	73	.000
	CQ5	.253	73	.000	.841	73	.000
	MKR2	.296	73	.000	.768	73	.000
	MKR1	.381	73	.000	.689	73	.000
	KSB1	.307	73	.000	.719	73	.000
	KSB2	.236	73	.000	.829	73	.000
	KSB3	.245	73	.000	.805	73	.000
	KSB4	.357	73	.000	.794	73	.000
	KSB5	.289	73	.000	.769	73	.000
Randomized	ST1	.261	51	.000	.777	51	.000
	ST2	.257	51	.000	.826	51	.000
	ST3	.239	51	.000	.879	51	.000
	ST4	.286	51	.000	.762	51	.000
	ST5	.281	51	.000	.858	51	.000
	ST6	.291	51	.000	.866	51	.000
	T1	.216	51	.000	.876	51	.000
	T2	.254	51	.000	.864	51	.000
	T3	.265	51	.000	.852	51	.000
	T4	.256	51	.000	.885	51	.000
	T5	.286	51	.000	.841	51	.000
	SL1	.275	51	.000	.854	51	.000
	SL2	.271	51	.000	.881	51	.000
	SL3	.299	51	.000	.858	51	.000

	SL4	.199	51	.000	.908	51	.001
	SL5	.330	51	.000	.810	51	.000
	SV1	.242	51	.000	.800	51	.000
	SV2	.214	51	.000	.902	51	.000
	SV3	.273	51	.000	.864	51	.000
	SV4	.246	51	.000	.893	51	.000
	SV5	.360	51	.000	.787	51	.000
	CQ1	.346	51	.000	.719	51	.000
	CQ2	.295	51	.000	.771	51	.000
	CQ3	.231	51	.000	.894	51	.000
	CQ4	.286	51	.000	.845	51	.000
	CQ5	.235	51	.000	.851	51	.000
	MKR2	.334	51	.000	.723	51	.000
	MKR1	.322	51	.000	.741	51	.000
	KSB1	.233	51	.000	.817	51	.000
	KSB2	.274	51	.000	.840	51	.000
	KSB3	.291	51	.000	.805	51	.000
	KSB4	.210	51	.000	.894	51	.000
	KSB5	.274	51	.000	.755	51	.000
*ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, MKR=marker variable.							

A-13. Mann–Whitney U-tests between items in the ordered and randomized surveys

Distributions of items across the ordered and randomized surveys at significance level of 0.05				
	Item*	Mann–Whitney *U*	Z	Sig.
1	ST1	2180.500	0.471	0.638
2	ST2	2426.500	1.682	0.093
3	ST3	2338.000	1.233	0.218
4	ST4	1989.500	-0.514	0.607
5	ST5	2135.000	0.220	0.826
6	ST6	2044.000	-0.225	0.822
7	TRU1	2144.500	0.264	0.792
8	TRU2	2331.500	1.186	0.236
9	TRU3	2225.000	0.825	0.409
10	TRU4	2492.000	1.978	0.048
11	TRU5	2330.000	1.355	0.175
12	SL1	2296.000	1.060	0.676
13	SL2	2538.000	2.396	0.358
14	SL3	2318.500	1.122	0.925
15	SL4	2412.000	1.574	0.013
16	SL5	1892.500	-0.833	.008
17	SV1	2006.500	-0.418	0.289
18	SV2	1903.000	-0.918	0.017
19	SV3	2109.000	0.094	0.262
20	SV4	2592.500	2.475	0.115
21	SV5	2593.500	2.662	0.405
22	CQ1	2111.000	0.112	0.911
23	CQ2	2337.000	1.277	0.202
24	CQ3	2067.000	-1.112	0.911
25	CQ4	2290.000	0.995	0.320
26	CQ5	2144.000	0.268	0.789
27	KSB1	2331.500	1.674	0.094
28	KSB2	2192.500	0.509	0.611
29	KSB3	2185.000	0.482	0.630
30	KSB4	2792.500	3.467	0.001
31	KSB5	2049.500	-0.209	0.834
32	MKR1	2180.500	1.682	0.365
33	MKR2	2426.500	-0.471	0.940
*ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, MKR=marker variable.				

A-14. One-Way ANOVA test between items in the ordered and randomized surveys

One-Way ANOVA results at significance level of 0.05						
Items*		Sum of Squares	df	Mean Square	F	Sig.
ST1	Between Groups	.177	1	.177	.413	.522
	Within Groups	55.213	129	.428		
	Total	55.389	130			
ST2	Between Groups	4.044	1	4.044	4.765	.031
	Within Groups	109.468	129	.849		
	Total	113.511	130			
ST3	Between Groups	1.907	1	1.907	2.293	.132
	Within Groups	107.329	129	.832		
	Total	109.237	130			
ST4	Between Groups	.163	1	.163	.229	.633
	Within Groups	91.883	129	.712		
	Total	92.046	130			
ST5	Between Groups	.175	1	.175	.131	.718
	Within Groups	172.359	129	1.336		
	Total	172.534	130			
ST6	Between Groups	.000	1	.000	.000	.988
	Within Groups	139.908	129	1.085		
	Total	139.908	130			
TRU1	Between Groups	.122	1	.122	.092	.762
	Within Groups	170.535	129	1.322		
	Total	170.656	130			
TRU2	Between Groups	2.279	1	2.279	2.391	.125
	Within Groups	122.943	129	.953		
	Total	125.221	130			
TRU3	Between Groups	.875	1	.875	1.119	.292
	Within Groups	100.056	128	.782		
	Total	100.931	129			
TRU4	Between Groups	4.781	1	4.781	3.965	.049
	Within Groups	155.540	129	1.206		
	Total	160.321	130			
TRU5	Between Groups	1.063	1	1.063	1.673	.198
	Within Groups	81.314	128	.635		
	Total	82.377	129			
SL1	Between Groups	.195	1	.195	.242	.624
	Within Groups	104.034	129	.806		
	Total	104.229	130			
SL2	Between Groups	.534	1	.534	.538	.465
	Within Groups	128.198	129	.994		
	Total	128.733	130			
SL3	Between Groups	.029	1	.029	.028	.868
	Within Groups	132.949	129	1.031		
	Total	132.977	130			
SL4	Between Groups	6.332	1	6.332	5.926	.016
	Within Groups	137.836	129	1.068		
	Total	144.168	130			
SL5	Between Groups	2.997	1	2.997	5.912	.016
	Within Groups	65.385	129	.507		
	Total	68.382	130			
SV1	Between Groups	.995	1	.995	1.745	.189
	Within Groups	73.540	129	.570		
	Total	74.534	130			

SV2	Between Groups	6.263	1	6.263	5.809	.017
	Within Groups	138.014	128	1.078		
	Total	144.277	129			
SV3	Between Groups	1.366	1	1.366	1.263	.263
	Within Groups	139.580	129	1.082		
	Total	140.947	130			
SV4	Between Groups	2.599	1	2.599	2.485	.117
	Within Groups	134.943	129	1.046		
	Total	137.542	130			
SV5	Between Groups	.626	1	.626	1.109	.294
	Within Groups	72.305	128	.565		
	Total	72.931	129			
CQ1	Between Groups	.075	1	.075	.150	.699
	Within Groups	64.627	129	.501		
	Total	64.702	130			
CQ2	Between Groups	.500	1	.500	1.142	.287
	Within Groups	56.417	129	.437		
	Total	56.916	130			
CQ3	Between Groups	.037	1	.037	.029	.865
	Within Groups	162.803	129	1.262		
	Total	162.840	130			
CQ4	Between Groups	.854	1	.854	1.065	.304
	Within Groups	103.527	129	.803		
	Total	104.382	130			
CQ5	Between Groups	.031	1	.031	.040	.841
	Within Groups	99.969	129	.775		
	Total	100.000	130			
KSB1	Between Groups	1.253	1	1.253	2.178	.142
	Within Groups	73.072	127	.575		
	Total	74.326	128			
KSB2	Between Groups	.106	1	.106	.129	.720
	Within Groups	105.863	129	.821		
	Total	105.969	130			
KSB3	Between Groups	.030	1	.030	.046	.831
	Within Groups	84.214	129	.653		
	Total	84.244	130			
KSB4	Between Groups	13.293	1	13.293	11.445	.001
	Within Groups	149.836	129	1.162		
	Total	163.130	130			
KSB5	Between Groups	.049	1	.049	.078	.780
	Within Groups	79.967	129	.620		
	Total	80.015	130			
MKR1	Between Groups	.157	1	.157	.322	.571
	Within Groups	62.274	128	.487		
	Total	62.431	129			
MKR2	Between Groups	.079	1	.079	.185	.668
	Within Groups	55.066	129	.427		
	Total	55.145	130			

*ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, MKR=marker variable

A-15. Mann–Whitney U-tests between samples collected in social networks and the host firm

Distributions of survey items across data collected inside and outside the host firm at significance level of 0.05				
	Item*	Mann–Whitney *U*	Z	**Sig.**
1	ST1	19769.000	-1.956	0.050
2	ST2	20096.500	-1.706	0.088
3	ST3	24186.500	1.122	0.262
4	ST4	20015.000	-1.849	0.064
5	ST5	24400.500	1.257	0.209
6	ST6	23141.000	0.397	0.691
7	TRU1	21936.000	-0.416	0.678
8	TRU2	22591.000	0.022	0.982
9	TRU3	20463.000	-1.427	0.154
10	TRU4	21977.500	-0.394	0.694
11	TRU5	21425.000	-0.787	0.431
12	SL1	21387.500	-0.808	0.419
13	SL2	24579.000	1.364	0.173
14	SL3	23918.000	0.945	0.345
15	SL4	22875.500	0.217	0.828
16	SL5	22260.500	-0.223	0.824
17	SV1	20759.500	-1.251	0.211
18	SV2	21696.500	-0.576	0.565
19	SV3	20994.500	-1.070	0.285
20	SV4	21299.500	-0.857	0.391
21	SV5	19731.500	-1.949	0.051
22	CQ1	20312.000	-1.600	0.110
23	CQ2	21219.500	-0.944	0.345
24	CQ3	22932.000	0.252	0.801
25	CQ4	22577.000	0.013	0.990
26	CQ5	22840.500	0.198	0.843
27	KSB1	21054.500	-1.065	0.287
28	KSB2	21330.000	-0.864	0.387
29	KSB3	21281.000	-0.915	0.360
30	KSB4	23583.500	0.691	0.490
31	KSB5	19590.500	-2.083	0.037
32	MKR1	21222.000	-0.901	0.368
33	MKR2	21541.500	-0.642	0.521
*ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, MKR=marker variable				

A-16. Normality test for the full data

Tests of Normality						
Items*	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ST1	.250	633	.000	.786	633	.000
ST2	.283	633	.000	.845	633	.000
ST3	.303	633	.000	.845	633	.000
ST4	.317	633	.000	.788	633	.000
ST5	.287	633	.000	.855	633	.000
ST6	.258	633	.000	.885	633	.000
TRU1	.191	633	.000	.909	633	.000
TRU2	.232	633	.000	.896	633	.000
TRU3	.245	633	.000	.873	633	.000
TRU4	.260	633	.000	.882	633	.000
TRU5	.283	633	.000	.859	633	.000
SL1	.284	633	.000	.848	633	.000
SL2	.239	633	.000	.890	633	.000
SL3	.300	633	.000	.854	633	.000
SL4	.270	633	.000	.880	633	.000
SL5	.327	633	.000	.781	633	.000
SV1	.282	633	.000	.824	633	.000
SV2	.215	633	.000	.906	633	.000
SV3	.273	633	.000	.876	633	.000
SV4	.250	633	.000	.887	633	.000
SV5	.267	633	.000	.876	633	.000
CQ1	.292	633	.000	.748	633	.000
CQ2	.260	633	.000	.785	633	.000
CQ3	.215	633	.000	.903	633	.000
CQ4	.285	633	.000	.833	633	.000
CQ5	.287	633	.000	.825	633	.000
KSB1	.257	633	.000	.789	633	.000
KSB2	.295	633	.000	.836	633	.000
KSB3	.281	633	.000	.791	633	.000
KSB4	.206	633	.000	.903	633	.000
KSB5	.244	633	.000	.794	633	.000
MKR1	.291	633	.000	.756	633	.000
MKR2	.248	633	.000	.779	633	.000
*ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, MKR=marker variable						

A-17. Harman one-factor analysis

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.421	21.592	21.592	7.946	20.375	**20.375**
2	3.491	8.952	30.544	3.046	7.811	28.186
3	2.173	5.572	36.116	1.610	4.127	32.313
4	1.979	5.074	41.190	1.443	3.701	36.014
5	1.414	3.626	44.816	.763	1.955	37.969
6	1.197	3.069	47.885	.576	1.477	39.446
7	1.090	2.795	50.680	.514	1.317	40.763
8	1.069	2.742	53.422	.484	1.242	42.005
9	1.033	2.649	56.071	.405	1.038	43.044
10	.993	2.547	58.618			
11	.961	2.465	61.083			
12	.906	2.324	63.407			
13	.891	2.285	65.693			
14	.826	2.119	67.812			
15	.798	2.045	69.857			
16	.790	2.026	71.884			
17	.761	1.950	73.834			
18	.719	1.843	75.677			
19	.694	1.779	77.456			
20	.677	1.735	79.191			
21	.644	1.651	80.841			
22	.639	1.638	82.480			
23	.602	1.545	84.024			
24	.576	1.477	85.502			
25	.556	1.425	86.927			
26	.521	1.337	88.264			
27	.503	1.290	89.554			
28	.467	1.198	90.752			
29	.441	1.131	91.883			
30	.412	1.056	92.938			
31	.388	.995	93.933			
32	.345	.886	94.819			
33	.339	.869	95.688			
34	.314	.804	96.493			
35	.301	.772	97.264			
36	.299	.766	98.030			
37	.275	.706	98.736			
38	.262	.672	99.409			
39	.231	.591	100.000			
Extraction Method: Principal Axis Factoring.						

A-18. Descriptions of open codes

* P = Number of participants, Q = Quantity, number of times stated.

	Code	P*	Q*	Description
1	No impact of ST on knowledge donating	8	18	ST does not influence donating of knowledge sharing behaviour.
2	Impact of ST on knowledge seeking	5	12	Employees ask knowledge in e-gov systems from colleagues with whom they have strong ST.
3	ST and personality of colleague	3	6	Depending on social ties, sharing knowledge in a style that a colleague personally prefers.
4	ST increases timing of knowledge sharing.	1	2	More effort is paid to provide close colleagues with knowledge at the right time.
5	Sharing K regardless of trust in colleague	6	20	Trust in a colleague does not affect sharing of knowledge in e-government systems.
6	Documentation	3	9	Documentation of knowledge in e-government systems obviates the need for trust in a colleague.
7	Trust in colleague is important.	5	24	An employee requires trust in their colleague in order to share knowledge with them.
8	Fear of repercussions	7	18	Concern of being questioned or penalized by management if a mistake is made in an e-government system.
9	Management indifference	4	6	Management acts does not care about employees' need, suggestions, etc.
10	Tolerance to mistakes	5	11	Employees expect that management will understand their mistakes and try to correct the mistakes rather than blaming them.
11	Management attention to employees	3	4	An employee believes that management is open to opinions and empathizes with employees' needs.
12	SV with collaboration	4	7	Participants focus on collaboration when asked about shared vision.
13	SV with incentives	6	12	Participants focus on incentives when asked about shared vision.
14	No CQ available	2	10	Says that e-government systems do not have any CQ at all.
15	Not enough space	4	4	The space allowed for employees to share knowledge in e-government systems is insufficient.
16	Lack of accessibility	4	16	Employees do not access each other's assigned tasks on e-government systems.
17	Redundancy	1	3	Same task might be processed more than once by different employees.
18	Ineffective notifications	4	11	Unavailability of effective notification tools in e-government systems.
19	Ineffective archive	4	5	Inability or difficulty finding or retrieving knowledge stored in e-government systems.
20	No instant chatting	5	7	An unmet need for instant chatting within e-government systems.
21	No voice comments	3	3	An unmet need for sending or receiving voice recordings within e-government systems.

	Code	P*	Q*	Description
22	No KS templates	1	1	Need for templates of forms for sharing knowledge in e-government systems.
23	No knowledge feedback	1	1	No way to give knowledge recipients the option to evaluate knowledge in e-government systems.
24	Writing comments	8	12	Ability to leave comments on a transaction within an e-government system..
25	Attachments	3	8	A feature that allows different types of files to be attached to transactions.
26	Sharing work within a transaction	2	2	Allocating a transaction to two or more employees.
27	Assigning tasks	3	4	Employees can assign their assigned task to another colleagues.
28	Tools for confidential knowledge	4	5	Features that allow employees to determine who has access to a transaction in an e-government system.
29	Discussion board	1	4	Availability of a space where employees can interactively discuss solutions for a specific work task.
30	Sending queries to colleagues	1	4	A feature that allows employees to send and respond to queries between each other in e-government systems.
31	Video and voice sharing	1	1	Ability to share videos and voice recordings within e-government systems.
32	Effective archive	1	1	Ability to easily find previous tasks inside e-government systems.
33	Forward copies of transactions	2	5	A feature that allows an employee to forward copies (carbon copies) of assigned transactions to other colleagues.
34	Importance of CQ	5	5	CQ was essential to allow KSB in e-government systems.
35	Delivering K in a clearer manner	5	6	CQ helps knowledge recipients easily understand knowledge in the systems.
36	CQ and workload	6	13	CQ could be used to mitigate heavy workload.
37	Reusing stored knowledge	7	22	Employees return to stored knowledge for solutions to similar new transactions.
38	Preference to share K in e-government	9	15	E-government systems are the preferred places to share knowledge.
39	Avoiding potential issues	3	8	Sharing knowledge in e-government systems helps employees protect themselves from issues with their managers or colleagues.
40	Individual intellectual contribution	5	13	Employees share knowledge in the systems to record their knowledge/ideas and protect them from being plagiarized by others.
41	Recognition	6	17	Sharing knowledge in the systems to draw attention of managers.
42	Mandatory use	8	15	The use of e-government systems is mandatory to do work, and work cannot be done outside the systems.
43	Abbreviation	4	7	Knowledge in e-government systems needs to be abbreviated.

	Code	P*	Q*	Description
44	Formal style	3	9	Formal organizational tones should be used when sharing knowledge via e-government systems.
45	Knowledge relevance	2	2	The knowledge being shared in e-government systems needs to be directly related to the assigned transactions.
46	Knowledge accuracy	6	13	Employees share knowledge only when they are sure about it.
47	Face-to-face	9	16	Sharing knowledge face-to-face.
48	Phone	7	11	Sharing knowledge over the phone.
49	Email	5	17	Using email to share knowledge.
50	WhatsApp	4	19	Using WhatsApp to share knowledge.
51	Competition style	8	20	Information about how participants perceive competition in e-government systems, and how it could influence KSB in the systems.
52	Training	3	4	The need to train employees how to use e-government systems.
53	Support equipment	1	1	The need to have support equipment to make knowledge sharing in e-government systems easier.

A-19. Descriptions of focused codes

* P= Number of participants, Q = Quantity, number of stating times.

#	Code	P	Q	Description
1	No impact of ST on K donating	8	18	ST does not influence donating of knowledge sharing behaviour.
2	Impact of ST on K seeking	4	11	Employees ask for knowledge in e-gov systems from colleagues with whom they have strong ST.
3	ST increase knowledge quality	3	8	Providing knowledge in the recipient's preferred style and at their preferred time depending on strength of ST.
4	Sharing K regardless of trust in colleague	6	22	Trust in colleagues does not affect sharing of knowledge in e-government systems.
5	Trust in colleagues is important.	5	24	An employee requires trust in their colleague in order to share knowledge.
6	High trust in management	5	15	Employees perceive that their management will understand their mistakes and try to correct the mistakes rather than blaming them, or if they believe that management is open to opinions and empathizes with their needs.
7	Low trust in management	8	24	Employees are afraid of punishments if a mistake is made in e-government systems or if they think management does not care about their concerns.
8	SV with collaboration	4	7	Participants focus on collaboration when asked about shared vision.
9	SV with incentives	6	12	Participants focus on incentives when asked about shared vision.
10	Low CQ	14	23	Various collaborative features were not available to participants.
11	High CQ	15	49	Various CQ features were available to participants and helped them share knowledge in e-government systems.
12	Importance of CQ	5	5	CQ was essential to allow KSB in e-government systems.
13	Other benefits of CQ	13	27	Benefits of CQ not directly related to KSB.
14	Reusing stored knowledge	7	22	Employees return to stored knowledge for solutions to similar new transactions.
15	Preference to share K in e-gov systems	9	15	E-government systems are the preferred way to share knowledge.
16	Personal benefits	7	38	Employees get personal benefits when they share knowledge in e-government systems.
17	Formality	6	16	Knowledge in e-government systems is supposed to be formal and brief.
18	Knowledge quality in e-gov	8	15	Knowledge in e-government systems should be relevant and accurate.
19	Face-to-face	9	16	Sharing knowledge face-to-face.
20	Phone	7	11	Sharing knowledge over the phone
21	Email	5	17	Using email to share knowledge.
22	WhatsApp	4	19	Using WhatsApp to share knowledge.

#	Code	P	Q	Description
23	Competition style in e-government systems	8	20	Participants perceive competition in e-government systems, and how it can influence their KSB.
24	Support needed for outside systems	3	5	KSB in the systems needs employees to be trained on how to use e-government systems and access to support equipment.

A-20. A multi-group analysis for high and low CQ

The data set was split using a median split approach. Such an approach does not lead to loss of information and offers better statistical power (Khedhaouria, Gurău, & Torrès, 2015). Values more than or equal to the median were considered high CQ; otherwise, they were low CQ. The high CQ group had 320 cases, whereas the low CQ had 318. Accordingly, multi-group analysis was conducted in SmartPLS. After running MGA, a parametric test showed no significant difference in any relationship between the high and low CQ groups (Table 59).

Table 59: MGA for high and low CQ.

	β-diff (High CQ − Low CQ)	*t*-value (High CQ vs Low CQ|)	*p*-value (High CQ vs Low CQ)
ST→ KSB	0.086	1.009	0.313
TRU → KSB	0.025	0.243	0.808
SV → KSB	−0.079	0.779	0.436
CQ → KSB	0.053	0.638	0.524
M CQ on (ST→KSB)	−0.156	1.567	0.118
M CQ on (SV→KSB)	−0.013	0.101	0.920
M CQ on (TRU→KSB)	−0.059	0.494	0.621

ST=social ties, TRU=trust, SL=shared language, SV=shared vision, CQ=collaboration quality, KSB=knowledge sharing behaviour, M= moderating effect.

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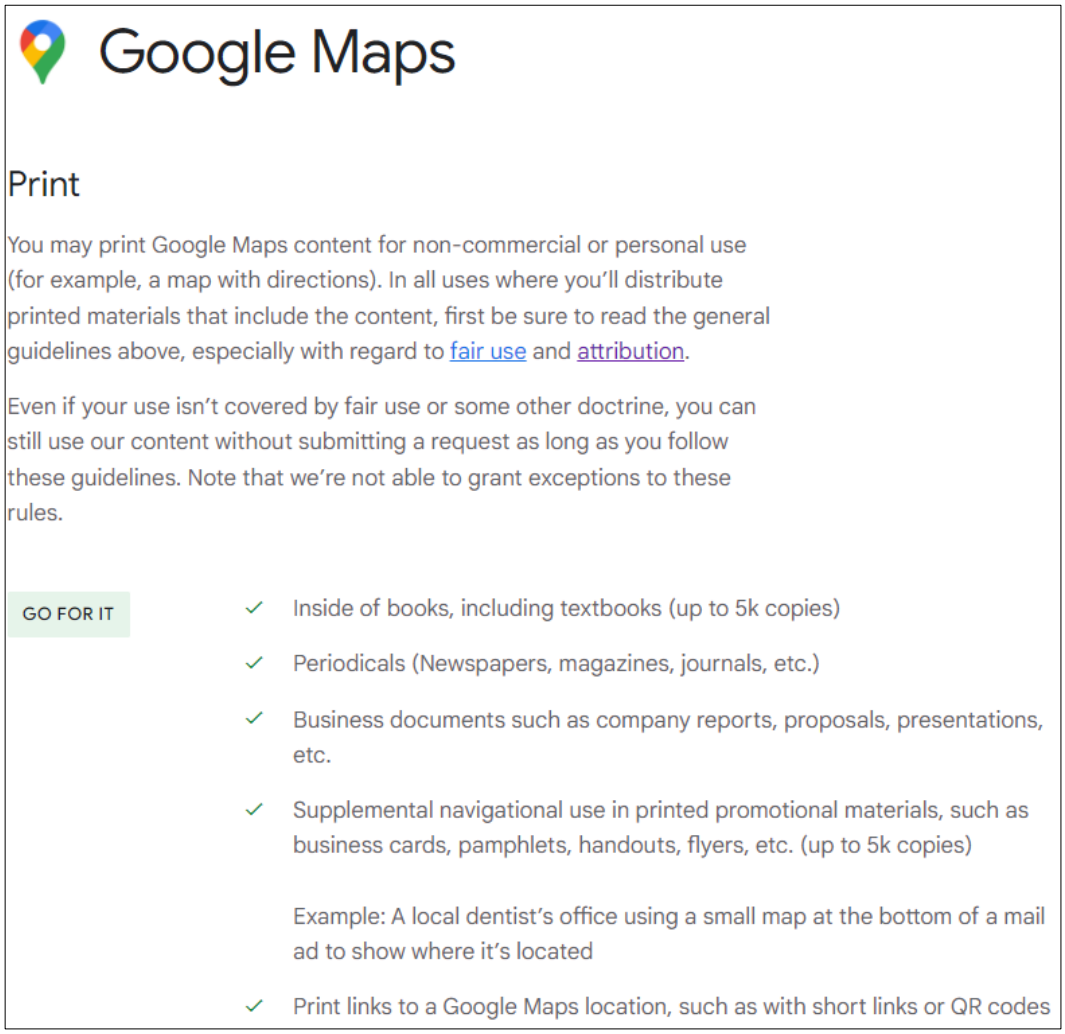

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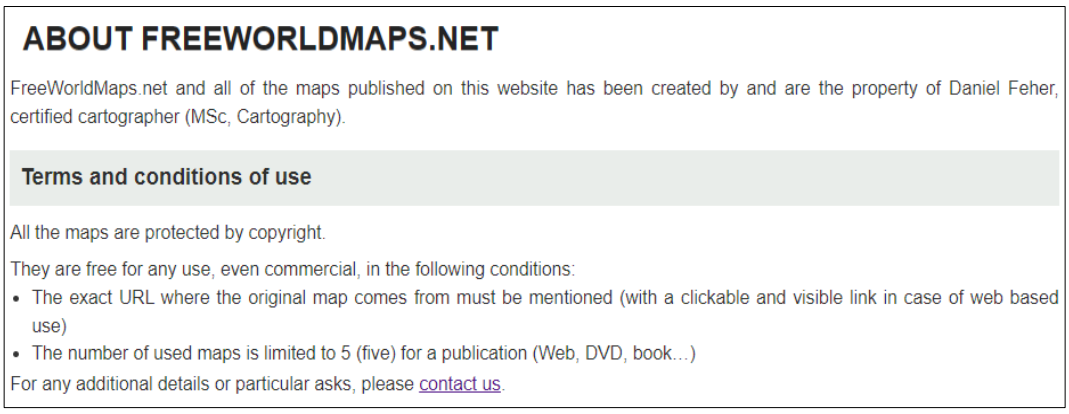

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SAGE Publishing

Knowledge Sharing in Organizations: A Conceptual Framework

Author: Minu Ipe
Publication: Human Resource Development Review
Publisher: SAGE Publications
Date: 12/01/2003

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