A multi-perspective and multi-theoretical approach on the role of Knowledge Process Capabilities in enhancing patient safety: the case of Chiapas

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by:

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Abstract

Knowledge in medical practice is indispensable in accomplishing the objective of healing, conserving and protecting human health. Health institutions are organisations of knowledge; through their human resources, processes, methods, practices and instruments, they constantly promote the generation, access, transference and application of knowledge. Therefore, governments in developing countries such as Mexico can integrate knowledge management strategies, considering as a reference the best practices of developed countries and adapting them to the context of public policies and institutions. However, in the adoption and adaptation process, the local context conditions influencing any knowledge-based initiative's success or failure must be carefully analysed and evaluated. Therefore, an exploratory study will provide insight into the contribution of different critical factors to the development of knowledge capabilities of healthcare professionals and their impact on the improvement of patient safety from the view of a public Mexican health institution.

This research proposed a methodology composed of three phases. First, The knowledge generation to understand the foundations of Knowledge Management through a literature review of the theories, perspectives, disciplines, critical factors, and evidence from past studies that support this field of study. Second, the knowledge and evidence generated through rigorous statistical analyses to evaluate three structural models whose relationships were established based on previously identified theoretical foundations. The critical factors considered in this study are the Organisational Enablers of Knowledge Management, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour, Knowledge Process Capabilities developed by healthcare professionals, and Organisational Performance in terms of Patient Safety. Third, the knowledge generated through a dialogue between the evidence generated by statistical analyses and the conditions of the local context that affect the behaviours proposed by the theories.

Identifying the context effects of a developing country such as Mexico will let to identify and analyse the conditions of the social, cultural, and economic dimensions and governmental practices that can obstruct the development of knowledge capabilities in healthcare professionals, as well as the formal establishment of knowledge practices. The importance of this contribution relies on the fact that health institutions are pillars for the development of society, so strengthening their different capabilities and knowledge strategies is more than ever essential for the well-being and development of countries.

Acknowledgement

I want to thank **God** for my life because He brought peace to my heart, joy to my sadness, light to my mind, strength to continue, and hope to live.

I am grateful for the support of my **family and friends**, who encouraged me to continue moving forward despite all the difficult moments in my life.

Thank you to the **Tec de Monterrey leaders and colleagues** for your trust and support.

I am very grateful to my advisor, **Doctor Ashish Dwivedi**, who accompanied me on this long journey; I admire him for being a great researcher and, above all, for his great human quality. His patience and empathy kept me standing for continuing through the most difficult stages until I concluded this great challenge.

Dedication

This effort is dedicated to the memory of my mother and father who passed away during my PhD journey.

Dedicate to my mother, **Lucitania Díaz Gómez**, who taught me to love, to forgive and who, with her example, encouraged me to put my capacity in favour of those who need more support.

Dedicate to my father, **Efraín Velázquez Jiménez**, who taught me to make all my dreams come true.

Some chapters were written with the happiness of sharing life, while others with the sadness of their departure. Today, I finished this challenge hoping to meet them again soon.

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List of Abbreviations

AGFI	Adjusted goodness-of-fit index
AMOS	Analysis of Moment Structures
ASV	Average shared variance
AVE	Average Variance Extracted
BSC	Balanced Scorecard
C.R.	Critical Ratio
CB-SEM	Covariance-based Structural Equation Modelling
CBR	Case Based Reasoning
CC	Culture of Collaboration
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Composite Index
CLF	Common Latent Factor
CMV	Common Method Variance
CN	Critical N
CR	Composite Reliability
df	Degrees of Freedom
DSS	Decision Support System
EFA	Exploratory factor analysis
EM	Estimation maximization
EMR	Electronic Medical Records
ERMIS	Emergency Response Medical Information System
FIML	Full Information Maximum Likelihood
GDP	Gross Domestic Product
GFI	Goodness-of-fit index
LMX	Leader-Member Exchange
MACS	Mean and Covariance Structure
MAR	Missing at Random
MCAR	Missing Completely at Random
Mi	Modification Indices
ML	Maximum Likelihood
MLE	Maximum Likelihood Estimation
MNAR	Missing Not at Random
MSV	Maximum Shared Variance
MUI	Multiple Imputation
MVA	Missing Value Analysis
N	Sample size
NFI	Normed Fit Index
OE	Organisational Enablers
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
OP	Organisational Performance
PCFI	Parsimony Comparative Fit Index
PLS	Partial Least Square
PNFI	Parsimony Normed Fit Index
POS	Perceived Organisational Support
R&D	Research and Development
RBV	Resource-Based View
RMSEA	Root Mean Square Error of Approximation
SECI	Socialisation, Externalisation, Combination, and Internalisation Processes

GNI	Gross National Income
GOF	Goodness-of-Fit
H	Hypothesis
HDI	Human Development Index
HIS	Health Information System
HRRS	Health Risk Reminder and Surveillance
HTMT	Heterotrait-Monotrait Ratio
ICT	Information and Communication Technologies
IFI	Incremental Fit Index
IS	Information Systems
IT	Information Technology
IV	Independent Variable
KBV	Knowledge-Based View
KM	Knowledge Management
KMS	Knowledge Management System
KPC	Knowledge Process Capabilities
KS	Knowledge Sharing
KSB	Knowledge-Sharing Behaviour
KSE	Knowledge-Sharing Environment
SEM	Structural Equation Modelling
SET	Social Exchange Theory
SMC	Squared Multiple Correlation
SME	Small and Medium-sized Enterprise
SPSS	Statistical Package for Social Sciences
SRMR	Standardised Root Mean Square Residual
TA	Technology Acceptance
TAM	Technology Acceptance Model
TAM2	Theoretical Extension of Theory Acceptance Model
TLI	Tucker-Lewis Index
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UNDP	United Nations Development Programme
US	United State
USD	United State Dollar
VIF	Variance Inflation Factor
X^2	Chi-square
α	Cronbach's Alpha
β	Standardised coefficient
λ	Factor loading

Chapter One: Introduction and research background

1.1. Introduction

Since ancient time, human beings have left vestiges of history by transmitting their experiences; either orally or symbolically -by scrabbling their first sketches in the form of cave paintings-, or centuries later with the invention of the printing press and today with digital media. From our earliest forms of social organisation, emerges a need to retain knowledge and preserve our memory. Kransdorff (2008) suggested that the transmission of messages facilitated human beings to preserve world history records, allowing us to shape the encyclopaedia of life.

Many centuries of conquests and warfare due to religious, territorial or wealth pretensions not only sacrificed millions of human lives but also destroyed ancient knowledge treasures of incalculable value.

Nowadays, this loss of knowledge is still a reality. From the so-called “modern” organisations back in the 1980’s, a model of a company with a flat organisational structure was promoted as an answer to the need for cutting expenses and, by doing so, to increase profits. To cut expenses, some positions were closed, and employees were laid off. As expected, this resulted in a reduction of costs due to savings on salaries. Nonetheless, this also led to an unaccounted loss in terms of knowledge. This effect was observed in terms of the experience and knowledge that cut-off employees took away, as well as the lack of experience and knowledge of the new employees who undertook functions.

Kransdorff (2008) stated that the “flattening” of organisational structures strategy brought on the need for re-apprehending processes and routines on many occasions, which in turn led to the revalorisation of knowledge as a factor of permanency and efficiency in the business arena.

Nowadays, we are facing a fast-changing and competitive environment in terms of the marketplace, products, technologies, regulations, and society itself; innovation and knowledge are vital sources for the organisation's sustainability (Nonaka, Toyama, & Konno, 2000). To face current challenges, companies must have the ability to react swiftly and flexibly, making use of existing knowledge and strengthening their learning capabilities to produce new knowledge.

Great advancements of our time have been enhanced by knowledge more than they have been relied on physical or natural resources owned by nations. The main resources of this new economic engine are intangible, and are based on experience, culture, teamwork and learning capabilities that organisations promote through their human capital (Curado & Bontis, 2006). The ability to efficiently manage the dynamic flow of knowledge, which directly contributes to the decision making process, which also increases the capacity for innovation and improves an organisation's performance, is known as Knowledge Management (KM) (Mills & Smith, 2011; Rhodes et al., 2008).

The definition of Preston, Swan, Newell, Scarbrough, and Hislop (1999) broadly represents the scope and value of the Knowledge Management contribution. The authors defined Knowledge Management as *"any process or practice that creates, acquires, captures, shares and uses knowledge, wherever it may reside in order to enhance learning and performance in organisations"*.

This proposal suggests that the definition of a model, which analyses the factors that promote the development of knowledge process capabilities in a health context, can contribute substantially to improving patient safety. This research also considers that the design of an integrated model must be based on a theoretical framework that allows the recognition of each factor's characteristics and expected behaviour, which facilitates a systemic understanding of the phenomenon analysed. It is also argued that statistical methods provide rigour and robustness in evaluating the proposed model. Finally, this research holds that the suggested methodology can substantially improve the development of studies, the design of strategies and the practice of Knowledge Management according to the analysed context.

The definition of a Knowledge Management strategy and the elements or factors that are part of it responds to the discipline, field of study or perspective from which it is approached. For example, in information sciences, emphasis is set on technology; in computer systems management, it is on information resources. In organisational sciences and other social sciences, the individual is the main factor in creating and distributing knowledge, by means of trust, socialisation, learning capabilities and disposition to share information and practices (Orzano et al., 2008).

Knowledge in health sciences is an essential element in pursuing preservation, restoring and protection of human health. In health institutions, knowledge is a fundamental element that materialises in processes, methods, practices, and instruments. Accessing, transferring, and generating new knowledge are crucial for health organisations. Corrao et al. (2009) stated that every health professional including nurses, doctors, administrative personnel, and directors must participate in knowledge creation, to ensure that the broad knowledge corpus in medicine is current and available at any area of the institution, at the right time and in the right place. To achieve this, it is important to define strategies for Knowledge Management and for the promotion of a knowledge culture throughout the institution.

Dwivedi, Bali, and Naguib (2007) posited that "*the capacity of doctors and health institutions has been surpassed by the rapid growth of information systems and technologies*". Thus, the need for organising, accessing, and capturing elements such as information, technology and knowledge has forced health organisations to adopt different strategies for their management. However, the poor development of Knowledge Process Capabilities in healthcare professionals can inhibit the success of the proposed strategy.

The myriad of disciplines that have served as the basis for implementing and analysing both strategies and processes of Knowledge Management has made studies available from different perspectives. Analysing and observing from different views have facilitated the understanding of barriers, better practices, and the identification of the several different factors that allow organisations to generate the capabilities to acquire, transfer, apply and protect knowledge. In this study, Knowledge Management phenomena are analysed under three perspectives: technical, socio-technical, and socio-cognitive.

According to Davenport and Grover (2001), analysis from multiple perspectives develops a systemic view of the different factors that interrelate in the Knowledge Management process; therefore, its analysis and evaluation are complex processes that require a theory to guide and facilitate the understanding and synthesis of the findings. This study considers that developing and evaluating integrated models based on a main body of theories drives practice and research. This proposal is valuable for areas where multiple theories and disciplines intervene in its development and implementation. Therefore, the integration of a theoretical and multifactorial model facilitates a systemic understanding of the behaviour of factors and thus contributes to the design and implementation of successful practices of Knowledge Management.

For this study, the Resource-Based View (RBV), through its conceptual framework about the strategic management of the resources for companies' sustainable competitive advantage, facilitated and guided the analysis of the interrelation of factors. This view states that an organisation is a collection of unique capacities and resources, influencing its strategic growth and determining profit generation. Therefore, knowledge -as residing in people and services generated from the organisation's resources- is regarded as an opportunity for generating differentiation and establishing a competitive advantage among organisations (Curado, 2006). According to Barney (1991), a competitive advantage is established when resources and capabilities are difficult to imitate, difficult to substitute, and create value for the organisation. The way organisations manage such resources (physical, human and organisational) impacts its performance and determines a company's competitive advantage.

From the Resource-Based View (RBV) emerged an extension named Knowledge-Based View (KBV). In this perspective, knowledge is the single, most important resource in the organisation, and it may turn into a competitive advantage when several internal factors become capable of using, transferring, and creating new knowledge. Based on this view, Gold, Malhotra, and Segars (2001) defined a model that evaluates the impact of the development of two critical knowledge capabilities on organisational efficiency. These capabilities are knowledge infrastructure and the knowledge process. Being this model one of the most cited in the Knowledge Management literature, the current study selected it as the reference model. This model provided a structure and a guide for the revision of past studies that analysed different Knowledge Management strategies and facilitated the understanding of the interaction and contribution of multiple factors according to each component proposed by the model.

This research proposed an integrative methodology from a multi-perspective and multi-theoretical approach to analyse the role of Knowledge capabilities in enhancing patient safety and the context effects on their development. First, a conceptual framework developed through literature review facilitated a better understanding of the Knowledge Management foundations, identifying its main theories, models, strategies and critical factors. Second, based on such theoretical foundations, three systems of relationships represented by three structural models were evaluated by applying a set of statistical analyses to obtain evidence of how the expected relationships behave in the local context. Third, this study critically evaluated the influence of context conditions on the promotion or obstruction of the expected relationships of critical factors, the development of knowledge capabilities, and their impact on patient safety. Finally, the proposed methodology and models were applied and evaluated in a public health institution in Chiapas, Mexico.

1.2. Research background and problem definition

A growing contribution of studies on Knowledge Management and its broad application to different disciplines support the notion that we live in a knowledge-based society. The Twenty-First Century has witnessed the most important technological developments, which have made possible the communication and processing of large amounts of information; organisations tend to transform themselves into knowledge organisations, which promote a culture of collaboration and stimulate intellectual capital growth.

Nonaka et al. (2000) stated that today´s society is in constant change propelled by accelerated technological advancement, and in such a context the most important sources for a sustainable competitive advantage are markets, competitors, innovation, and knowledge. Additionally, Nonaka et al. (2000) affirmed that organisations should not rest in a static and passive manner, like information processing machines trying to solve problems but rather should visualise themselves as in a dynamic process for developing and applying new knowledge, generated from actions and interactions from both, within an organisation and its environment. Knowledge creation in organisations starts at individuals; it flows throughout the organisation by the interaction of different teams and departments and goes even further to transcend the boundaries of such an organisation.

Current literature shows different models of Knowledge Management, in which different factors interact to enable the knowledge process. The present study promotes the definition of a theory-based model for evaluating the impact of critical factors in developing capabilities for the Knowledge Process and patient safety. As mentioned earlier, Knowledge Management and the development of the Knowledge Process Capabilities are defined and integrated from different disciplines, perspectives, and contexts.

The Technical Perspective considers two main pillars that support Knowledge Management: software and hardware. To analyse these elements, Mathiassen and Sørensen (2002) proposed five categories that previous studies amply used to analyse the role of technology and its impact on Knowledge Management strategies. These categories are transactional systems, collaboration systems, collaboration platforms, workflow management systems and diverse technologies and infrastructure that speed up communication and information sharing.

Socio-technical perspective focuses on the relation and dependence between social and technical factors. This perspective facilitates an understanding of how people do their job by adequately using technology. Based on this perspective, authors such as Pan and Scarbrough (1998) analysed the complex interrelation between the subjective behaviour of employees and the specificity and objectivity of their work processes.

In analysing how organisations construct their knowledge, it is crucial to understand how people think, and process information since these processes affect their decision-making, daily behaviour and, ultimately, their performance (Barcellini et al., 2008). This perspective is broadly applied in organisational and technological studies to identify how the individual or grouping knowledge structure, generated by experience, influences behaviour in negotiating, sharing, and transferring knowledge, thus favouring change and a better result for the organisation (Davidson, 2002).

Chapter Two explores the three perspectives which identify the theories, disciplines, factors, and relationships that shaped Knowledge Management strategies in past studies.

As mentioned before, in section 1.1 (p. 5), the model proposed by Gold et al. (2001) is selected as the reference model to provide a coherent review. As can be observed in Figure 1.1, this model evaluates key capabilities that directly impact the organisations' performance, where knowledge is valued, generated, transformed, and distributed.

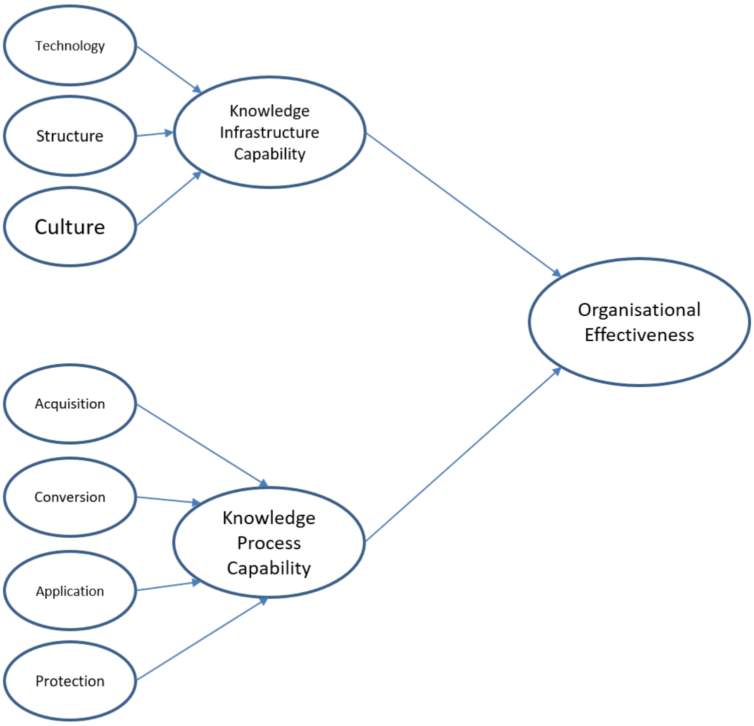


Figure 1.1: Model proposed by Gold and Arvind Malhotra (2001)

The first key element in the above-cited model refers to infrastructure, which is composed of three factors. First, the technological capabilities to facilitate communication and knowledge integration; second, an organisational structure that facilitates collaboration among hierarchical units; and the third and last factor, a culture that promotes trust and fosters interactions among individuals and groups, in such a way that knowledge can easily flow and be transmitted.

The second key element of this reference model refers to the knowledge process' capabilities. These are the acquisition process, in which new knowledge is sought, acquired, and created; the conversion process, where knowledge is structured and organised in order to make it more useful for the organisation; the application process that facilitates usage, access, transferring and safeguarding of knowledge, and lastly the protection process that secures knowledge for its proper and authorised usage.

Finally, the above-cited model evaluated the impact of the mentioned capabilities on the organisational performance. Rhodes et al. (2008) stated that traditionally, the way to measure organisational performance was through financial results with indicators such as cost reduction, sales volume, profits in US dollars, etc. The authors argue that there is a set of intangible elements that are also considered as performance indicators, some of them are customer satisfaction, product development rate and deploying of new competences and capabilities. Mills and Smith (2011) suggested that recognising knowledge resources and capabilities in an organisation will facilitate the identification of an effective Knowledge Management strategy, according to the guiding model proposed in this research, will positively impact on organisational performance.

After the literature review, some limitations on current knowledge were found. It can be inferred that when models are analysed from a specific perspective, one could only expect to understand a particular aspect of Knowledge Management. This fragmentation allows for profound knowledge in the analysed dimension; however, the studies provided a limited vision regarding the diversity of factors and interrelations that interact in a Knowledge Management strategy.

The literature review retrieved a small number of studies addressing the healthcare context that incorporated an integrated vision from different perspectives. For example, Ghosh and Scott (2006) analysed both the knowledge process and the organisational enablers' dimensions as associated with a Knowledge Management System (KMS) effectiveness in the clinical nursing area of a hospital. This study applied the Gold et al. (2001) model by analysing the organisational structure, its culture and technology, and its impact on nurses' interaction to support knowledge creation activities. In Chen (2014), the Knowledge Management Infrastructure and Knowledge Process dimensions were analysed. Additionally, the author included a third dimension, employment satisfaction, to assess the influence of these three dimensions on the administrative employees' loyalty to the organisation at a hospital in Taiwan.

From the above, there is, as it was earned during the literature review, a limited number of studies in the healthcare sector that proposed models composed of different factors to obtain a better understanding of Knowledge Management from multiple perspectives.

Also, it is important to note that the literature review showed that extensive research had been conducted in the Knowledge Management area for developed countries. Regarding Moh'd Al-adaileh et al. (2012) stated that it is not possible to generalise the findings of these studies because cultural, economic, social, political and technological differences among nations exert a strong impact on the implementation of a strategy for Knowledge Management. For developing countries such as Mexico, the lack of development of formal and long-term strategies for Knowledge Management in the healthcare sector obstructs the consolidation of initiatives such as electronic medical records to improve the services of the public health system. In addition, a lack of studies on KM in the field of Public Administration was identified. There is a need for understanding Knowledge Management to provide society with more innovative and effective institutions (Monavvarian & Kasaei, 2007).

Based on the identified gaps through the literature review, more research is necessary to understand the current status of Knowledge Management and broaden the knowledge of the factors that promote or mediate the success of the initiatives implemented in public health institutions of developing countries. Therefore, this study proposes to address the limitations explained above by:

***Providing a theoretical framework*.** The underlying reason for this phase is to get a deep understanding of the theoretical fundamentals and the existent research of the analysed phenomenon from an impartial standpoint. The proposed theoretical framework established the foundations and conceptual structure of this research. The literature review of the existing body of knowledge identified the theories, strategies, and models that constitute Knowledge Management's fundamentals. This theoretical framework contributed to understanding the concepts, identified the grounds from which this topic has been developed, and summarised the results of models and practices implemented in different contexts from past studies. In addition, this theoretical framework allowed us to propose a theory-based model that synthesises and extends the existing research.

Analysing from multiple perspectives. The development of Knowledge Management evolved from different disciplines, theories, and practical experiences, which evidence the multidisciplinary nature of this phenomenon. Additionally, Knowledge Management becomes a systemic process while analysing dimensions such as people, organisational culture, and technology in a transversal and integrated manner (Hausmann et al., 2016).

Levy et al. (2015) have established that the *"maturity of Knowledge Management must be judged from multiple perspectives, including technologies, processes and employees, in order to obtain a holistic evaluation of its development"*.

This research adopts three main perspectives. These are the technological, socio-technical, and socio-cognitive, described in this section.

Applying statistical analyses to evaluate the system of relationships. Based on the theoretical framework, structural models represent the expected relationships between critical factors and their impact on developing knowledge capabilities and patient safety.

Evaluating such models by selecting and applying appropriate statistical analyses generates empirical evidence to understand the behaviour of the relationship system in the local context.

Expanding research avenues in developing countries. Davenport, cited by Orzano et al. (2008), suggested that *"when the context changes, new KM paradigms can be expected."* Regarding this, Rhodes et al. (2008) also stated that based on the model analysed in their research, a comparison in different cultures was established, allowing them to explore the effect of factors and their predictive capacity in different industries under different cultural environments.

As mentioned above, a significant number of Knowledge Management studies come from developed countries in Europe and the United States of America. Broadening the avenues of research in developing countries will contribute to a greater exploration of Knowledge Management and expand its benefits to enhance the development of society. The present research has been conducted in Mexico, a developing country in Latin America. Specifically, our research was developed in the State of Chiapas. The analysis of Chiapas's political, social, and economic environment allowed us to interpret the results and the behaviour of the evaluated factors in the specific context of a Mexican Public Health Institution.

1.3. Mexican Context

The United Nations Development Programme has the aim to contribute to the transformation of all nations, through projects to improve human development.

The 2010 annual report published by UNDP defined that the most important measures to determine the level of human development are the wellbeing and the life quality of the population. In this report the UNDP affirmed that an approach to measure the success of the Nations *"must also gauge whether people can lead long and healthy lives, whether they have the opportunity to be educated and whether they are free to use their knowledge and talents to shape their own destinies"* (United Nations Development Programme, 2011).

The Human Development Index (HDI) was published by UNDP for the first time in 1990. In 2015 the Human Development Report stated that HDI is "a *composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living."* The HDI value is represented on a scale of 0 to 1, where the higher index is better (United Nations Development Programme, 2015).

The UNDP measurements showed improvements in the HDI indicators' progress, but developing countries remain with low values showing the vulnerability of most populations. This affirmation is depicted in the next graph (Figure 1.2), which was extracted from the 2015 report (United Nations Development Programme, 2015).

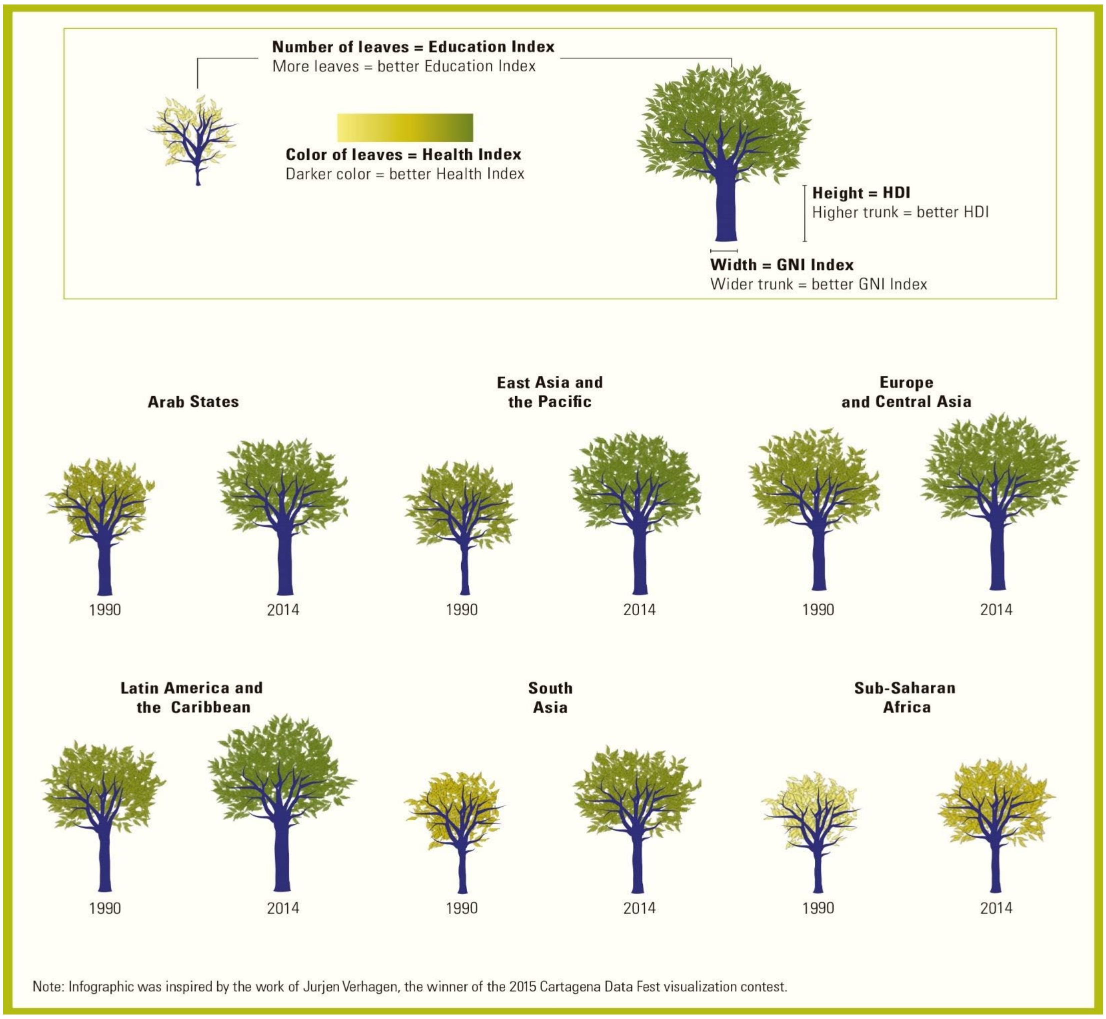


Figure 1.2: HDI indicators progress from United Nations Development Programme (2015)

Mexico is a developing country with opportunities to grow and improve the quality of life of its population. In 2010 Mexico was situated in 56th place with an HDI value of 0.75 (United Nations Development Programme, 2010), in 2015 it was situated in 74th place with an HDI value of 0.756 (United Nations Development Programme, 2015) and in 2019 it was placed in 76th place in a ranking of 189 countries with an HDI value of 0.767 (United Nations Development Programme, 2019). In ten years, Mexico's HDI showed low variation, and the fall in the UNPD's ranking was due to the improvement of other countries. Otherwise, the variation of life expectancy at birth dimension was from 76.7 to 75; expected years of schooling dimension improved, changing from 13.4 to 14.3; and the Gross National Income (GNI) per capita increased from 13,971 to 17,628. Despite some dimensions showing an improvement, Mexico did not show progress in HDI ranking.

Figure 1.3, taken from the UNDP data centre, compares partners in the North American Free Trade Agreement (NAFTA). It can be observed that Mexico improved its HDI index; however, from 1980 to 2014, its progress was very slow, keeping low levels of development.

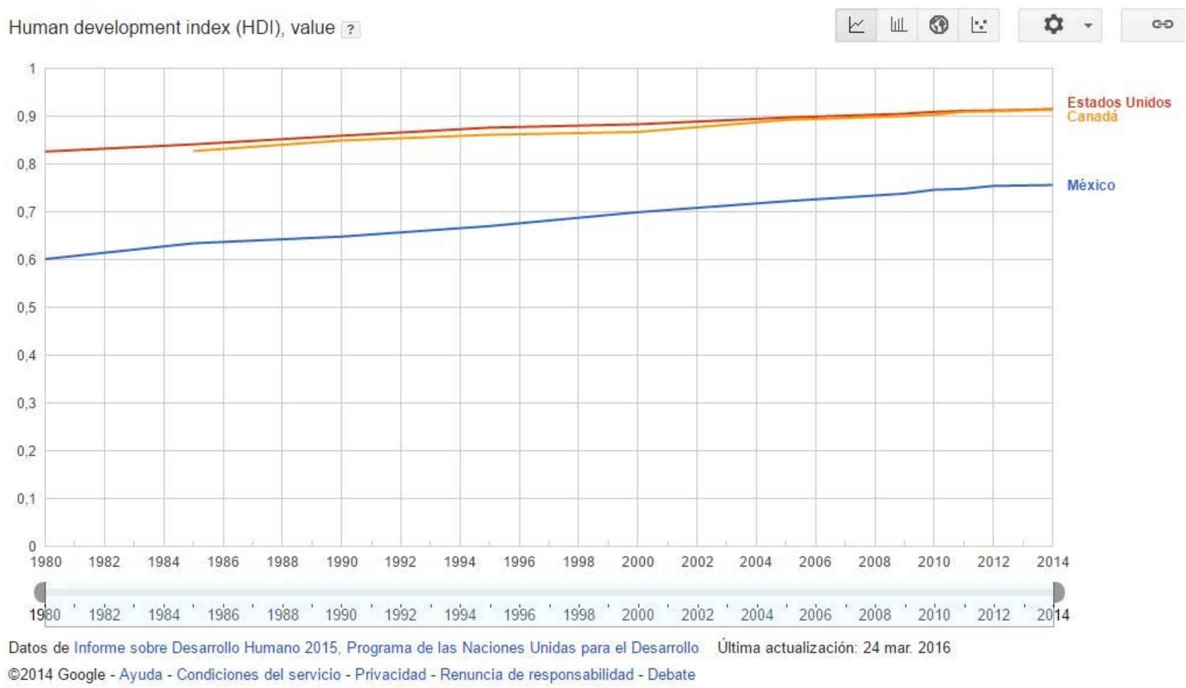


Figure 1.3: HDI indicators progress from (United Nations Development Programme, 2016b)

This research focuses on the State of Chiapas, located in the southeast of Mexico and shares a border with Guatemala. Chiapas State includes 118 municipalities. According to the last Census of Population and Housing in 2010 there were registered 4,726,580 citizens and 26% of its population are indigenous citizens who are grouped in nine ethnicities (Instituto Nacional de Estadística y Geografía, 2010).

Chiapas is the richest State in natural resources in Mexico. It concentrates 30% of Mexico's water in its rivers and water dams. It has 43 protected areas which are home to endangered species (Gobierno del Estado de Chiapas, 2007). In contrast, its social reality is a scenario of poverty, illiteracy, and a deteriorated welfare. In relation to the Human Development Index, Chiapas occupies the last position out of the 33 States that make up Mexico. This low rank can also be seen in the health index where its position is 30th; and for education and income it is 33rd (United Nations Development Programme, 2016a).

Harvard's Centre for International Development (CID) has a research initiative to analyse the development in Chiapas, Mexico. In its working paper titled Why is Chiapas poor? it is affirmed that Chiapas is not only the poorest state, but also the state with the second highest rural population in Mexico (Levy et al., 2015). Thus, Chiapas faces an important challenge of geographical dispersion that represents a main challenge because rural communities are located far from the cities. Furthermore, one important obstacle in Chiapas is the lack of a public transportation system, which represent a restriction for the development of many communities (Hausmann et al., 2016).

The conditions of most people increase the demand for public services. Access to more and better-quality services in healthcare institutions are critical factors to break the poverty spiral and to provide the population with the opportunity to preserve life and health, and as a consequence, enable people to work or to study with the aim of improving their life conditions and wellbeing.

In 2020, the National Council for the Evaluation of Social Development Policy of Mexico estimated that 75.5% of the population in Chiapas lives in poverty, that is, 4,218,000 people; 29% live in extreme poverty, representing 1,623,100 people. This council considers that poverty affects the population according to the degree of vulnerability and the social context in which it develops. For those above, the indigenous population (26%) and people under 18 years of age (39%) are at greater risk of not being able to exercise their fundamental social rights, healthy physical and emotional development, and enhance their capacities. Out of the total population of Chiapas, 89.6% live with at least one social deprivation, and 50.4% live with at least three social deprivations. These indicators represent the lack of the fundamental rights of the person; these are deficiencies due to educational backwardness (32.5%), access to health services (37.1%), access to social security (78.9%), quality and housing spaces (20%), access to essential services in the home (55.8%) and access to nutritious and quality food (24.5%) (Consejo Nacional de Evaluación de la Política de Desarrollo Social, 2020).

This condition of poverty, which has remained for centuries in the history of Chiapas, gave rise in 1994 to a movement promoted by the indigenous communities of Chiapas who demanded decent housing, land, work, health, food, education, independence, freedom, democracy, justice, and peace. This movement called itself the Zapatista Army of National Liberation (EZLN for its acronym in Spanish). The EZLN issued a declaration of war against the Mexican military due to the extreme conditions of marginalisation and poverty and the government's repression. This confrontation lasted 12 days, during which different national and international civil society organisations held protests and mobilisations to demand a ceasefire. Subsequently, the dialogue between the federal government and the EZLN concluded with the signing of the San Andrés agreements on Indigenous Law and Culture. These agreements committed the Mexican State to constitutionally recognise indigenous peoples, granting them autonomy to lay the foundations for an inclusive society. The National Human Rights Commission affirmed that, in the absence of non-compliance with these agreements by the Mexican government, the EZLN declared autonomous Zapatista regions and implemented good-government boards to mediate conflicts and equitably aid with the development of municipalities and autonomous communities (Comisión Nacional de Derechos Humanos, 2020).

Currently, poverty, marginalisation and discrimination continue to be a reality, especially in the indigenous communities of Chiapas. However, their history of struggle has encouraged them to generate other livelihood activities and to keep searching for opportunities for their development despite the challenges they continue to face.

In the indigenous populations, the coffee-producing, honey, and tropical fruits cooperatives, among others, preserve the organic production system aligned to the worldview and the uses and customs of these communities, where balance, respect for nature, and a sense of community prevail. Although organic products are valuable in Western culture, producers do not obtain a fair price for their crops since intermediaries with the knowledge to process and export pay low prices for the products. Even when the conservation of the organic farming technique is of value both for the producers and consumers looking for healthier options, these forms of production have kept the economy of this region with low dynamism. From the logic of competitiveness, promoting investment, technology and modernisation in production techniques would represent a possibility to increase production efficiency. However, this logic conflicts with the worldview of balance and respect in which these communities live. In Chiapas, the activities of the primary sector such as agriculture, breeding, animal exploitation, forestry, fishing and hunting represented the sector with the highest participation in the gross domestic product of Mexico from 2011 to 2015. This sector, with its traditional forms of production, continues to be, after retail, the main economic activity of this locality (Instituto Nacional de Estadística y Geografía, 2017).

Vulnerable communities living near ecological reserves have made efforts to develop services and ecotourism centres as livelihood and income generators, contributing to the region's economy. However, geographical dispersion and the lack of road infrastructure hinder access to these areas and impede the market growth for these services. Tourism is a strategic sector for the state; Chiapas occupies the sixth position at the national level in the number of foreigners and nationals entering the country (Instituto Nacional de Estadística y Geografía, 2017). For their part, indigenous women who are promoters of health, community organisation and culture, in exercising their rights, have formed cooperatives for social and commercial purposes. Among these are the cooperatives of weaver women who transmit their history, beliefs, and ways of understanding life through their textiles. To promote these groups, the Gender Equality Secretariat offers capacity-building and financing programs through the Chiapas women's economy support fund (Secretaría de Igualdad de Género, 2022).

According to the 2020 statistical and geographic yearbook published by the National Institute of Statistics and Geography of Mexico, the percentage of the illiterate population in Chiapas was 14.84%, the state with the highest number of illiterate people in Mexico. Furthermore, only 32.97% of the population aged three and over was registered and attended regularly as a student or pupil at a teaching centre of the National Educational System or its equivalent. The remaining 66.84% received courses to learn a trade or crafts, attended literacy classes for adults, or did not attend a National

Educational System teaching centre. Regarding health care, the 32.7% percentage represented the not affiliated population with health services; the 66.7% represented the affiliated with government health institutions and 0.9% with private institutions. The three predominant causes of death are those caused by cardiac and circulatory problems, diseases of the respiratory system, and endocrine, nutritional, and metabolic diseases (Instituto Nacional de Estadística y Geografía, 2020).

The poverty of thousands of families and the need to obtain income for their livelihood is the primary cause of emigration; 3.5% of the population in Chiapas leaves the territory searching for better opportunities inside or outside of Mexico (Instituto Nacional de Estadística y Geografía, 2017). On the other hand, Chiapas is the gateway for thousands of Central American immigrants on their way to the United States. Due to the subhuman conditions provided by networks of human traffickers, Chiapas has been the scene of human tragedies such as death by starvation or suffocation in abandoned vehicles, road accidents, sunstroke and extreme fatigue from walking thousands of miles from their countries of origin under extreme weather conditions. Moreover, most emigrants from the state of Chiapas are young people of their productive age, adolescents and children. The emigrant phenomena cause two significant problems, the decrease in productivity in local activities and the loss of transmission of the ancestral culture, such as the Mayan culture, and with it, their extensive knowledge in farming techniques, the use of traditional medicine and native languages, in the understanding of natural phenomena and the forms of community coexistence (Instituto Nacional de Estadística y Geografía, 2020).

Concerning public government institutions, corruption is one of the problems with the deepest roots and presence at its different levels. According to the International

Transparency Organisation, corruption is the abuse of power by public officials for personal gain. This organisation annually publishes the corruption perception index. In 2021, Mexico obtained 31 out of 100 on a scale where zero point is highly corrupt, and 100 points represent the absence of corruption. With this evaluation, Mexico ranked 124th in a ranking of 167 positions. The poverty that prevails in the country, especially in Chiapas, makes it easier for corrupt groups to buy votes, the conditioning of social programs, and massive participation in strikes to gain sympathisers for political parties, misusing the public budget by granting different incentives. In addition, the administrative bureaucracy facilitates other forms of corruption, such as bribes to expedite procedures and gain access in a shorter time to essential services. Finally, the education and health sectors are also affected by corrupt practices. For example, when authorities exercise nepotism to assign positions in a health or educational institution, which usually do not fulfil the contractual obligations but receive the benefits of salary and the count of years of services (Transparency International, 2020).

Chiapas is a land of natural wealth but also a state mired in extreme poverty. Further, agricultural production continues to be the basis of development, with a valuable culture and ancestral knowledge concerning techniques, the use of medicinal plants, the legacy of the Mayan culture, and the worldview of the indigenous peoples who keep such a culture alive. In Chiapas, there are valuable forms of knowledge deeply rooted in the culture and worldview of its peoples. However, it is imperative to establish ways to promote its development, preserve culture, conserve natural resources, transmit knowledge to future generations, and preserve life through equitable and quality health services, which are essential to exercise citizens' rights and freedom.

1.4. The Purpose of the Research and the Research Questions

This research aims to define a methodology and an integrated model for evaluating the contribution of factors and their system of relationships that promote the development of Knowledge Process Capabilities of healthcare professionals to improve of patient safety as a measure of Organisational Performance in a developing country such as Mexico. To achieve this broad aim, four specific objectives were formulated:

1. Define a theoretical framework based on a multiperspective approach to exploring the main factors for developing Knowledge Capabilities and their impact on Organisational Performance.
2. Design an instrument that captures the main attributes of the identified factors to get a deep understanding of them and their relationships.
3. Define a methodology composed of sophisticated statistical testing methods, which give rigour and robustness to the analysis of the results.
4. Apply the study in a context that expands Knowledge Management and Organisational Performance research in developing countries such as Mexico, particularly in a state with multidimensional poverty such as Chiapas.

To accomplish the objectives, this research must answer the following questions:

1. What theories, perspectives and factors have contributed to the development of Knowledge Management?
2. Do the identified factors contribute to the development of Knowledge Process Capabilities of health professionals?
3. Do the identified factors directly impact patient safety as a measure of organisational performance?

4. How does the context of a developing country such as Mexico affect the analysed relationships?
5. What are the contributions and implications for the practice and theory of the proposed research?

1.5. The importance of this study

Knowledge Management, its theories and strategies, have been promoted and generated mainly in developed countries. However, adopting and implementing the initiatives of KM designed in these countries in a different context, such as developing countries, does not guarantee the same results since the local context could affect the level of maturing of the factors and resources involved in such initiatives. Therefore, understanding the local context and diagnosing the level of contribution of the main factors in developing Knowledge Process Capabilities will provide a solid basis for defining a strategy that responds to the specific needs. Therefore, the implications of this study are explained as follows.

Firstly, based on the literature review, Knowledge Management (KM) has been outlined from different perspectives; some studies analysed KM strategies in organisations of different sectors (construction, software development, health care, and others) from an individual perspective to a combination of two or more perspectives. Lee, Kim, and Kim (2012) affirmed that many studies on KM initiatives have been explored in a fragmented manner, arguing that future studies must propose frameworks with a systemic view. Considering prior arguments, the proposed framework offers a systemic approach integrating the technological, socio-technical and socio-cognitive perspectives. From them, a set of key factors that have contributed to the success of KM strategies were identified.

Secondly, this research proposes a solid methodology to evaluate the contribution of factors that promote the development of Knowledge Process Capabilities of healthcare professionals to improving patient safety as a measure of Organisational Performance. Applying such methodology in the Mexican context allowed us to acknowledge the effect of the context on the selected factors to identify if these contributed in a different way than in the original context.

Finally, due to Mexicans' low income, citizens are forced to use public health services; therefore, the quality of the services in public health institutions in Mexico is a crucial factor in guaranteeing the individual and collective welfare of most Mexicans. The empirical evaluation of this study allows to take the first insight into the Healthcare Knowledge Management initiatives in Public Hospitals in Chiapas, Mexico. This proposed evaluation methodology is centred on developing Knowledge Capabilities of healthcare professionals to contribute to patient safety.

1.6. Structure of the study

- Chapter One. This chapter presents, in general terms, the introduction and research background. It briefly explains the theoretical approach and the perspectives used to approach the research problem. It contains the research purpose, objectives, research questions, significance, and structure of the study.
- Chapter Two. This chapter presents the Knowledge Management development and analyses the current research findings of KM literature from different disciplines. In addition, the main concepts of Knowledge Management, the initiatives in the

healthcare context and the factors that promote the development of Knowledge Process capabilities in healthcare professionals are presented, as well as the relationships between these concepts.

- Chapter Three. Based on the literature review, this chapter presents the theoretical background of Knowledge Management and describes the relationships between the constructs based on specific theories. These relationships and their behaviour shape the conceptual framework of this research. The defined hypotheses represent the system of relationships and their expected behaviours.
- Chapter Four. This chapter describes the research design, the sampling approach and the statistical techniques employed.
- Chapter Five. This chapter explains the research instrument's development and the pilot study's results.
- Chapter Six. In this chapter, the proposed methodology is explained. The analysis was conducted using statistical techniques on the quantifiable data collected to test the hypotheses.
- Chapter Seven. This chapter discusses the findings, describes the implications and limitations of this research, and gives recommendations for further studies.

Chapter Two: Knowledge Management development

2.1. Introduction

Chapter Two presents a literature review of the key Knowledge Management concepts and empirical evidence of past studies. This chapter also presents the revision of the perspectives and disciplines contributing to its development. In addition, the characteristics of the learning organisation, the knowledge processes and their application in health services are analysed. Figure 2.1 depicts the literature review process and provides a structure for integrating the theoretical framework.

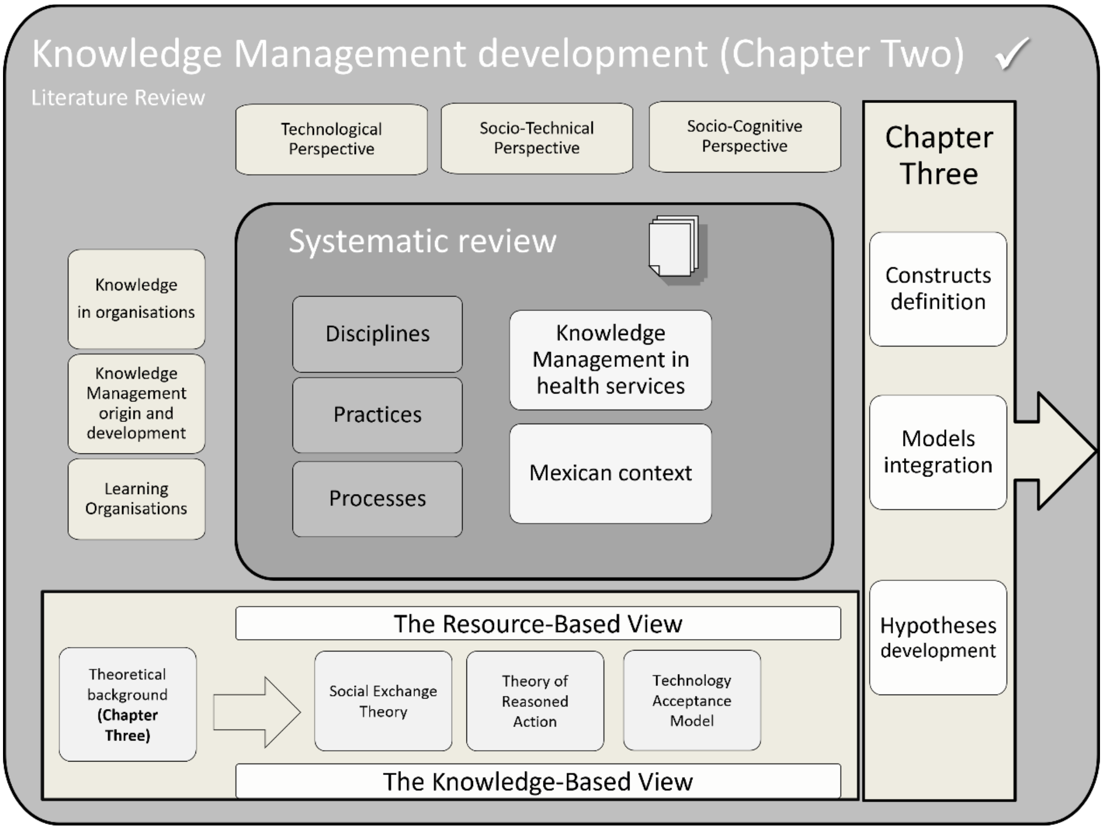


Figure 2.1: Literature review process

A systematic review of previous studies provided structure, order and clarity to this process; it additionally facilitated identifying, analysing, and synthesising evidence in the Knowledge Management field. This process began with the definition of eligibility criteria, which allowed the identification of studies that responded to specific research questions; it also facilitated the identification of essential elements in past studies, such as the validity of the results, the methodology, and the use of statistical methods (McKenzie et al., 2019). Through the systematic review, the above elements were identified, as well as the critical factors that have mainly been analysed and evaluated in the Knowledge Management field. In the following sections, a summary of the findings is presented.

2.2. Knowledge in Organisations

Knowledge has been identified as a fundamental element throughout the history of humankind; nowadays, knowledge is considered a strategic and intangible element in any organisation. Meso and Smith (2000) defined knowledge as a strategic element due to its characteristics: it is not imitable, does not have a substitute, and can stay long before the competition can replicate or acquire it. On the other hand, the tangible elements within an organisation can easily be acquired and imitated, which is why they are not considered strategic; these elements are not determinants in maintaining the company's long-term success.

Traditional economists have examined the dynamics of firms' resources, products, and market participation. Today, theorists and strategists from many disciplines have focused on the knowledge embedded in routines and practices. They realised that the most critical asset in an organisation is what the firm and its employees collectively know, how efficiently they use what they know, and how readily they acquire and use new knowledge.

Due to its relevance, authors have proposed diverse theories, models and perspectives to support knowledge and its dynamism in organisations. However, it is necessary to first understand what knowledge is and distinguish the elements that compose it. Contributing to this purpose, the hierarchy and the purposeful action of knowledge defined by Jashapara (2011, p. 19) present these elements in a didactic, clear and precise way (see Figure 2.2).

The primary element **data** is a collection of facts that can be or can not be related; its content is directly observable or verifiable; **information** represents analysed data and is a set of related facts to each other. The related data set provides sense and definition (Dalkir, 2011; Preiss, 1999).

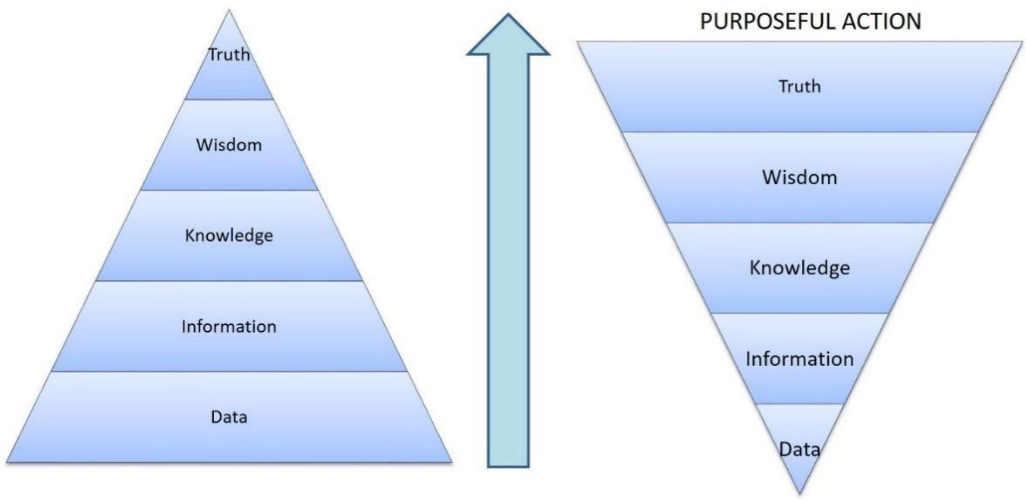


Figure 2.2: Data, information, knowledge and purposeful action from Jashapara (2011, p. 19)

According to Mårtensson (2000), knowledge is formed by processing, creating and using the information in the mind of people; knowledge is affected by their experiences, attitudes and the context where they work. In other words, Jashapara (2011) posited that knowledge is actionable information to help us make decisions and provide rational justification.

Nonaka and Takeuchi (1995) asserted that knowledge and information are related to meaning from the semantic perspective. Like information, knowledge depends on the situation (context-specific). Both are created in social interaction and dynamic ways among people (relational), constructing social knowledge as a reality, and influencing judgement, behaviour, and attitude. On the other hand, unlike information, knowledge is about beliefs and is related to human action in terms of intention and commitment deeply rooted in individuals' value systems. The authors defined knowledge as *"a dynamic human process of justifying personal belief toward the truth"*.

Two other elements with higher qualities are wisdom and truth. Wisdom lets us act critically or practically in any situation based on ethical judgement or the individual's belief system. Finally, truth is a controversial term because, as a social phenomenon, it can be understood only through particular ways of seeing the world; that is why there is no absolute truth (Jashapara, 2011).

Using the purposeful action from Jashapara (2011) in a practical example from the healthcare setting, doctors make diagnoses by taking data from lab tests, information from the patient, and knowledge from previous experiences. Ganesh (2001) stated that the relationship between data, information and knowledge is not just hierarchical but recursive, facilitating that doctors make decisions and increase their knowledge in each iteration.

In general, explicitly or tacitly, knowledge in organisations is found in processes, practices, methods, instruments, tools, assets, information systems and human resources (Perrott, 2007). Explicit knowledge is captured, documented, structured and shared utilising information technologies. Explicit knowledge, or codified knowledge, refers to a type of knowledge which is available to be shared. It can be expressed in formal and systematic language and stored easily, for example, in documents, manuals, routines, and others. Tacit knowledge resides in humans' minds; it is expressed by people's behaviours, perceptions, mental models, interactions and exchanging of ideas. Tacit knowledge is difficult to put in text, words or documents because it is deeply rooted in human action, commitment, ideals, values, emotion and involvement in a specific context (Dalkir, 2011; Meso & Smith, 2000; Nonaka, 1994; Nonaka et al., 2000).

Studying the forms of interaction between tacit and explicit knowledge is one of the most important contributions of Ikujiro Nonaka's work. Nonaka's process of Knowledge Conversion (see Figure 2.3) is a fundamental concept in Knowledge Theory; in this view, the author posited that tacit and explicit knowledge are mutually complementary entities. Social interactions facilitate the interchange of tacit and explicit knowledge in human beings' activities, expanding human knowledge in terms of both quality and quantity (Nonaka & Takeuchi, 1995, p. 62).

Socialisation occurs when tacit knowledge is shared from person to person through interaction (tacit knowledge to tacit knowledge). In this process, individuals share experiences through language, discussions, and informal meetings; it is possible to share experiences without using language through observation (e.g. apprentices work), imitation and practice.

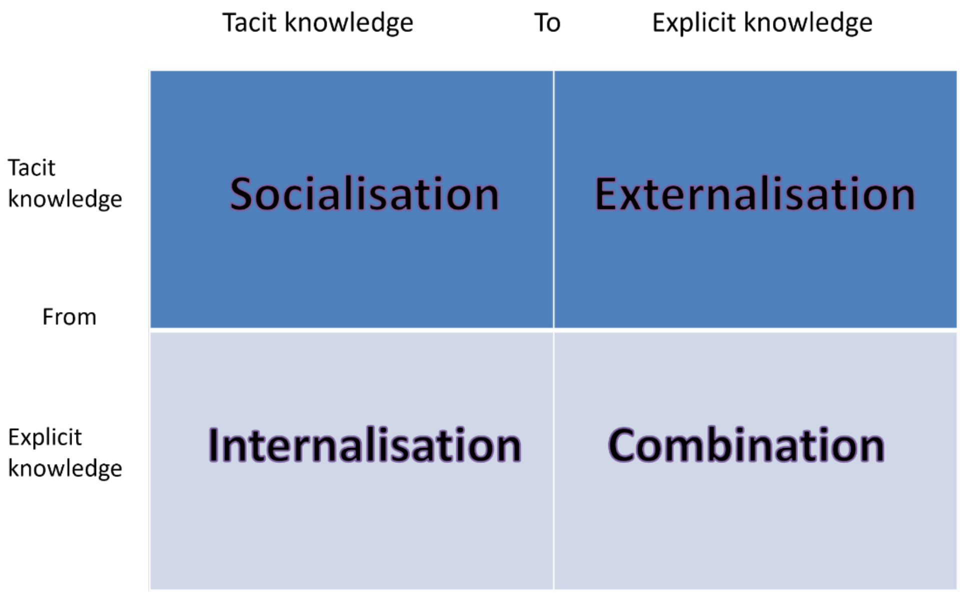


Figure 2.3: Four modes of knowledge conversion from Nonaka and Takeuchi (1995, p. 62)

The process of capturing tacit knowledge and transforming it into explicit knowledge is known as **externalisation**, which is considered the key to knowledge creation. Authors affirmed that metaphors and analogies often feed externalisation to articulate tacit knowledge into explicit concepts, and then they can be modelled with systematic language and coherent logic.

Combination usually occurs via formal education and training through the exchange of explicit knowledge; this mode is a process of systemising concepts into a knowledge system which computer networks and databases could facilitate. This mode considers the reconfiguration of explicit knowledge through sorting, adding, categorising and combining explicit knowledge.

The process of transforming explicit knowledge previously captured into tacit knowledge is known as internalisation. At an individual level, internalisation represents an enrichment of tacit knowledge obtained from explicit knowledge like documents, manuals, training and others.

2.3. Knowledge Management: Origin and development

This section presents the most important motivators that gave rise to Knowledge Management, the initiatives developed over time, and the perspectives and disciplines that have promoted its evolution.

According to Mårtensson (2000), Oder and DiMattia (1997), the strategy of thinning the organisational structure and its results boosted the beginning of Knowledge Management. This organisational strategy aimed to cover the necessity of knowledge retention, employee experience preservation, time of induction for new employees, and managers' support to learn from their own experiences. The second motivating factor for the beginning of Knowledge Management was technological development. The expansion of networks and the growth of the computer capacity of the companies ensured communication, and it allowed the use of platforms, such as the Internet and databases, to capture and distribute knowledge.

As the previously mentioned authors posited, complexity, connectivity, and information overloading are some of the characteristics of our environment and represent a global challenge. Technological advances enable organisations to be connected, to be more global, to do more and faster, to mobilise their workforce, and create a necessity of learning and knowledge continuity.

The phenomenon of globalisation intensified the need to improve, optimise and increase services and products to reach more consumers and open new markets. Also, globalisation blurred borders in economics and commercial aspects, which forced companies to seek ways to differentiate themselves through processes and knowledge assets that are difficult to imitate. In this way, the development of knowledge capabilities at the individual and organisational level gained more interest in organisations to improve decision-making, and the capacity for innovation and research, among others. Furthermore, the vision that the organisation prospers as its knowledge grows and strengthens its capabilities displaced the misconception that Knowledge Management focuses only on processing information and data through technology (Prusak, 2001).

The evolution of Knowledge Management initiatives responded to this challenge by trying to manage information overload and articulating tacit knowledge residing in individuals' experiences, which need to be available for the organisations.

Figure 2.4 represents the three major components of KM and its development through time. The first generation of KM initiatives focused on information technologies as knowledge containers. Intranets and Knowledge Management Systems respond to the necessity of inventorying their knowledge stock more effectively. The second generation focused on people and cultural dimensions through Knowledge Sharing to foster Knowledge Creation for more significant innovation and efficiency. The third generation enlightened the importance of content by creating metadata and knowledge taxonomies to facilitate how people know what needs to be known, find knowledge when they need it, and understand and apply it (Dalkir, 2011, pp. 22-25).

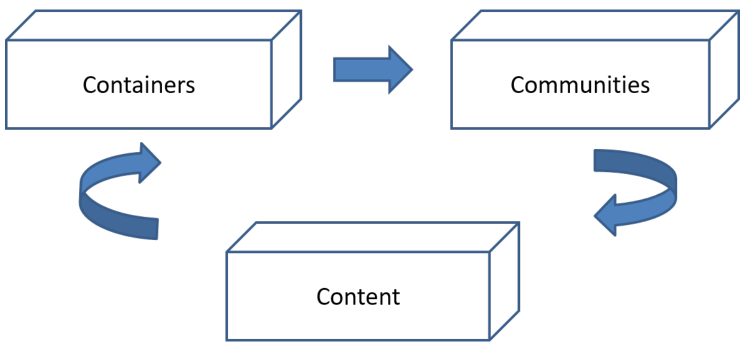


Figure 2.4: Summary of the three major components of KM. From Dalkir (2011)

The benefits of these initiatives are summarised in three primary levels:

1. Individuals improved decision-making and problem-solving skills. They perceived more opportunities to participate in improving processes, greater openness to listen to their ideas and opinions, and better capacities to contribute to the organisation's challenges.

2. Communities perceived closer collaboration bonds, relational capital strengthened through networking, and supportive relationships through peer-to-peer mentoring.

3. At the organisational level, Knowledge Management strategies facilitated direction and guidance toward achieving objectives and promoted the understanding and solving problems based on exchanging knowledge and best practices. In addition, KM initiatives promoted the generation of spaces to create a corporate memory and strengthened the capacity for innovation and research, creating differentiators to obtain a competitive advantage.

The benefits mentioned above ratify that a systemic approach must drive Knowledge Management by developing individual, organisational, cultural, and technological capabilities, among others, and not only from the limited view of one dimension, such as technology.

Because the roots of knowledge originate from very different disciplines, their value is significant for many dimensions and perspectives. Therefore, the definitions of Knowledge Management can highlight different aspects according to their theoretical or practical nature and the discipline that adopts them (see Table 2.1). For example, a strategic vision highlights the importance of the organisation's resources to boost performance (Davenport & Prusak, 1998; uit Beijerse, 2000). Other definitions promote the knowledge process: creating, acquiring, capturing, sharing and using knowledge to enhance learning (Mertins et al., 2003; Swan et al., 1999). Finally, some definitions highlight the systemic character of Knowledge Management by promoting innovation (Dalkir, 2011; Newell, Robertson, Scarbrough, & Swan, 2009).

Dalkir (2011) brings together the relevant aspects revised previously in a definition that explicitly integrates different perspectives and disciplines.

> *"Knowledge management is the deliberate and systematic coordination of an organisation's people, technology, processes, and organisational structure in order to add value through reuse and innovation. This is achieved through the promotion of creating, sharing, and applying knowledge as well as through the feeding of valuable lessons learned and best practices into corporate memory in order to foster continued organisational learning".*

Table 2.1: Representative sample of Knowledge Management definitions from Jashapara (2011, p. 13)

Author/s	Definition	Perspective
Davenport and Prusak (1998)	*'Knowledge management draws from existing resources that your organisation may already have in place – good information system management, organisational change management, and human resources management practices.'*	Integration of resources
Swan et al. (1999)	*'… any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organisations.'*	Knowledge process Organisational learning Strategy
Skyrme (1999)	*'The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organising, diffusion, use and exploitation, in pursuit of organisational objectives.'*	Strategy Knowledge process
Mertins et al. (2003)	*'… all methods, instruments and tools that in a holistic approach contribute to the promotion of core knowledge processes.'*	Organisational resources Knowledge Process
uit Beijerse (2000)	*'The achievement of the organisation's goals by making the factor knowledge productive.'*	Knowledge strategy
Newell et al. (2009)	*'… improving the ways in which firms facing highly turbulent environments can mobilise their knowledge base (or leverage their knowledge 'assets') in order to ensure continuous innovation.*	Innovation Knowledge strategy

As Dalkir (2011) posited, there is no generally accepted definition of KM. However, most practitioners agree with the idea that "*KM treats both tacit and explicit knowledge with the objective of adding value to the organisation*". Finally, knowledge for organisations plays a crucial role in supporting business strategy and enhancing organisational performance. A KM strategy determines the more effective ways to use knowledge, but most importantly, it promotes the necessary behaviours and relationships throughout the organisation (Davenport & Prusak, 1998; Liebowitz & Suen, 2000).

2.4. Perspectives of Knowledge Management

Phenomena can be analysed from different mental models or points of view, highlighting specific characteristics according to their understanding. A perspective is a way of observing a phenomenon; the opinions and understandings manifested from a particular perspective coexist and complement other ways of observing it.

In most studies of Knowledge Management initiatives, the implemented strategies respond to the required field of action. For example, in revised literature, a diversity of studies explored the technological dimension and its benefits; these studies have focused on analysing only the technological aspects, which are critical factors in Knowledge Management since they allow the flow of knowledge, information and data throughout the organisation. However, for a systemic and deep understanding of Knowledge Management, studies must promote an integrated vision (multi-perspective) analysing the different dimensions that integrate it.

2.4.1. Technological Perspective

Technological developments have improved communication through networks; the internet or information technologies have become a supporting tool for administering different intellectual assets. From a technological perspective, it explores the potential of Information and Communication Technology (ICT) as a means of supporting knowledge management.

A structured way of understanding how technology has supported the development of knowledge assets and their management is through the four knowledge discourses proposed by Sorensen and Kakihara (2002) (see Table 2.2).

The first discourse is based on the assumptions of knowledge as objectified, codified and transferable within and between organisations. Effective utilisation of ICTs contributes to the production, distribution and consumption of information and knowledge. The design of structured databases or semi-structured document collections provides broad access to knowledge bases available for the members of organisations.

Knowledge as an interpretation discourse recognises that knowledge remains tacit and personal to some extent, associated with human subjective interpretations and shaped by social reality. Furthermore, this discourse acknowledges that technologies carry out each individual's work activities that demand complex patterns of interpretation. Complex ICTs that support knowledge as interpretation discourse perform tasks such as information filtering, classifying information according to personal interpretational preferences using modelling and software agents, and information technology to reduce the experience of information overload.

Sorensen and Kakihara (2002) affirmed that knowledge as a process discourse recognises that "*knowledge is not a static entity but the manifestation of a dynamic process of 'knowing' by which human beings make sense of the world and reality*". This discourse describes knowledge as a distributed social interaction process. Technologies that support such work processes and collaboration are shared workspaces such as discussion databases, scheduling systems, workflow management systems and classification schemes.

Nowadays, organisations are becoming network organisations. Therefore, establishing more and new relationships is crucial in maintaining sustainable competitiveness. Knowledge as a relationship discourse interprets knowledge as an interconnected web of relationships residing within various contextual factors. Helped by the potential of the

Internet, organisations could design how they are connected to have operational processes within more flexible and dynamic distributed processes of knowing and social structures to support knowledge communities. Electronic communication technologies such as electronic mail, online discussion groups, mobile information devices, netmeeting video conferencing, bulletin boards, and others play a central role in maintaining knowledge communities.

Table 2.2: Examples of ICT support issues inspired by the four knowledge discourses from Sorensen and Kakihara (2002)

Knowledge as:	ICT support issues
Object	Supporting information distribution Information overload
Interpretation	Supporting interpretation and navigation Filtering and agents Information overload Digital traces of human activities
Process	Embedding collaborative structures Coordination mechanisms Structure overload
Relationship	Establishing and maintaining connections Mutual Awareness Interaction overload

Next, a set of selected past studies are included to exemplify the application of ICTs under the logic of the previously presented discourses. Such studies analysed the adoption of intranets systems and infrastructure such as networked PCs, communication protocols software, servers, and application software.

With the vision of knowledge as a codified and transferable object, Wang et al. (2003) and Althoff and Weber (2005) analysed case-based reasoning (CBR) knowledge repositories to support learning communities. In a CBR, the community members store, disseminate, and use intellectual assets to manage experiences.

Considering knowledge as a process discourse, technology like data repositories and algorithm-based software facilitate the customisation of workflows. For example, in formulating predictions supporting critical healthcare processes, Michael et al. (2008) presented a case study focused on diabetes conditions for developing data repositories and workflows that developed personalised treatment and tailored drugs for a given patient. Abdalkareem et al. (2021) focused on analysing the metaheuristics algorithms to perform searches. Also reviewed the types of scheduling systems such as patient admission, operating room, surgery scheduling and other scheduling problems to optimise costs, resources and efficiency.

In Marketing, vast amounts of customer data are accumulated in databases; technology strongly supports this field from the interpretation discourse due to the facilities offered by data mining to manage marketing knowledge and support marketing decisions. For example, Shaw et al. (2001) analysed one of the major areas of Knowledge-base marketing: the customer profiling system. Profiling systems evaluate *"frequency of purchases, size of purchases, recency of purchases, identification of typical customer groups, computing customer lifetime values, prospecting, and marketing programs"*. Their main applications are fraud detection, medical diagnosis, bankruptcy prediction, and others.

Platforms like Web 2.0 and later versions enable the vision of knowledge as a relationship discourse because they offer social software applications that facilitate open knowledge creation and communication models like wikis, blogs and others. For example, Tay Pei Lyn (2009) analysed three successful case studies of ICTs implementation (Mapa, eBay, and Ingenta) to capture critical knowledge and promote interactions through internal and external information exchange between employees and users or sellers and buyers.

Technology is an essential enabler of Knowledge Management that facilitates generating, structuring and sharing knowledge. Therefore, the role of ICT in the knowledge strategy must guarantee to maximise the benefits of knowledge at individual, team, community, and organisational levels and support the work processes for its best use, overcoming the limited vision of knowledge management as a repository of data and information.

2.4.2. Socio-Technical Perspective

The socio-technical perspective had its origins in 1951, with the work of Trist and Bamforth in the coal mining industry in post-World War II Britain. The authors made an essential contribution to the field of organisational development, analysing the work systems, the social structure and the technical content making changes that promoted greater efficiency, collaboration, a sense of belonging, and better compensation, among others (Bauer & Herder, 2009). Pan and Scarbrough (1998) defined that *"the socio-technical perspective adopts a holistic approach which highlights the interweaving of social and technical factors in the way people work"*. Therefore, this perspective recognises the subsystems' close interrelation and interdependence and their weaknesses and strengths. Under this perspective, knowledge is socially constructed and shaped by the emergent interplay between social and technical factors and organisational context.

For many years, researchers in the Knowledge Management field have been promoting particular approaches such as technical or cognitive, considering knowledge as an economic asset, a technical issue or a cognitive phenomenon without considering the interrelation of factors to evaluate KM success.

Currently, empirical studies have been increasingly considering the importance of human, social and technical factors for a more holistic point of view. From the socio-technical perspective, researchers consider both social and technical factors equally important and analyse their interactions to highlight the interplay that could result in better KM strategies and performance for organisations. Technical factors comprise physical and logical ICT assets (computers, communication technologies, databases, technical platforms) supporting the information technology infrastructure. KM infrastructure (Knowledge Management Systems, intranet systems, knowledge base) facilitate business intelligence, collaboration, organisational learning and knowledge creation. Social factors comprise resources associated with relationships possessed by a human or a social unit; they are organisational structure, organisational culture, and human resources (Choi et al., 2008; Chuang, 2004).

Pan and Scarbrough (1999) proposed a multi-layered interactions diagram representing a socio-technical perspective for KM strategies (see Figure 2.5).

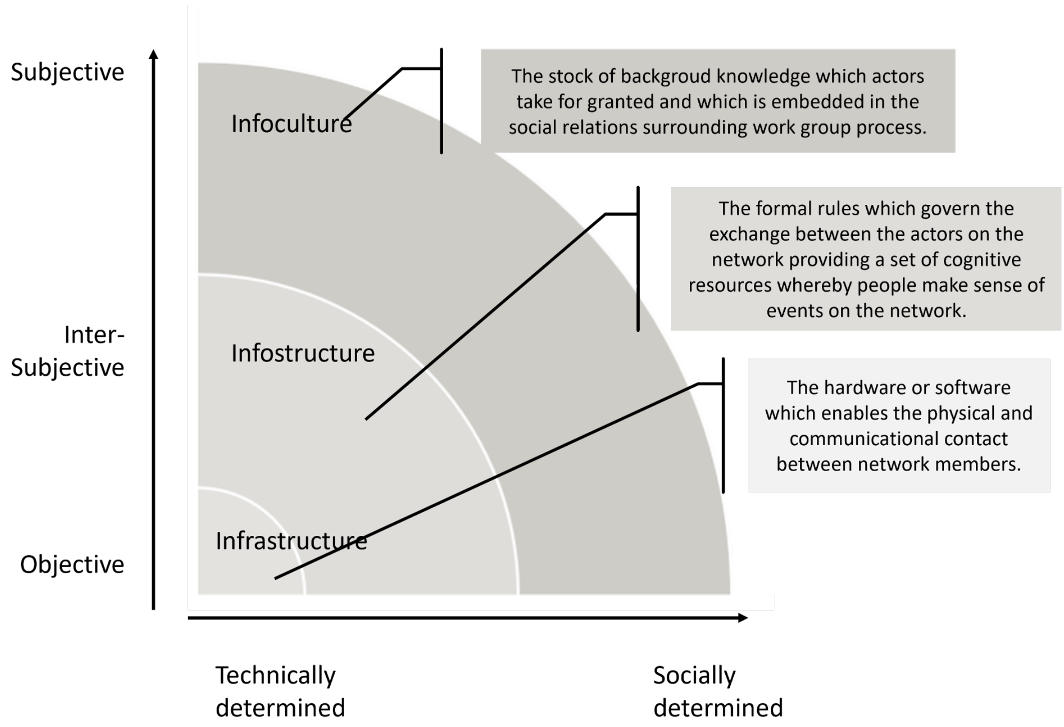


Figure 2.5: A Socio-Technical Perspective on Knowledge Management. Adapted from Pan and Scarbrough (1999)

The graph represents the complex interaction between employees' subjective perceptions and work processes' objective characteristics. Pan and Scarbrough (1998) affirmed that the socio-technical analysis seeks a joint optimisation and parallel design of the social and technical subsystems within the organisation.

When an analysis of a socio-technical system is required, it is necessary to observe the total system because subsystems are related to each other. Therefore, the joint optimisation of personal experience, social relations and technologies facilitate the integration and leverage of knowledge in organisations (Ganesh, 2001).

Knowledge Management has been broadly promoted by two disciplines: information systems and organisational development. From them, studies have evaluated knowledge enablers and their impact on efficiency and performance in organisations. During the literature review, several studies that explored the interaction between technological and social factors were identified to explain the ability of individuals in organisations to share knowledge as well as recognise knowledge enablers that allow gaining long-term competitive advantage (Bock & Kim, 2002; Chen & Hsiao, 2012; Choi et al., 2008; Chuang, 2004; Ganesh, 2001; Hsiu-Fen & Gwo-Guang, 2006; Meso & Smith, 2000; Pan & Scarbrough, 1998).

The use of information systems and technological infrastructure (ICT) have been widely analysed, usually individually, as enablers of Knowledge Management. For its part, from the social dimension, trust, intrinsic and extrinsic recognition, and culture, among others, have also been analysed as enablers to promote the behaviour of sharing knowledge. Both disciplines have individually evidenced their contribution to the phenomenon analysed.

However, the studies have provided new insights from a joint analysis based on a socio-technical perspective. Results contributed to the understanding that technological enablers contribute to the rapid organisation of data into information, and social and human enablers facilitate the ability to interpret information and generate knowledge. However, only by working together, through the flow of knowledge, organisations strengthen their abilities to sustain their competitive advantage. The main contributions in these studies are: identifying the factors that interact from the two dimensions, recognising that such interactions generate a system that contributes to experience, knowledge, relationships and efficiency; each one contributing from its capacities and, in the sum of them, strengthening the global strategy of the organisation.

2.4.3. Socio-Cognitive Perspective

Diagnosis, decision-making, strategies of working and planning are elements of a cognitive process. These activities are part of the daily work; with them, employees contribute to knowledge production inside organisations. Socio-cognitive perspective focuses on understanding how people think, process information, decide and interact with others in organisations and how reality is constructed through social interactions that provide a framework for meaning creation that influences interpretation, action, and organisational outcomes (Barcellini et al., 2008; Davidson, 2002; Stein, 1997).

Chiu et al. (2006) affirmed that the Social Cognitive Theory argues that a person's behaviour is shaped and controlled by the influence of social networks and the person's cognition. Therefore, stimulating knowledge-sharing behaviour is a big challenge in a Knowledge Management setting. In the light of the social cognitive perspective, to understand why people decide to share or not knowledge within and across organisations, the interplay between personal and cultural resources, the need for cognition, and social interactions have to be analysed.

For example, Tohidinia and Mosakhani (2010) claim that an organisation could provide its employees with technological facilities and require them to share knowledge. However, each individual ultimately decides on sharing or not to share knowledge. Behaviour that triggers an individual to share their knowledge has been studied from the socio-cognitive perspective to analyse motivations and individual behaviour.

Past studies contributed to analysing self-efficacy, organisational climate, and the quality of technology as enablers of knowledge-sharing attitudes. In addition, other studies analysed a set of extrinsic motivators such as recognition, self-esteem, and reciprocal relationships in promoting attitudes toward knowledge-sharing (Bock et al., 2005; Chen et al., 2012). Also, the literature review identified studies from management and healthcare to evaluate how people and organisations learn and collaborate. Social interaction, reciprocity, shared vision, trust, subjective norms, and outcome expectations are motivators for knowledge-sharing behaviour (Chiu et al., 2006; Ryu, Ho, & Han, 2003).

Finally, as it can be seen, institutions per se can not determine how people learn or share knowledge; however, institutions can influence the media and how information can be organised, selected and retrieved. Learning and knowledge-sharing rely on understanding how humans make choices and take decisions and how social-cultural context conditions their behaviours (Stein, 1997).

2.5. Disciplines and practices of Knowledge Management.

In his essay on "Where did Knowledge Management come from?", Prusak (2001) recapitulated the theoretical background and the disciplines that shaped the practice of KM. The author established that from economics, improving efficiency is possible by promoting learning through experience. Researchers observed that by repeating working processes, employees gained learning and increased production in less time and with fewer defects in each iteration. From this observation arises the concern of organisations to establish and improve learning processes, especially in how people use the tacit knowledge acquired from experience. Based on this understanding, the term "Learning by Doing" was neologised from a published article by the award-winning economist Kenneth Arrow in 1962. Furthermore, from the practice of economics, a variation in the performance of companies was observed to the extent that organisations were able to manage knowledge assets, especially in their tacit form.

Prusak (2001) stated that Sociology contributed substantially to the development of Knowledge Management. After the industrial revolution, sociologist Daniel Bell defined the term "knowledge-based society" by outlining the principles that guided knowledge work. Research work from sociology in the post-industrial era promoted the study of internal networks and communities as complex structures within organisations from which knowledge exists and grows. Sociology analysed from practice how people carry out their work using knowledge and the circumstances that favour reciprocity by being willing to share and receive the knowledge of others. As a result, knowledge Management tools and techniques rose to support these processes and activities.

Philosophy and Psychology favoured the distinction between tacit and explicit knowledge, between "know how" and "know what", whose origin comes from Aristotle. After the Second World War, the world witnessed an exponential growth of infrastructure and computer systems favouring massive data and information storage. However, during this period, organisations realised the value of tacit knowledge residing in people's minds, which could not be copied or extracted from a database, as a source of competitive advantage.

Prusak (2001) stated that the information science approach focused on availability, storage capacity, operation techniques, and data management evolved to studying content quality, perception of benefits, user satisfaction, and adaptive knowledge from the Knowledge Management approach. Similarly, the quality movement, which aimed to transform manufacturing processes through customer satisfaction, process compliance, and the establishment of shared goals, gave rise through Knowledge Management to the study of knowledge processes, organisational learning, and other complex processes hard to measure. Finally, the movement of human capital, whose purpose was to obtain financial advantages by increasing productivity, capacity for innovation, and development of skills through training and education of employees, derived from Knowledge Management in a revaluation of human capital as the primary source of knowledge.

In recent years, knowledge process capabilities, attitudes that facilitate knowledge sharing, collaborative technology, and learning communities have been extensively studied in developed countries and have a growing interest to be explored in different contexts and fields of study.

From the field of health, public and private institutions are undoubtedly organisations that face significant challenges and changes since health science must be in constant progress to respond to the needs and care of millions worldwide who depend on them. The Knowledge Management approach facilitates strategies looking for improvements in knowledge availability, better strategies that support the quality of practices, better planning and decision-making processes of healthcare professionals, and a better environment where knowledge prospers, aiming to guarantee patient safety and wellbeing. They have been addressed by applying adequate and useful technologies, analysing capabilities in managing knowledge processes, defining better organisational structures, and enhancing a culture based on collaboration, among others.

In specific tasks, Knowledge Management has contributed to the definition of standards in the medical nomenclature, classification of diseases, clinical procedures, monitoring and follow-up of medical treatments, medical emergencies, and the administration of medical records (Hwang et al., 2008; Vázquez-Leal et al., 2011). Furthermore, through such technologies, results have shown improvements in the efficiency of workers representing savings in terms of the time invested in the search for knowledge and a decrease in frequency, impact and severity of medical errors (Pai & Huang, 2011; Stock et al., 2010). Other studies have stated that organisational structures and leadership values strongly influence learning and knowledge transfer, that in conjunction with a culture of trust and collaboration among individuals, contribute to patient safety (Horsburgh et al., 2001; Kim et al., 2012; Lee et al., 2012; Nejad & Saber, 2012; Stock et al., 2010; Sveiby & Simons, 2002).

The studies previously exposed and identified during the systematic review have proved to be examples of the practice of Knowledge Management from different disciplines. Up to this point, the literature review has allowed the identification of a set of dimensions evaluated in Knowledge Management past studies. Appendix A presents the details of the literature review. The fundamentals that explain the nature and behaviours of such dimensions are described in Chapter Three.

2.6. The Knowledge Management Cycle

During the literature review, it was identified that the assortment of steps or processes that provide the route to identify and allocate knowledge and sources of knowledge is known as the knowledge process or Knowledge Management cycle.

This process facilitates the identification, capture, generation, acquisition, and diffusion of knowledge. Until now, there is no consensus to describe the major steps that integrate a KM cycle. In the literature, some steps with different names were identified; however, they have some similarities and overlap, considering the different types of knowledge processing. Table 2.3 synthesises the preceding steps from four approaches to a KM cycle (Dalkir, 2011, pp. 32, 52).

Table 2.3: A synthesis of the key KM cycle steps from four approaches by Dalkir (2011, p. 52)

Meyer and Zack (1999)	Bukowitz and Williams (2000)	McElroy (1999)	Wiig (1993)
Acquisition	Get	Individual and group learning	Creation
Refinement	Use	Knowledge claim validation	Sourcing
Store / retrieve	Learn	Information acquisition	Compilation
Distribution	Contribute	Knowledge validation	Transformation
Presentation	Assess	Knowledge integration	Dissemination
	Build / sustain		Application
	Divest		Value realization

Based on the previous synthesis, Dalkir (2011, pp. 53-54) classified the identified key processes into three significant stages. In the first place are the knowledge capture and knowledge creation steps. Knowledge capture occurs when internal or external knowledge from the environment is identified or codified; meanwhile, knowledge creation occurs when developing new knowledge that does not have a previous existence within the organisation. Once new or newly identified content has been assessed, knowledge is shared and disseminated through the organisation. Identifying key attributes of such content facilitates contextualisation, intending to obtain a better match with a variety of users and embed it in the organisation's business process. Then, when knowledge is contextual, users understand and decide to use the content; after that, the KM cycle is restarted, updating the knowledge content (see Figure 2.6).

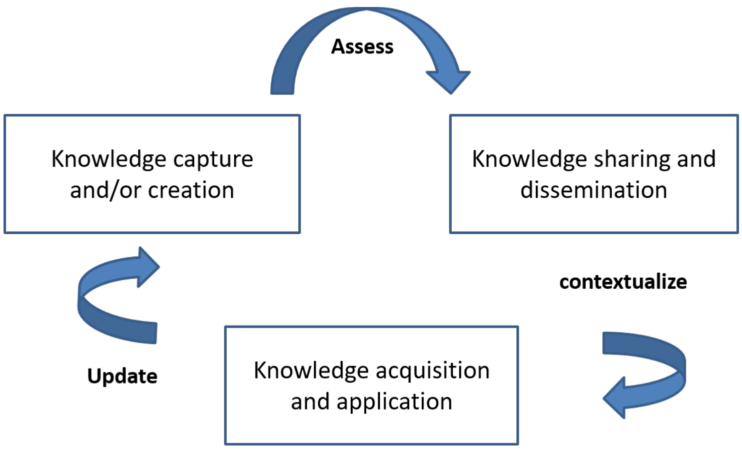


Figure 2.6: An integrated KM Cycle Dalkir (2011, p. 54)

In section 2.2, the knowledge conversion process proposed by Nonaka and Takeuchi (1995) was presented. This process is known as the SECI model, by the initials of each step that integrates it (socialisation, externalisation, combination, and internalisation). From this model, past studies identified and evaluated the influence of different factors on each process's development. For example, the influence of the adoption of ICTs to promote knowledge creation has been analysed from a technological perspective. The results affirmed that a careful selection of ICTs is a crucial element in leveraging the creation of knowledge and organisational learning. Past studies validated that technologies based on algorithms for data search and information classification strengthen organisational memory. However, it does not support knowledge creation and does not engage in learning. On the other hand, the technology that promotes communication and collaboration supports the processes of combination and internalisation. Finally, the technology that facilitates workflows favours the externalisation process (Lee & Kelkar, 2013; Lopez-Nicolas & Soto-Acosta, 2010).

As mentioned before, knowledge capture information technology (IT) is essential in ensuring that information is available for anyone who needs it. However, this process is not purely about technology; knowledge capture depends on the culture's organisation, the kind of business and how people solve problems. The knowledge base in organisations increases as knowledge is captured and codified, developing a memory that embodies the employees' experience with explicit or tangible data; all these resources must be available throughout the organisation (Dalkir, 2011, p. 100). In an early stage, the intranet network was a simple repository of information and data; nowadays, user-generated content mechanisms facilitate socialisation and learning through group-centred activities where individuals contribute to the organisational memory and the intellectual climate.

Empirical research on the knowledge-sharing process has been conducted from different perspectives. From the socio-cognitive perspective, intrinsic and extrinsic motivation based on intentions and attitudes are evaluated as variables that promote knowledge-sharing behaviour. Other indicators of this dimension are reciprocal relationships, self-efficacy, extrinsic rewards, organisational climate, subjective norms and behavioural control (Bock & Kim, 2002; Kuo & Young, 2008; Tohidinia & Mosakhani, 2010; Wang, Yen, & Tseng, 2015).

Knowledge dissemination plays a vital role for knowledge-based organisations, an individual's knowledge stock increases through this process. Considering that tacit knowledge could be diffused through communication, imitation, and practices, strong relationships and intelligent communication among members enhance the transfer of complex knowledge. Many scholars have analysed knowledge dissemination using the thought of epidemic spread. Su, Yang, and Duan (2018) proposed a model based on Cellular Automata with heterogeneity. The results affirmed that increasing the number of knowledge disseminators for introducing new knowledge or strengthening existing knowledge is an effective way to increase knowledge dissemination performance.

Additionally, to enhance the distribution patterns of knowledge disseminators, managers need to enhance trust and cooperation, nurturing a culture of knowledge sharing and collaboration, promoting flat management, and knowledge resources openness. Finally, the study concludes that strengthening closer connections improves the formal and informal knowledge exchange among employees and adopting performance evaluation and incentive system practices will foster knowledge accessibility. Both knowledge exchange and knowledge accessibility contribute to knowledge dissemination.

The final steps in the knowledge management cycle are Knowledge Acquisition and Knowledge Application. Once knowledge has been captured, coded, and shared, the next step needs such knowledge to be used in the best way to make it available, ensuring a better match between knowledge content and personal knowledge of workers' preferences and requirements. Some technologies that support Knowledge Applications are mapping tools, collaboration software, high-end flowcharting tools, knowledge maps, automatic taxonomy creation, knowledge repository, content management software and electronic performance support systems (Dalkir, 2011, pp. 183-209).

Knowledge acquisition is the capability of seeking and acquiring new knowledge or creating new knowledge through collaboration and benchmarking. On the other hand, knowledge application or reuse is oriented towards using knowledge to develop tasks and decision-making processes. Past studies have evidenced that the following factors contribute to developing knowledge acquisition and knowledge application capabilities: a clear organisational vision and goals that provide a sense of involvement and contribution among employees, learning culture and transformational leadership, social networks that support and encourage knowledge-related activities, a culture based on trust among employees, and employee usage of IT applications (Gil et al., 2020; Kim & Lee, 2010).

The evidence has served to identify that studies have analysed various factors related to the knowledge process over the years. Although the technological perspective supports the execution of each process in a meaningful way so that knowledge grows in quantity, the socio-technical and socio-cognitive perspectives enable organisations, people and cultures so that knowledge through its processes grows in quality.

2.7. Learning Organisation

In this section, the different models are addressed, as well as their characteristics and practical recommendations to become an organisation aimed to improve continually by its commitment to learning.

The Fifth Discipline by Senge in 1990 stimulated the concept of Learning Organisation and established five learning disciplines as the core of this concept:

1. Personal mastery refers to people who have a distinctive sense of purpose and live in a continual learning mode.
2. Mental models are internal images about how the world works, and such models affect our behaviours; in organisations, mental models shape strategies and internal ways of working.
3. A shared vision creates a sense of common identity and purpose, allowing people to work together.

4. Team learning is the ability to act together and create results that members genuinely desire.
5. Systems thinking is the last discipline. It refers to comprehending and addressing everything, integrating the disciplines and *"fusing them into a coherent body of theory and practice"*.

The author affirmed that for the practice of any of these disciplines, individuals must be lifelong learners on a never-ending developmental path. By practising these disciplines, people expand their capacity to confirm and look for a vision, reflect and inquire about attitudes to develop collective capabilities and understand and be aware of how systems work. A Learning Organisation develops skilled employees for creating, acquiring, and transferring knowledge; these capabilities facilitate holistic and systemic thinking, promote open discussions, and cultivate tolerance (Senge, 1994, pp. 6, 17-21, 44-45).

Garvin (1993) proposed the *"Building Blocks of Learning Organisations"*. This framework comprises five primary activities to develop capacities and insights for creating, acquiring and transforming knowledge that Learning Organisations must integrate into their processes. They are problem-solving systematically, experimenting with new approaches, learning based on their history and experience, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organisation. Later, Garvin et al. (2008) consolidated previous building blocks of Learning Organisations into three broad factors. The first refers to a supportive learning environment based on four characteristics: psychological safety, appreciation of differences, openness to new ideas, and time for reflection. The second building block refers to concrete learning processes for collecting, interpreting, and disseminating information through experimentation, training, and analysis. The third building block considers leadership behaviour reinforcing the importance of taking time for problem identification and knowledge transfer. Finally, each building block reinforces one another in a continuous virtuous circle. When organisations practise these activities, they need to be supported by specific policies, systems and processes to integrate them into daily operations and across functions and units. Therefore, the authors affirmed that the learning process occurs by design rather than by chance; in other words, organisations must design and manage the learning process.

According to the previous contributions, Goh and Richards (1997) and Goh and Ryan (2002) affirmed that organisations must adopt strategies and structures to foster and operate a learning mode, and leaders must intervene to establish certain conditions. The authors proposed five characteristics and management practices to establish learning conditions. First, clarity of purpose and mission refers to an organisation needing a clear and articulated purpose, which Senge (1990) called *"building shared vision"*. Second, leadership commitment and empowerment concern how leaders need to create a climate of trust, encouraging the search for knowledge to resolve failures and solve performance gaps, admitting mistakes, seeking feedback and empowering employees to take risks and make decisions. Third, experimentation and rewards must be encouraged and supported through structures and systems, allowing people not to be afraid of experimenting with new forms and methods, thus participating in a creative and innovative process. Fourth, the transfer of knowledge refers to the ability to transfer knowledge and information across departmental and functional boundaries and to transfer knowledge from external environments such as suppliers, and customers, among others. Finally, teamwork and group problem solving promote sharing knowledge to solve problems in groups, reducing dependence on management.

The Knowledge-Creating Company by Nonaka and Takeuchi (1995) proposed to take knowledge as a basic unit of analysis for explaining the firm's behaviour, not only in the sense of how a business organisation processes knowledge but also from the belief that the organisation creates knowledge. Knowledge creation promotes the flow and conversion of tacit knowledge, occurring when the interaction between tacit and explicit knowledge (epistemological dimension) is elevated dynamically from a lower level to higher levels, such as individual, group, organisational, and inter-organisational (ontological dimensions). Figure 2.7 depicts Nonaka and Takeuchi's two dimensions of knowledge creation (1995).

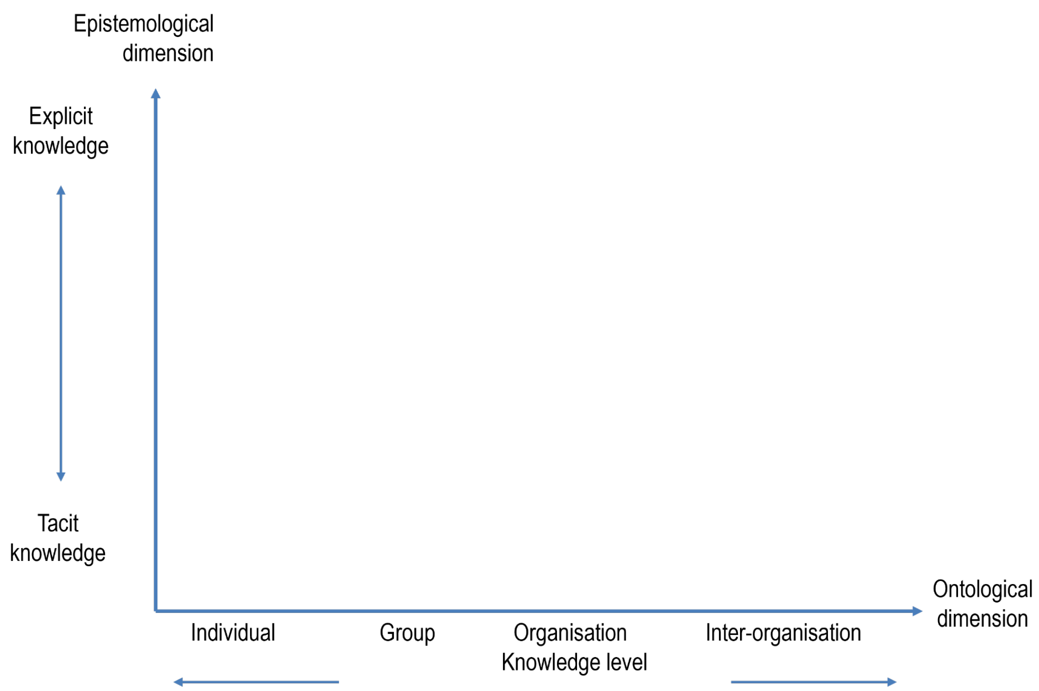


Figure 2.7: Two dimensions of Knowledge Creation by Nonaka and Takeuchi (1995, p. 57)

The authors argued that in Western philosophy, the subject who possesses and processes knowledge is the individual. In the Knowledge-Creating Company proposal, knowledge creation occurs at an individual, group, and organisational level. However, while individuals are the source of knowledge creation in organisations, such knowledge is amplified and materialised as part of the organisation's knowledge network; then, knowledge expansion occurs through interaction across intra- and inter-organisational levels.

The models described above have provided the basis for developing strategies that promote learning processes and suggest strengthening a set of capabilities to establish a competitive advantage based on knowledge.

In terms of firm performance, a learning organisation is a highly effective, competitive, and innovative organisation that creates and transfers knowledge to solve problems, influencing performance and its effectiveness in the long term. In addition, learning Organisations generate the capability to learn faster and adapt more quickly to environmental changes generating a competitive advantage that responds to a growing global competitive environment (Goh & Ryan, 2002).

Learning occurs in an organisation when knowledge is accessible to the whole organisation, including tacit and unarticulated knowledge that resides in employees' minds and when knowledge is relevant to the organisation's purpose. Learning also occurs by transforming experiences into knowledge, and the organisation becomes more aware of its underlying knowledge base. Previously mentioned capabilities facilitate organisations to define strategic changes to be implemented and to achieve significant strategic advantages in the competitive world (Gilley & Maycunich, 2000, p. 108; Senge, 1994, pp. 49-51). To leverage learning in the organisation, a change in how people interact must occur, promoting and developing capacities to think differently and share what they know. Managers must find a way to create time to think and promote different types of thought and collective discussions; honesty and openness must be rewarded and recognised (Senge, 1994, p. 48).

From the vision of the learning organisation, it can be identified that the interaction of human, social, and organisational factors with the support of technological resources promotes learning as well as the collective construction of knowledge. The cognitive congruence framework proposed by Merali (2000) explains the interconnected relationships between "*cognitive and social elements with action*". In other words, through the proposed framework, it could be understood that the collective knowledge construction, generated by the interactions between humans performing actions, dynamically transforms knowledge and generates what the organisation "knows". The cognitive congruence framework evaluates the level of cognitive positions of the established relationships and how internal and external environments are connected to leverage organisational capabilities effectively.

The models reviewed in this section facilitate that learning organisations develop the capabilities to transform themselves towards a knowledge-centred organisation. In the same way, they facilitate guides to define strategies focused on promoting the development of people's capabilities that enhance learning and the exchange of knowledge within the organisation. However, the way organisations learn, their practices and system learning are part of the organisational learning field study. Organisational learning promotes changes that transform leadership, empower people, promote teamwork, generate collaboration networks, and change the organisational structure and culture. These transformations promote the organisational development to face the challenges of the context, an easy adaptation to new technologies and markets and improve organisational efficiency (Bennis, 1966; Bennis & Nanus, 1985).

According to Argyris and Schön (1978), organisations must identify problems through a comprehensive diagnosis before defining and implementing a learning model. These authors also affirmed that when organisations are unaware of their lack of capacity in their current learning system, becoming aware of it and identifying the theory-in-use that currently governs the organisation are fundamental steps to transform their learning systems. Based on Argyris and Schön (1978), the theories-in-use are the actions that occur in organisations, which may vary with what people say drives their actions (theory-in-action). The theory-in-use reflects the behaviour of the individuals that belong to the organisation, which makes it possible to identify patterns of behaviour and particular action guides modified over time. Many of these individual behaviours, generated by the organisational culture itself, represent defensive routines to protect themselves from challenges and maintain control in threatening conditions such as a financial or institutional crisis. Such defensive routines obstruct capability development and inhibit organisational learning.

Argyris and Schön (1978) suggested that when organisational changes come from individual learning, based on error-correction learning, it can be detrimental to organisational improvement because such changes only maintain the stability of the practices and characteristics of the organisation. Therefore, Argyris and Schön (1978) defined that first-order learning facilitates the incremental change of routines within the existing schemes in the organisation to generate a domain in existing routines. On the other hand, moving towards double-loop learning involves first changing the theory-in-use and questioning the existing assumptions and guiding values in the organisation. The authors stated that this self-discovery process could be painful, and organisations may deny discovered problems; however, overcoming this situation is part of the learning process.

Double-cycle learning promotes organisational change through the search for new routines and schemes as the context demands confronting the theory-in-use and the organisation's current structure. Finally, triple-cycle learning promotes collective reflection on beliefs and the underlying structure of the organisations. This triple-cycle learning develops the capability to be an effective learner, which drives the organisation to become a learning system and to be open to self-criticism and innovation (Argyris, 1993; Argyris & Schön, 1978).

The models reviewed in this section empower learning organisations with guidelines for action and promoting behaviours that facilitate transformation through learning and innovation. Throughout this review, it was also identified that the importance of intentionally encouraging and promoting the interaction between various factors lies in its potential to generate learning and promote knowledge transfer. Through this interaction and the strategies designed to promote it, individuals and organisations strengthen their capabilities to improve their performance and establish a competitive advantage.

According to Brown and Duguid (1991), work processes have historically been defined and executed according to manuals, procedures and job definitions; in the same way, established training and education programs frame learning. The authors argued that when these processes strictly complied with manuals, programs, or pre-established procedures provoked resistance to change. The separate vision of the work and learning processes inhibited the possibility of identifying, proposing and experimenting with improvements, which hindered organisations from developing their capacity for innovation. The authors argued that organisations, through their education programs, training and procedures, reproduced abstract representations of the forms of work and learning objectives; therefore, they suggested that learning from practice and collaboration leverage the generation of knowledge and innovation and determine the success or failure of the organisation.

The literature review identified that communities of practice (CoP) foster interaction between people and social structures to share knowledge resources in their tacit or explicit form and generate learning. Technology through virtual environments enhances these communities' expansion, facilitates online meetings, the generation of collective knowledge and the development of shared practices. Concerning their structure and organisation, communities of practice may include members of a single organisation or various organisations according to their particular purposes.

Wenger (1998) defined communities of practice as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly". The author emphasised that the main difference between CoP and other types of communities lies in the intentionality of their purpose, which is learning. The community of practice shares a domain of interest for which the members have some developed competence; however, collective competence is strengthened by sharing knowledge among the members. The knowledge generation process is developed by defining activities and meetings that promote interaction and knowledge practice. Through constant interaction, the members of the CoP generate a shared practice. Some basic practices are problem-solving, request for information, search for experience, reuse of assets, coordination and synergy, discussion of new developments, project documentation, visits, knowledge mapping and identification of knowledge gaps. The authors affirmed that the CoP as a tool for Knowledge Management and for learning in the workplace has the potential to develop the strategic capabilities of organisations since their members generate the responsibility of managing knowledge, and linking practice, learning and its functions within the organisation, generating connections inside or outside it.

Communities of practice in public health have supported the practice in disease control and prevention, obesity, nutrition, and mental health, among others. In the review developed by Barbour et al. (2018), the authors identified the barriers and enablers of CoPs from the analysis of twelve previous studies that involved health professionals in public institutions in developed countries. Concerning the barriers, the authors identified the following: the lack of time to interact among the members of the community, the inadequate structure of the community and its duration, the lack of opportunities to promote discussion, the inadequate facilitation and the lack of quick responses have been the main barriers to achieving the objectives of the CoPs. On the other hand, the evidence analysed showed that the following are the primary enablers of communities of practice: a clear definition of the scope, purpose, and roles within the CoP, the generation of a safe environment and sufficient time for reflection, as well as having structured and articulated plans to promote learning and building trust between facilitator and participants. Such enablers let communities of practice flourish and promote learning and collective knowledge.

2.8. Knowledge Management in Health Services

Knowledge in medical science is indispensable in accomplishing the objective of healing, conserving and protecting human health. Health institutions are organisations of knowledge; through their processes, methods, practices, instruments, people and culture, they constantly promote the creation, representation, storage, access, use, re-use and transference or dissemination of knowledge (Wickramasinghe, 2007).

De Brún (2007) defines Knowledge Management in healthcare as: "*The way in which multidisciplinary teams, working in healthcare, harvest the personal expertise that is essential to patient safety, learn from it, adapt it to local situations and individual patients, and distribute it via reliable networks to the people caring for the patients, so that they can use it to improve the quality of care delivered*".

During the literature review, a diversity of factors involved in the dynamic of Knowledge Management was identified. Similarly, healthcare institutions must deal with an abundance and proliferation of knowledge resources, the presence (or not) of a knowledge-sharing culture, practitioners with different specialisations and a diversity of clinical cases that demand specialised manipulation of healthcare knowledge. Considering these challenges, Abidi (2007) proposed six knowledge modalities for supporting healthcare professionals' work (see Figure 2.8). Under this categorisation of knowledge modalities, it is possible to identify the use of tacit or explicit knowledge, the development of the knowledge process, and the practice of knowledge conversion (SECI model). In other words, this categorisation shows how some previously reviewed concepts are fostered and intertwined through different knowledge initiatives. For example, based on knowledge modalities, data-warehouse systems capture and categorise explicit knowledge; tacit knowledge resides in the practitioners' clinical experiences. The knowledge dissemination process is performed by publishing the best practices, and decision-support systems facilitate knowledge application. Healthcare professionals perform a socialisation process during collaborative discussions, and institutions facilitate the knowledge externalisation process through educational programs.

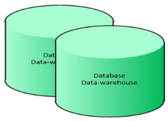
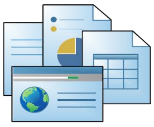
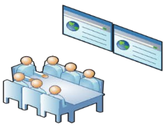
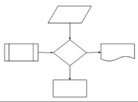
	Population Health Data-warehouse	Data-mediated knowledge derived by mining healthcare data on clinical observations, diagnostic tests, and therapeutic treatments recorded in medical records and stored in a clinical data warehouse.
	Best Evidence (Literature, protocols & guidelines)	Published medical literature and clinical practice guidelines. Disseminating clinical research findings. Operational knowledge in terms of clinical protocols and pathways.
	Problem – specific Discussions	Collaborative problem-solving discussions or consultations between practitioners. Social networks involving members of a community of practice highlighting their communication patterns, interests, and maybe even expertise. Psychosocial support and rehabilitation discussions between patient groups. Public health and community support for patients.
	Expert's Tacit knowledge	The tacit knowledge of practitioners in terms of problem-solving skills, judgment, and intuition. Practitioners' clinical experiences (both recorded and observed) and lessons learnt through practice. Translation of knowledge to practice and vice versa.
	Educational content and modules	Medical education content for practitioners. Practitioner's education and experience enhancement. Patient-specific educational interventions. Patient empowerment programs.
	Clinical Decision Support Knowledge	Formal decision-support knowledge encapsulated as symbolic decision rules obtained from domain experts and or decision models included from data.

Figure 2.8: Knowledge Modalities by Abidi (2007)

The interrelation of factors in healthcare knowledge practices is even more evident. However, through the years, studies have broadly evaluated the development of specific factors from a particular perspective.

The technological perspective has significantly contributed to analysing how health information systems (HIS) support Knowledge Management practices. Some examples of such technology are Decision Support Systems, Electronic Medical Records or Electronic Health Systems, Computerised Physician Order Entry Systems, Electronics Alerts and Reminders Systems, Medication Prescribing or Electronic Prescribing

Systems, Chronic Disease Management Systems, Preventive Care Systems, Telemedicine Systems and Informational Resources for Providers and Patients.

Evidence shows that health information systems improve:

- performance of the providers and the quality of patient care (Shekelle, Morton, & Keeler, 2006),
- clinical management and facility to access data (Shekelle, Morton, & Keeler, 2006),
- the efficiency of processes, collaboration, flexibility, coordination and communication (McKibbon et al., 2011),
- safer work process, with higher quality and increasing efficiency (Carayon, Karsh, & Cartmill, 2010),
- security of patients, making the management more efficient and facilitating the analysis and redesigning of workflows (Carayon, Karsh, & Cartmill, 2010),
- development of skills and attitudes toward knowledge by healthcare professionals (McKibbon et al., 2011).

Thus, hospitals have adopted a trend to develop, adopt, and implement healthcare information systems (HIS) to improve the quality of patient care, safety, effectiveness, timeliness, and performance. Therefore, a necessity to measure the effectiveness of HIS through a validated theoretical framework emerges. One of the most widely used models for this purpose is the DeLone and McLean Information System Success Model for evaluating system quality, information quality, system use and user satisfaction. This model has been applied in evaluating Electronic Medical Records (EMR) Systems (Otieno et al., 2008), Health Risk Reminder and Surveillance systems (HRRS) (Jen & Chao, 2008), and Emergency Response Medical Information Systems (ERMIS) (Petter & Fruhling, 2011).

Even when technological infrastructure and information systems are available, the perception of their benefit and the acceptance of these systems by users can become a barrier or an enabler for the implementation to be successful. The Technology Acceptance Model (TAM) provides a theoretical framework for studying attitudes and behaviours that encourage users to accept and use technology. Based on TAM, past studies analysed the barriers to accepting the introduction of new technology or information system in hospitals (Aggelidis & Chatzoglou, 2012; Yarbrough & Smith, 2007), for example, the acceptance of sensor-based medication systems (Kummer et al., 2013), electronic health record (Gagnon et al., 2014), and the adverse event reporting systems (Wu et al., 2008), among others.

Socio-cognitive perspective has contributed to empirical studies in another main avenue. This avenue is focused on understanding individuals' knowledge-sharing behaviours. For healthcare organisations, a culture of knowledge sharing (KS) promotes better use of physicians' know-how, skills and experiences to generate new ideas and implement best practices to provide better healthcare quality (Gider et al., 2015). Godin et al. (2008) analysed past studies through a systematic review to understand the intention and prediction for clinical knowledge-sharing behaviours of healthcare professionals. Their findings affirmed that the most appropriate theory to understand such behaviour was the Theory of Reasoned Action (TRA) and its extension, the Theory of Planned Behaviour (TPB). Based on the previously mentioned theory, Ryu et al. (2003) analysed subjective norms, attitudes and perceived behavioural control variables as factors influencing physicians' intentions. In this same line, Kim et al. (2012) studied how institutional structures, leadership and employees' behaviours facilitate knowledge-sharing practices and their impact on organisational performance. Their findings confirmed that such factors in a collective form considerably enhanced patient safety.

Diverse authors have analysed how knowledge-sharing intentions and behaviours vary according to demographic characteristics such as gender, position, hospital units, workers' age, education level, and job position, among others. For example, Lee and Hong (2014) found that men with higher education levels have stronger knowledge-sharing intentions than females with the same level of studies. In addition, the older people and the higher positions showed stronger relationships for knowledge-sharing behaviours.

Regarding the barriers or factors affecting knowledge-sharing behaviours, the study of Zhou and Nunes (2016) identified the absence of trust for individuals to share knowledge with others, inadequate channels for communication and inadequate KS tools, the absence of communication between hospitals, and the lack of mechanisms for informal KS. Other identified barriers were the lack of defined KS hospital management policies, specific hospital KS requirements, and lack of leadership. From their findings, the authors proposed four categories of barriers: interpersonal trust barriers, communication barriers, management and leadership barriers and inter-institutional barriers.

When organisations overcome barriers by improving their capabilities to manage knowledge, they are more efficient and get to know themselves (Mårtensson, 2000).

From a socio-technical perspective, to develop knowledge process capabilities in a healthcare setting, Ghosh and Scott (2006) suggested the following examples to evidence the extensive knowledge activities performed by nurses in their work routines:

Nurses develop their knowledge acquisition process by interacting with patients and physicians during daily rounds and participating in education programs. In addition, they apply their knowledge and experience when annotating the patient's diagnosis board and solving problems while caring for a patient. When the nursing team participates in the definition of new clinical services and when they generate informative bulletins to be distributed in the hospital, nurses contribute to the knowledge conversion process. At last, knowledge protection is performed when access to the patient is restricted to preserve confidentiality and when access to the patient's clinical information is restricted for physicians that do not work for the institution.

During these exemplified routines, the interaction between healthcare professionals, knowledge resources, information systems, and institutional policies, among others, is carried out within a culture and a specific organisational structure for caring for patients and improving the quality of services. Therefore, the need for a rational approach to understanding how such resources and factors are interrelated and contribute to competitive advantage emerges. For this purpose, the Resource-Based View and its extension, the Knowledge-Based View, provide a widely studied reference framework to establish an effective strategy that ensures competitive advantage leveraged on knowledge and the development of unique resources that are difficult to imitate.

A systemic approach facilitates a holistic view, where components (culture, people, technology, among others), interactions and dynamics are observed as a whole in organisations' processes, activities and functions. The right balance among all factors is the key to any knowledge system's success (Chowdhury, 2007).

In developed nations, health institutions have implemented strategies where the factors mentioned above interact with knowledge assets at different levels and domains to improve the efficiency and efficacy of healthcare delivery services. Most developed countries have enabled initiatives to provide health services to remote populations through significant investments in physical infrastructure, human capital, and information systems. However, the general provision of these crucial initiatives depends on creating mechanisms such as policy statements and healthcare information security applications to guarantee the confidentiality of patients' sensitive information.

A KM strategy in health institutions would facilitate the transformation of the medical data available in their repositories into reliable clinical information and knowledge. At the same time, through diverse technologies, regulation, professional healthcare education and their interactions, a KM paradigm can offer mechanisms to transfer and disseminate acquired knowledge to all healthcare providers, even in a rural context, for better treatments and diagnosis (Dwivedi et al., 2001; Dwivedi et al., 2002).

The following section aims to provide a general overview of the public health reforms in Mexico to understand the historical and current bases that promote or inhibit the implementation of knowledge management strategies.

2.8.1. Mexican Public Healthcare and initiatives of Knowledge Management

Chapter One presented an overview of Mexico's context and the underdevelopment conditions that affect the population of Chiapas state. Access and quality in health services are critical factors to breaking the poverty spiral by providing the opportunity to conserve the life and health of the population and, as a consequence, enable people to work or study to improve their living conditions and well-being. This section presents a summary of the different public health reforms in Mexico to identify the historical barriers that have impeded the healthy development of society.

The current Mexican health care system was shaped through a distinct generation of reforms. Carrillo (2002) mentioned that in 1891 the first Sanitary Code was declared in Mexico. This code granted the power to the State to carry out the function of watching the public and private hygiene of the country through the Salubrity Superior Council. The interest in public health was part of the political and economic strategy because by assuring the population's health, the workforce's capacity and production would be guaranteed.

In 1943, the Ministry of Health, the Mexican Institute for Social Security, and the Children's Hospital were created to meet the demands of industrialisation to take advantage of technological progress and economic growth. This system was limited to salaried employees in the public sector, private firms, and their families. The Mexican Institute of Social Security and the Institute for Social Security and Services for Civil Servants, created in 1959, provided coverage to federal public workers and their families of each estate. Self-employed, unemployed and people working in the informal sector of the economy used their resources to get poor-quality and unregulated health services in private health units. This group represented 50% of the population who did not have access to any form of health insurance.

In the late seventies, reforms extended basic health care coverage to serve rural and urban poor populations through the decentralisation of facilities; authorities started by designing policies and programs based on evidence and evaluation. In the arduous search for universal health coverage that facilitated access for all Mexican citizens to health services, in 1983, a constitutional amendment established the right of every person to the protection of their health. This reform reorganised the health system by functions improving equity and efficiency. Between 1985 and 2000, states received the responsibility of health service delivery for the uninsured population. The efforts to extend the health service infrastructure reached the poorest states of Mexico (Chiapas, Guerrero, Hidalgo, and Oaxaca). In 1987 the National Public Health Institute was created to track progress in health and health care through research programs and teaching programs as part of the policy-making process (Frenk et al., 2003).

In the mid-1990s, the following reform promoted structural changes to adopt horizontal integration for reorganising the health system regarding stewardship, financing, and provision. To complete the decentralisation process for the uninsured population, an incentive-based welfare program, "*Program for Education, Health and Nutrition*," was created to enhance the basic capabilities of people living in extreme poverty. This program offered cash subsidies to poor people for adherence to education, health and nutritional interventions; it was renamed "Oportunidades". In 2000, Mexico spent 5.6% of its Gross Domestic Product (GDP) on health care, a low percentage compared to the average registered in Latin America (7%). From 2001 to 2006, the National Health Program established five main goals:

1. To improve the health conditions of Mexicans.
2. To address health inequalities.
3. To improve the responsiveness of public and private services.
4. To ensure adequate financing for health.
5. To strengthen the health system, especially public institutions.

These goals were included in the reform approved in 2003. This reform aimed to provide universal health insurance by establishing a System of Social Protection in Health, introducing new financial rules for public health, community-based services and personal health care encompassing three dimensions: risk, patient and finance.

In 2004, the Popular Health Insurance program was created to gradually expand and protect about 12 million uninsured families over seven years, mainly low-income families. An information system was created as a roster to identify the contribution level of every affiliated family. First, the Popular Health Program offered a basic health package with 13 interventions and financial protection. Later, the "Oportunidades" Program offered more than 250 interventions at primary and secondary levels of care. In 2006, aligned with a master plan for investment in infrastructure, 1792 new health units were built, including four high-speciality regional hospitals for Chiapas, Oaxaca, and Tabasco, the least-developed states of Mexico. By the end of 2006, the GDP grew to 6.5% as a direct consequence of additional public resources assigned by the reform. In 2007, "Oportunidades" transformed into "Prospera", a Social Inclusion Program that provided a monetary contribution to families living in poverty for them to be able to participate in education, nutrition, and health programs. This program reached 20% of the national population, representing 6.6 million Mexican families (Frenk, 2006; Frenk et al., 2006; Knaul et al., 2012).

Nowadays, a new Mexico Health system restructuring reform is ongoing. The current Federal Government argues that more than 20 million Mexicans still lack coverage for health services. Therefore, in January 2020, a new system was created, the Health for Welfare Institute, whose three primary ethical principles are universality, services without payment and anti-corruption. For people who have access to health services, the specified packages of interventions and medicines do not offer universal coverage; therefore, this system does not provide the medical care people need. Consequently, people continue suffering from high costs of services and medicines.

Furthermore, the Federal Government argued that the administration of the public funds sent to the states and the private sector involvement promoted practices based on corruption. The new health system aims to provide all health services from public providers based on citizenship instead of social security without any affiliation process. All health services will be free and provided by the public sector to reduce individuals' spending on services and medicines. Aligned to the policy for eliminating any practice based on corruption, the Federal Government centralised control over the main processes. These processes are supplying, service delivery, employment of health workers, and managing health facilities to deliver health services in states. Also, through this new reform, participation of the private sector in services for the public health sector, such as delivering services for public agencies, purchasing services and supply for particular treatments, is limited (Reich, 2020).

The literature review shows how throughout the multiple reforms implemented, the Mexican Federal Government has conserved the power and control of fundamental elements such as the financial budget, the administration of human resources, provision of supplies, the definition of health programs and the coverage of services.

Figure 2.9 shows Current Health Expenditure in terms of GDP and expenditure per capita in USD. The blue line shows variations in GDP proportion assigned for health with a tendency to decrease from 2009 (6.1) to 2017 (5.5). The bars show that in 2017, the current health expenditure per capita in Mexico was 494.70 USD which represented 4.48% of expenditure assigned by the United States for Health (10,246.00 USD per capita) in the same year.

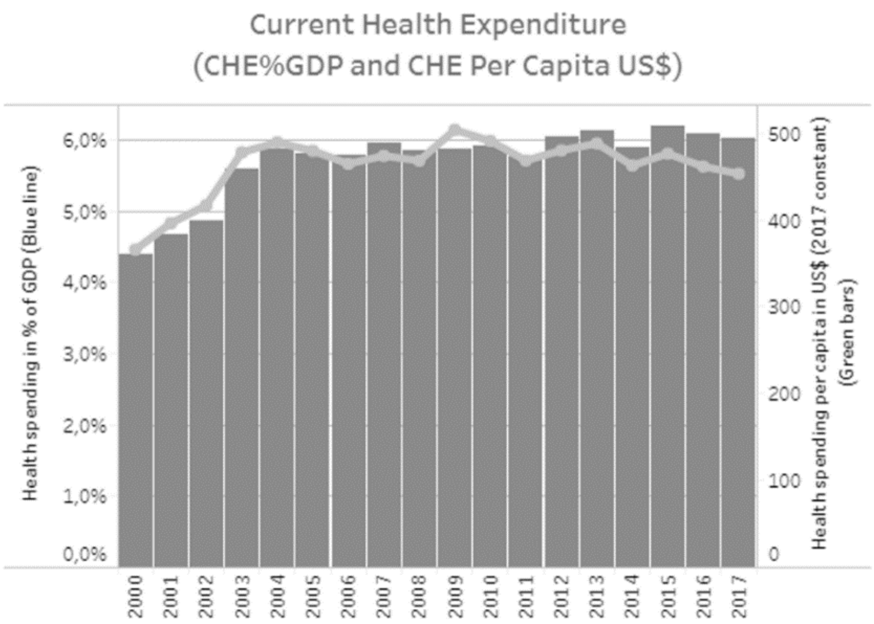


Figure 2.9: Current Health Expenditure (World Health Organisation, 2020)

As it can observed from the literature review, Mexico has a high degree of social inequality that has an exponential effect on health problems. Despite the presented reforms showing that the Health System of Mexico has embraced a transformation process, the request continues to improve the quality of services and cover the poorest Mexican families. The mass media constantly published the growing demands for lack of supplies and medicines, budget and personnel cuts, the deterioration of hospital infrastructure, malpractices, and the lack of care in rural clinics. Furthermore, in politics, the opposition strongly criticises that corruption practices continue and worsen. The previously presented Mexican context indicates the urgent necessity of strategies to improve health services and the quality of services.

Designing or adopting initiatives of Knowledge Management aligned to the healthcare necessities and contributing to the definition of adequate public health policies enable an opportunity to respond better to the priorities of the Mexican context. However, for this to become a reality, it is essential to identify the current capabilities of public health institutions and the presence or absence of various factors that enhance knowledge initiatives.

Regarding innovation and knowledge-creation capabilities in Mexico, the Organisation for Economic Co-operation and Development (OECD) in 2009, through a revision of the Innovation Policy, affirmed that despite the efforts to improve design, technology and innovation policies, Mexico had not reached the appropriate level of performance in its innovation policy. Some of the identified weaknesses are inefficient governance of the National Innovation System, low budget allocation and weak political commitment, the poor performance of the education system, and low qualification of the labour force, among others (Organisation for Economic Co-operation and Development, 2009). In addition, the OECD reported that Mexico continues to suffer several structural weaknesses, such as the low capacity to generate knowledge with commercialisation potential (e.g., patent cooperation and treaty). As a result, even though some policies have progressed to build an innovation ecosystem, including knowledge-based firms, Mexico's innovative performance is still lagging (Organisation for Economic Co-operation and Development, 2013).

To diagnose the KM capabilities developed for successfully implementing KM strategies and KM processes, in October 2016, the Ministry for Public Function designed and applied a survey; such instruments collected data in 214 federal public institutions. The designed survey captured the perceptions, conditions and progress of Knowledge Management processes in Mexican Federal Institutions of Public Administration to strengthen governmental management and the public workers' professionalisation. The Ministry for Public Function affirmed that knowledge is created and enhanced through collaboration and interaction between public workers, users, providers, and institutions. However, despite this natural process, institutions should be conscious of the importance of knowledge and how a formal strategy to strengthen individual skills and capabilities to manage it could improve processes, activities and performance. The applied survey consisted of five main sections and one supplementary. These were: understanding the Knowledge Management concept, knowledge identification, knowledge storage, knowledge creation, and knowledge transfer, and the complementary section was about barriers to implementation.

The preliminary diagnostic spotlighted significant issues. Most institutions ignored the concept of Knowledge Management, but 45% of participant institutions recognised that some processes of KM have been adopted into their functions, mainly identification and storage processes (77%). Conversely, the least recognised processes were knowledge creation and knowledge transfer (69%), which refers to capturing experiences and generating new knowledge-enhancing practices for innovation. Practices to transfer knowledge have been limited to meetings, memorandums, and workshops; therefore, an opportunity to generate activities for transferring information through socialisation was identified. Results showed a lack of formal research for knowledge generation. The main barriers identified are lack of financial budget, not providing time, technology and tools, and lack of individual attitudes to share knowledge (Secretaría de la Función Pública, 2016).

Regarding KM capabilities developed by public hospitals in Mexico, Fierro and Mercado (2012a) developed a study to analyse the relation between Organisational Innovation and Knowledge Management. This research was applied in seven public hospitals in the State of Mexico. While five of them cared for uninsured populations, one hospital looked after insured workers and their families. One hundred and fifty-eight healthcare professionals (doctors, paramedics, and administrative directors) participated in the survey. The instrument measured two dimensions: Organisational Innovation, composed of organisational practices and workplace organisation, and Knowledge Management, composed of socialisation, creation, organisation and application processes. The results showed a positive and significant relation between such dimensions. Findings affirmed that as more hospitals facilitate the generation of new ideas, learning opportunities, knowledge acquisition and information systems development, the greater the possibility that healthcare professionals participate in the generation of innovative processes.

On the other hand, results showed a weak relation between organisational innovation dimensions and socialisation, creation and application processes; the authors supported these findings, arguing the lack of formalisation in implementing KM strategies for all levels in the analysed hospitals. In a second study, the same authors, Fierro and Mercado (2012b), analysed the association level between Knowledge-Centred Culture and Knowledge Management. The study was applied in eight hospitals in Mexico State. Results showed a moderated association in three processes of KM (Knowledge Sharing, Knowledge Organisation, and Knowledge Creation and Application) with five dimensions of Knowledge-Centred Culture (warmth, rewards, support, personal autonomy, and planning); 50% effect on Knowledge Organisation, 35% on Knowledge Sharing and 25% on Knowledge Creation and Application.

Mexico is a developing country with many opportunities to enhance its innovation system and facilitate changes in its policy to develop the necessary capabilities for implementing KM strategies and KM processes. Furthermore, lessons learned from developed countries are a source of knowledge that countries like Mexico could adopt and adapt to improve and reach better innovation and knowledge capabilities.

2.9. Summary

This chapter began by defining the fundamental concepts of knowledge and recognising its different components, origins and development. Then, the conceptualisation of Knowledge Management and how KM has been analysed and defined from different disciplines and perspectives were described. Next, the Learning Organisation was discussed to identify the different elements that leverage learning in organisations and enhance knowledge-sharing capabilities. Subsequently, the KM process concept was introduced as the core element of any KM strategy that provides the route to identify and allocate knowledge and sources of knowledge. Finally, the focus was on analysing KM in the healthcare setting in a developing country, Mexico.

Chapter Three: Theoretical background and hypothesis development

3.1. Introduction

In the previous chapters, the fundamental concepts of Knowledge Management were provided. Examples of strategies analysed in past studies were explored to identify the perspectives, disciplines and factors that have driven this field of study. The public health field was approached to identify how KM contributes to patients' health care and safety.

As it was mentioned in Chapter One, the guiding model proposed by Gold et al. (2001) integrated two critical knowledge capabilities to promote organisational effectiveness. Through the literature review in Chapter Two, it was identified that these capacities have been widely analysed through empirical and theoretical studies, individually or collectively. The guiding model and the evidence provided the basis for defining the factors to be analysed in this chapter. First, regarding the knowledge infrastructure capability, a broad interest in studying the following factors was identified: the organisational enablers of Knowledge Management (leadership, the promotion of teamwork, and the alignment of the organisational vision towards a knowledge-based strategy), the organisational culture based on trust, collaboration, and leadership, among others, and the technological factor focused on the analysis of the development of attitudes and behaviours for the acceptance and use of technology. Second, regarding knowledge process capabilities, the literature review identifies that the primary aspect that triggers the dissemination of knowledge resides in individuals through their behaviours and attitudes toward sharing their knowledge and experiences with others. Additionally, the ability of individuals to consciously incorporate knowledge processes into their work activities is a central element of any organisational strategy that seeks to improve their performance and obtain a competitive advantage.

The second part of the literature review, addressed in this chapter, allows establishing the theoretical structure of the model to be evaluated. In addition, Chapter Three fosters a theoretical understanding and a more elaborated definition of each essential factor identified in the literature review. Also, through the Resource-Based View and its extension, the Knowledge-Based View, it was proposed to articulate such factors to evaluate how their interaction contributes to the development of the knowledge process capabilities and patient safety as an indicator of performance in public health institutions.

In general, selecting a set of theories from different disciplines offer a particular point of view to understand the behaviours of the identified factors as potential promoters of the development of knowledge capabilities and their interaction to enhance the organisation's performance.

In the following sections, five theories are presented in order to establish a solid conceptual background; these theories supported past empirical studies and the selected factors. Finally, the hypotheses representing the established relationships evaluated in later chapters are defined.

3.2. Theoretical background

3.2.1 Social Exchange Theory (SET)

Social Exchange refers to "*the voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do in fact bring from others*". The central premise of SET is that exchanging physical or social resources as knowledge is an elemental form of human interaction (Blau, 2017).

Some differences between social and economic exchanges are that the latter involve tangible exchanges, they are contracted specifically and create obligations. The former occurs when an individual aids another but does not create a specific obligation. However, due to the norm of reciprocity, the recipient is obligated to act in favour of the initiator. Economic exchanges involve quantifiable material goods; social exchanges involve intangible goods that are not quantifiable (support, empathy, positive attitudes, others). Economic exchanges take place in the market, disregarding personal ties and facilitating direct profit-making. Social exchanges imply personal ties founded upon trust, reciprocity and rewards that shape the exchange of benefits (Casimir, 2014; Gouldner, 1960).

Employees in organisations establish long-term relationships based on social exchange, expecting reciprocity over time, especially when employees face job difficulties such as work or family imbalances, overwhelming task demands, and new job challenges. Under these circumstances, employees' support from their leaders and co-workers is critical because, in the absence of such support, employees can seek alternative employment. Hence, effective support structures based on positive relationships could prevent individuals from leaving their organisations and taking their accumulated knowledge and experiences (Madden, 2015).

When successful exchanges between employees and employing organisations occur, a positive Perceived Organisational Support (POS) is created. Leader-Member Exchange (LMX) occurs when the interaction or exchange is carried out by the employee and his or her leader. Although LMX and POS are interrelated concepts, what differentiates them is related to particular employee attitudes and behaviours (Wayne, Shore, & Liden, 1997).

Eisenberger et al. (1990) affirmed that POS explains the development of employee commitment to an organisation, generating engagement in behaviours that support organisational goals. The effect of this relationship is reflected in a positive perception such that the organisation recognises and values the employees' contributions and well-being and rewards their attitudes and behaviours in the forms of praise, mentoring, promotion, salary increases and other formal or informal rewards.

Graen and Scandura (1987), in their study about roles, processes and structure in LMX, affirmed that in an interpersonal relationship established between employees and supervisors, each one will offer something valuable to the other party, understanding that the exchange will be "reasonably equitable or fair". The perceived value of the material resources, information or support exchanged is the base for the LMX relationship quality.

An essential element that provides stability in social relationships is reciprocity. In a social relationship, individuals base reciprocity on compliance. Then, in a leader-member relationship, when one party benefits the other party, the last one would feel obligated to perform a good job and behave for the direct benefit of the other person. In the leader's case, he or she would feel obligated to provide rewards or privileges. Employees' attitudes and behaviours must be analysed to understand both relationships (POS and LMX) (Eisenberger et al., 1990; Wayne et al., 1997). Madden (2015) pointed out that when individuals participate in a reciprocal relationship, they will likely have enhanced abilities and skills to benefit other employees. They will also seek out their co-workers for a reciprocal exchange of knowledge as continuous development.

According to the study about trust in leadership by Dirks and Ferrin (2002), the authors claimed that a social exchange relationship encourages individuals to spend more time accomplishing their work and to be willing to go beyond their job role. The study's evidence indicated that trust in leadership affects attitudinal, behavioural and performance outcomes. Based on Rousseau et al. (1998, p. 395), "*trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another*". As was mentioned before, Social Exchange Theory has been a support for many studies to explain collaboration and many types of exchange relationships. For example, Malmström and Johansson (2016) analysed three social facilitators of SET: trust, commitment, and congruence, in which reciprocity results from an interdependent relationship of individuals willing to contribute.

As was mentioned in Chapter Two, a strategy of Knowledge Management implies changes in the organisational culture, such as positive attitudes toward learning, ideas generation and sharing, and a trustworthy climate to facilitate communication and feedback. Shim (2010) argued that to conduct a more appropriate study of the impact of a collaborative climate, corporations and leaders should be more conscious of aspects of the social environment and how organisational members perceive it.

Since knowledge encompasses individuals, organisations must foster values and an atmosphere of collaboration to provoke exchanges of knowledge, information and experiences. In the words of Nonaka and Konno (1998), "*Ba can be thought of as a shared space for emerging relationships*". Ba could be a virtual, physical, mental or a combination of spaces to provide a platform for individual and collective knowledge creation. Previous studies analysed that in a culture that supports collaboration, social exchange is needed through some facilitators such as trust, reciprocity, employee attitudes, leader commitment to promoting collaboration, and others (Madden, 2015;

Malmström & Johansson, 2016; Nejad & Saber, 2012). Accordingly, there has been an increasing interest in social exchange in organisations.

Nejad and Saber (2012) assessed the collaborative work climate based on four dimensions: work group support, immediate supervisor, employee attitude and business unit culture. Madden (2015) evaluated a sample of employees from a long-term nursing care facility; this sample was analysed to study how attachments to an organisation are formed and why those attachments persist based on Social Exchanges Theory.

The studies mentioned before have demonstrated relevant outcomes. For example, when employees perceive a collaboration based on social exchange, positive relationships with co-workers and organisational support produce beneficial organisational effects. Such effects are increasing affective commitment, more support from employees to their organisations, job performance, and more participation in knowledge exchanges and collaboration.

In a Knowledge Management setting, interactions promote the exchange of knowledge components such as data, skills, information, and expertise between individuals in organisations. Therefore, it has been regarded that fostering a culture of collaboration that induces interactions to share knowledge is an essential activity for establishing organisational effectiveness and competitiveness.

3.2.2 Theory of Reasoned Action (TRA)

The Theory of Reasoned Action is adopted as the theoretical basis and a widely accepted model in Social Psychology to explain virtually any human behaviour. TRA, proposed by Fishbein and Ajzen (1975), "*assumes that human beings are usually quite rational and* *make systematic use of information available to them*". Furthermore, the theory establishes that a person's attitudes and subjective norms determine their intention to perform a behaviour; finally, a person's intention determines the performance of a particular behaviour (Bock & Kim, 2002) (see Figure 3.1).

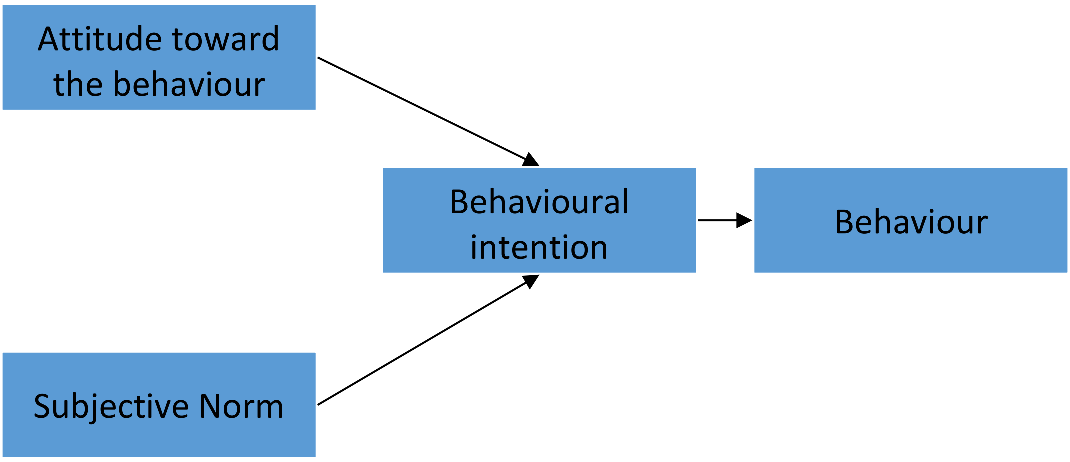


Figure 3.1: Theory of Reasoned Action framework.
Adapted from Fishbein and Ajzen (1975, p. 8)

Attitudes are the individual's assumptions based on experience about the consequences of behaving in a particular manner. Based on a definition by Fishbein and Ajzen (1975), a Subjective Norm is "*the person's perception that most people who are important to him or her think he should or should not perform the behaviour in question*".

The Theory of Planned Behaviour (TPB) is an extension of TRA. It adds the perceived behavioural control variable as a determinant of intention and behaviour (see Figure 3.2). Based on Ajzen's (1991) definition, Perceived Behavioural Control refers to people's decision about performing or not performing the behaviour through time depending to some degree on non-motivational factors availability such as time, money, skills, and cooperation of others. TPB posits that the greater an individual has perceived behavioural control, the more likely it is that the individual will intend to perform the behaviour (Ramayah et al., 2013).

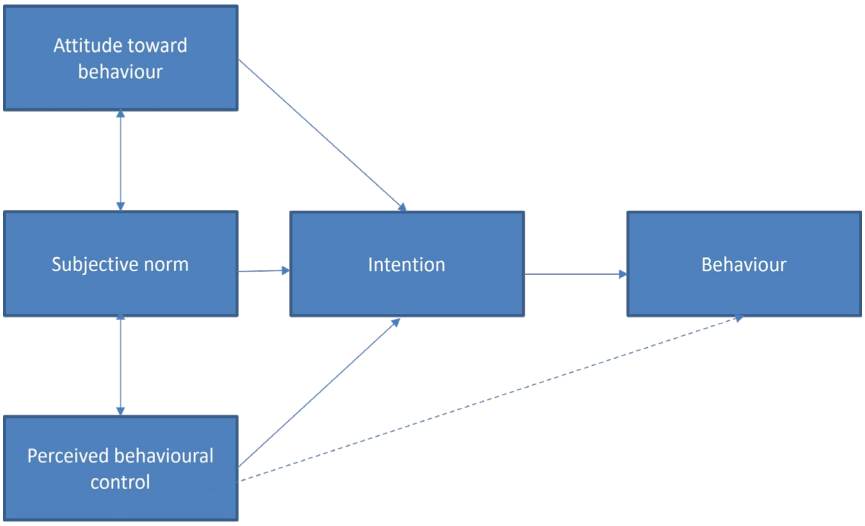


Figure 3.2: Theory of Planned Behaviour. From Ajzen (1991)

TRA and its extension TPB are the most often used Socio-Cognitive Theories for predicting behaviours. They have been successfully used in many domains, such as psychology, information systems, Knowledge Management, and healthcare systems. It is relevant to understand the individual's mechanism for adopting new behaviours because, for example, the decision to adopt clinical practices is an individual professional decision in a healthcare setting. Therefore, based on social cognitive theories, the cognitive mechanism underlying behaviours could be comprehended to improve behavioural change interventions targeting healthcare professionals. Godin et al. (2008) conducted a systematic review of studies based on social cognitive theories. They reported that TRA and its extension, the TPB, were the most frequently referenced theories to explain the intention of healthcare professionals to adopt clinical behaviours and predict their clinical behaviour. The study included physicians, nurses, and other healthcare professionals such as pharmacists, psychologists, and social workers. The investigated behaviours among physicians were clinical practice, compliance with guidelines and counselling. In nursing, the behavioural studies were clinical practice, compliance with guidelines and documentation. The prediction of intention in physicians was analysed through clinical practice, acceptance of technologies, compliance with guidelines, counselling and documentation; for nurses, the intention was evaluated in terms of clinical practice, acceptance of technologies, compliance with guidelines and documentation. Finally, the authors affirmed that for predicting behaviour and intention TRA or its extension, the TPB, have a significant prediction efficacy, better than studies employing other theories.

In a knowledge-sharing context, an individual might reflect that sharing knowledge with a co-worker in his or her organisation is a positive action. Knowledge-Sharing Behaviour is a construct that has been widely analysed in favour of enhancing knowledge resources that contribute directly to a sustainable competitive advantage for companies. Knowledge-Sharing Behaviour is constantly fighting the tendency to hoard Knowledge; Davenport (1997) argued that Knowledge-Sharing Behaviour is often unnatural because people think about knowledge as a form of power. The present research echoes the study of Bock and Kim (2002), in which Knowledge-Sharing Behaviour is motivated and executed mainly at the individual level.

Accordingly, to understand how a Knowledge-Sharing Behaviour could be fostered a series of frameworks based on TRA that have contributed to comprehending the attitudes that predict such social behaviour have been analysed. For example, Bock and Kim (2002) analysed the attitudes towards Knowledge Sharing as a predictor of intention to share knowledge. Shim (2010) analysed the attitudes such as conscientiousness, agreeableness and collaborative culture as predictors of the intention to share knowledge. In addition, Lucas (2010) proposed a framework based on TRA to analyse the capacity to acquire and retain relevant skills that positively impact the knowledge transfer process. Finally, the Korean study by Ryu et al. (2003), with a sample of 334 physicians in 28 departments of 13 tertiary hospitals, analysed the Knowledge-Sharing

Behaviour of physicians in hospitals. Conclusions suggested that positive normative beliefs of significant members, physician's motivation to comply, and positive attitude toward knowledge sharing are essential for fostering physicians' Knowledge-Sharing Behaviour.

In a healthcare setting, the applicability of psychological theories, such as TRA and its extension, the Theory of Planned Behaviour (TPB), to the prediction of physicians' Knowledge-Sharing Behaviour is significant.

3.2.3 Technology Acceptance Model (TAM)

Even though Information systems and technology offer potential possibilities to increase performance, users' unwillingness to accept and use available systems is often a critical obstructer, hence, a significant problem. The Technology Acceptance Model developed by Davis (1989) contributes to better measures for predicting and explaining system usage.

In 1989, derived from the Theory of Reasoned Action, Fred Davis published his research "*Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*". Davis' (1989) study aimed to develop and validate the scales to measure the perceived usefulness variable and perceived ease of use variable, both fundamental determinants of user acceptance. Perceived usefulness refers to the extent to which people believe an application will help them perform their job better; when the system is constantly used, there is an improvement in the user's job and performance. Finally, perceived ease of use refers to the extent to which people believe that the system is too complex or easy to use and that using the particular system will not need an outstanding effort. Figure 3.3 depicts the Technology Acceptance Model developed by Davis (1989).

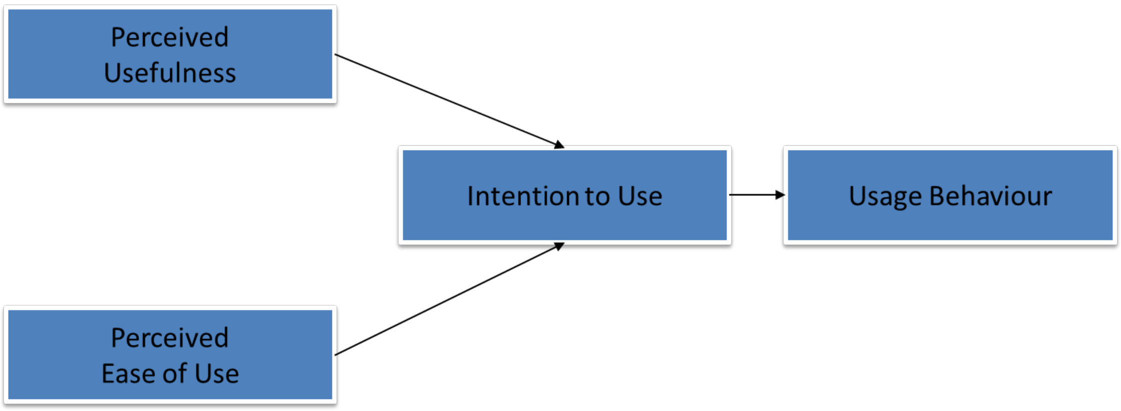


Figure 3.3: Original Technology Acceptance Model. Adapted from Davis (1989)

From 1989 to 2000, TAM became a well-established model for predicting user acceptance. Venkatesh and Davis (2000) proposed a theoretical extension of TAM based on the favourable acceptance of the original TAM compared with alternative models such as TRA and TPB. The acceptance was based on numerous empirical studies where TAM explained a substantial proportion of the variance (about 40%) in usage intentions and behaviour. The theoretical extension of TAM, named TAM2, incorporates additional constructs, integrating the social influence process such as subjective norm, voluntariness (to distinguish between mandatory and voluntary usage of technology), and image (the way that using technology enhances the perception of status in the individual's social system). TAM2 also integrated cognitive instrumental processes such as job relevance, output quality and result demonstrability. The authors concluded that these results showed consistency with the original TAM relationships and with prior studies, where "*perceived usefulness was a strong determinant of intention to use, and perceived ease of use was a significant secondary determinant*". Considering these new proposed constructs (social influence processes and cognitive instrumental processes), TAM2 showed that subjective norm significantly influenced usage intentions for mandatory systems, where "*people incorporate social influences into their own* *usefulness perceptions and they use a system to gain status and influence within the workgroup and thereby improve their job performance*". Through time, individuals gained direct experience with a system but continued to judge its usefulness by the potential status benefits resulting from its use. Regarding the cognitive instrumental process, "*judgments about a system's usefulness are affected by an individual's cognitive matching of their job goals with the consequences of the system use*". The effects of cognitive instrumental processes remained significant over time (Venkatesh & Davis, 2000).

TAM has proven to be a reliable and robust model through different contexts and holds across most cultures; this model has proven to be applicable for individuals at all levels of IT competency, genders and ages. In other words, TAM has successfully predicted the acceptance of various technologies. For example, in their study about Technology Acceptance among physicians, Yarbrough and Smith (2007) affirmed that in a healthcare environment, the adoption of technologies is noticeably lagging due to the barriers that make physicians hesitant to adopt new technologies. The authors reviewed 18 articles covering different types of technology. Some key findings were that doctors hesitate to adopt new technology when a technology or information system requires more time per physician per patient than paper. This additional time represents one of the significant barriers to physician Technology Acceptance. In addition, results showed that demographic factors do not influence the perception of the usefulness of technology; instead, computer experience and perceived organisational support influence the perceived usefulness of technology. Based on a systematic revision, the authors identified that in studies applied in hospitals where physicians did not individually finance technology, the cost is probably not a barrier to Technology Acceptance. Conversely, costs could be a barrier to implementing new technology in private settings.

Finally, the authors affirmed that TAM is a good predictor of physician behavioural intention to accept technology.

Based on the extended model TAM2, Chismar and Wiley-Patton (2002) developed their research in the paediatrics care arena. Mainly, they analysed the adoption of the internet and internet-based health applications (IHA) within paediatrics. Results partially confirmed the model, identifying that usefulness and job relevance are the primary factors in paediatricians' acceptance of technology. Likewise, three demographic variables were analysed: age, size of practice, and experience with computers. The authors affirmed that results were consistent with prior studies; perceived usefulness was a strong determinant of intention to use.

Conversely, perceived ease of use and subjective norm did not significantly affect intention to use. The authors justified these findings by explaining physicians' willingness to adopt information technology when health applications are perceived as beneficial to accomplish their daily tasks, even if they may not be easy to use. The second justification is based on physicians' higher level of competencies, intellectual, cognitive capacity and adaptability on average. For these reasons, the authors justify that perceived ease of use is not a significant variable for usage intentions for paediatricians. As a general result, 54% of the variance in intention to use by paediatricians is caused by the effects of perceived usefulness, perceived ease of use and subjective norm in conjunction.

Finally, based on previous examples and literature revision, TAM and its extension TAM2 are good predictors of physicians' behavioural intention to accept technology.

3.2.4 The Resource-Based View

In 1959, Edith Penrose recognised the importance of resources to a firm's competitive position. The author stated that an organisation is a broader set of unique firm-specific resources (physical and human) and capabilities, which influence its strategic growth and determine profit generation and performance in the way they are exploited. Her contributions derived the Resource-Based View (RBV), one of the most widely accepted theoretical perspectives in strategic management (Curado & Bontis, 2006; Newbert, 2007; Theriou et al., 2009; Wernerfelt, 1984).

In the same logic, Wernerfelt (1984) contributed to analysing a firm's resource position by selecting, developing and fostering a set of resources that drive its performance. The author defined a firm's resources as "*those (tangible and intangible) assets which are tied semi-permanently to the firm*", such as efficient procedures, equipment or machinery, brand names, skilled personnel, and in-house knowledge of technology, among others. Such resources can be purchased or produced depending on the nature of the resource or on an economic reason.

Wernerfelt (1989) affirmed that for organisations to have an advantage in markets, their resources must be superior to those of the competitors. Therefore, organisations need to strengthen their capabilities to identify their critical resources and to know how to deploy and develop them. Additionally, after recognising such resources, organisations need to verify their capacity, for example, resources with long-run, short-run, limited or unlimited capacity. Furthermore, the author suggested that critical resources can be used individually or in conjunction with noncritical or critical resources; organisations can also leverage their critical resources via a merger, a joint venture, or investors. Finally, Wernerfelt posited that organisations must develop the capability to grow their critical resources and establish competitive advantage.

Therefore, the efficient use of critical resources, their unique capabilities, and an exemplary implementation of methods for the organisation and management of such resources, including intangible resources like knowledge, is the primary concern of various strategic management theories, including RBV.

According to Barney's (1991) contribution, resources can be classified into three categories: physical resources (technology, equipment, geography location, among others), human capital (training, experience, judgement, intelligence, relationships) and organisational resources (structure, controlling and coordinating systems, internal and external relations). Generally, firms' resources include assets, capabilities, processes, information, knowledge, and others. The author posited that competitive advantage is established when resources and capabilities are valued to exploit opportunities and nullify threats, when resources are rare among potential competitors, when they are difficult to imitate or imperfectly imitate, or when resources are difficult to substitute. Barney concluded with the same logic that Wernefelt, that organisations' management of such resources impacts their performance and determines a company's competitive advantage.

Figure 3.4 depicts the conceptual model proposed by Barney (1991). As mentioned earlier, the author settled that firms that possess valuable and rare resources would attain a competitive advantage and improve performance in the short term. The second part of Figure 3.4 depicts that for a sustained advantage over time, a firm's resources should also be inimitable and non-substitutable.

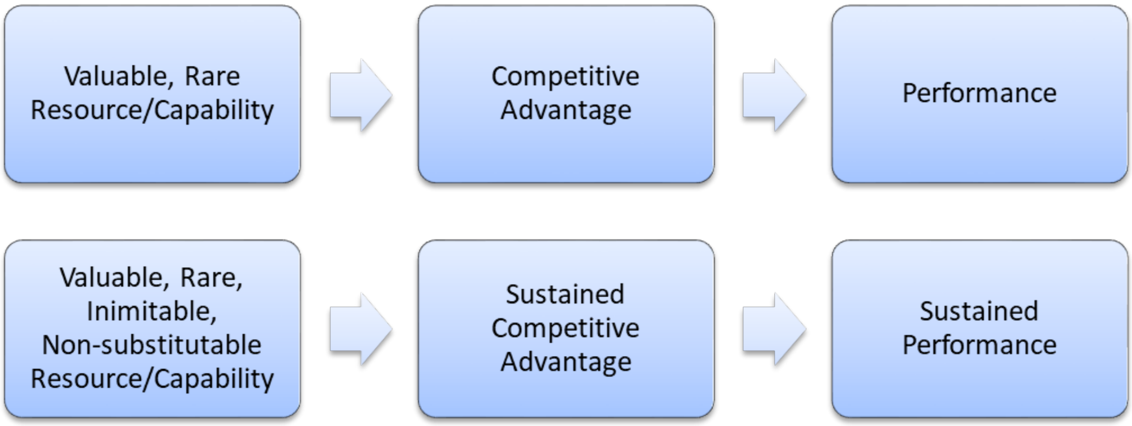


Figure 3.4: Barney's (1991) conceptual Model

Firms have focused on developing and strengthening capacities to adapt their skills, knowledge and dynamism. Through a complex combination of previously mentioned capacities, firms reconfigure and integrate processes, routines, technologies and personal skills to obtain superior performance. Accordingly, core competencies should be valuable, rare, imperfectly imitable and non-substitutable. They are developed through the complex bundles of tacit and explicit knowledge, skills, technologies, collective learning, employee skills, management systems and the value system, contributing to competitiveness and increasing performance in organisations (Theriou et al., 2009; Wang et al., 2004).

Peter Drucker refers to core competencies as part of an organisation's personality. Core competence is an ability to do something others cannot or find difficult to do, even poorly (Drucker, 2003). To maintain a leadership position and manage core competencies, the author recommended that firms be aware of their own and competitors' performances. Special attention must be paid to unexpected success that indicates a leadership advantage; on the contrary, unexpected poor performance indicates either weakened core competencies or changes in the market.

For Prahalad and Hamel (1990), "*core competencies are the collective learning in the organisation*", involving many levels of people and functions to deliver value with a deep commitment and communication across organisational boundaries. The authors affirmed that, unlike physical resources that diminish over time and use, core competencies are strengthened and developed to the extent that they are applied and shared; however, it is critical to nurture them. In addition, the authors asserted that a core competence functions as an engine to widen access to different markets, significantly contributing to the customer's perceptions about the benefits of their product or service and making imitation more complicated to their competitors. Therefore, the authors proposed the creation of a strategic architecture of core competencies that aims to identify and commit to the core competencies development. The creation of such strategic architecture depends on resource allocation and administrative infrastructure that facilitates developing and strengthening core competencies while nurturing a willingness to share resources and protect developed skills. Finally, a core competence empowers businesses to adapt quickly to changing opportunities; companies who did not invest in growing their core competencies have a high risk of not entering emerging markets.

Other essential resources at individual and organisational levels are capabilities. Based on Newbert (2007), to develop capability, a firm must improve a specific capacity using organisational processes through complex interactions among the resources that are owned and controlled by it. Capabilities are tangible or intangible processes, usually information-based and knowledge-based, enhanced through knowledge-sharing activities performed by the firm's human capital. Theriou et al. (2009) posited that because knowledge is not directly observable or measured, firms' and employees' capabilities, expressed through observable actions, represent the existence of specific knowledge. The authors affirmed that by developing distinctive and unique capabilities, firms can build a potential strategy for establishing a sustained competitive advantage.

Previously mentioned contributions and concepts related to fostering critical resources, core competencies and capabilities to enhance organisational performance have favoured the line of research from the behavioural and sociological paradigms for determining the organisation's success over the economic tradition. For example, Hansen and Wernerfelt (1989) evaluated a model of firm performance integrated with the economic and organisational paradigm. Both paradigms and their factors contributed to organisational performance in conjunction or individually. However, the results showed that organisational factors such as organisational structure, communication flow, decision-making practices, skills, rewards, and information systems and their relation with the environment explained substantially more performance than economic factors. Furthermore, the authors emphasised the influence of managers on individuals in promoting a context where psychological, physical and sociological factors interact from individual and organisational levels contributing to performance.

Because the Resource-based View has amply contributed to understanding how unique or critical resources enhance a firm's growth and extend its competitive advantage, an important body of studies has been developed to evaluate such interactions. Table 3.1 shows a categorisation provided by Newbert (2007) of the different analysed independent and dependent variables to evaluate the relationships supported by the RBV. First, the author categorised the variables in resources, capabilities and core competencies. Then, the author systematically evaluated the results of articles categorising the impact on performance, competitive advantage, sustained performance and sustained competitive advantage that supports this theoretical perspective. Some of these studies analysed the relationships between resources, performance, and sustained advantages.

Table 3.1: Independent and dependent variables analysed in Newbert (2007)

Variable	Studies #	Supported #	Supported %
Independent variable			
Specific resource	232	85	37%
Specific capability	161	114	71%
Specific core competence	24	16	67%
Capability and Organisation	72	40	56%
Inimitability	20	14	70%
Competitive advantage	13	6	46%
Resource and Capability	13	5	38%
Resource and Organising context Value	3	3	100%
Rareness	3	3	100%
Organising context	2	2	100%
Dependent variable			
Performance	363	173	48%
Competitive advantage	154	91	59%
Sustained performance	24	24	100%
Sustained competitive advantage	8	4	50%

For example, Hatch and Dyer (2004) and Powell and Dent-Micallef (1997) supported the RBV with empirical evidence that evaluated the relationship between human resources and processes of learning for developing human capital that embodies firm-specific tacit and inimitable knowledge. The authors found that organisational learning and firm performance significantly improved by managing the selection, development, and deployment of human capital. The authors concluded that these evaluated relationships develop "*the truly sustainable advantage – the ability to learn (and improve) faster than competitors*".

Powell and Dent-Micallef (1997) developed an integrative RBV theoretical framework focused on the retail industry to analyse if ICTs produce sustainable competitive advantages. The results showed that ICTs per se do not generate sustainable performance advantages. However, findings showed that ICTs might produce advantages by merging them with other resources, for example leveraging intangible resources such as organisational leadership, business processes and organisational culture. Therefore, ICTs advantage depends on exploiting relationships among complementary organisational resources.

Chandler and Hanks (1994) established that the organisation's performance improves when there is a good fit between available resources and well-defined strategies. In other words, more or better resources will not make firms more profitable; however, when the organisation develops a distinctive competence that allows it to better use its available resources, it can be more profitable. Hence, the study proposed a relationship between resource-based capabilities, strategy, and performance. Finally, the results confirmed that the interaction between capabilities and strategies for quality and innovation is significantly related to business growth.

As it has been observed in the studies presented above, RBV facilitates understanding the interaction of resources, skills and capabilities that promote growth and the strengthening of competitive advantage. The present research incorporates these resources and capabilities as antecedents of organisational performance. With the support that the analysed evidence offered, it is interesting to evaluate in a healthcare setting that a set of identified critical resources interacting with knowledge capabilities enhance organisational performance.

3.2.5 The Knowledge-Based View of the Firm

The Knowledge-Based View of the Firm (KBV) is an extension of the Resource-Based View developed mainly under two perspectives. One perspective asserts that knowledge is the most important strategic resource for firms closer to the RBV assumptions. In that sense, intangible assets considered intellectual capital, are highly valued. From this perspective, knowledge resources should be difficult to imitate to ensure a sustained competitive advantage. The second perspective is based on the importance of collective knowledge (tacit and social), considering that knowledge is distributed across firms' members. Therefore, this KBV perspective states that organisations exist to generate, transform, and transfer knowledge into a competitive advantage (Curado, 2006; Theriou et al., 2009). The previous assertions are derived from Spender (1996), Grant (1996) and Foss (1999), who contributed to KBV, highlighting that knowledge is distributed across firms' members and does not reside in one person's head. Therefore, knowledge is a social construction process.

Spender's contribution (1996) emphasised that the company is a complex system of knowledge activity that provides meaning and a basis for communication between people. Furthermore, in this adaptive and evolutive system knowledge is applied and produced through interaction between its members and the external environment. Therefore, the role of managers is critical to identify the internal processes of knowledge, its organisational meaning, and the institutional influences in the environment.

Foss (1999) posited that managers need to know if an employee holds the knowledge and skills to develop his or her activities and how a combination of skills occurs through interaction with other employees. This process is known as managerial meta-knowledge, a knowledge-based construct that explains the managers' capability to know what skills employees possess and how they are combined with other employees' skills. However, managers are not always expected to possess this knowledge (imperfect managerial meta-knowledge); when this occurs, managers can make wrong decisions. Therefore, managers could delegate some decisions to knowledgeable employees.

A set of pertinent characteristics of knowledge are established by Grant (1996) to emphasise critical implications for management; they are transferability, aggregation, appropriability and specialisation of knowledge.

Transferability is the mechanism for knowledge transfer across time, space and individuals. For example, explicit knowledge could be transferred via its communication at a marginal cost. Conversely, tacit knowledge can be observed via its application, acquired through practice, and its transfer is slow, costly and uncertain. Capacity for aggregation is related to the recipient's ability to add new knowledge to existing knowledge (absorptive capacity). Knowledge aggregation is facilitated when knowledge can be expressed using a common language. Appropriability is the ability of the owner of a valuable asset to receive something considering the value created by the resource. For example, explicit knowledge could be available to be sold, and anyone who acquires it can resell it without losing it, except when patents and copyrights protect knowledge. On the other hand, tacit knowledge cannot be directly transferred; this type of knowledge could only be appropriate through its application in productive activity.

Specialisation in knowledge acquisition refers to knowledge creation requiring a greater specialisation in particular areas of knowledge than what is required for its utilisation. In terms of production, the KBV considers knowledge as a critical input and primary source for production that requires a coordination of efforts between different specialists with different types of Knowledge (Grant, 1996).

Knowledge workers deal with complex matters by having updated knowledge within their area of speciality and applying it through their capacity to make informed decisions and undertake meticulous analyses for solving problems. Some characteristics of knowledge workers' work may be unpredictable, usually it has very little structure, and it is often multi-disciplinary and non-repetitive. Therefore, their tasks cannot be standardised; they may need to collaborate with other co-workers, use new technologies and apply theoretical and analytical knowledge previously acquired through formal education to develop new knowledge. Organisations deal with the challenge of retaining valuable knowledge by encouraging knowledge workers to share their knowledge with other members, but it is known that this process implies a great deal of effort. Therefore, organisations should create a culture where individuals share knowledge and provide a supportive environment for the knowledge worker to be comfortable and productive, facilitating learning and providing the opportunity to contribute to innovation and creation. Even though knowledge workers are independent, they expect support; therefore, managers' behaviours should promote cooperation, encouraging teamwork and sharing of knowledge between departments (Jayasingam et al., 2016).

This research is aligned with the firm's vision as a complex and adaptive system of knowledge driven by the interaction between its members and the external environment. This research also consider that adopting both RBV and KBV perspectives facilitates the integration of resources and capabilities within a system that promotes the generation and application of knowledge. This integration was previously studied by Theriou et al. (2009), who proposed a composite framework where both perspectives, RBV and KBV, seek to explain the sources of competitive advantage in a complementary way through their effects on performance and the sustained competitive advantage in firms. Figure 3.5 schematically depicts the proposed composited framework and its direct and indirect effects. The framework includes three relations: a strategy for achieving higher performance, firm-specific assets, and capabilities for achieving sustainable competitive advantage and sustainable performance. The authors affirmed that the two approaches of RBV and KBV integrated into the proposed model, complement each other and better explain the generation and sustainability of competitive advantage through their effects on performance.

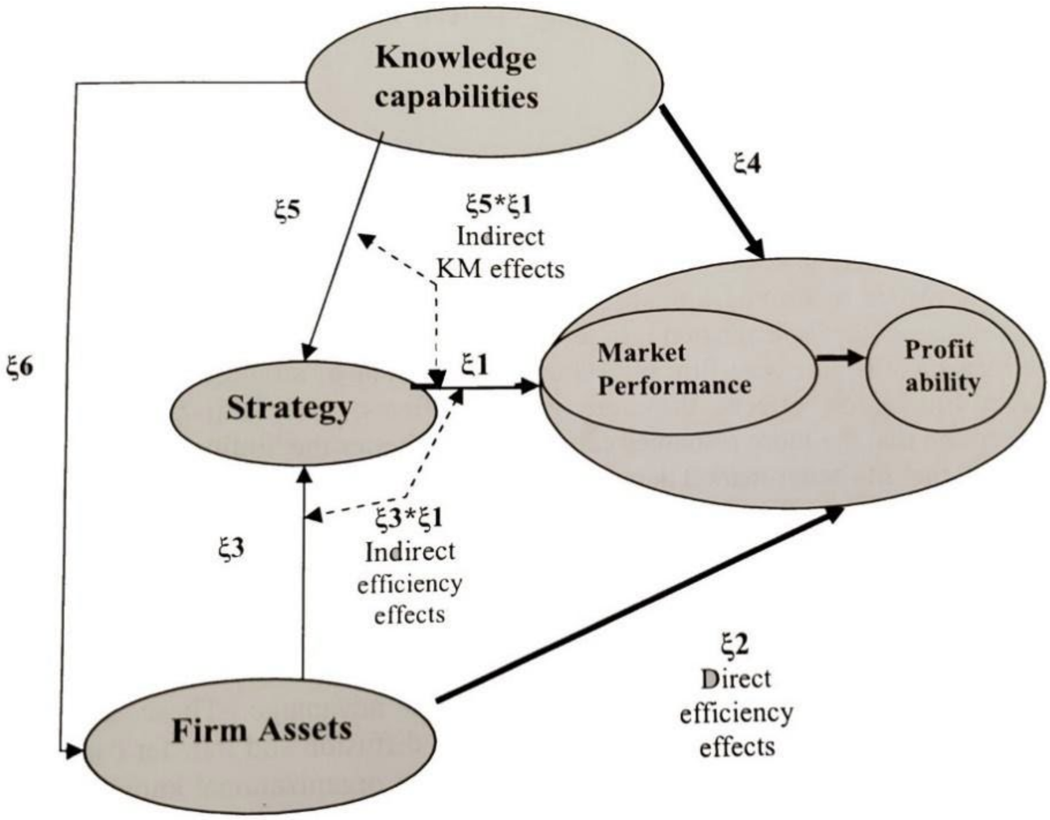


Figure 3.5: Composite Model RBV and KBV from Theriou et al. (2009)

From this perspective firms are institutions for knowledge application through implementing processes to know what employees know and integrating individuals' specialised knowledge. Therefore, considering the revised theoretical foundations both RBV and KBV were incorporated in the theoretical framework in order to establish the relationships between the present research constructs. Based on the revised evidence, integrating both perspectives will facilitate understanding the relationships between critical resources and knowledge-centred capabilities to evaluate their impact on organisational performance.

Finally, through the past sections the theoretical foundations that facilitate the interpretation of a body of concepts have been approached in order to build a model to comprehend how critical resources and the knowledge processes of health specialists interact and enhance the exchange and generation of knowledge to improve patient safety.

3.3. The theoretical models and hypothesis development

A graphic element called framework is used to clearly represent the particular phenomenon, its relationships and its causal factors to be analysed. A framework is a graphical representation of a system of relationships to identify the effects between independent and dependent variables. The straight-lines highlight the impact of independent variables on dependent variables, and the curved lines establish a correlation between variables (Hair et al., 1999). This graphical element is called a path diagram, its origins date from 1921 as a contribution of Sewell Wright, an American geneticist. The path diagram communicates abstract statistical models clearly and efficiently, pointing out the linear relationships among variables. It is easier to comprehend and less intimidating than an algebraic system of equations (Hoyle, 2012). As argued in Chapter One, considering that Knowledge Management is a field that integrates different disciplines, theories and practical experiences, the framework of the present research is supported by multiple perspectives (Technological, Socio-Technical, and Socio-Cognitive perspectives). Therefore, the framework of the present research is supported of six variables. It is evaluated through three conceptual research models to understand how the Knowledge Management capabilities of healthcare professionals and the safety of patients are impacted by a conjunction of factors from different perspectives of knowledge.

The framework evaluates four independent variables and two dependent variables. Organisational Enablers that support KM and Organisational Performance measured by Patient Safety are developed from the Resource-Based View from Penrose's (1959) and Barney's (1991) contributions and adapted from Curado (2006), Monavvarian and Kasaei (2007), Pham and Swierczek (2006). Culture of Collaboration is based on The Social Exchange Theory from Blau (1964) and adapted from Chan (2003), Korst et al. (2011), Lucas (2010), Shim (2010). Knowledge-Sharing Behaviour is based on the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and its extension, the Theory of Perceived Behaviour (TPB) (Ajzen, 1985) adapted from Bock et al. (2005), Goh (2001), Lucas (2010) and Shim (2010). The Technology Acceptance construct is based on the Technology Acceptance Model (TAM) developed by Davis (1989) and adapted from Aggelidis and Chatzoglou (2009), Chen and Hsiao (2012), Dünnebeil et al. (2012), Pai and Huang (2011), Tung et al. (2008), Yarbrough and Smith (2007). Finally, the Knowledge Process Capability construct is based on the KBV as an extension of the RBV. Items are adapted from Gold et al. (2001), and Lee et al. (2012).

For Model 1, factors such as Organisational Enablers of Knowledge Management (OE), Culture of Collaboration (CC), Knowledge-Sharing Behaviour (KSB), Technology Acceptance (TA), and Knowledge Process Capabilities (KPC) are modelled as predictor variables of the Organisational Performance construct (OP). Model 2 is a simple mediation model where the Knowledge Process capabilities variable is the mediator between OE, CC, KSB and TA with OP. Finally, Model 3 is a multiple mediator model using KSB and KPC as the mediator variables between OE, CC, and TA with OP.

The proposed models represent the relationships between six constructs described in the next section. The evaluated relationships between them are based on the Resource-Based View and the Knowledge Based View described in sections 3.2.4 and 3.2.5.

3.3.1. Organisational Enablers of Knowledge Management (OE)

In a Knowledge Management context, an organisational structure should maximise attributes to promote learning and knowledge (Pham & Swierczek, 2006). Organisational Enablers of KM refer to how an organisation governs and implements its strategies and defines roles and rules to transform itself into a knowledge-based organisation.

Past research has shown that the organisational factors that drive Knowledge Management strategies are diverse. The evidence from these studies proved to identify a group of frequently studied organisational enablers to understand how they develop, relate to each other, and contribute to KM strategies and organisational goals. Three of the studies identified were developed in organisations that have adopted knowledge management strategies, and two were developed within the framework of strategies to promote organisational learning.

The studies by Lee et al. (2012) and Yin et al. (2020) are similar in analysing the behaviours and relationships of various factors in developing knowledge processes and their impact on organisational performance. For its part, the study by Korst et al. (2011) focused on information and best practices transfer to enhance the quality of care and respond more efficiently to emergencies.

While Yin et al. (2020) analysed factors such as transformational leadership and teamwork, Lee et al. (2012) included other factors such as decentralisation of the structure and top management support. Additionally, the authors analysed other factors such as the culture and the support provided by the technological infrastructure. Similarly, Korst et al. (2011) analysed the leadership support, the incentives to join the collaboration, and the design of policies and work strategies to promote a shared vision of the relevance of the exchange of information.

The contribution of the study by Goh and Richards (1997) has been instrumental because it analysed the characteristics of the learning organisation. Within these, there are organisational enablers such as clarity of purpose and mission, leadership commitment, teamwork and problem-solving groups. Jyothibabu et al. (2010) also analysed teamwork and the construction of a process to create and develop a shared vision as enablers of individual learning; the role of leadership and empowerment were analysed as enablers of group learning, among others.

The studies have similarities in specific organisational enablers, even though some carry out their analysis at the organisational level and others at the individual level. Studies showed that factors such as shared vision and purpose, teamwork, and leadership support are organisational enablers that contribute to learning-focused strategies or Knowledge Management strategies. The evidence provided by the studies mentioned above is supported by validated samples, instruments and robust statistical analyses that facilitated the evaluation of the factors and their relationships. The studies by Korst et al. (2011) and Yin et al. (2020) demonstrated that organisational and transformational leadership promote successful participation in information exchange within organisations and international contexts. Similarly, Lee et al. (2012) states that top management leadership's support drives knowledge process development along with other factors such as collaboration, learning culture and technological support. Yin's study (2020) also stated that the effectiveness of teamwork mediates the relationship between leadership and the ability to share knowledge. Considering the context analysed by Goh and Richards (1997), the authors argued that private organisations, according to their size, reduce the need for formalisation and bureaucracy. On the other hand, in the federal government sphere, the study reaffirmed the restrictive nature of this environment in relation to experimentation, knowledge transfer, clarity of purpose and leadership.

In general, and supported by the evidence, organisational enablers are a critical factor in developing knowledge capabilities either at the individual or organisational level, in both public and private settings. In addition, its direct or mediating contribution to improving the organisation's performance has also been evidenced.

As mentioned before in section 3.2.4, according to the RBV and its extension, the KBV, the relationship between resources and capabilities improves performance and strengthens the firm's competitive advantage; therefore, organisational enablers, their relationships and their impacts are founded on RBV and KBV.

Thus, the following hypotheses are suggested:

> H1a. A higher level of Organisational Enablers will lead to a greater improvement in Organisational Performance on Patient Safety.
>
> H1b. A higher level of Organisational Enablers will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
>
> H1c. A higher level of Organisational Enablers will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.

3.3.2. Culture of Collaboration (CC)

A Culture of Collaboration refers to a shared set of underlying beliefs and values that employees adopt in organisations affecting their behaviours, actions and expectations towards collaboration and knowledge transfer (Sveiby & Simons, 2002). A Culture of Collaboration enhances the organisation's ability to transform the natural tendency to hoard knowledge into the willingness to share knowledge between group members, at the same time facilitating the process of learning and increasing individuals' and the firm's capabilities (Mahmoudsalehi et al., 2012; Pham & Swierczek, 2006).

The literature review has allowed to identify that collaboration is a fundamental factor for organisations based or not on knowledge strategies to achieve their objectives more effectively. However, collaboration is critical for knowledge-based organisations or those that aim to develop a knowledge-based competitive advantage. The study about the Culture of Collaboration has been widely developed analysing different forms of promoting it and the different ways of developing the characteristics at the individual and organisational levels that enhance such culture. Some examples of past studies analysed this construct as an enabler of knowledge management strategies (Lucas, 2010; Shehzad et al., 2022) and a promoter of innovation capability (Le et al., 2020; Shehzad et al., 2022). Le et al. (2020) analysed the culture of collaboration and knowledge-sharing as potential factors that nurture and drive innovation capability, which lets organisations adapt to changes flexibly and effectively to take strategic advantage of market opportunities. Additionally, the authors analysed the culture of collaboration as an essential antecedent to stimulate the knowledge-sharing capabilities among employees that impulse the innovation capability.

Similarly, Shehzad et al. (2022) analysed the Culture of Collaboration as a factor that contributes directly to innovation, strengthening the differentiators that allow the organisation to maintain leadership over its competitors. Also, they analysed the mediator effect of the knowledge processes between the Culture of Collaboration and innovation capability. Lucas (2010) analysed the employees' desire and commitment to cooperate actively promoting knowledge sharing. Similarly, Lei et al. (2019) analysed the direct effect of the Culture of Collaboration on the ability to share knowledge; they also analysed the culture of collaboration as a mediator between ethical leadership and the development of employee behaviour toward knowledge sharing.

Although some of the referenced studies are from the innovation field, their findings are valuable for the present research because Knowledge Management and Innovation are intertwined concepts. These concepts are related because knowledge and knowledge processes stimulate innovation capability and because knowledge is the base of the innovation process.

The results of these studies affirmed that the Culture of Collaboration directly contributes to the development of the knowledge process (Shehzad et al., 2022) and increases innovation capability (Le et al., 2020). Furthermore, both Lucas (2010) and Lei et al. (2019) stated that the culture of collaboration directly influences the development of knowledge-sharing capability; they also found that a work environment that constantly promotes collaboration contributes to improving organisational performance.

Since one of the main enablers of a culture of collaboration is the individuals' behaviour to exercise reciprocal and cooperative actions, the Social Exchange Theory facilitates understanding this construct. Furthermore, as was mentioned in section 3.2.1, Social Exchange Theory establishes that reciprocal actions and social exchange relationships will be developed if employees associate the organisation with a supportive atmosphere (Shim, 2010).

Based on the evidence analysed about the contribution of the Culture of Collaboration, this construct is part of the variables integrated into the model of the present research a potential factor for promoting the development of knowledge capabilities and improving organisational performance.

Thus, the following hypotheses are suggested:

> H2a. A higher level of Culture of Collaboration will lead to a greater improvement in Organisational Performance on Patient Safety.
>
> H2b. A higher level of Culture of Collaboration will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
>
> H2c. A higher level of Culture of Collaboration will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.

3.3.3. Technology Acceptance (TA)

The literature review has allowed to identify technology's fundamental role in optimising processes and as a factor that boosts the organisation's performance. Similarly, in knowledge-based organisations, technology promotes the knowledge processes and the defined strategy for the organisation to establish its competitive advantage based on knowledge.

This research accepts Holsapple (2005) argument based on the exclusive and identification perspectives that while technology closely supports KM, other factors such as people, processes, and knowledge-based tasks strongly drive KM.

Although it is suggestive but incorrect to think that a KM strategy can be implemented only through technology, its role as a factor that enhances KM from practice and research is undeniable. Nevertheless, as suggested throughout the literature review, it relies on people, their acceptance and ability to use it, that the technological implementation meets the objective of promoting knowledge processes.

In a healthcare setting information technology can significantly improve the quality of healthcare services, provide timely and accurate information that improves effectiveness and efficiency in treatments and personnel administration, reduce the incidence of adverse events, and reduce organisational expenses (Aggelidis & Chatzoglou, 2009; Dünnebeil et al., 2012; Wu et al., 2008). Therefore, as suggested before, it is crucial to determine healthcare professionals' acceptance of technology to successfully implement a Knowledge Management strategy strongly supported by a Hospital Information System.

Findings of the systematic review performed by Yarbrough and Smith (2007) affirmed that the Technology Acceptance Model (TAM) had been a reliable and robust theoretical foundation for empirical studies aimed at analysing how people perceive usefulness and accept using technologies in their work processes. Other studies have used the DeLone and McLean model to evaluate the success of an information system. Their analysis is based on the quality of the system and the information as enablers for use, satisfaction, and impact at the individual and organisational levels (DeLone & McLean, 1992). The present study prioritises the analysis of the individuals' motivations (perception, attitude and intention) over the technical (quality of the system) and semantic dimensions (quality of the information) for the acceptance and use of technology. The present research argues that although the technology could be installed and the organisational policies establish the obligatory nature of its use, it relies on the behaviours and attitudes of people to make efficient use of such technology, as was mentioned repeatedly.

Evidence from past studies has allowed to identify the importance of Technology Acceptance as one of the critical factors in driving a knowledge management strategy. Valuable evidence was obtained both in studies in the field of information systems from a technological perspective and in studies in the knowledge management field integrating technical and social dimensions.

For instance, Lau (2011) analysed the intention of using Web tools to promote knowledge sharing, learning, and collective intelligence in the nursing domain. Wu et al. (2007) and Wu et al. (2008) analysed the determinants for the acceptance of a mobile health system and an adverse event reporting system, respectively. Melas et al. (2011) analysed the intention to use a clinical information system among physicians in public and private hospitals. All studies used advanced statistical techniques such as the structured equation model to analyse data collected through surveys and validated instruments. The studies mentioned above used the Technology Acceptance Model as the theoretical foundation to analyse the selected factors. The studies analysed three variables in common: the perception of usefulness, ease of use and behavioural intention. The first variable refers to the degree to which people believe their job performance will increase by using an information system or computer-based application with sufficient quantity, quality, clarity, and data accuracy. The second variable refers to the degree to which people believe using a computer system will require as little effort and time as possible. Finally, the third variable refers to the actual use of an information system or technology, determining technology acceptance. The authors Lau (2011) and Wu et al. (2007) additionally analysed the incorporated variables in the Decomposed Technology Acceptance Model related to processes of social influence and instrumental cognitive processes such as compatibility, self-efficacy and subjective norm. The evidence in each study reaffirms that the intention to use technology positively relates to usage behaviour. Also, the perception of usefulness and the perception of ease of use are determining factors in promoting such behaviour; furthermore, the studies evidenced that the perception of ease of use affects the perception of usefulness. Additionally, subjective norm (Lau, 2011; Wu et al., 2008) and self-efficacy (Wu et al., 2007) are essential antecedents to promote the behaviour of the use of technology.

Important assertions for the present research emerge from these studies. Wu et al. (2007) suggested a noteworthy difference between public and private hospitals regarding the ability to implement new technologies. The authors recommended that public hospitals strengthen their capacity to plan and implement the technological and information infrastructure required to generate their competitive advantage. Additionally, the authors state that younger employees who recently joined, and with less experience, showed greater mastery and confidence in using the new technology.

Healthcare professionals are critical patient service providers and primary users of hospital technology and information systems. Therefore, understanding the acceptance behaviour takes significant importance for two main reasons: first, to ensure that any effort for developing and implementing HIS will be successful; and second, to accomplish the objective of providing timely and accurate information that improves effectiveness and efficiency in managerial, operational and particular healthcare tasks at a reasonable cost Chen and Hsiao (2012).

Revised evidence showed that users' behavioural intention to use technology in the health sector is a determinant factor for successfully implementing technology and information systems. Since the technology factor enhances the knowledge processes, it is essential for the present research to acknowledge how people develop intention and behaviour in favour of Technology Acceptance. Therefore, the following hypotheses were defined:

> H3a. A higher level of Technology Acceptance will lead to a greater improvement in Organisational Performance on Patient Safety.
>
> H3b. A higher level of Technology Acceptance will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
>
> H3c. A higher level of Technology Acceptance will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.

3.3.4. Knowledge-Sharing Behaviour (KSB)

Knowledge Sharing is a behaviour to spread or disseminate the valuable knowledge acquired through time from person to person; it is part of a KM strategy where converting individual knowledge into organisational knowledge is one of the primary concerns (Ryu et al., 2003).

Technology is strongly related to this knowledge-sharing process. IT-based systems facilitate the capture and utilisation of knowledge. This type of application, known as a knowledge-sharing environment (KSE), is based on agents that process knowledge and program to deliver contextual information based on the individual or group's needs and are interconnected through different internal and external electronic resources. In addition, adaptive agents execute the task of updating the interest or disinterest in users' profiles (Merali & Davies, 2001).

However, without downplaying the contribution of technology to this process, it is of particular interest to understand how individuals perform knowledge sharing and how they develop the capacity to share knowledge with another person even though the development of knowledge is critical, valuable and essential for him or herself.

A better understanding of the mechanism to adopt a new behaviour is valuable and very important for clinical practice. Therefore, understanding the determinant factors of performing a specific behaviour, such as knowledge sharing, in healthcare professionals could contribute to more effective and efficient patient care (Godin et al., 2008).

Lee and Hong (2014) posited that hospital organisations are the most complex organisations in the modern world. A large amount of information, skills, knowledge, decision-making processes and networks are part of the intellectual assets that require an effective Knowledge Management strategy. It is also important to change employees' attitudes toward hoarding knowledge into behaviours towards knowledge-sharing by identifying their intention and motivators to perform such behaviour.

Experiences from healthcare institutions in developed countries such as Canada and the UK have designed a prominent strategy for supporting learning, innovation and improvement within healthcare services: knowledge brokering. This strategy aims to contribute to healthcare improvement by the diffusion of research evidence into clinical practice along with organisational departments and clinical teams. Knowledge brokers' functions are embedded into different actors, such as technologies, objects and people that facilitate the translation, coordination and alignment between unconnected actors, sharing the knowledge of one community to be used by another. These actors support, among other things, knowledge sharing and capacity building, facilitate social engagement and learning, identify and seize opportunities and mediate the boundaries between communities (Waring et al., 2013). The creation of this new role in organisations shows the importance of promoting knowledge sharing at the different levels of the organisation, including with external actors. Furthermore, when people show attitudes and behave in favour of knowledge sharing, it also promotes the culture of collaboration and the cycle of knowledge, enhancing the capacities of individuals and the organisation.

Today, organisations increase their efforts to implement KM systems and effective practices to share and use the knowledge that people and they possess. Also, organisations provide facilities such as equipment, systems, databases, training, and other technological facilities to interchange information and knowledge; however, employees are the ones who decide whether to share knowledge (Tohidinia & Mosakhani, 2010).

Therefore, empirical evidence has been relevant to determine the importance of people and their motivations at the individual level to develop knowledge-sharing capabilities and the contribution of this capability to the organisation's sustained performance.

In section 3.2.2, two essential theories of the social psychological field were introduced: the Theory of Reasoned Action and the Theory of Planned Behaviour. These theoretical foundations have proven to be useful in predicting various behaviours in social settings, as demonstrated by the studies mention next. Reychav and Weisberg (2010), Mafabi et al. (2017), Ryu et al. (2003), and Bock et al. (2005) evaluated knowledge-sharing behaviour based on TRA and TPB and used a series of statistical analyses to support their findings. The central concept of these studies is the behaviour to spread the knowledge that individuals possess and share it with other members of the organisation. Because the studies were based on the same theoretical foundation, they analysed common aspects such as attitude, intention, subjective norm and perception of control as behavioural antecedents to sharing knowledge. However, the studies analysed additional variables that explored other factors that precede and promote knowledge-sharing behaviour. For instance, in Reychav and Weisberg (2010), intention and behaviour were split into the intention to share explicit and tacit knowledge and explicit and tacit knowledge-sharing behaviour.

The results suggested that companies should implement methods to promote knowledge sharing by strengthening the ability to create, store and use explicit knowledge and promote the exchange of tacit knowledge through interaction between people. Such results reaffirm the understanding that knowledge process and knowledge-sharing behaviour are related factors; in the same way, interactions promoted by a culture of collaboration boost knowledge-sharing behaviour.

Mafabi et al. (2017) incorporated a dimension to assess the willingness to provide valuable and useful information to another person who requires such information (knowledge donation). Additionally, they evaluated the dimension that measures the ability to request useful information from someone who has what is needed (knowledge collection). Similarly, to the previous study, the present research has identified that knowledge-sharing behaviour and knowledge process capabilities are related variables.

Bock et al. (2005) added extrinsic motivators such as rewards to their analysis; however, unlike other studies, this dimension did not significantly affect the intention to share knowledge. The authors also analysed the organisational climate, particularly equity, affiliation, and innovation dimensions. The findings of this study suggested that organisations should create a context and positive attitudes for knowledge sharing and prepare cultural factors to promote the ability to share knowledge within the organisation.

The studies mentioned above demonstrated that the dimensions and relationships established by TRA and TPB efficiently predict knowledge-sharing behaviour. Also, the relationship of knowledge-sharing behaviour with other dimensions, such as the culture of collaboration and knowledge processes, was evidenced.

Based on the previous argumentation, the following hypotheses are suggested:

> H4a. A higher level of Knowledge-Sharing Behaviour will lead to a greater improvement in Organisational Performance on Patient Safety.
>
> H4b. A higher level of Knowledge-Sharing Behaviour will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.

3.3.5. Knowledge Process Capabilities (KPC)

Based on the Knowledge-based View (KBV), companies recognise and consolidate their knowledge assets and capabilities as an aggregation of resources representing the main source of their competitive advantage (Mills & Smith, 2011). For KBV, organisations and employees generate unique capabilities and core competencies by creating, storing, sharing and deploying all necessary knowledge to develop their functions and tasks. This set of key activities is called the Knowledge Process Capability (Theriou et al., 2009; Zaim et al., 2007).

In organisations, knowledge could be dispersed along different locations, mainly in people's minds. However, depending on the level of KM implemented initiatives, knowledge is disseminated in processes through corporate culture, procedures, and workflows and stored in different types of media such as disks, optical media, and cloud servers among others. Knowledge process capability is a dynamic process leading to changes in behaviours, practices and policies, and changes in the competitive environment (Zaim et al., 2007). Shendel (1996), cited by Merali (2000), posited that "*It is the process of learning rather than what is learned, meaning that the capacity to develop organisational capability may be more important than the specific knowledge gained*". Therefore, it is understood that generating Knowledge Process Capabilities is the most valuable advantage to be developed more than the accumulation of knowledge by itself.

Knowledge process capability (KPC) has been analysed as a factor that directly affects the performance of a KM strategy or directly influences organisational performance. Furthermore, KPC has also been analysed as a mediator factor between various organisational capabilities and organisational performance. The studies by Zaim et al.

(2007), Mills and Smith (2011), and Wu and Hu (2012) adopted the capabilities proposed by Gold et al. (2001) to analyse their effect in terms of effectiveness or organisational performance. As was mentioned in Chapter One, section 1.2, such capabilities are infrastructure capabilities (structure, culture and technology) and knowledge process capabilities (knowledge acquisition, conversion, application, and protection). Regarding knowledge process capabilities, the ability to identify, acquire and accumulate knowledge is known as knowledge acquisition. The knowledge conversion process refers to the ability to convert data into information and information into knowledge. The ability to make knowledge active and relevant for creating organisational value is known as knowledge application. Finally, through knowledge protection, organisations can ensure the integrity of knowledge assets through security protocols and the establishment of permissions and authorisation levels for access to knowledge assets.

Although some of the previously mentioned authors proposed certain variations or emphasised specific characteristics of knowledge processes, the categories proposed by Gold et al. (2001) incorporate the characteristics contemplated by such studies. For example, Chang and Lin (2015) analysed knowledge creation and storage which are integrated into the previously described knowledge acquisition process. On the other hand, Wu and Hu (2012) additionally analysed knowledge integration which refers to the way of assimilating the transferred knowledge into the existing knowledge of the individual, which is similar to the knowledge application process suggested by Gold et al. (2001). Because it is a widely used reference and the various characteristics of knowledge processes are widely covered, the knowledge processes capability established by the Gold et al. (2001) model were adopted in the present research.

According to the results and the nature of the evaluated models (integrated or decomposed) in the studies mentioned above, knowledge processes directly impact the effectiveness of a KM strategy or organisational performance. For example, the decomposed model evaluated by Mills and Smith (2011) identified that the acquisition, application and protection processes directly impact organisational performance. However, the knowledge conversion process did not show any influence on performance. On the other hand, in the integrated model of Gold et al. (2001), it is evidenced that both the knowledge process and the knowledge infrastructure capabilities influenced organisational effectiveness. In the same way, in the study by Zaim et al. (2007), both capabilities directly influence the performance of KM practices.

Concerning the studies that analysed the impact of other organisational capabilities on the knowledge process, Wu and Hu (2012) posited that human, organisational and information capital positively affect the development of knowledge process capabilities. Furthermore, Chang and Lin (2015) stated that specific dimensions of the organisational culture (results-oriented, tightly controlled and job-oriented) directly influenced the knowledge processes capabilities of individuals. In other words, the authors argued that organisational culture inhibits or enables the individual's intention to perform knowledge processes.

In this research, the KPC construct was adopted to be analysed as a capability developed at an individual level because individuals decide whether to adopt the processes mentioned: knowledge acquisition, knowledge conversion, knowledge application and knowledge protection. Therefore, the following hypothesis is suggested to evaluate Knowledge Process Capabilities as a source of sustained performance:

H5a. A higher level of Knowledge Process Capabilities developed by Healthcare Professionals will lead to a greater improvement in Organisational Performance on Patient Safety.

3.3.6. The effect of moderators

Baron and Kenny (1986), cited by Hoyle (2012), defined a moderator variable to be a "*variable that affects the direction and/or strength of the relationship between an independent or predictor variable and a dependent or criterion variable*". Conversely, generalisation is the opposite of moderation; for example, this occurs when the effect of an intervention is the same across genders (the same for males and females).

Interactions between a categorical manifest variable and a latent variable refer to the impact of users' demographic characteristics such as gender, race, school type, education level, occupation, years of practice, and immigrant status, among others. Multi-group structural equation models are applied for this type of interaction to conduct the analysis.

In the Knowledge Management field, studies have analysed the effect of age, gender and other demographic characteristics. For example, in Witherspoon (2013), gender and national culture were evaluated as moderators of knowledge-sharing antecedents, intention and behaviour. Nguyen (2019) investigated the moderation roles of individual characteristics, organisational contexts and cultural contexts in the motivation and knowledge-sharing relationship.

After reviewing various empirical studies developed in the context of Knowledge Management, the present research considered incorporating the multi-group analysis of two characteristics captured in demographic data, which have been widely studied; these are gender and years of practice.

A- Gender moderation impact

The multi-group analyses made it possible to identify whether the effects analysed are influenced according to the gender of the people. For example, concerning knowledge-sharing capability, the results of Nguyen (2019) showed that women are more sensitively motivated to share knowledge than men. The authors argued that some causes are that women and men respond differently to external stimuli or that women tend to have more communal attributes (altruism). Regarding the intrinsic factors to promote Knowledge-Sharing behaviours, self-efficacy on KS was a stronger motivation factor in female-dominated samples. However, self-enjoyment was a more important motivation factor in male-dominated samples. For extrinsic motivation factors, gender did not significantly affect the relationship between motivation and knowledge sharing. Additionally, in Witherspoon (2013), the influence of gender on KS behaviour and KS intention indicated no gender effect.

Referring to organisational culture, one of the factors widely studied in knowledge management, the study by Atapattu (2014) showed a difference between males and females regarding the intensity of transcendence values. Therefore, it can be expected that females are more motivated to engage in KM-related activities through teamwork than males, and males are more motivated to engage in KM-related activities through incentives than females.

There may be many causes of these variations in the results of the different studies; however, capturing the influence of physical, psychological and behavioural characteristics related to gender help to take into account differences in knowledge-sharing behaviour. Therefore, for the present study, the following hypotheses are suggested:

H6a: The effect of Organisational Enablers, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour and Knowledge Processes Capability on Organisational Performance in terms of Patient Safety are moderated by gender.

In more detail, the resulting subset is the following:

H6.1 The effect of Organisational Enablers on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for men).

H6.2 The effect of a Culture of Collaboration on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).

H6.3 The effect of Technology Acceptance on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for men).

H6.4 The effect of Knowledge-Sharing Behaviour on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).

H6.5 The effect of knowledge process capability on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).

B- Years of practice impact

During the literature review, there was an identification of studies that performed multi-group analyses to identify the influence of years of practice on various factors that promote knowledge management capabilities. According to Lee, Wong, and Chong (2005), the years of practice are directly related to the accumulated experience that develops knowledge, competencies, and skills to achieve robust individual job performance. Evidence from studies in the clinical area showed that years of practice are related to the quality of patient care since experience contributes to the development of knowledge, skills and competencies (Baktoft et al., 2003; Endacott et al., 2003). Previous findings are confirmed by Fulbrook et al. (2012) because their results showed that nurses from intensive care units with experience greater than five years attained better knowledge scores than those with less than two years of practice. The results demonstrated a cause-effect relationship as the more experience the more the knowledge.

Lee and Hong (2014) analysed demographic characteristics such as age, gender and work experience to understand their effects on three variables: knowledge-sharing intention, knowledge-sharing behaviour and innovation behaviour. Results showed that as workers' experience increases, innovation behaviour also tends to increase. However, results showed that there was no work experience affectation in knowledge-sharing behaviour, nor intention.

Similarly, this moderator variable (years of practice) showed inconsistency in the shared results. Nevertheless, it is crucial to analyse the effect of years of practice from the particular context this research addresses.

Thus, the following hypotheses are suggested:

H7a: The effect of Organisational Enablers, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour and Knowledge Processes Capability on Organisational Performance in terms of Patient Safety are moderated by years of practice.

In more detail, the resulting subset is the following:

H7.1 The effect of Organisational Enablers on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice)

H7.2 The effect of a Culture of Collaboration on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for less than ten years of practice).

H7.3 The effect of Technology Acceptance on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for less than ten years of practice).

H7.4 The effect of Knowledge-Sharing Behaviour on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice).

H7.5 The effect of knowledge process capability on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice).

3.3.7 Organisational Performance

Snow and Hrebiniak (1980) stated that organisational performance, also understood as effectiveness, is a complex phenomenon and its measure can vary due to different criteria, such as the organisation's purpose, the point of view from where it is measured, and the observed time, among others. The point of convergence of scholars and practitioners is that organisational behaviour (interactions between organisational factors) directly impacts performance. The authors analysed the relationship between strategy, distinctive competencies (capabilities) and organisational performance. The results showed that different strategies could respond to the particular industry's needs; however, each strategy must be supported by adequate distinctive capability to obtain high performance.

Other authors, such Felkins et al. (1993) and Ho (2008), also related Organisational Performance to effectiveness and achieving goals and objectives. Felkins et al. (1993) posited that performance is bounded by specific cultural norms and expectations for roles and actions. Therefore, it could be assessed through collective interpretations of quality, trust, service, and cooperation. Table 3.2 shows a categorisation provided by the authors for performance indicators.

One of the most popular tools for measuring performance is the Balanced Scorecard (BSC). BSC measures performance goals related to financial, customer, and learning processes, capturing the full range of Organisational Performance through a translation of an organisation's mission and vision into measurable performance goals, from work units' goals to the overall corporate objectives. Initially, BSC was created to evaluate the performance of the private sector; however, it was extended to public and non-profit organisations facilitating nonfinancial measures. One of their significant advances since the introduction of BSC is the incorporation of measurements of strategic readiness of intangible assets (Kaplan, 2009; Kaplan & Norton, 2005).

Table 3.2: Units of Change and Performance Areas from Felkins et al. (1993, p. 222)

Individual measurements	Intragroup	Intergroup
1. Work satisfaction 2. Productivity 3. Quality 4. Job knowledge 5. Organisational knowledge 6. Participation 7. Medical expense	1. Productivity 2. Quality 3. Teamwork 4. Commitment 5. Communication	1. Information exchange 2. Coordination 3. Alignment 4. Cooperation 5. Teamwork

Organisation	Social and global
1. Profitability 2. Quality 3. Productivity 4. Return on investment (ROI) 5. Shareholder equity 6. Profit and loss 7. Customer satisfaction	1. Social responsibility 2. Ethics 3. Environmental concern 4. Conservation of resources

Contributing to the measure of intangible assets, Gold et al. (2001) studied the impact of effective Knowledge Management by developing capabilities on critical aspects of Organisational Performance by measuring the improvement of new product innovation, identification of new business opportunities, responsiveness to market change, and adaptation to unanticipated changes. Lee and Choi (2003) evaluated Knowledge Management Enablers by developing knowledge creation capability and organisational creativity, measuring market share, profitability, growth rate, innovativeness, success, and business size compared with critical competitors as performance indicators.

In a healthcare setting, Patient Safety is a crucial aspect of Organisational Performance and one of the most important indicators (Kim et al., 2012). Patient Safety is strongly related to knowledge because it is the most vital resource to support diagnostics, make decisions about treatments, prevent adverse events, and prevent medication errors, among others. Stock et al. (2010) posited that patient safety "*involves the establishment of operational systems and processes that increase the reliability of patient care*". Patient safety performance has been measured by empirical studies, evaluating cause-effect relationships of different factors through statistical analyses. For example, the results presented by Jen and Chao (2008) showed that knowledge distributed by information systems contributes to improving patient services and reducing patients' risk. The study of Kim et al. (2012) affirmed that knowledge-sharing activities influenced by institutional structures enhance Patient Safety. Stock et al.’s (2010) study contributed to analysing the relationship between organisational culture, knowledge management and patient safety performance. Additionally, the results showed the mediator role of knowledge management between culture and patient safety.

The findings of mentioned studies showed that knowledge management strategies increase patient safety. However, it is important to highlight that the studies above analysed the relationships between critical factors, capabilities, strategies and performance. For example, Jen and Chao (2008) analysed information systems (critical resource), knowledge dissemination (capability), and patient safety (performance). Kim et al. (2012) analysed knowledge-sharing behaviour (capability), organisational structure (critical resource) and patient safety (performance). Stock et al. (2010) analysed Organisational culture (capability), knowledge management strategy (capability) and patient safety (performance). Therefore, such studies are consistent with the Resource-Based View (RBV), which posits that improving a firm's resources and capabilities contributes to Organisational Performance.

Snow and Hrebiniak (1980) and Mills and Smith (2011) specified that only some capabilities would contribute directly to Organisational Performance.

Under this argument, the first proposed model of the present research aims to evaluate the contribution of the critical factors and capabilities presented in this chapter to patient safety as a measure of organisational performance.

Additionally, Snow and Hrebiniak (1980) and Mills and Smith (2011) affirmed that the combination of resources and capabilities will vary across firms and how they will improve performance. Consequently, Models 2 and 3 aim to evaluate two different configurations in the relationships of the critical factors to identify their influence on patient safety through a capability as a mediator variable. Model 2 uses knowledge process capability as a mediator variable. Model 3 represents multiple mediations, using knowledge process capability and knowledge-sharing behaviour as mediating variables between critical factors and organisational performance.

Therefore, the present research suggests the following hypotheses to evaluate the mediation role of knowledge process capability and knowledge-sharing behaviour.

H1d. The relationship between Organisational Enablers and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.

H1e. The relationship between Organisational Enablers and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.

H2d. The relationship between a Culture of Collaboration and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.

H2e. The relationship between a Culture of Collaboration and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.

H3d. The relationship between Technology Acceptance and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.

H3e. The relationship between Technology Acceptance and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.

H4c. The relationship between Knowledge-Sharing Behaviour and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge Process Capabilities as a mediation variable.

Finally, Figure 3.6 depicts the developed research models, and Table 3.3 presents the current study's research hypotheses.

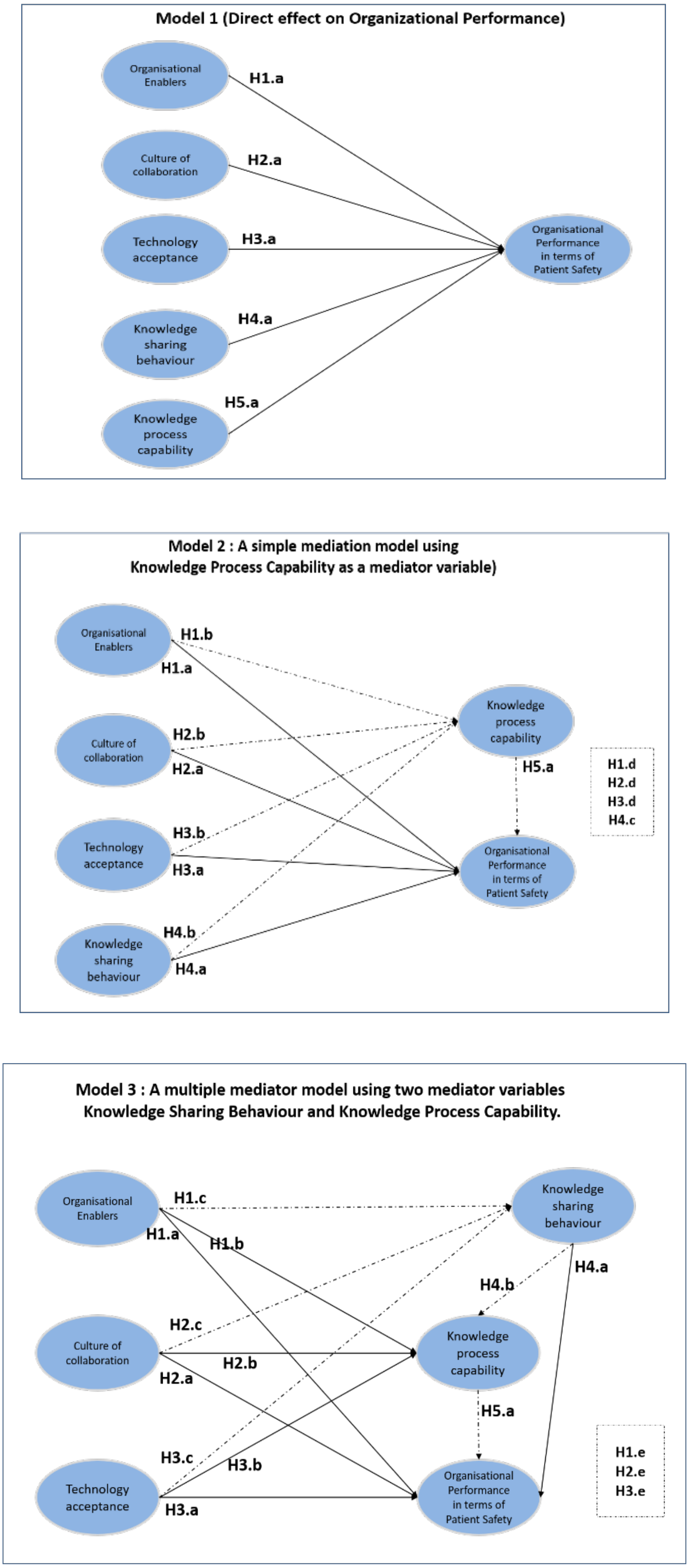


Figure 3.6: The proposed research frameworks (Models 1, 2, and 3)

Table 3.3: Research Hypotheses

No.	Model	Research Hypotheses
H1a.	1,2,3	A higher level of Organisational Enablers will lead to a greater improvement in Organisational Performance on Patient Safety.
H1b.	2	A higher level of Organisational Enablers will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
H1c.	3	A higher level of Organisational Enablers will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.
H1d.	2	The relationship between Organisational Enablers and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.
H1e.	3	The relationship between Organisational Enablers and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.
H2a.	1,2,3	A higher level of Culture of Collaboration will lead to a greater improvement in Organisational Performance on Patient Safety.
H2b.	2	A higher level of Culture of Collaboration will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
H2c.	3	A higher level of Culture of Collaboration will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.
H2d.	2	The relationship between a Culture of Collaboration and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.
H2e.	3	The relationship between a Culture of Collaboration and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.
H3a.	1,2,3	A higher level of Technology Acceptance will lead to a greater improvement in Organisational Performance on Patient Safety
H3b.	2	A higher level of Technology Acceptance will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.

H3c.	3	A higher level of Technology Acceptance will lead to a greater level of Knowledge-Sharing Behaviour developed by Healthcare Professionals.
H3d.	2	The relationship between Technology Acceptance and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing behaviour as a mediation variable.
H3e.	3	The relationship between Technology Acceptance and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediation variables.
H4a.	1,2,3	A higher level of Knowledge-Sharing Behaviour will lead to a greater improvement in Organisational Performance on Patient Safety.
H4b.	2	A higher level of Knowledge-Sharing Behaviour will lead to a greater level of Knowledge Process Capabilities developed by Healthcare Professionals.
H4c.	2	The relationship between Knowledge-Sharing Behaviour and Organisational Performance in terms of Patient Safety will be indirectly affected by Knowledge Process Capabilities as a mediation variable.
H5a.	1,2,3	A higher level of Knowledge Process Capabilities developed by Healthcare Professionals will lead to a greater improvement in Organisational Performance on Patient Safety.
H6a	1,2,3	The effect of Organisational Enablers, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour and Knowledge Processes Capability on Organisational Performance in terms of Patient Safety are moderated by gender.
H6.1.	1,2,3	The effect of Organisational Enablers on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for men).
H6.2.	1,2,3	The effect of a Culture of Collaboration on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).
H6.3.	1,2,3	The effect of Technology Acceptance on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for men).
H6.4.	1,2,3	The effect of Knowledge-Sharing Behaviour on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).

H6.5.	1,2,3	The effect of knowledge process capability on Organisational Performance in terms of Patient Safety will be moderated by gender (stronger for women).
H7a.	1,2,3	The effect of Organisational Enablers, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour and Knowledge Processes Capability on Organisational Performance in terms of Patient Safety are moderated by years of practice.
H7.1.	1,2,3	The effect of Organisational Enablers on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice).
H7.2.	1,2,3	The effect of a Culture of Collaboration on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for less than ten years of practice).
H7.3.	1,2,3	The effect of Technology Acceptance on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for less than ten years of practice).
H7.4.	1,2,3	The effect of Knowledge-Sharing Behaviour on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice).
H7.5	1,2,3	The effect of knowledge process capability on Organisational Performance in terms of Patient Safety will be moderated by years of practice (stronger for ten or more years of practice).

3.4 Summary

In Chapter Three, the theoretical foundations of the current study have been explained based on the detailed revision of five theories. Therefore, the relationships between the adopted variables were explained and supported. In conjunction, based on theoretical foundations and prior findings, the research frameworks were developed. Finally, the hypotheses presented in Table 3.3 and models shown in Figure 3.6 were developed to evaluate and answer the research questions and achieve the research aim.

Chapter Four: Research Methodology

4.1 Introduction

The theoretical framework of this research, shown in Figure 4.1, was developed by analysing the multidisciplinary and multi-perspective nature of Knowledge Management, identifying its theoretical foundations and critical factors that have contributed significantly to its development.

Chapter Three presented the defined models and the system of relationships to be evaluated in this research. The assumption that configures the models is that organisations are adaptive and dynamic systems of knowledge enhanced by the interaction between critical factors, individuals (with their capabilities and behaviours), and the environment. This interaction strengthens the knowledge capabilities of individuals and organisations, which can be leveraged by defining a knowledge-based strategy to improve organisational performance and establish a competitive advantage.

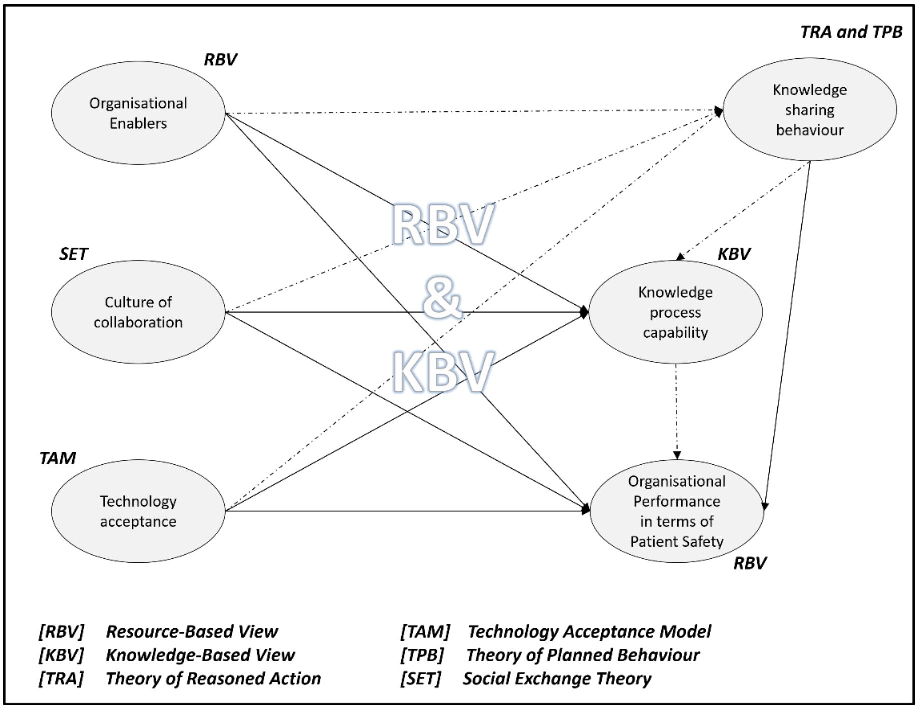


Figure 4.1: The proposed theoretical framework and the critical factors for a KM strategy in a healthcare setting

The literature review provided evidence of past studies that addressed some aspects of this research. These studies have generated evidence using a rigorous research methodology based on an objective view of reality from a positivist philosophical position. Such studies have developed models that established relationships to identify the causes and effects of the constructs analysed. Data was collected through validated instruments and processed with multiple advanced statistical methods. Finally, the results were interpreted to understand the phenomenon and to contribute to the knowledge field. For example, in Shehzad et al. (2022), Lei et al. (2019), Wu et al. (2007), and other cited studies in Chapter Three, the authors evaluated their proposed frameworks using validated instruments and applied questionnaires to collect empirical data from participants. In addition, the authors applied a factorial or structural model defined to evaluate direct, mediating and moderating effects according to their proposed models and the established relationships between their variables.

Figure 4.2 shows the scheme proposed by Saunders et al. (2009, p. 138), summarising the different stages to develop research and an explanation that provides credibility and rigour to the analysed phenomenon. The current study adopts the mentioned scheme to guide the research.

This chapter encompasses the elements of the research design to analyse the established relationships in the proposed models and answer the research questions defined in section 1.4. Therefore, taking into account the methodology other researchers have addressed for similar research aims, the following sections define the philosophical approach of this research, the selected methodology, the data analysis techniques, the definition of the sample, and the development and validation of the measuring instrument.

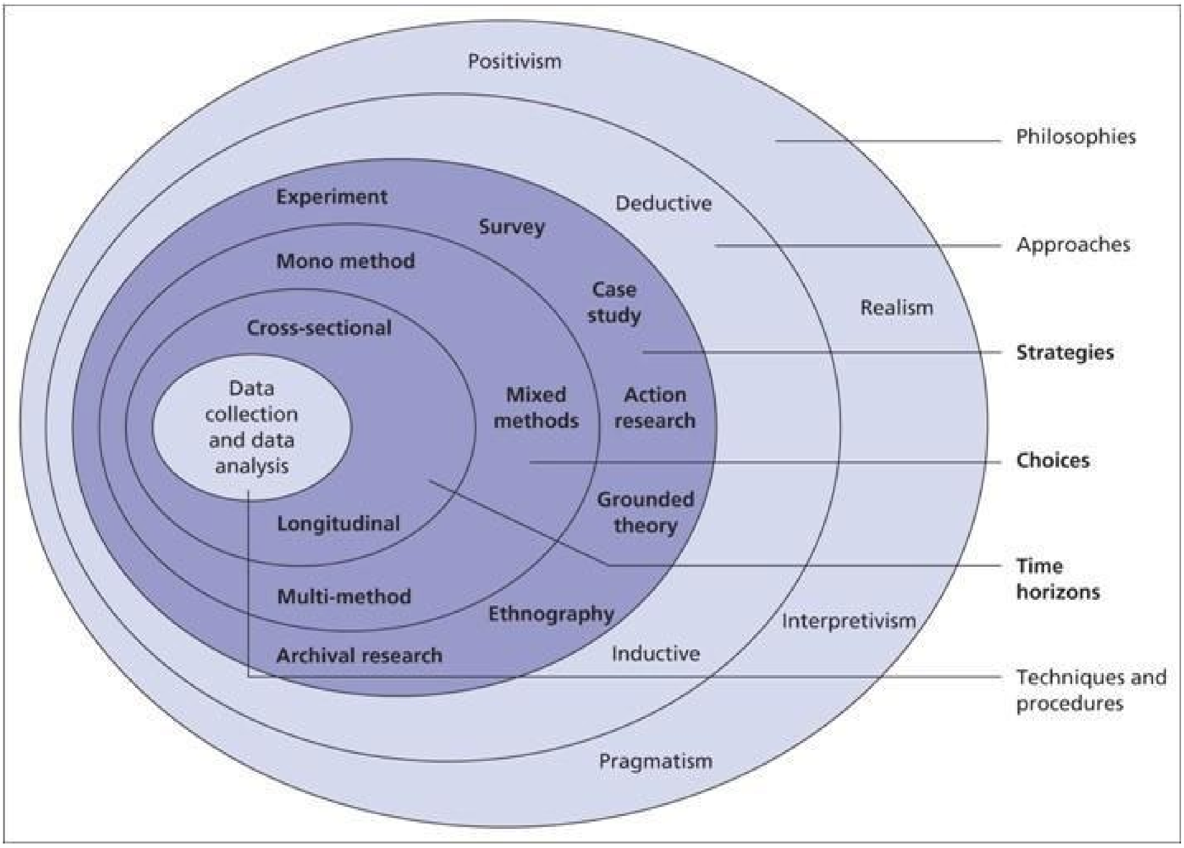


Figure 4.2: The research onion by Saunders et al. (2009, p. 138)

4.2 Overview of research methodologies

Throughout history, knowledge generation has been possible thanks to the capacity of observation, analysis and evaluation of human beings. These capacities create different ways of thinking and interpreting reality, in which the objects of study are developed.

The realism philosophy considers that reality and objects exist independently from the human mind. This paradigm involves observation and experimentation, applying an inductive logic to establish explanatory theories used for prediction (Saunders et al., 2009, p. 115).

The post-positivism assumption is also called the scientific method, positivist research, or empirical science. This paradigm attends to identifying and assessing which causes probably determine or influence effects or outcomes. As a result, it is possible to support or refute statements explaining a phenomenon and describing the causal relationships of interest. Under this assumption the researcher is independent of the subject of the research and uses a highly structured methodology leading to further development of the theory, and facilitates replication (Creswell, 2009, p. 7; Saunders et al., 2009, p. 114). In social constructivist assumption, individuals comprehend the world where they live, developing subjective meanings of their experiences. Interpretation is shaped by the researcher's background and experiences (Creswell, 2009, p. 7).

Pragmatism assumptions are concerned with what works, such as actions, situations, and consequences, rather than background conditions. Researchers focus on understanding the problem and have a freedom of choice from both quantitative and qualitative assumptions according to their needs, purpose or what they need for their research (Collis & Hussey, 2003, p. 59; Creswell, 2009, p. 10).

4.2.1 Paradigm assumptions

An essential element to define in research is Ontology which states that every human being has their perspective of reality or their own beliefs about the world, which influences the research practice. Based on this assumption, two main approaches exist. First, positivism considers that reality is objective, external and independent of the individual. The research is developed deductively, and its focus is the phenomenon explanation or prediction through theories that explain the relationship between variables involved in it. The second primary approach is interpretivism, which considers that social reality is subjective. Since it is built from different perceptions of individuals about reality, it leads to having different realities. The study of the complexity of realities aims to interpret and understand them. Researchers accept both postures (positivism and interpretivism) as valid to generate knowledge (Collis & Hussey, 2003, p. 59; Creswell, 2009, p. 10; Saunders et al., 2009, p. 109).

Epistemology refers to the knowledge accepted by a determined field of study (Collis & Hussey, 2003, p. 59). If the researcher's position is objective, adequate knowledge could be data, facts or observations that can be measured and analysed. From this point of view, the researcher's empathy or beliefs do not influence the piece of knowledge because the reality of this object is external to the researcher. On the other hand, when the researcher's position is subjective, adequate knowledge does not belong to an outsider's perspective; the objects are studied from the interpretation and insights of the researcher (Saunders et al., 2009, p. 112).

Saunders et al. (2009, p. 116) affirmed that values guide the actions of human beings. Therefore, identifying the researcher's value judgments facilitates making appropriate decisions from an ethical point of view. This research must be free of judgments and based on the evidence that demonstrates the research process.

4.2.2 Methodological assumptions

For the formal research of any phenomenon or object, it is crucial to define the approach in which it will be observed. Different methods or procedures to collect data and analyse the object's behaviour will be selected when defining such an approach, thus giving answers to the questions defined by the researcher.

Two approaches, quantitative and qualitative, are considered the main paradigms of scientific research. In a quantitative approach, researchers test a theory based on hypotheses and collect data to develop a series of analyses using statistical procedures to support or refute such hypotheses. Experiments, quasi-experiments, and correlational studies are some strategies for conducting quantitative research. Recently, new complex experiments that involve factorial designs or structural equation models for the identification of causal paths and the relations of multiple variables are part of these strategies. In a qualitative approach, researchers collect participants' meanings to understand a phenomenon, studying shared patterns and behaviours. Then, researchers interpret the collected data and validate the accuracy of the findings. Some strategies to conduct qualitative research are ethnography, grounded theory, case studies, phenomenological research and narrative research, among others (Creswell, 2009, pp. 12,13).

Additionally, mixed-method research uses quantitative and qualitative data collection techniques and analysis procedures in a parallel or sequential way but it does not combine them. Through mixed methods, it is possible to convert quantitative data into a narrative that can be analysed qualitatively. It is also possible to convert qualitative data into numerical codes that can be analysed statistically (Creswell, 2009, p. 14; Saunders et al., 2009, p. 153).

4.3 The methodology adopted in this research

In previous sections, the methodological elements were briefly described to provide guidelines regarding the philosophical approach, methods and techniques to conduct the research and address the research questions (Creswell, 2009, p. 5).

Now, through this section, the research paradigm assumptions adopted in this study as well as their justifications are presented to obtain answers to the research questions defined in section 1.4.

4.3.1 Philosophy of Research: Positivism

Public health hospitals are regulated by the policies of their governments. Their operations are highly influenced by their environment. In the particular context of public hospitals in Mexico, public health institutions are entities regulated by Policies of Public Health according to the Mexican Constitution. Budgets, human resources, investments and projects are provided and managed by the Federal Government through the Secretary of Health to all health units in the Mexican Republic. Therefore, the researcher perceives Public Hospital reality as a wholly independent and external context. In other words, the researcher does not control the elements that intervene in this context; therefore, ontologically from the researcher's point of view, external reality exists independently, and an objective view of this reality is required. This research depends on predetermined laws, policies and contextual elements that shape a set of relationships in the healthcare setting where the present research is developed. Therefore, the researcher's objective view of reality is needed, and it is an appropriate choice to conduct this research.

With an exploratory study, this research attempts to understand the actual situation of the specified phenomenon; thus, the research process has no influence and does not seek to transform it. Therefore, value-free is the axiological standpoint for this research; the researcher's values will not affect or influence the research hypotheses, the research instrument, the data collected and how the data are interpreted. With value-free positions, the researcher will remove any possibility of bias and maintain an objective stance to warrant that those research activities will not affect the object of study.

The research aims to explore the state of factors previously identified in Chapter Three and their relationships with the development of knowledge process capabilities of healthcare professionals to improve patient safety in public health hospitals in Chiapas, Mexico. From an objective point of view, well-established and validated theories will help examine the relationships to answer the research questions. Therefore, epistemologically, the source of the accepted knowledge for this research is based on previous studies grounded on observable and measurable sources. In Chapter Three, the different theoretical streams were introduced to explain the source from which the defined variables (independent, mediating and dependent) were derived. At the beginning of this chapter, the theoretical framework depicted in Figure 4.1 was introduced. It can be observed that Organisational Enablers (OE) and Organisational Performance (OP) were developed based on the Resource-Based View. Knowledge-Sharing Behaviour and Knowledge Process Capabilities were adopted from the Knowledge-Based View literature. Technology Acceptance (TA) was adopted from the Technology Acceptance Model (TAM). Finally, the Culture of Collaboration (CC) was derived and developed from the Social Exchange Theory (SET). Furthermore, Appendix A presents various studies where factors and relationships were studied previously in a Knowledge Management setting; past studies and their evaluated relationships are the basis for establishing the hypotheses evaluated in this research. The quantitative methodology was identified as the principal and most accepted methodology for their analysis.

Based on the previously identified studies, the present study used reliable and pre-validated scales acquired from them. Items have been modified to fit the current context, considering academic experts' suggestions, and constructs' reliability and validity were re-examined. Confirmatory Factor Analysis (CFA) was conducted to validate the scales for measuring the theoretical constructs adopted from studies and theories mentioned before. A confirmatory strategy will help to test and confirm pre-specified causal relationships. The structural Equation Model (SEM) is a statistical modelling technique capable of examining a series of dependent relationships simultaneously. It combines several traditional multivariate procedures, some of which are factor, path or regression analyses. A primary element of the model is the structural model. This element represents the relationships between latent variables, following a sequence from left (independent variables - predictor) to the right (dependent variables - outcome). This sequence is determined by theory and logic, but when the literature is not clear, researchers should apply their best judgement to define the sequence (Hair et al., 2016, p. 14). The measurement model represents the relationships between constructs and their indicators. As mentioned earlier, theory and previous studies are the basis for established relationships. A mediation analysis was conducted because it is of primary interest to conduct an analysis to evaluate whether a change in the moderator variable mediates the effect of the independent variable on the dependent variable.

Overall, most previously-identified studies about Knowledge Management and its factors have been studied from a positivist approach, examining the relationship between variables through a formal methodology. Therefore, the researcher strongly believes that a quantitative paradigm is appropriate for the research purpose and questions.

4.3.2 Research Approach: Deductive

Based on Collis and Hussey (2003, p. 8), deductive research is "*a study in which a conceptual and theoretical structure is developed which is then tested by empirical observation; thus, particular instances are deducted from general inferences*".

Figure 4.3 depicts a deductive model of thinking proposed by Creswell (2009, p. 55), which is intended to be used in this research.

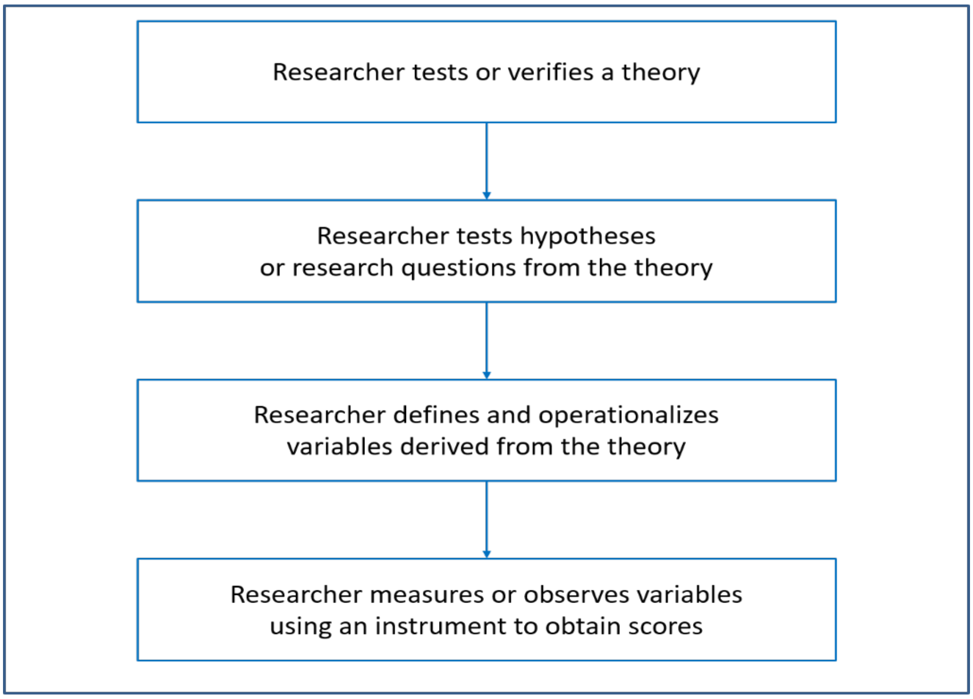


Figure 4.3: The Deductive Approach Typically Used in Quantitative Research from Creswell (2009, p. 57)

A body of literature revised in Chapter Three provided the theoretical foundations to address the explanations of the expected relationships between critical factors, capabilities at individual and organisational levels, and patient safety as a performance indicator in a knowledge strategy. Section 3.3 presented the developed hypotheses to explain causal relationships, and through a highly structured methodology, hypotheses are tested, facilitating replication and ensuring reliability, considering a sufficient numerical sample size (Collis & Hussey, 2003, p. 8; Saunders et al., 2009, pp. 124,125). The operationalisation of the variables defined in this study is carried out through the construction of scales derived from scales previously validated by past studies. In Chapter Five, a series of statistical analyses were developed to ensure that the adapted scales are clearly understood and that such scales capture the characteristics of the constructs for which they were designed. Finally, Chapter Six presents the process of evaluating the proposed models and their established relationships through rigorous statistical analyses to obtain results that provide direction to answer the research questions.

For this research, the deductive approach allows to:

- Identify the main theories, or foundations, in which Knowledge Management strategies have been developed.
- Identify the main factors, relationships and measures of Knowledge Management strategies in public health institutions.
- Generate a conceptual framework to analyse and evaluate the main factors, capabilities and relationships that promote the development of knowledge process capabilities in a health context and their contributions to improving patient safety within the Mexican context.

4.3.3 Research Strategy: Survey

Accordingly, with the defined research philosophy and with the aim to look for a strategy that enables the researcher to answer the research questions and to explore the state of the defined factors in Chapter Three, it is required a strategy supported by theories, a procedure to collect data from a sample in an easy, quick, and inexpensive way.

Exploratory and descriptive studies commonly use the survey strategy; such strategy is associated with the deductive approach. A survey allows the capture of large amounts of data through a combination of questions about one or more variables. The strategy answers the questions: who, what, where, how much and how many, which collects standardised data that allow easy comparison. Through surveys, quantitative data are collected, and the researcher analyses them using descriptive and inferential statistics. Based on the results, it is possible to suggest reasoning about the relationships among variables. The data collection technique for this strategy is the deployment of questionnaires (Saunders et al., 2009, p. 144).

A survey could be designed or adapted from an instrument previously developed by someone else. Likewise, it is possible to assemble a survey from items of other instruments. When using an existing survey, the researcher must review the validity and reliability obtained in the previous usage of the instrument to determine if it is a good instrument to use in the research. Researchers must re-establish validity and reliability scores when using modified or combined instruments (Creswell, 2009, pp. 146-150).

In Chapter Five, section 5.2 specifies the instrument's development and the operationalisation of the constructs. They are Organisational Enablers, Culture of Collaboration, Technology Acceptance, Knowledge-Sharing Behaviour, Knowledge Process Capability, and Performance in terms of Patient Safety; all were defined based on existing instruments. In addition, compliance with validity and reliability criteria was considered for the scale selection. Finally, statistical analyses were executed after the adaptation process to validate the instrument's psychometric properties.

4.3.4 Research Method

Due to the research paradigm selected for this study, the objective measurement of the behaviour of the variables that integrate the proposed models is critical. Therefore, to get a deep understanding of the identified factors and their relationships, the study requires a technique for data collection and procedures to analyse them. For this purpose, the data collection method chosen for this research is a questionnaire. Based on Collis and Hussey (2003, p. 192) definition, "*a questionnaire is a method for collecting primary data in which a sample of respondents are asked a list of carefully structured questions chosen after considerable testing, with a view to eliciting reliable responses*". When the selected data collection method is a questionnaire, it is necessary to define how it will be administered concerning the level of contact with the respondents. Questionnaires can be self-administered, completed by the respondents or interviewer-administered, where the interviewer records respondents' answers. Some characteristics must be considered when defining the type of questionnaire to apply in this research. For example, for internet and intranet-mediated questionnaires, computer-literate individuals are sought. When postal or delivery and collection types are used, contamination or distortion of respondents' answers may result from consultation with others. Some types of data collection require financial resources such as a telephone questionnaire, an interviewer, telephone calls, clerical support, photocopying and data entry or software and computers; and field workers and travel expenditures are required for the delivery and collection type (Saunders et al., 2009, pp. 363-366).

Designing a questionnaire requires steps such as defining the type of questions, formulating the precise wording, defining the ordering in which they are presented and evaluating the reliability and validity of the responses. The main steps in designing a questionnaire are represented in Figure 4.4.

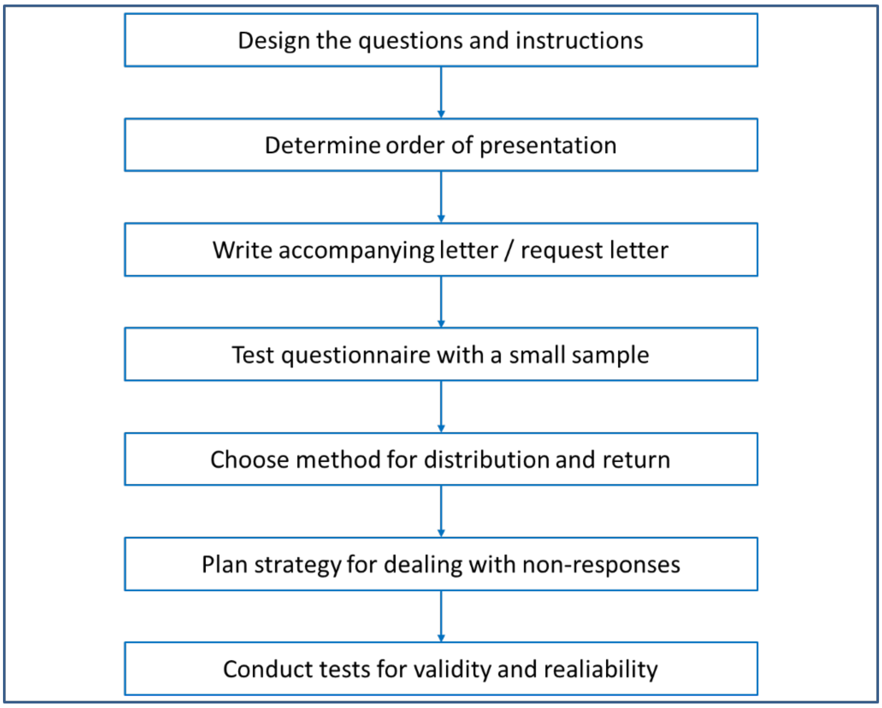


Figure 4.4: Designing a questionnaire or interview schedule. From Collis and Hussey (2003, p. 192)

The designed questionnaire was applied to a representative sample (see section 4.4.3) and accompanied by a cover letter which explained the purpose of the survey. The cover letter, instructions and questions were typed using a 12-point plain font to facilitate the reading and printed on good-quality paper. In addition, the researcher ensured that the formatting of the complete text was consistent throughout the questionnaire.

The questionnaire was based on in-person hand delivery and collection, meaning that the researcher delivered the questionnaires to healthcare professionals and then called on them again to collect the completed version during the same workday, eliminating the need for a follow-up. The researcher introduced the questionnaire and stressed its confidential nature. In order to optimise the time for capturing the responses, they were designed using optical answer sheets and read with an optical mark recognition machine. The researcher gave detailed explanations and instructions to each respondent about how to use the optical answer sheet and correlate an answer sheet with a separate set of questions; the researcher also enclosed the necessary pencils to motivate respondents. Through all this preparation, the researcher tried to avoid any possible adverse effects of using this response collection method. At the end of each day of data collection, a detailed revision of the marks on the answer sheets took place for every questionnaire delivered to ensure a correct reading process and avoid any improper marks. Appendix B presents the designed questionnaire.

4.3.5 Time Horizon

Saunders et al. (2009, p. 155) posited that cross-sectional studies observe a particular phenomenon at a particular time; in other words, cross-sectional studies allow to take a picture of what is happening to the object under study in a particular instance. Therefore, it does not account for the variation of variables in time. The authors affirmed that most research projects are time-constrained, and commonly cross-sectional studies employ the survey strategy. On the other hand, longitudinal studies enable researchers to observe people or events over time to answer questions about any change occurring over that interval.

Because this study pretends to analyse the association between the identified critical factors, capabilities and performance in only one point of time, it has been undertaken as a cross-sectional research.

4.4 Population and Sampling Procedure

In order to generalise valid conclusions about a population from a sample, it is necessary to select an appropriate method to take a sample with desired characteristics that represent the original population. In other words, Hair et al. (2016, p. 22) hold that the selected elements in a sample should maintain both the similar and different characteristics found in the population to be able to make inferences about the population from the sample.

This study was carried out in a tertiary paediatric hospital in the state of Chiapas, Mexico. For members of healthcare institutions, stratified random sampling was applied. This technique divides the population into a series of relevant strata. The stratification variable was defined in terms of the functions of different healthcare professionals.

4.4.1 Target Population and Sampling frame

Table 4.1 shows the hospital's population under consideration, as reported by the Human Resources department. Considering that the aim of this research is focused on the knowledge process capabilities of healthcare professionals, the sample frame from which the sample was drawn is composed of 803 healthcare professionals, representing 83% of the population.

Considering that the Human Resources Department facilitated information about the population, the sampling frame is accurate and up to date, thus ensuring that all cases were included and that every case would be represented. Therefore, the sample is representative of the total population. Saunders et al. (2009, pp. 216, 217) affirmed that the use of sampling is required because it is impractical to collect data from the entire population; therefore, how the sampling frame is defined has implications on the extent to make generalisations about the population from the sample.

Table 4.1: Sample Population and Sampling frame

	Population	Sample frame	%
Doctors (General practitioner, specialists)	163	163	20%
Nurses	435	435	54%
Administrative staff	102		
Managers / Supervisors	65		
Paramedic area: therapists, technicians, pharmacy, social workers.	205	205	26%
TOTAL	970	803	100%

4.4.2 Sampling technique

When doing research, two sampling techniques are available, (1) probability or representative sampling and (2) non-probability or judgemental sampling. The first one is often associated with survey and experimental research strategies when the research requires a statistical estimation of the characteristics of the population. With this sampling technique, the chance of being selected is usually equal for all cases. Conversely, the second sampling technique does not allow statistical inferences to be made about the characteristics of the population, and the probability of being selected is unknown. Generally, in the second technique, the selection is based on the researcher's subjective judgement (Collis & Hussey, 2003; Saunders et al., 2009). Saunders et al. (2009) suggested that in the exploratory stages of some research, such as a pilot study survey, the first technique must be the most practical; subsequently, for the main study, a probability sampling technique may be used. Collis and Hussey (2003) suggested avoiding a sample where some population members are significantly under or overrepresented. A stratified sampling ensures that the same proportions of different categories are reflected in the sample.

In a stratified random sampling technique, a sampling frame is divided into some subsets, where significant strata are based on a number of attributes. Because relevant strata separate the population, each stratum is represented proportionally within the sample; therefore, this technique makes the sample more representative. As it was mentioned before, considering that the aim of the research is focused on the knowledge process capabilities of healthcare professionals, a critical stratum is the category of healthcare professionals to ensure that they were correctly represented in every analysis. Table 4.2 shows the stratified sampling for this study.

Table 4.2: Sample Population, Sampling frame, and Stratified sampling

	Population	Sample frame	%	Stratified sampling
Doctors (General practitioner, specialists)	163	163	20%	44
Nurses	435	435	54%	118
Administrative staff	102			
Managers / Supervisors	65			
Paramedic area: therapists, technicians, pharmacy, social workers.	205	205	26%	56
TOTAL	970	803	100%	218

4.4.3 Sample size

Cochran's formula allows calculating the sample size given a desired level of precision and reliability and the estimated proportion of the attribute present in the population. Therefore, this formula is considered appropriate for large populations. The formula is:

$$n_0 = \frac{Z^2pq}{e^2}$$

Where:

- Z is the value for the confidence level desired
- e is the desired level of precision
- p is the estimated proportion of the population which has the attribute in question
- q= 1 -p

Based on the stratified sample, considering a sample frame of 803 healthcare professionals (representing 83% of the population), a confidence level of 95%, a 5% margin of error, and a Z value of 1.96 for the confidence level desired, Cochran's formula calculated a sample size of:

$((1.96)^2 (0.83) (1-.83)) / (0.05)^2 = \mathbf{217}$

The hospital in consideration granted access for applying the designed questionnaire; thus, a high response rate of 72% is estimated. Therefore, taking into account the 72% of response rate, the suggested formula by Saunders et al. (2009) was used to calculate the number of questionnaires to apply to obtain the minimum sample size.

$$\text{Actual sample size} = \frac{\text{minimum sample size X 100}}{\text{response rate}}$$

Thus,

$$\text{Actual sample size} = \frac{217 \text{ X } 100}{72} = 301$$

Therefore, 301 questionnaires were distributed, of which 299 completed questionnaires were obtained for the analysis, surpassing the minimum sample size calculated.

The literature about the decision on sample size shows that different criteria abound. Even when there are no unique criteria for determining the sample size, Hair et al. (1999, p. 631) suggested four factors that affect the sample size definition for multivariate analysis:

- Poor model specification, which means the omission of relevant variables from the specified model,
- Model size, where the minimum sample size must be as large as the number of covariances and correlations in the input data matrix,
- Non-compliance with normality, where the impact of the sampling error must be overcome by increasing the ratio of participants,
- Estimation procedure, because it has been demonstrated that some specific methods, such as Maximum Likelihood Estimation (MLE), increase their sensibility as the sample size increases, resulting in fitting measures exhibiting a poor fit.

Tabachnick and Fidell (2013) affirmed that Structural Equation Modelling (SEM), similar to factor analysis, is a large sample technique when SEM is based on covariances. Structural Equation Modelling needs large sample sizes to achieve robust parameter estimates and adequate power to carry out planned hypothesis tests. Hair et al. (2016) posited that a sample size of 200 provides a reasonable basis for estimation, which has been considered a rule of thumb applied in various studies. However, Blunch (2013, p. 103) confirmed that the required sample size depends on the complexity of the model, the estimation method and the distributional qualities of the data. For SEM analysis, the sample size determines the precision and stability of the estimation model, the power of statistical tests and the size of various fitting measures. The author posited that a larger sample size is required for more complicated models. Some specific tests show a weakness in terms of sample size. For example, for the X^2 test, when the sample size is sufficiently small, any model will be accepted, and when the sample size is sufficiently large, any model will be rejected. Therefore, considering this problem, fit indices are calculated to evaluate the extent the data support the evaluated model (Blunch, 2013, p. 114).

Hoyle (2012, p. 191) posited that, in order to avoid waste and low power in studies using SEM, the determination of the minimum sample size, based on the desired level of power for a specified test, is a critical definition to conceive during the design stage of a research project. The author established that for a single model, by setting the desired power level (e.g. 0.80), the calculated minimum sample size provides a strong likelihood for detecting when the hypothesis about a model fit is false. Furthermore, for tests of differences between models, the calculated minimum sample via a particular method and software provides the desired level of probability for detecting when the hypothesis about the difference in the fit of various degrees is false under various conditions.

Finally, Hampton (2015) recommended that, whenever possible, the sample size should be maximised to increase the precision and stability of covariances and SEM estimation results. For this research, the sample size was 299; this sample size is considered sufficient and satisfactory in relation to the previously revised recommendations.

4.5 Data Analysis Techniques

Based on Saunders et al. (2009, pp. 587, 590), following data collection, a researcher starts a process of analysis, breaking down data to understand the nature of the constituent parts and the relationships between them. For the current research, SPSS and AMOS software were used to analyse the quantitative data collected. The following sections will introduce the statistical techniques used for this study.

4.5.1 Preliminary and descriptive statistics

Once data is collected, and before conducting the fundamental analysis, an examination of data quality is performed, and any issue that arises is resolved. This preliminary analysis included data screening concerning the sample, missing data, multivariate normality, outliers, linearity, and multicollinearity. With this careful data analysis, better prediction and a more accurate evaluation can be achieved (Tabachnick & Fidell, 2013, p. 60). The preliminary data analysis is developed for this research in Chapter Six, section 6.2. Also, to facilitate interpretation and reporting, Table 6.6 presents the results of the conducted descriptive analyses for every single variable in this study (see Chapter Six).

Moreover, in this study, the Common Method Variance (CMV) was tested in section 6.3.3. This test was performed to identify the spurious variance attributable to the measurement method, by measurement context, by item characteristics or by item context. Therefore, it is necessary to control CMV using measured and unmeasured latent common method factors (Johnson et al., 2010). As mentioned, the current research applied this technique.

Finally, when a scale was created and applied in a particular context and the evaluation of its reliability and validity was performed and accepted, it is possible to adapt it in other applications by adding or removing items and changing the original wording. By doing so, the psychometric properties of a scale (scale refinement) improve, establishing a better level of consistency for a particular research context (Finn & Kayande, 2004). The present study used reliable and pre-validated scales acquired from previous research. Items were modified considering suggestions from academic experts, and the reliability and validity of constructs were re-examined to fit the current context of a public health hospital (see section 5.4).

4.5.2 Confirmatory factor analysis (CFA)

Factor analysis is used to validate instruments and test the theories on which they are based. This analytic technique facilitates the reduction of interrelated variables or multiple predictors to achieve parsimony in a smaller number of non-overlapping significant variables. In confirmatory factor analysis (CFA), specific hypotheses, factors, and variables within each factor should be formulated prior to the analysis. Then the analysis determines whether the data are consistent with a hypothesised factor structure (Tinsley & Tinsley, 1987). In a CFA test, the convergent and discriminant validity are calculated. Convergent validity is achieved when indicators are significant according to the purported constructs (Kim et al., 2012). Discriminant validity examines the number of times an item achieves higher correlations with items from other factors than those from its own factors (Ho, 2008).

For this research, six latent variables were tested and measured by at least four indicators; the variables were: organisational performance (OP), organisational enablers (OE), culture of collaboration (CC), knowledge-sharing behaviour (KSB), technology acceptance (TA) and knowledge process capabilities (KPC), all of them within a healthcare setting. Section 6.3 describes the process followed to perform the measurement model assessment of this research.

4.5.3 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) was applied to complete the data analysis and evaluate the proposed framework and hypotheses. SEM was used since it is a statistical modelling technique capable of examining a series of dependent relationships simultaneously, such as those included in the model to be evaluated in this research. Furthermore, SEM combines several traditional multivariate procedures, such as factor analysis and regression or path analysis. A good model fit indicates the validity of the research meaning that a good fit between the data and the proposed theoretical model was obtained (Rhodes et al., 2008).

The main characteristics of this technique are its capacity to estimate multiple and cross-dependent relationships, and to represent concepts not observed in these relationships in an integrated model (Hair et al., 1999; Hair et al., 2012; Peng & Lai, 2012; Sarstedt et al., 2014). In SEM, proposed relationships strongly supported by theory, and represented in the path model, are translated into a series of structural equations for each dependent variable. Relationships represent chains of causal and indirect effects that could be interrelated. Therefore, some dependent variables are converted to independent ones in other relationships, and this capacity allows for modelling complex relationships. Each relationship, or path, represents a hypothesis for testing a theoretical proposition represented by arrows in SEM diagrams, pointing in the proposed direction of causation (Hair et al., 2012; Lowry & Gaskin, 2014). Blunch (2013, pp. 5, 6) affirmed that SEM is a confirmatory, rather than an exploratory, technique because the objective of this collection of tools is to test models based on a prior theory against empirical data; however, the possibility to make modifications to the original model is not excluded. Therefore, as was mentioned before, through SEM it is possible to measure the strength of the various connections to answer the research questions.

Conducting an SEM analysis in this research involves the following phases.

4.5.3.1 Model specification

Hoyle (2012, p. 117) argued that most of the attention is on the statistical machinations of SEM and not enough on the specifications about exogenous influences, directionality, and the structure of the error terms of the structural model; the author considers that the rationale for model specification should be fully explained. Strong knowledge about the phenomena under study is required because the specification of structural models in SEM is based on the researcher's reasonable judgement. Such specifications are in terms of describing and measuring variables of interest, correctly defining exogenous and endogenous variables, accurately mapping identified patterns of direct and indirect effects, and proper specification of the error covariance structure. For this research, variables and parameters were developed based on the literature review (see Chapter Two) and supported by the evidence provided by previous studies on Knowledge Management in a healthcare setting. Chapter Three explained the theories on which all hypothesised relationships are based and developed.

For this research, three models were evaluated. For Model 1, factors such as Organisational Enablers of Knowledge Management (OE), Culture of Collaboration (CC), Knowledge-Sharing Behaviour (KSB), Technology Acceptance (TA), and Knowledge Process Capabilities (KPC) are modelled as predictor variables of the Organisational Performance construct (OP). Its specification is detailed in section 6.4.1. Model 2 is a simple mediation model where the Knowledge Process capabilities variable is the mediator between OE, CC, KSB and TA with OP (see specification in section 6.4.2). Finally, Model 3 is a multiple-mediator model using KSB and KPC as the mediator variables between OE, CC, and TA with OP (see specification in section 6.4.3).

4.5.3.2 Model identification

Based on algebra, to compute a result when defining a system of equations, it is necessary to have more data than unknowns. According to this principle, in a structural model, it is necessary to ensure the model identification and evaluate if there is enough data to estimate the parameters in the model. In a Confirmatory Factor Analysis (CFA), free parameters (unknown), fixed parameters (either 1.0 or 0) or constrained parameters can be specified. The data in SEM are the variances and covariances in the sample covariance matrix. The number of data points is the number of sample variances and covariances. A model is identified if the number of freely estimated parameters (e.g., factor loadings, uniqueness, factor correlations) is, at most, the number of data points. In an overidentified model, the number of data points exceeds the number of parameters to be calculated, representing the condition for proceeding with the analysis. Degrees of freedom (df) represents the difference in the number of knowns and unknowns. Overidentified models have positive df. When the number of data points equals the number of unknowns, the model has zero df; therefore, it is a just-identified model. An under-identified model occurs when df is negative because the number of freely estimated parameters exceeds the number of data points; in an under-identified model, parameters cannot be estimated. In estimation and testing, the more degrees of freedom, the more precise the estimation and the more powerful the test (Blunch, 2013, p. 78; Hoyle, 2012, pp. 365, 366; Tabachnick & Fidell, 2013, p. 714).

4.5.3.3 Model estimation

The next step in the analysis is the estimation of its parameters to minimise the difference or discrepancy between the observed model, that is, the sample variance-covariance matrix and the estimated model-implied, which is the population variance-covariance matrix. SEM executes iterative procedures to solve unknown parameters in the model. First, an intermediate model-implied variance-covariance matrix is calculated and substitutes unknown parameters with their values. In every iteration, a new set of estimated parameters replaces the previous set of values until the changes in an estimated parameter become acceptably small (convergence criterion). Then, the final set of estimated parameters is taken as the final solution for the unknown parameters. Popular estimation methods used in SEM are the maximum likelihood family, least squares family, and Bayesian methods. Some assumptions need to be considered when selecting an estimation method related to sample size, the plausibility of the normality and independence. Maximum Likelihood (ML) may be a good choice with medium to large samples and accomplishing the other two assumptions mentioned. ML is considered the most well-known and widely used estimator to date. It calculates the probability of obtaining the present data (covariance or correlation matrix) as a function of the parameters or the model. In other words, the likelihood function estimates the value with the largest probability of producing the covariance or correlation matrix on which the estimation is based (Blunch, 2013, p. 72; Byrne, 2016, p. 90; Hoyle, 2012, pp. 165-167; Tabachnick & Fidell, 2013, pp. 717, 720).

4.5.3.4 Model evaluation

To infer the correspondence between the defined model and the true phenomena under investigation, the fit of the hypothesised model to sample data in this research was evaluated. The structural equation model (SEM) is commonly used for such model evaluations. It represents a conjunction of theoretical hypotheses that manifest the complexity of the evaluated relationships. When researchers test the fit of single models, the null hypothesis (H_0) evaluates whether the specified model holds exactly in the population. In other cases, when researchers fit more than one model to the data, the null hypothesis evaluates if there is no difference in model fit between the two models in the population. Finally, for testing close fit procedures, the null hypothesis evaluates if the specified model is a close approximation of the true process of interest (Hoyle, 2012, p. 181).

Models are represented in a compact form by using a path diagram. Such a diagram has a measurement component depicting the constructs' relationships and their indicators. As it was mentioned previously, theories and previous studies are the basis for the established relationships. The second component is the structural model, which shows the relationships between latent variables following a sequence from the left (independent variables - predictor) to the right (dependent variables - outcome). This sequence is determined by theory and logic, but when the literature is unclear, researchers should apply their best judgement to define it (Hair et al., 2016). Hoyle (2012, p. 209) posited that after establishing the model diagram path, model evaluation through a set of analyses will verify if the hypothesised model finds an adjustment with the observed data for every defined variable.

This section introduces the chi-square (X^2) test statistic and other complementary indices to assess the overall model fit.

Chi-square (X^2) is a test statistic that compares observed and expected values to assess if they are discrepant. X^2 has been used as a generalised goodness-of-fit test. Warner (2012, p. 334) affirmed that "*the higher the chi-square value, in general, the worse the agreement between the model used to generate expected values that correspond to some model and the observed data*". Critical assumptions underlying X^2 are in Hoyle

(2012, p. 211): the observed variables, N, have a multivariate normal distribution, N is sufficiently large, and none of the tested parameters is at a boundary.

Also, the literature offered different arguments stating that assessment of fit is more complex than conducting an X^2 test because for X^2 with large samples, differences between sample and estimated population covariance matrices are often significant. In other words, if the sample size is sufficiently large, H_0 will always be rejected. On the other hand, if the sample is sufficiently small, H_0 will always be accepted. However, under these circumstances, X^2 has low power to detect meaningful levels of model misspecification because small samples potentially yield less precise estimates of the free parameters in a model (Blunch, 2013, p. 106; Hoyle, 2012, p. 211; Tabachnick & Fidell, 2013, p. 720). Therefore, considering the limitations of X^2, the X^2/df- ratio was introduced, where X^2 values could be used more descriptively, with the df acting as a standard of comparison. Based on Carmines and McIver, cited by Netemeyer et al. (1991), a value of three, two or less for this measure has been advocated as an acceptable level of fit for confirmatory factor models.

Hampton (2015) suggested that, given the limitations of the Chi-square test statistic, such as the sensitivity of sample size and data non-normality, it is necessary to take a more pragmatic approach to the evaluation process. For this purpose, a group of absolute, incremental and parsimony fit indices are introduced. As mentioned before, fit indices make it possible to calculate the distance between the sample covariance matrix and the estimated implied covariance matrix.

Absolute fit measures compare the hypothesised model with no model at all. This group of indices ranges from zero to one, where a value close to one indicates a good fit. Byrne (2016, p. 94) defined the goodness-of-fit Index (GFI) as "*a measure of the relative amount of variance and covariance in S that is jointly explained by Σ*". Hoyle (2012, p.

215) affirmed that "*GFI is similar to the* R^2 *measure used in ordinary least squares regression because it is calculated using the weighted sum of squared residuals from a covariance matrix and weighted sums of squared variances and covariances*".

Additionally, Blunch (2013, p. 118) affirmed that "*if GFI is adjusted for the number of degrees of freedom compared with the number of parameters, this gives AGFI (Adjusted Goodness of Fit Index) with rewards models with fewer parameters*".

As mentioned, to obtain strong evidence about model fit, it is necessary to determine that the sample size has adequate power for model testing. Root Mean Square Error of Approximation (RMSEA) is part of the group of absolute fit indices. RMSEA guides determining the necessary sample size, achieving a given power level for covariance structure modelling. RMSEA produces a lower-bound sample size estimation that indicates the minimum sample size necessary for testing model fit. Considering that the null hypothesis represents a lack of close fit, a situation in which that hypothesis is rejected supports the conclusion that the model fit is close (MacCallum et al., 1996). The RMSEA is one of the most informative criteria in covariance structure modelling (Byrne, 2016, pp. 98, 99). This index considers the error of approximation in the population. Values less than .05 indicate a good fit and values as high as .08 represent reasonable errors of approximation in the population.

The Comparative Fit Index (CFI), the normed fit index (NFI), the incremental index of fit (IFI), and the Tucker-Lewis Index (TLI) are part of the group of incremental, comparative or relative indices. This group of indices provides a measure of the location of the model between the saturated model (which has the maximum fit) and the independence model (which has the minimum fit) (Blunch, 2013, p. 118). Hoyle (2012, p. 118) affirmed that with these indices, it is possible to evaluate a model by looking at its location between these two model extremes (saturated model and independent model). This group of indices provides measures of complete covariation in the data. For all indices, a value close to .95 is advised to indicate that the model describes the sample data. For example, with NFI, an interval from 0 – 1.00 is calculated, which means how far the model is from the independence model to the perfect fitting model. NFI has been mostly used, but this index underestimates the fit in small samples. Therefore, it has been transformed into CFI, including degrees of freedom.

Blunch (2013, p. 119) posits that adding more parameters to the model makes it possible to increase the fit. However, by doing this uncritically, it is possible to attain a model that will not fit any comparable sample from the same population.

The parsimony principle considers that simple models with relatively few parameters are more generalisable than complex models. For parsimony-based fit indices, it is possible to introduce a penalty for the complexity of the hypothesised model in the assessment of overall model fit by multiplying the parsimony ratio with a particular index, such as NFI and CFI, generating PNFI or PCFI indices. Parsimony-based fit values larger than 0.60 are generally considered satisfactory.

Byrne (2016, pp. 101-102) posited that researchers "*do not need to report the entire set of fit indices*"; the author suggested that "*an array can give us a good sense of how well the model fits the sample data*". However, the question of which indices are appropriate in evaluating model fit always arises. The answer and the choice are not easy because indices behave "*somewhat differently given the sample size, estimation procedure, model complexity*" and the accomplishment of some assumptions, such as normality. Therefore, careful consideration of these critical factors is required. Finally, the author affirmed that model adequacy assessment is based on multiple criteria (theoretical, statistical, and practical considerations), and such criteria "*rest squarely on the shoulders of the researcher*". Table 4.3 shows a summary of the recommended cut-off values.

Table 4.3: Fit Indices for Covariance Structure Models. Adapted from Hoyle (2012, pp. 212, 213)

Fit index	Reference	Goodness or badness of fit index	Theoretical range	Cutoff criterion	Sensi-tive to N	Penalty for model complexity?
X^2	Jöreskog (1969)	Badness	>=0	p<.05	Yes	No
X^2/df	Jöreskog (1969)	Badness	>=0	<5[d]	Yes	Yes
GFI	Jöreskog & Sörbom (1981)	Goodness	0-1[a]	>.95[d]	Yes	No
AGFI	Jöreskog & Sörbom (1981)	Goodness	0-1[a]	N/A [d,e]	Yes	Yes
GFI*	Maiti & Mukherjee (1990); Steiger (1989)	Goodness	0-1[a]	>.95	No	No
AGFI*	Maiti & Mukherjee (1990); Steiger (1989)	Goodness	0-1[a]	N/A[e]	No	Yes
RMR	Jöreskog & Sörbom (1981)	Badness	>0	N/A[e,f]	Yes	No
SRMR	Bentler (1995)	Badness	>0	<.08	Yes	No
RMSEA	Steiger & Lind (1980)	Badness	>0	<.06	Yes to small N	Yes
TLF	Tucker & Lewis (1973)	Goodness	0-1[a,b]	>.95	No	Yes
NFI	Bentler & Bonett (1980)	Goodness	0-1	>.95[d]	Yes	No
IFI	Bollen (1989); Marsh et al. (1988)	Goodness	>0[b]	>.95	Yes to small N	Yes
RNI	Bentler (1990); McDonald & Marsh (1990)	Goodness	>0[b]	>.95	No	Yes
CFI	Bentler (1990)	Goodness	0-1	>.95	No	Yes

[a] Can be negative. Negative value indicates an extremely misspecified model.
[b] When exceeds 1, the fit index indicates extremely well-fitting model.
[c] Also called non-normed fit index (NNFI)
[d] Fit index is affected by sample size
[e] No cutoff criteria have been proposed for this index.
[f] Not standardized, so will be affected by size of elements in covariance matrix.

4.6 Summary

This chapter discussed the elements of research design such as research philosophy, research paradigm and choice of methodology, population and sampling procedures and data analysis. Also, this chapter presented the assumptions that underlie each element and guided and justified the methodology to be developed in the following chapters. A positivistic and quantitative approach was adopted because it provides the appropriate methodology for data analysis and exploring the defined causal relationships. Chapter Five discusses the development and validation of the research instrument.

Chapter Five: Instrument development and testing (pilot study)

5.1 Introduction

Science explains phenomena through two essential elements: theories and laws about the relationships between constructs and empirical evidence. The measurement process enables the definition of correspondence rules to establish the correlations between theory and empirical evidence (Torgerson, 1958).

Therefore, theories and measurements are conceptually integrated and are best dealt with together, as Lowry and Gaskin (2014) affirmed. These authors postulated that the "*separation of theory and measure can cause incorrect measurements, incorrect explanations, and incorrect predictions*".

Chapter Five describes the development of constructs based on theories previously tested and their measurements, as well as the validation of the properties and quality of the designed questionnaire.

5.2 Instrument development and constructs operationalisation

Dawis (1987) defined the term scale as "*those instruments that are constructed by researchers in order to obtain quantitative data on variables for which appropriate standardised instruments are not available*" (i.e. perceptions, feelings, attitudes, plans and behaviours).

On a physical scale, we can order objects as a function of their measured weights based on a physical continuum. However, when we need to order objects based on judgement, the scale is based on a psychological continuum. In 1927, Thurstone established that a psychological continuum is determined by a discriminatory power measured in terms of sense distances or just noticeable differences. Quantitative investigation of all kinds of values and subject experiences is what Thurstone defined as "*the law of comparative judgement*" (Edwards, 1957). Currently, these methods are known as psychological scaling methods.

Dawis (1987) established that defining the variable to be measured is required to design a scale and that such a definition should be based on theory generated by other studies. This definition includes distinctions (what the variable is and what it is not), dependencies with other terms and relations with other variables. Indications of how the variable is to be measured are required too. In this regard, issues such as how to represent the variable best, what the context is, who the respondents will be, and the research design, among others, must be considered.

A preliminary form is used in developing a scale, and data are analysed to select items for the final form. With a pilot study, considering a small sample, it is possible to check the appropriate level of readability and clarity of the instructions. Dawis (1987) suggested verifying the readability level of the scale to ensure the appropriate level for the respondent population. In addition, with the pilot study, it is possible to check how long it takes to complete the scale and how well the scale format functions.

In this chapter, based on the reliable and pre-validated scales from previous studies, the re-worded items were re-examined to fit the current context.

Organisational Enablers Construct (OE)

This construct refers to how an organisation governs and implements its strategies and defines roles and rules to transform itself into a knowledge-based organisation. An organisational structure should maximise the attributes in a knowledge management context to promote learning and knowledge (Pham & Swierczek, 2006).

The foundation of the construct and its dimensions is the Resource-Based View (RBV), which recognises resources as a source of competitive advantage, including intangible assets highly valued in organisations.

The selected indicators were identified, adopted and adapted from previous studies grounded in the RBV. From this point of view, the role of internal factors in organisations for this research is to facilitate the development of knowledge process capabilities that strengthen the firm's competitive advantage (Curado, 2006).

In this research, four dimensions with five items represent the Organisational Enablers construct. These are Learning Supportive Vision, adapted from Jyothibabu et al. (2010); Mission and Learning Values, adapted from Goh and Richards (1997); Leadership Commitment, adapted from Korst et al. (2011); and Use of Teams, adapted from Jyothibabu et al. (2010) and Poulton and West (1999).

Figure 5.1 depicts the Organisational Enablers construct composed of four dimensions with five indicators.

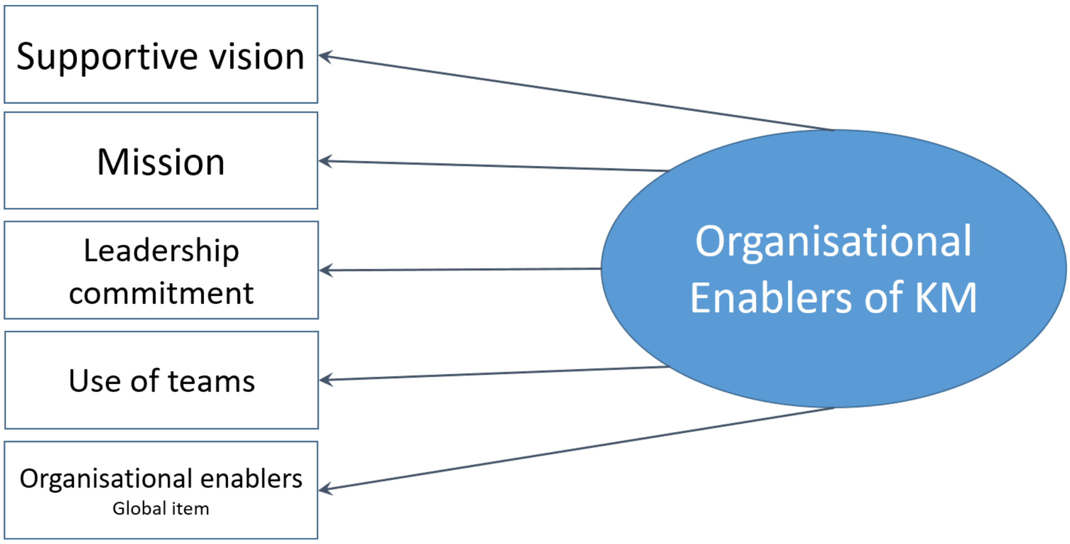


Figure 5.1: Organisational Enablers Construct (OE)

- *Learning Supportive Vision*: reflects a collective vision to establish strategies and processes that support learning and knowledge activities, creating a sense of purpose and promoting people to work together.

- *Mission and Learning Values*: reflect an articulated purpose and identify the values to promote knowledge and learning practices.
- *Leadership commitment*: reflects the leaders' shared vision and a commitment to learning; also communicates the relevance of collective learning and knowledge sharing to enhance patient safety.
- *Use of teams*: reflects the spirit of collaboration and the collaborative skills that enhance the knowledge culture and the commitment to objectives.

Culture of Collaboration Construct (CC)

Culture is a crucial factor for organisations in any environment. It plays an essential role in achieving established goals and organisational performance. Because the term culture is too broad, in this research, the construct refers to a shared set of underlying beliefs and values that employees adopt in organisations, affecting their behaviours, actions and expectations towards collaboration and knowledge transfer (Sveiby & Simons, 2002). A culture of collaboration enhances the organisation's ability to transform the natural tendency to hoard knowledge and to promote the willingness to share knowledge between group members while facilitating the learning process (Mahmoudsalehi et al., 2012; Pham & Swierczek, 2006).

The dimensions that reflect this construct are taken from the Social Exchange Theory (SET). The theory established that reciprocal activities and social exchange relationships will be developed if the employees perceive the organisation with a supportive atmosphere (Shim, 2010).

Additionally, a Culture of Collaboration is a valuable organisational capability developed through a complex and intangible process involving interactions among different resources such as people, a system of values and beliefs, information, knowledge, and others.

The dimensions were identified, adopted and adapted from previous studies grounded in the Social Exchange Theory. These are Trust from Rhodes et al. (2008); leader-member exchange from Korst et al. (2011); and employee attitude and reciprocity from Lee and Hong (2014).

Figure 5.2 depicts the Culture of Collaboration construct composed of four dimensions with five indicators.

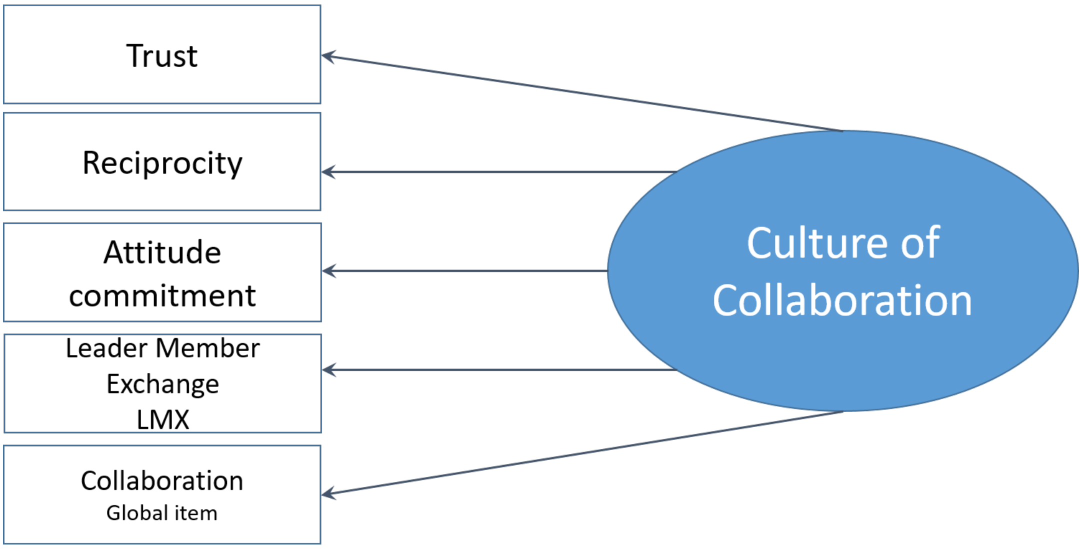


Figure 5.2: Culture of Collaboration Construct (CC)

- *Trust:* Refers to an atmosphere of trust perceived among healthcare professionals that enhances collaboration.
- *Reciprocity:* Perception to support each other for knowledge needs that motivate employees to engage in a culture of collaboration.
- *Employee attitude:* valued attitude towards collaboration that increases commitment toward knowledge activities.
- *Leader-Member Exchange:* Refers to the leaders' support to fostering a culture of collaboration and enhancing knowledge exchange among healthcare professionals.

Knowledge-Sharing Behaviour Construct (KSB)

The knowledge-sharing behaviour construct represents the behaviour performed by individuals toward spreading or disseminating the valuable knowledge they possess to other persons (Ryu et al., 2003). In a healthcare setting, knowledge-sharing behaviour is critical due to the multidisciplinary treatment of diseases and the exponential growth of information and knowledge related to healthcare practices.

Tohidinia and Mosakhani (2010) affirmed that knowledge sharing depends on individual decisions; thus, empirical research is needed to identify the factors that determine a physician's behaviour toward sharing knowledge, as Ryu et al. (2003) posited.

Knowledge-Sharing behaviour is operationalised for this research, adapting nine items grouped in four dimensions analysed in relevant prior studies. In addition, items were subjected to wording changes to adapt them to the healthcare professionals' knowledge-sharing context. Items reflect the validated components of the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB). Both models have been widely used and valuable in predicting behaviours in different contexts.

The validated components of TPB, as an extension of TRA, are: (1) attitude towards the behaviour, where personal beliefs about the consequences influence performing the behaviour in question; (2) subjective norm, defined as the perceived social pressure to perform or not to perform the behaviour in question; (3) perceived behavioural control, defined as the amount of control one has over the achievement of personal goals; and (4) intention, defined as the degree of a person's decision to perform a specified behaviour (Godin et al., 2008; Kuo & Young, 2008; Shu & Chuang, 2011).

Dimensions have been empirically examined in Bock et al. (2005), Tohidinia and Mosakhani (2010) and Ryu et al. (2003). For this research, items were adapted from Bock et al. (2005), Goh (2001), Lucas (2010) and Shim (2010), studies grounded in the Theory of Reasoned Action and the Theory of Planned Behaviour.

Figure 5.3 depicts the Knowledge-Sharing Behaviour construct composed of four dimensions with nine indicators.

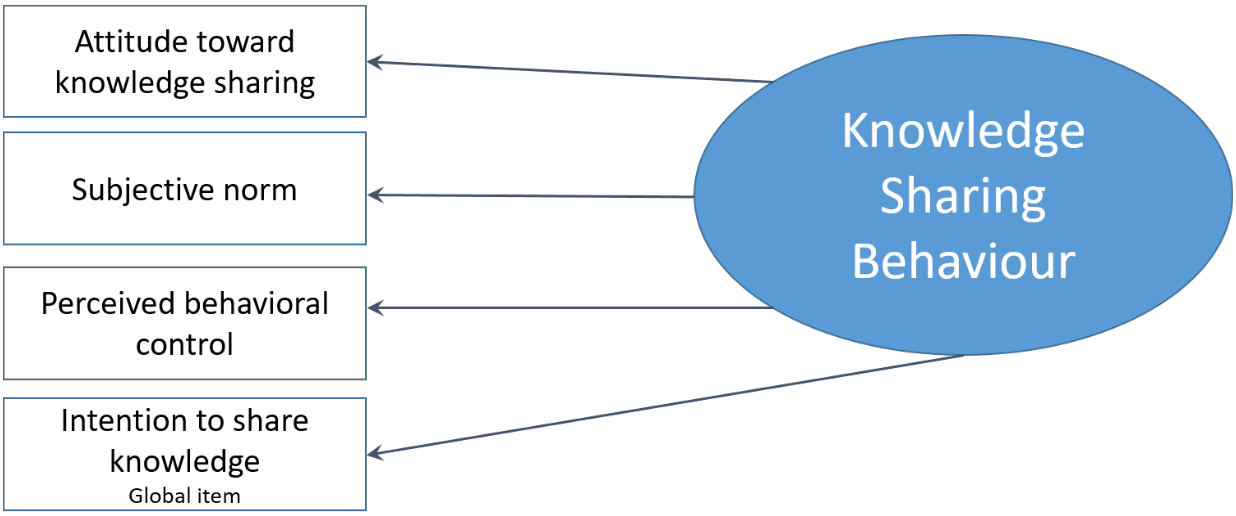


Figure 5.3: Knowledge-Sharing Behaviour Construct (KSB)

Technology Acceptance Construct (TA)

One of the primary motivations for analysing Technology Acceptance in healthcare systems is to understand the determinant factors that promote that healthcare professionals, in a voluntary manner, adopt new technologies to increase efficiency and improve quality through access to knowledge in their healthcare settings.

In this study, dimensions that reflect the Technology Acceptance construct are taken from the Technology Acceptance Model (TAM) developed by Davis (1989).

Dimensions such as perceived ease of use, perceived usefulness, attitudes towards using, and intention to use have been analysed in a variety of studies in the healthcare setting to understand the interrelated social forces that facilitate or hinder the use of Health Information Services (Khan & Western, 2011; Norman & Skinner, 2006; Yu, Li, & Gagnon, 2009).

For this research, eleven items grouped in five dimensions were adopted from studies applied to healthcare settings (Aggelidis & Chatzoglou, 2009; Chen & Hsiao, 2012; Dünnebeil et al., 2012; Pai & Huang, 2011; Tung et al., 2008; Yarbrough & Smith, 2007).

In addition, some items were re-worded to adapt them to the specific context of the current research.

Figure 5.4 depicts the Technology Acceptance construct, composed of five dimensions with eleven indicators based on TAM.

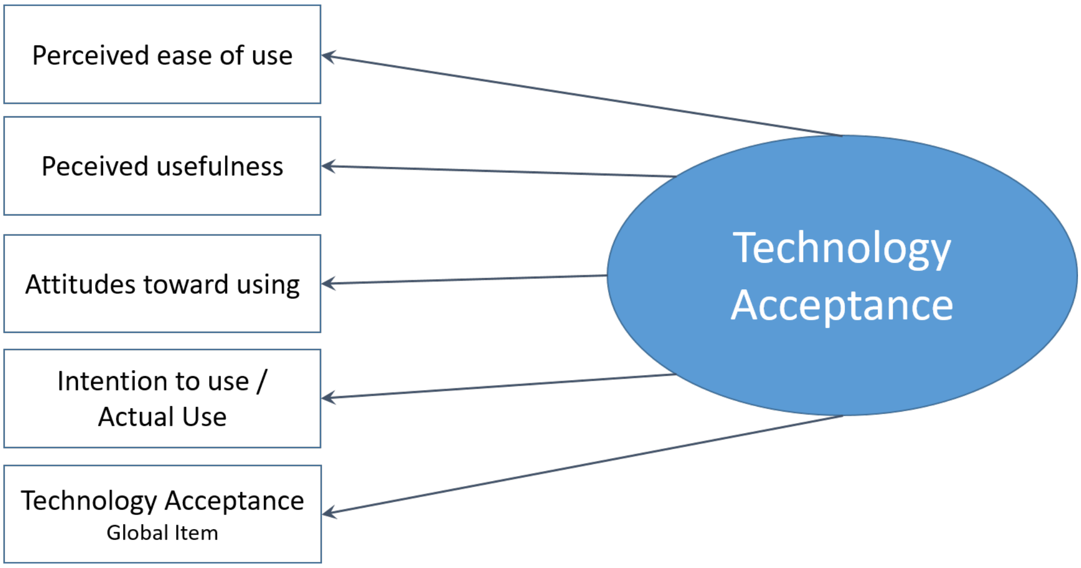


Figure 5.4: Technology Acceptance Construct (TA)

- *Perceived usefulness:* reflects the healthcare professionals' belief that using technology increases their knowledge and job performance.
- *Perceived ease of use:* reflects the healthcare professionals' belief that using technology is free of effort.
- *Attitudes towards using:* reflect the attitudes and beliefs of healthcare professionals toward using technology to perform their job.
- *Intention to use*: refers to healthcare professionals' intention to use technology.

Knowledge Process Capabilities Construct (KPC)

This research adopted the Knowledge Process Capability construct from Gold et al. (2001). Gold and Malhotra's model was initially developed to analyse the KPC construct on an organisational level. However, in this research, the KPC construct was adapted to be analysed as a capability at an individual level adopting the four dimensions: knowledge acquisition, knowledge conversion, knowledge application and knowledge protection.

This construct aims to measure the ability of individuals to acquire, convert, apply and protect knowledge, consciously and intentionally, through the activities performed in their job and interactions with other individuals.

Figure 5.5 depicts the Knowledge Process Capabilities construct, composed of nine indicators and grouped in four dimensions, adopted and adapted from Gold et al. (2001) and Lee et al. (2012), grounded in the Knowledge-Based View.

Gold et al. (2001) defined:

- *Knowledge acquisition* refers to the ability to identify, acquire and accumulate knowledge.
- *Knowledge conversion* refers to the ability to convert data into information and information into knowledge.
- *Knowledge application* is the ability to make knowledge active and relevant for creating organisational value.
- *Knowledge protection* refers to the application of security protocols established by organisations to ensure knowledge integrity.

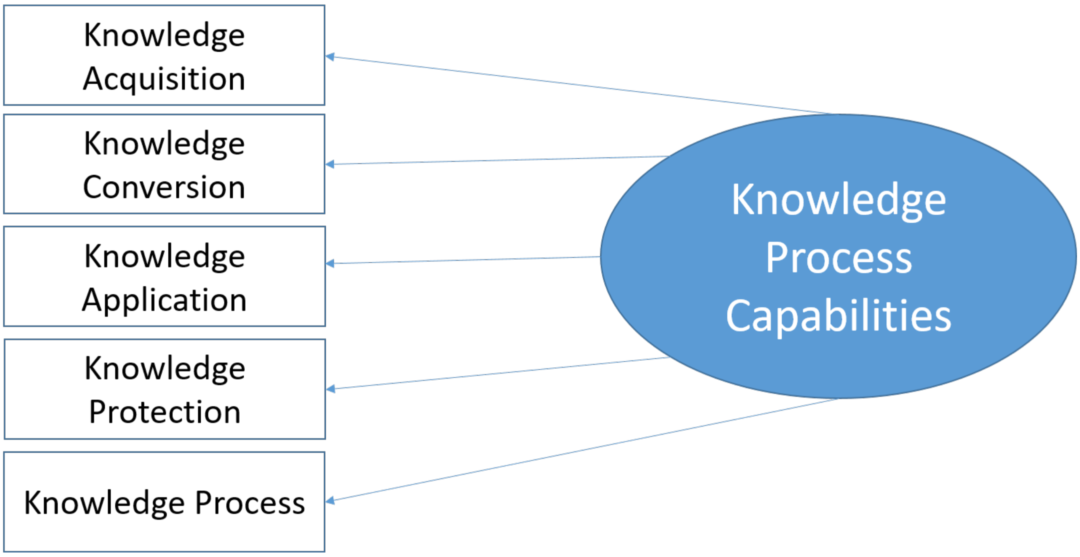


Figure 5.5: Knowledge Process Capabilities Construct (KPC)

Organisational Performance Construct (OP)

Measuring organisational performance is related to achieving goals and objectives assessed in terms of efficiency and effectiveness (Ho, 2008). Gold et al. (2001) affirmed that "*effective Knowledge Management through the development of capabilities should contribute to key aspects of organisational performance*". Additionally, Mills and Smith (2011) specified that only some capabilities contribute directly to organisational performance. The combination of resources and capabilities differs across firms and, with it, how their performance improves.

In a healthcare setting, patient safety is a crucial aspect of organisational performance and one of the most critical indicators (Kim et al., 2012). Furthermore, patient safety is strongly related to knowledge because it is an essential resource to support diagnostics, make treatment decisions, and prevent adverse events and medication errors.

This research adapts five items from Jen and Chao (2008), Lee et al. (2012), and Jyothibabu et al. (2010) to measure Organisational Performance in terms of continuous improvement in patient safety, capability to predict unexpected incidents, improvement in services quality and patient safety capability.

The foundation of the construct and its dimensions is the Resource-Based View (RBV), which recognises that resources and capabilities contribute to improving performance and developing a source of competitive advantage.

Figure 5.6 depicts the Organisational Performance construct in terms of patient safety, composed of four dimensions with five indicators.

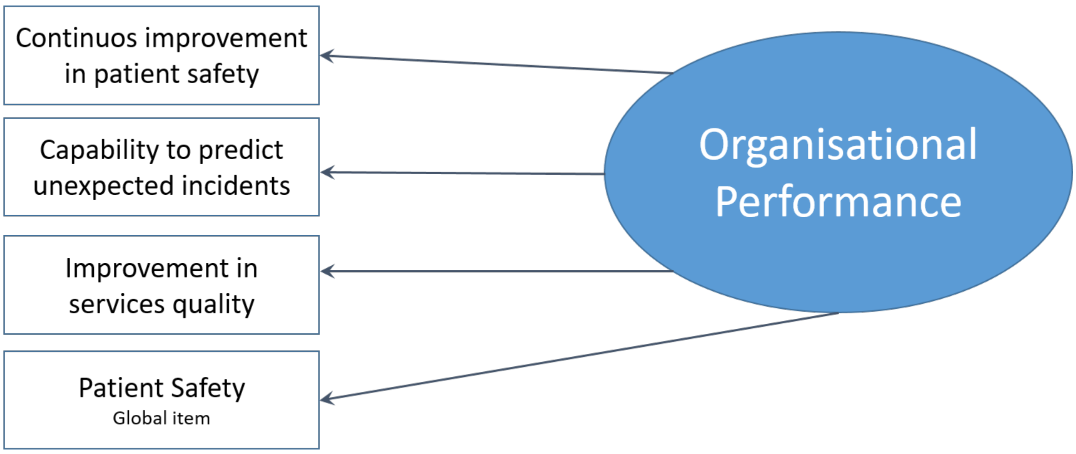


Figure 5.6: Organisational Performance Construct (OP)

Finally, the designed instrument was composed of six dimensions with forty-three items. All of them were adopted from validated scales.

Reflective measures

A measurement model represents the form in which the unobservable variables are related to their corresponding indicator variables. These relationships can be defined by formative or reflective measures that integrate the measurement model. In formative measures, the causal relationships flow from the indicator variables to the construct, suggesting that each indicator captures a specific facet of the related construct. Hence, they altogether determine the meaning of the construct.

In reflective measures, the causal relationships flow from the construct to its indicator variables; this type of measure represents the effects of an underlying construct. Reflective measures are more appropriate than formative measures when a researcher wishes to test theories (Hair et al., 2016).

Drawing upon the affirmations of Hair et al. (2016), since reflective indicators are a representative sample of all possible items caused by the same construct, high correlations are expected. Hence, individual items could be interchangeable or removed without changing the meaning of the construct. In reflective measures, an error term should be added to capture all the other causes that are not included in the model to measure the latent variable fully.

Figure 5.7 graphically represents the difference between reflective and formative measures:

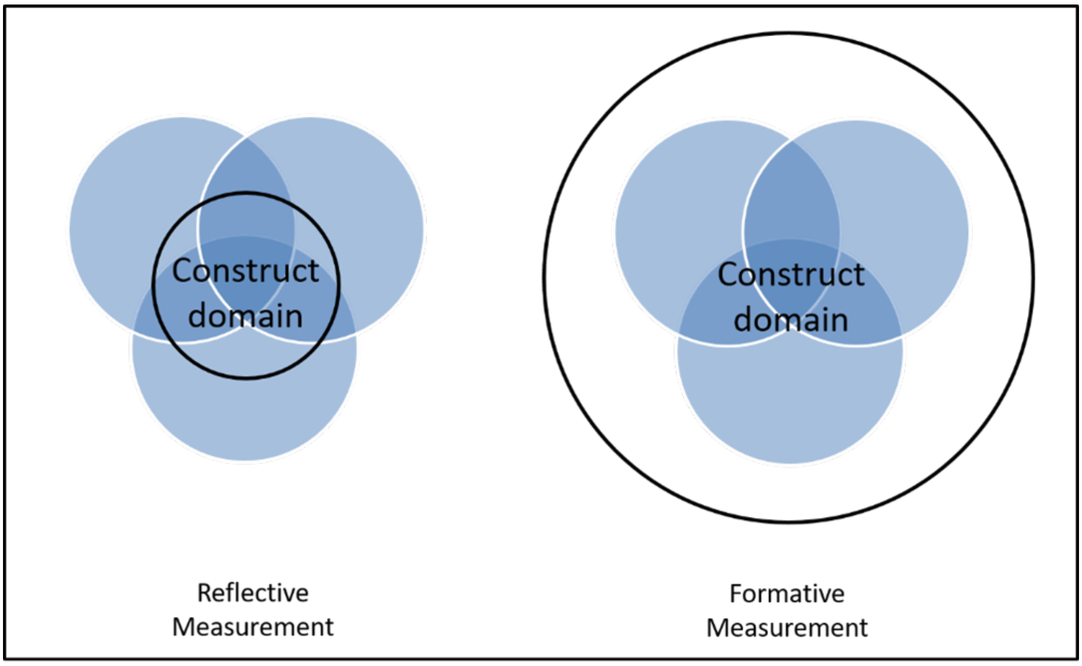


Figure 5.7: Reflective and Formative measures. From Hair et al. (2016)

The grey circles represent each indicator's scope, and the circles with a black line represent the construct domain or the content that the construct represents and is intended to measure. As can be seen, formative measurements try to represent and cover the complete construct. Overlapping grey circles are small due to the importance of avoiding collinearity between indicators because each indicator represents a different construct dimension. Conversely, reflective measurements maximise the overlap in grey circles because indicators could be interchangeable; this type of measurement attempts to be a representative sample of all the possible items that compose the conceptual domain of the construct (Hair et al., 2016).

It is essential to distinguish between formative and reflective constructs to evaluate the predictive capabilities of the measurement model. Each approach is evaluated in a different form. Suggestions for the evaluation of the measurement models are shown in Table 5.1.

Table 5.1: Evaluation of the Measurement Model. From Hair et al. (2016)

Reflective Measurements Models	Formative Measurement Models
● Internal consistency (Cronbach's alpha, composite reliability) ● Convergent validity (indicator reliability, average variance extracted) ● Discriminant validity	● Convergent validity ● Collinearity between indicators ● Significance and relevance of outer weights

For this research, the variables have been operationalised using multi-item reflective measures; all of them have been rigorously anchored in previous studies and discussed with professionals to ensure content validity.

5.3 Reliability and Validity

As mentioned above, the designed instrument in this research adopted scales from past studies. Therefore, items were adapted to the particular context of this research, adding or deleting some items to integrate a new instrument.

Finn and Kayande (2004) established that the adapted instrument must be evaluated through a pilot study, considering a small sample to refine the questions and verify the instructions' appropriate level of clarity and readability. Furthermore, the authors stated that by modifying and refining the scale, it is possible to improve the psychometric properties of the original scale. Therefore, the validity and reliability assessment was conducted to ensure the quality of the defined scale.

5.3.1 Reliability

Reliability is concerned with the credibility of the research findings or the consistency of the findings; this means that a repeated study should produce the same result, or other participants could reach similar observations. This characteristic is essential in positivistic studies because the authenticity of the findings ensures that the researcher did not influence the research (Collis & Hussey, 2003; Saunders et al., 2009).

A good research design reduces the possibility of offering wrong results and increases consistent findings. Cronbach’s alpha reliability is the most common measure for estimating internal consistency reliability, and it measures the scale's stability.

Composite reliability is a different measure of internal consistency reliability; this measure considers each indicator's contribution to its related construct. A very high value in this measure is not desirable because it indicates that the scale consists of redundant indicators measuring the same phenomenon (Hair et al., 2016).

Following the recommendations of Hair et al. (2016) that the true reliability usually lies between Cronbach's alpha (which is a conservative measure) and the composite reliability (which tends to overestimate the internal consistency), both measures are considered and reported for this research.

5.3.2 Validity

Validity "*is the extent to which the research findings accurately reflect the phenomena under study*" (Collis & Hussey, 2003). In other words, "*findings are really about what they appear to be about*" (Saunders et al., 2009). Therefore, inaccurate measurement can undermine validity, which is why researchers should ensure that the tests or used measures represent what they are supposed to measure.

Construct validity was addressed by assessing content, convergent and discriminant validity. Saunders et al. (2009) hold that content validity could be accomplished by careful definition of the research through the literature review, and by the judgement of a panel of individuals. Accordingly, the content validity of the questionnaire was addressed through a rigorous literature review (see Chapters Two and Three), and items were anchored in prior studies and validated surveys (see Chapter Four). For this research, scales were assessed by experts' judgements regarding the length and clarity of questions. Thus, four academicians with over ten years of practice in Strategic Management were asked to review the questionnaire to enhance the instrument by performing adjustments based on their feedback.

To identify any potential problem with the questionnaire, the academicians, in conjunction, reviewed each item and grouped them according to the construct they considered related. The first exercise helped to unify the criteria and clarify the definitions of the constructs. During the second exercise, after grouping the items into related constructs, two problematic items were identified and deleted from the Technology Acceptance and Knowledge Process Capabilities constructs due to their lack of clarity and duplicity, and because the items could not be classified as indicators of the construct.

Convergent validity examines the degree of similarity between operationalised items that should theoretically be similar, suggesting that all items integrate a single construct. This requirement is sufficient when high Average Variance Extracted (AVE) values are met (Jyothibabu et al., 2010; S. Lee et al., 2012). The average variance extracted (AVE) is a criterion that calculates the grand mean of the squared loadings of the indicators related to the same construct; this criterion explains the variance that a construct exerts on its indicators (Hair et al., 2016).

Conversely, discriminant validity examines the degree of lack of similarity between operationalised items that theoretically should not be similar, suggesting that a latent variable differs from the other latent variables; this requirement is sufficient when "*the intercorrelations among the latent variables do not exceed the square root of the AVE*" (Jyothibabu et al., 2010; S. Lee et al., 2012).

Assessing cross-loadings is the first approach to evaluate that a construct is unique and that other constructs in the model do not represent the same phenomenon. In order to establish discriminant validity, an indicator's outer loading should be higher on its corresponding construct than any of its cross-loadings. A second approach to evaluate discriminant validity is the Fornell-Larcker criterion, which is based on the premise that the square root of the AVE value for each construct should be larger than its correlation with other constructs. Karjaluoto et al. (2016) said, "*a latent variable should better explain variance of its own indicators than variance of other latent variables*". Assessing the heterotrait-monotrait ratio (HTMT) is a third approach to evaluate discriminant validity. "*HTMT is the mean of all correlations of indicators across constructs measuring different constructs relative to mean of the average correlations of indicators measuring the same construct*"; a conservative value of this criterion to suggest that the construct in the path model is conceptually more distinct is 0.85. A fourth approach to evaluate discriminant validity is through a bootstrap confidence interval, evaluating if neither of the confidence intervals includes the value one. If a confidence interval contains the value one, it indicates a lack of discriminant validity. If the value one falls outside of the interval, this suggests that the two constructs are empirically distinct. The bootstrapping method randomly builds subsamples from the original data set to derive a distribution of the HTMT statistic (Hair et al., 2016).

Section 5.5 presents the results of the reliability and validity tests mentioned before.

5.4 Translation process

It is believed grammar and syntax are the basis for the correct use of language, as it is the use of well-formed sentences; these critical linguistic elements are taken into consideration in the translation process. Other essential element suggested by Saunders et al. (2009) are:

- The lexical meaning, which refers to the meaning of a word in isolation.

- The idiomatic meaning, which is defined as the meaning of expressions that are natural to a native speaker.
- The experiential meaning refers to the familiar terms to people in their everyday experiences.

In Table 5.2, Usunier (1998), cited by Saunders et al. (2009), outlines some questionnaire translation techniques.

Table 5.2: Questionnaire translation techniques. From Usunier (1998) cited by Saunders et al. (2009)

	Direct translation	Back-translation	Parallel translation	Mixed techniques
Approach	Source questionnaire to target questionnaire	Source questionnaire to target questionnaire to source questionnaire; comparison of two new source questionnaires; creation of final version.	Source questionnaire to target questionnaire by two or more independent translators; comparison of two target questionnaires; creation of final version.	Back-translation undertaken by two or more independent translators; comparison of two new source questionnaires; creation of final version.
Advantages	Easy to implement, relatively inexpensive	Likely to discover most problems	Leads to good wording of target questionnaire	Ensures best match between source and target questionnaires
Disadvantages	Can lead to many discrepancies (including those relating to meaning) between source and target questionnaire	Requires two translators, one a native speaker of the source language, the other a native speaker of the target language	Cannot ensure that lexical, idiomatic and experiential meanings are kept in target questionnaire	Costly, requires two or more independent translators. Implies that the source questionnaire can also be changed.

As mentioned, a questionnaire was developed based on existing instruments from the Knowledge Management literature; all were created and written in English. The selected items that formed this research questionnaire were written in English, and the equivalent Spanish version was generated using a back-translation technique.

The first translation from the original version in English to Spanish was performed by a native Spanish speaker, an Associate Professor at Tec de Monterrey University with a degree in English teaching and a Postgraduate degree in Management. The first chapter and the constructs' definitions were provided to the translator to understand the research topic better. Following an initial translation, the questionnaire was re-translated to English to fulfil the requirement of the back-translation technique and compared the translated version with the original English questionnaire. A native English speaker, an Associate Professor at Tec de Monterrey University with a degree in English Literature, carried out the back-translation. Finally, to validate the final Spanish version, it was compared again with the back-translated English version; this process identified some minor changes, resulting in insignificant variations.

A group of experts revised the final Spanish version during the validation process, which is explained in the next section.

5.5 Pilot Study

Saunders et al. (2009) suggested that once the questionnaire has been designed, it is crucial to conduct a pilot study to identify any problem related to the instrument before collecting data from the main study. The pilot study allowed the refinement of the instrument in such a way that the respondents could easily understand the questions and answer the questionnaire. Also, through the pilot study, it was possible to identify and resolve problems with the data recording. On the other hand, as part of the pilot study, the data's validity and reliability were analysed to respond to the phenomenon studied.

Before carrying out the pilot study, two experts assigned by the hospital's research department were consulted to validate the questions' clarity and representativeness and ensure that other instrument characteristics, such as the structure and clarity of the instructions, were adequate for the hospital environment. The opinion from healthcare experts asserted that all the questions and instructions were clearly stated. Thus, the questionnaire was not modified after this revision. Subsequently, based on the sample defined for the pilot study, the head of the research department allowed access to specific work areas to deliver the self-administered questionnaire to health professionals.

The characteristics of the respondents can be observed in Table 5.3.

Table 5.3: Demographic characteristics of participants (pilot study)

Factors	Variables	Frequency	%
GENDER	(1) Female	33	70
	(2) Male	14	30
	Total	**47**	**100**
AGE	(1) < 20	0	0
	(2) 20- 29	6	13
	(3) 30-39	24	51
	(4) 40-49	14	30
	(5) >=50	3	6
	Total	**47**	**100**
HEALTHCARE EMPLOYEE TYPE	(1) General Doctor	0	0
	(2) Specialist	9	19
	(3) Nurse	26	55
	(4) Medical Technician	1	2
	(5) Social Worker	4	8
	(6) Other	7	16
	Total	**47**	**100**
EDUCATION	(1) Technical Specialist	3	6
	(2) Medical Bachelor	19	41
	(3) Specialist/Master	25	53
	(4) PHD	0	0
	Total	47	100

Bryman and Bell, cited by Saunders et al. (2009) posited that a pilot study facilitates the identification of problems such as the time it takes to answer the questionnaire, the clarity of the instructions and the identification of ambiguity, confusing questions or difficulty to answer the questions. Additionally, through the pilot study, the researcher can ensure that the questionnaire is precise and attracts the respondent's attention and obtain other comments that help improve the validity and reliability of the instrument.

The tools and analyses used in the pilot study are detailed below.

Statistical technique:

Two methods could be considered for estimating the measures of latent variables from the model and their established relationships. These are covariance-based techniques (CB-SEM) and variance-based partial least squares (PLS-SEM). Some distinctive methodological features are that PLS-SEM has minimum demands regarding sample sizes, its algorithm works well with small sample sizes, and it generally achieves high levels of statistical power. On the other hand, CB-SEM has constraints regarding the number of observations and small sample sizes; the algorithm needs larger sample sizes to achieve robust parameter estimates. In addition, PLS-SEM results are robust if data are highly skewed; conversely, CB-SEM requires normally distributed data (Hair et al., 2012). Peng and Lai (2012) posited that when the study aims to explore relationships among theoretical constructs and assess the predictive validity of the exogenous variables, PLS-SEM is more appropriate.

Partial Least Squares (PLS) is a variance-based Structural Equation Model (PLS-SEM) technique for analysing multiple variables. PLS is a second-generation technique of statistical methods developed by Wold in 1960 (Peng & Lai, 2012) and later improved by Lohmöller (2013) that provides an alternative to the multivariate analysis method for modelling nomological networks.

PLS is oriented towards causal-predictive analysis of manifest and latent variables attempting to maximise the explained variance (R^2) of the dependent variables; this is the predictive power of the exogenous variables on the endogenous variables. In the words of Lowry and Gaskin (2014), this type of analysis tries "*to explain how changes in one or more variables result in changes to one or more other variables within a given context*". The method is based on an iterative combination of principal component analyses and regression, minimising the residual variance of the dependent variables. Once PLS has acquired the parameter estimates, it calculates the significance of each path in the model using a t-test (Carmona et al., 2016; Osei-Frimpong, 2017).

Hair et al. (2016) affirmed that the use of PLS has increased due to its predictive power and characteristics.

The main characteristics of PLS, as identified by Lyons and Perrewé (2014), Carmona et al. (2016), Osei-Frimpong (2017), and Hair et al. (2016) are:

1. "*PLS is flexible with regards to distributional assumptions allowing for the use of a distribution-free method or non-normal data*".
2. "*PLS is most appropriate in examining data where the sample size is relatively small*".
3. PLS is more suitable for predictive applications (validity of models); it "*focuses on maximising the variance in the dependent variables that are explained by independent variables*".
4. PLS is appropriate for theory development.

Specifically for this research, SmartPLS was used to estimate the measurement model, using a maximum iteration of 300 to ensure that convergence is obtained at the stop criterion of 10^{-7}. A value of 1.0 is used for all measurement model relationships to initialise the PLS algorithm.

Through the bootstrapping procedure, SmartPLS randomly builds subsamples from the original set of data to derive a distribution and to obtain a bootstrap confidence interval for the significance testing procedure and also for an assessment of parameter stability (Lowry & Gaskin, 2014; Peng & Lai, 2012; Ringle et al., 2012; Sarstedt et al., 2014). For the pilot study, a bootstrapping procedure was conducted by computing 5,000 bootstrap samples to verify that reflective measures are conceptually different using the Heterotrait-Monotrait Ratio (HTMT) statistic.

The rules of thumb for evaluating reflective measurement models of Hair et al. (2016) guided the proper use of PLS in this research (see Table 5.4).

Table 5.4: Rules of Thumb for Evaluating Reflective Measurement Models. From Hair et al. (2016)

Internal consistency reliability:	composite reliability should be higher than 0.70 (in exploratory research, 0.60 to 0.70 is considered acceptable). Consider Cronbach's alpha as the lower bound and composite reliability as the upper bound of internal consistency reliability.
Indicator reliability:	the indicator's outer loadings should be higher than 0.70. Indicators with outer loadings between 0.40 and 0.70 should be considered for removal only if the deletion leads to an increase in composite reliability and AVE above the suggested threshold value.
Convergent validity:	the AVE should be higher than 0.50.
Discriminant validity:	• According to the traditional discriminant validity assessment methods, an indicator's outer loadings on a construct should be higher than all its cross-loadings with other constructs. Furthermore, the square root of the AVE of each construct should be higher than its highest correlation with any other construct (Fornell-Larcker criterion). • Use the HTMT criterion to assess discriminant validity in PLS-SEM. • The confidence interval of the HTMT statistic should not include the value 1 for all combinations of constructs.

Sample Size for the pilot study:

Hair et al. (2016) hold that the selected elements in a sample should reflect the similarities and differences found in the population to make inferences about the population from the sample. The importance of a good sample relies on its capacity to ensure that the results of the statistical method, such as PLS-SEM, are robust and that the model is generalisable.

Due to PLS-SEM uses Ordinary Least Squares regressions to estimate the model's partial regression relationships, Hair et al. (2016) suggested using Cohen's recommendation in his statistical power analyses for multiple regression models to determine the sample size. Table 5.5 shows the minimum sample size requirements to accomplish the following characteristics:

- The significance levels of 1%, 5%, or 10%,
- The statistical power of 80%,
- Minimum R^2 values of 0.10, 0.25, 0.50, or 0.75 in any of the endogenous constructs in the structural model, and
- The complexity of the PLS path model regarding "*the maximum number of arrows pointing at a construct in the PLS path model that is the number of independent variables*".

Given that the proposed model for the pilot study has four independent variables and two dependents variables, the sample size recommended using the table above shows that 41 observations are needed to achieve a statistical power of 80%, with an R2 value of at least 0.25 and a 5% probability of error. Therefore, fifty questionnaires were distributed, and 47 were returned for this pilot study.

Table 5.5: Sample Size Recommendation in PLS-SEM for a Statistical Power of 80%. Source: A Power Primer (Cohen, 1992), cited by Hair et al. (2016)

Maximum number of arrows pointing a construct (number of independent variables)	Significance Level											
	10%				5%				1%			
	Minimum R^2				Minimum R^2				Minimum R^2			
	0.10	**0.25**	**0.50**	**0.75**	**0.10**	**0.25**	**0.50**	**0.75**	**0.10**	**0.25**	**0.50**	**0.75**
2	72	26	11	7	90	33	14	8	130	47	19	10
3	83	30	13	8	103	37	16	9	145	53	22	12
4	92	34	15	9	113	41	18	11	158	58	24	14
5	99	37	17	10	122	45	20	12	169	62	26	15
6	106	40	18	12	130	48	21	13	179	66	28	16
7	112	42	20	13	137	51	23	14	188	69	30	18
8	118	45	21	14	144	54	24	15	196	73	32	19
9	124	47	22	15	150	56	26	16	204	76	34	20
10	129	49	24	16	156	59	27	18	212	79	35	21

Data Analysis and results:

Before conducting the main study, a pilot study was developed to identify problems with the designed instrument. In this research, the designed instrument was formed by six reflective measures, where measures represent the effects of an underlying construct (Hair et al., 2016). Forty-three Indicators were assessed using a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5).

The evaluation for the reflective measurements included analyses of internal consistency reliability using Cronbach's alpha criterion and composite reliability using outer loadings of the indicator variables. In addition, the convergent validity and discriminant validity of the model are also assessed.

Hair et al. (2016) posited that eliminating one or more indicators may improve the reliability or discriminant validity but may decrease the measurement's content validity; also, item removal or retention should be carefully considered. To improve the psychometric properties of the constructs and their indicators, first, composite reliability was evaluated, taking into account the outer loadings of each indicator to attempt to purify the measurement model at each latent variable. Outer loadings of the reflective constructs that estimate the relationships between the reflective latent variables and their indicators are considered adequate when the factor loadings of the items are above the threshold value of 0.70, which suggests a good level of reliability.

In this process, one indicator of the Culture of Collaboration (CC) and Organisational Performance (OP) variables, two indicators of the Knowledge-Sharing Behaviour (KSB) variable, and six indicators of the Technology Acceptance (TA) variable showed weak outer loadings (<.70).

These results showed that such indicators did not capture or poorly capture some essential aspects of their constructs. By removing these indicators, their corresponding latent variables were not affected since the essential aspects of the domain of the construct are captured by the remaining indicators.

Discriminant validity analysis evaluates the cross-loadings to verify that each item loads highest on their respective construct; this means that the construct is unique, and another construct does not represent the same phenomenon. The results of the cross-loading analysis identified one indicator in the variable KSB and TA and two indicators in Knowledge Process Capability (KPC) that exceed the outer loadings in a different construct to the one with which they are associated. These indicators were eliminated, ensuring that each variable's remaining indicators captured the construct's essential aspects. Additionally, through the Fornell-Larcker analysis, two problematic items were identified in the KPC variable, contributing to a greater degree to the variance of another variable (KSB). By eliminating both indicators, the phenomenon represented by the KPC variable is not captured in any other construct of the model.

After this evaluation process, as Table 5.6 shows, composite reliability values exceeded the threshold level of 0.70, stretching from 0.876 (KPC) to 0.937 (KSB) for all measures. These values showed high levels of internal consistency reliability. For Cronbach's alpha criterion, values indicated that the internal consistency reliabilities of the constructs are above the 0.70 threshold.

The analyses identified that the OEKOLV, CCRPC, and KPCKAP1 indicators showed outer loadings very close to .70 (between 6.88 and 6.99). However, the mentioned indicators were not considered problematic because the Cronbach's alpha for each variable (OE, CC and KPC) as a whole is high (.875, .881, and .811, respectively), and their values in AVE exceeded the recommended limit value (0.50). Additionally, these indicators did not present a cross-loading in a different construct. Consequently, these indicators were kept in their respective scale.

For convergent validity on the construct level, the average variance extracted (AVE) was evaluated; based on Hair et al. (2016), an established rule of thumb is that a latent variable should explain a substantial part of each indicator's variance, usually at least 50%. The AVE values for reflective variables showed the required minimum level of 0.50, ranging from 0.640 (KPC) to 0.780 (TA).

Table 5.6: Reliability and validity measures

	Indicators	*Question*	*Loading*	Composite reliability	Cronnbach's alpha	AVE
CC	**CCEA**	It is important for me to learn from each of my job experiences and from my colleagues.	0.922	0.909	0.881	0.716
	CCLMX	My immediate supervisor supports and encourages my participation to foster a collaborative environment in my hospital unit.	0.791			
	CCRCP	In our team, people support each other to prevent and learn from mistakes.	0.820			
	CCTRT	The atmosphere of my organisational unit helps employees trust others.	0.845			
KPC	**KPCKA1**	In my practice, I usually encourage the creation of new knowledge from existing knowledge.	0.784	0.876	0.811	0.640
	KPCKAP1	I usually apply knowledge available in my organisation to solve new problems.	0.740			
	KPCKC2	In my practice, I usually transfer my own experiences to other employees	0.844			
	KPCKU1	In my practice, I am aware of the processes to protect knowledge from inappropriate use inside and outside the organisation.	0.827			
OE	**OEG**	In general, considering both the structure and the organisational characteristics, my organisation is a knowledge-based organisation.	0.902	0.908	0.875	0.666
	OEKLSV	My organisation has a clear vision and strategy to support learning and knowledge activities.	0.849			
	OEKLOV	The organisation's mission identifies values to which all employees must conform to facilitate the knowledge practices.	0.701			
	OELC	Your hospital's leaders have a well-defined vision of how promoting and participating in a collaborative environment will advance the strategic goals of the organisation.	0.779			
	OEUT	Has my organisation established clear objectives for team working?	0.835			
TA	**TAATU1**	Using the available system for healthcare information is a good idea.	0.836	0.934	0.906	0.780
	TAAU1	I frequently use the healthcare information system available.	0.868			
	TAPU2	The use of health technology and information systems will support me in my daily work.	0.893			

	TAPU3	The use of health technology and information systems will make it possible to work more efficiently.	0.933			
KSB	**KSBAKS2**	My knowledge sharing with other organisational members is valuable.	0.868	0.937	0.918	0.714
	KSBAKS3	My knowledge sharing with other organisational members is wise.	0.798			
	KSBPB1	I share my knowledge to any co-worker if it is helpful to the organisation.	0.825			
	KSBPB2	I intend to share my knowledge with other organisational members more frequently in the future.	0.910			
	KSBPB3	I always provide my knowledge at the request of other organisational members.	0.928			
	KSBSN	I am always happy to tell my colleagues of my involvement in finding new ways to do thigs.	0.726			
OP	**OPPS2**	There is continuous improvement on patient safety by implementing knowledge management practices in my organisation.	0.819	0.882	0.831	0.652
	OPPS3	After knowledge management processes are introduced, the capability to predict unexpected incidents on patient safety is improved.	0.814			
	OPPS4	The knowledge management process increases the patient safety capability of our hospital.	0.786			
	OPPS5	The knowledge management process improves the quality of services to high-risk patients.	0.810			

Notes: outer loadings >0.7; composite reliability >0.7; AVE>0.5; Cronbach’s alpha >0.7.

The cross-loading values, the Fornell-Larcker criterion, the Hetero-trait-Monotrait Ratio (HTMT) and the bootstrap confidence interval procedure were examined for discriminant validity. The results showed that all indicators' outer loadings on the associated construct are greater than any of their cross-loadings, as shown in Table 5.7.

Table 5.7: Discriminant validity. Cross-Loadings

Fornell-Larcker Criteri... | Cross Loadings | Heterotrait-Monotrait R... | Heterotrait-Monotrait R... | Copy to Clipbo

	CC	KPC	KSB	OE	OP	TA
CCEA	0.922	0.287	0.232	0.644	0.394	0.339
CCLMX	0.791	0.099	0.147	0.599	0.347	0.135
CCRCP	0.820	0.083	0.011	0.505	0.290	0.132
CCTRT	0.845	0.150	0.048	0.610	0.352	0.130
KPCKA1	0.022	0.784	0.581	0.075	0.330	0.362
KPCKAP1	0.322	0.740	0.475	0.369	0.327	0.622
KPCKC2	0.209	0.844	0.615	0.341	0.342	0.444
KPCKU1	0.158	0.827	0.569	0.274	0.388	0.589
KSBAKS2	0.058	0.577	0.868	0.168	0.436	0.592
KSBAKS3	-0.013	0.510	0.798	0.144	0.408	0.453
KSBPB1	0.243	0.498	0.825	0.383	0.410	0.575
KSBPB2	0.129	0.587	0.910	0.260	0.367	0.581
KSBPB3	0.128	0.649	0.928	0.249	0.507	0.708
KSBSN	0.270	0.674	0.726	0.358	0.321	0.528
OEG	0.616	0.379	0.388	0.902	0.434	0.404
OEKLSV	0.453	0.258	0.233	0.849	0.355	0.260
OEKOLV	0.401	0.146	0.299	0.701	0.418	0.339
OELC	0.648	0.227	0.106	0.779	0.306	0.078
OEUT	0.705	0.282	0.213	0.835	0.433	0.178
OPPS2	0.427	0.475	0.407	0.619	0.819	0.434
OPPS3	0.220	0.309	0.359	0.253	0.814	0.375
OPPS4	0.327	0.221	0.421	0.252	0.786	0.576
OPPS5	0.327	0.299	0.382	0.241	0.810	0.596
TAATU1	0.273	0.580	0.540	0.366	0.540	0.836
TAAU1	0.045	0.577	0.597	0.089	0.510	0.868
TAPU2	0.343	0.504	0.641	0.355	0.489	0.893
TAPU3	0.279	0.575	0.643	0.308	0.554	0.933

Regarding the Fornell-Larcker criterion, the AVE value's square root for each construct is larger than its correlation with other constructs. Correlations among the reflective constructs are displayed in Table 5.8.

Table 5.8: Fornell-Larcker criterion

	CC	KPC	KSB	OE	OP	TA
CC	**0.846**					
KPC	0.226	**0.800**				
KSB	0.166	0.700	**0.845**			
OE	0.702	0.337	0.311	**0.816**		
OP	0.417	0.435	0.484	0.473	**0.807**	
TA	0.263	0.636	0.685	0.314	0.594	**0.833**

Additionally, the HTMT ratio evaluates the pairwise correlation between constructs to verify that reflective measures are conceptually distinct. As seen in Table 5.9, the results are lower than the more conservative threshold value of 0.85; thus, this requirement is met.

Table 5.9: HTMT Ratio

	CC	KPC	KSB	OE	OP	TA
CC						
KPC	0.242					
KSB	0.163	0.802				
OE	0.772	0.380	0.351			
OP	0.445	0.486	0.551	0.496		
TA	0.265	0.734	0.747	0.362	0.699	

Testing whether the HTMT value is significantly different from value one to establish that the six variables are empirically different, a bootstrap confidence interval is obtained by computing 5,000 bootstrap samples. The result in Table 5.10 shows that value one falls outside the interval's range; this suggests that the evaluated constructs are empirically distinct.

Table 5.10: Discriminant validity. Heterotrait-Monotrait Ratio - Bootstrap confidence interval

Mean, STDEV, T-Values, P-Va...	Confidence Intervals	Confidence Intervals Bias C...	Sample		
	Original Sampl...	Sample Mean (...	Bias	2.5%	97.5%
KPC -> CC	0.242	0.337	0.095	0.094	0.369
KSB -> CC	0.163	0.263	0.100	0.071	0.186
KSB -> KPC	0.802	0.782	-0.020	0.447	0.994
OE -> CC	0.772	0.769	-0.003	0.545	0.911
OE -> KPC	0.380	0.434	0.055	0.158	0.607
OE -> KSB	0.351	0.390	0.039	0.164	0.563
OP -> CC	0.445	0.457	0.012	0.235	0.717
OP -> KPC	0.486	0.523	0.037	0.240	0.832
OP -> KSB	0.551	0.530	-0.021	0.211	0.858
OP -> OE	0.496	0.526	0.030	0.294	0.687
TA -> CC	0.265	0.318	0.053	0.114	0.401
TA -> KPC	0.734	0.716	-0.018	0.364	0.945
TA -> KSB	0.747	0.693	-0.054	0.352	0.929
TA -> OE	0.362	0.399	0.037	0.186	0.528
TA -> OP	0.699	0.687	-0.012	0.395	0.903

Therefore, once the tests above were passed the assumption of a valid and reliable instrument is supported. Appendix C (section 1) summarises the applied statistical analyses for the pilot study.

5.6 Summary

Chapter Five described the operationalisation of the constructs and the development of the instrument used in this research. The concepts of validity and reliability were analysed and evaluated through a pilot study to ensure that the scales integrated into the model captured the phenomenon of interest.

Chapter Six: Data Analysis (Main Study)

6.1 Introduction

This chapter presents the quantitative analysis of the data obtained through the research questionnaire to evaluate the measurement and the structural models. The obtained data were first subjected to a screening to identify problems related to missing data, outliers, normality, linearity and multicollinearity. Subsequently, the measurement model was validated through a Confirmatory Factor Analysis (CFA). Finally, through Structural Equation Modelling (SEM), the relationships between the independent and the dependent variables and the identification of possible mediators in three defined models were evaluated.

6.2 Preliminary data analysis

Based on Tabachnick and Fidell's (2013, p. 60) advice, "*following data collection, researchers have to deal with a set of issues that need to be resolved through data careful examination, prior to conducting the fundamental analysis*". Therefore, this section discussed essential issues in data screening, such as sample size, missing data, multivariate normality, outliers, linearity, and multicollinearity.

Careful analysis of the data allows for better prediction and more accurate assessment. For this research, preliminary data filtering revealed that one case (#235) had 77% values outside the range of the specified scale, making it unusable; thus, such a case was removed. Likewise, case #45 showed a value out of range on a scale variable. Such value was considered an incorrect data entry, so based on Hair et al.'s (1999, p. 57) suggestion, this value was recodified as missing. Following preliminary data filtering, 299 cases were examined in further analyses detailed in the following sections.

6.2.1 Missing values

An important issue when using surveys for data collection is missing data. Some reasons for missing data were, for example, that a respondent refused to answer because an indicator measures a sensitive topic, or they did not know the answer, or maybe inadvertently, the respondent did not answer a question. Other reasons for missing data could be mistakes in capturing the data, problems in the data collection process and other unknown issues resulting from participants' actions. Therefore, researchers have to analyse and understand the causes of missing data and detect any pattern in observations to avoid influenced or biased results.

For this study's data set, the Missing Value Analysis (MVA) in SPSS software showed that in univariate statistics, all variables have less than 1% missing values, except for the CCLMX, which has 1.4%. Through MVA, ten cases with missing values (2.9% in nine cases and 5.9% in another) were identified. In SPSS, a case represents independent observations, participants, subjects or experimental units in a dataset. Since these incidences were very low, they could not be considered offending cases. To resolve the missing data issue without affecting the results of the analysis, it must determined whether data are missing completely at random (MCAR), missing at random (MAR) or missing not at random (MNAR). Based on Byrne (2016, p. 394), MCAR analysis allows to assess if the missing data are independent of the unobserved and the observed values of all other variables in the data. In other words, MCAR allows to confirm the randomness of missing data through a comparison between missing and valid data.

Under the MCAR conditions, all the methods for dealing with missing data give consistent estimates and yield similar results (Blunch, 2013; Hair et al., 1999; Tabachnick & Fidell, 2013).

For this research, Little's test was performed to test the hypothesis of whether the missing values are missing completely at random (MCAR) or missing in a non-random way. For Little's test, a p-value of less than 0.05 is usually interpreted as the missing data is not MCAR. However, for this research, the results demonstrated that missing values are missing completely at random (Chi-Square=102,217, DF=104, Sig=.531). Therefore, based on Cohen et al.’s (2003) recommendations, when MCAR is confirmed, it is possible to use sophisticated techniques to deal with the missing data.

Byrne (2016, p. 399) affirmed that full information maximum likelihood (FIML) and multiple imputation (MUI) solutions are two techniques from the theory-based approach that consistently have shown unbiased and efficient parameter estimates. As mentioned by Blunch (2013, pp. 220, 227, 232), FIML estimates a model using all data at hand, even if, in some cases, they are missing without any form of imputation. However, this method has a limitation because it is not possible to estimate the causal model if we have missing data. Instead, the MUI method uses several imputations for estimating each of the variables with missing values, creating several complete data sets, performing the desired analysis on each data set and finally combining the various analyses into one. Since the MUI method is recommended by far as the best imputation method and is an excellent alternative to FIML (Blunch, 2013, p. 227), this method was used for this research.

6.2.2 Outliers

Tabachnick and Fidell (2013, p. 72) defined an outlier as "*a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that it distorts statistics*". The previous mentioned authors posited that outliers are classified into four categories:

- Error in data entry or codification error.
- Missing values specification, which is a failure to specify missing-value codes.
- Sampling errors occur when an outlier is not a member of the population we intend to sample.
- Extraordinary observations occur when a variable has more extreme values than a normal distribution.

From a univariate perspective, Warner (2012, p. 153) posited that for normally distributed values, *z*-scores are used to decide which ones to treat as outliers, considering scores of z that are less than -3.30 or greater than +3.30 as outliers. The present study adopted this recommendation, verifying outliers by converting the data values to z-scores. Results showed that fifteen variables had standard values less than -3.30, and no variables had values greater than 3.30. Additionally, using boxplots, some potential outliers were identified. Cases 17, 128, 195, 197, 260, 277, and 296 were outliers in different variables.

Two indicators from the Knowledge Process Capability (KPC) and one from the Organisational Performance (OP) construct presented the highest number of outliers with four values, representing 1.34%, respectively. According to Cohen et al. (2003, p. 128), this percentage is not significant. The authors stated, "*if outliers are few (less than 1% or 2% of N) and not very extreme, they are probably best left alone*". However, further analyses were conducted to decide whether to maintain or delete potential outliers.

For detection of multivariate outliers, Mahalanobis squared distance (D^2) measures in standard deviation units "*the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all variables*" (Tabachnick & Fidell, 2013, p. 74). Byrne (2016, p. 120) affirmed that an outlying case has a D^2 value that stands distinctively apart from all other D^2 values.

In this research, a linear regression analysis was used in SPSS to compute the Mahalanobis distance looking for unusual combinations of variables in each case. This procedure created a new variable in the present research's data set, representing the Mahalanobis distance calculated for each case and compared to a chi-square distribution with a degree of freedom equal to the number of predictors.

According to Tabachnick and Fidell (2013, p. 74), a very conservative probability ($p<.001$ for the X^2 value) estimate for an outlier case is appropriate for Mahalanobis distance. Therefore, the p-value was calculated using the appropriate function (1-Cdf_Chisq(MAH_1,27)), revealing that thirteen cases (17, 24, 46, 47, 77, 91, 104, 128, 155, 195, 197, 221, 260) are potential outliers.

Considering that the sample size surpasses the minimum sample size to obtain adequate power of model testing and that previous analyses detected potential outliers, the thirteen identified cases were eliminated. Table 6.1 shows the demographic characteristics of the sample.

Table 6.1: Research sample characteristics

Factors	Variables	Frequency	%
GENDER	(1) Female	204	71.3
	(2) Male	82	28.7
	Total	**286**	**100.0**
AGE	(1) < 20	0	0.0
	(2) 20- 29	38	13.3
	(3) 30-39	153	53.5
	(4) 40-49	80	28.0
	(5) >=50	15	5.2
	Total	**286**	**100.0**
YEARS OF PRACTICE	(1) <5	35	12.2
	(2) 5-9	73	25.5
	(3) 10-14	113	39.5
	(4) 15-19	46	16.1
	(5) >=20	18	6.3
	Missing	1	.3
	Total	**286**	**100.0**
UNIVERSITY	(1) Private	69	24.1
	(2) Public	215	75.2
	Missing	2	.7
	Total	**286**	**100.0**
HEALTHCARE EMPLOYEE TYPE	(1) General Doctor	0	0.0
	(2) Specialist	56	19.6
	(3) Nurse	157	54.9
	(4) Medical Technician	6	2.1
	(5) Social Worker	21	7.3
	(6) Other	46	16.1
	Total	**286**	**100.0**
EDUCATION	(1) Technical Specialist	17	5.9
	(2) Medical Bachelor	113	39.5
	(3) Specialist/Master	155	54.2
	(4) PHD	0	0
	Missing	1	.3
	Total	**286**	**100.0**
COMPUTER SKILLS	(1) Poor	5	1.7
	(2) Below average	18	6.3
	(3) Average	142	49.7
	(4) Above average	28	9.8
	(5) Good	79	27.6
	(6) Excellent	14	4.9
	Total	**286**	**100.0**

6.2.3 Normality

Since multivariate procedures and most statistical tests underlie the assumption that each variable and all linear combinations of the variables are normally distributed, an essential requirement in SEM analysis is that the data are multivariate normal (Tabachnick & Fidell, 2013).

Two components of normality are skewness and kurtosis. Based on Pallant (2010, p. 63), skewness indicates the symmetry of the distribution, where positive skewness indicates scores clustered to the left at the low values, and negative skewness indicates scores clustered to the right at high-end values. The kurtosis value indicates the peakedness of the distribution. Positive kurtosis indicates that values are clustered in the centre, representing a rather peaked distribution with long thin tails. Negative kurtosis, on the other hand, has too many cases in the extremes, depicting a relatively flat distribution.

Tabachnick and Fidell (2013, p. 80) posited that in a large sample (> 200 cases), a variable with significant skewness would not deviate enough from normality to make a substantive difference in the analysis. The risk of underestimating the variance associated with positive and negative kurtosis disappears with samples of 100 or more cases and 200 or more cases, respectively.

The descriptive statistics were obtained through SPSS software to verify that the normality criteria were met. Based on Bulmer's (1979, p. 63) criteria, the univariate normality for the 27 variables was verified. Seventeen variables had skewness in absolute values between 0 and 0.5, which are approximately symmetric distributions, and the rest (10) had skewness values between 0.5 and 1, representing moderately skewed distributions. Fisher kurtosis analysis considers the normal distribution centred at 0. The results of the sample showed that fourteen variables had moderate peaked distributions with kurtosis values > 0 (Leptokurtis), and thirteen variables had less peaked with thin tails distributions with kurtosis values < 0 (Platykurtis). The Shapiro-Wilk's W test is a standard normality test; as Table 6.2 shows the significance values are below .05, so the data significantly deviate from a normal distribution. However, as Hair, Black, Babin, and Anderson (2010) posited, the non-normality has negligible effects on samples > 200; additionally, when maximum likelihood (ML) estimation is used, the non-normality issue is controlled and has negligible impacts.

Table 6.2: Normality Statistics

Variable	Kurtosis	Skewness	Shapiro-Wilk	Df	Sig.
OEG	-.293	-.350	.866	277	.000
OEKLOV	.054	-.685	.840	277	.000
OEKLSV	-.196	-.591	.864	277	.000
OELC	-.522	-.324	.893	277	.000
OEUT	-.643	-.104	.906	277	.000
CCEA	.283	-.582	.866	277	.000
CCLMX	-.766	-.206	.907	277	.000
CCRCP	-.553	-.467	.891	277	.000
CCTRT	-.656	-.268	.880	277	.000
KSBAKS2	-.669	-.525	.719	277	.000
KSBAKS3	-.653	-.324	.762	277	.000
KSBPB1	.537	-.415	.738	277	.000
KSBPB2	-.028	-.404	.724	277	.000
KSBPB3	-.518	-.119	.743	277	.000
KSBSN	-.728	-.106	.795	277	.000
TAATU1	-.200	-.522	.788	277	.000
TAAU1	.284	-.825	.809	277	.000
TAPU2	1.252	-.870	.746	277	.000
TAPU3	.783	-.774	.770	277	.000
KPCKA1	.563	-.352	.785	277	.000
KPCKAP1	.808	-.241	.742	277	.000
KPCKC2	.378	-.292	.783	277	.000
KPCKU1	.345	-.308	.767	277	.000
OPPS2	.442	-.509	.835	277	.000
OPPS3	.326	-.441	.815	277	.000
OPPS5	1.106	-.646	.773	277	.000
OPPSS4	.538	-.364	.784	277	.000

Multivariate distribution was evaluated with Mardia's measure available in AMOS software. This index and its critical value represent the normalised estimate of multivariate kurtosis. Byrne (2016, p. 123) affirmed that normalised estimates >5.00 indicate non-normally distributed data. Results at the end of Table 6.3 show that the z-statistic of 19.783 is highly suggestive of multivariate non-normality.

Table 6.3: Assessment of normality AMOS

Variable	Min	Max	skew	c.r.	Kurtosis	c.r.
OPPS3	2.000	5.000	-.423	-2.922	.258	.890
KPCKU1	2.000	5.000	-.307	-2.120	.307	1.060
KPCKAP1	2.000	5.000	-.232	-1.600	.749	2.586
KPCKC2	2.000	5.000	-.280	-1.934	.307	1.059
KPCKA1	2.000	5.000	-.381	-2.628	.533	1.838
OPPS5	2.000	5.000	-.622	-4.292	1.002	3.460
OPPSS4	2.000	5.000	-.350	-2.414	.459	1.585
CCRCP	1.000	5.000	-.444	-3.067	-.593	-2.046
CCEA	1.000	5.000	-.581	-4.010	.288	.995
CCLMX	1.000	5.000	-.196	-1.352	-.760	-2.623
CCTRT	1.000	5.000	-.267	-1.843	-.636	-2.196
KSBSN	3.000	5.000	-.104	-.716	-.790	-2.727
KSBAKS3	3.000	5.000	-.336	-2.323	-.675	-2.329
KSBAKS2	3.000	5.000	-.558	-3.855	-.625	-2.159
KSBPB3	3.000	5.000	-.107	-.736	-.534	-1.842
KSBPB2	2.000	5.000	-.392	-2.703	-.071	-.244

Variable	Min	Max	skew	c.r.	Kurtosis	c.r.
KSBPB1	2.000	5.000	-.416	-2.869	.449	1.551
OPPS2	1.000	5.000	-.495	-3.418	.354	1.222
TAAU1	2.000	5.000	-.802	-5.538	.238	.822
TAATU1	2.000	5.000	-.519	-3.583	-.233	-.803
TAPU3	2.000	5.029	-.747	-5.155	.715	2.468
TAPU2	2.000	5.000	-.832	-5.743	1.076	3.713
OEG	1.000	5.000	-.346	-2.390	-.281	-.972
OEUT	1.000	5.000	-.127	-.878	-.646	-2.228
OELC	1.000	5.000	-.346	-2.386	-.539	-1.861
OEKLOV	1.000	5.000	-.669	-4.616	.022	.075
OEKLSV	1.000	5.000	-.597	-4.121	-.176	-.607
Multivariate					92.583	19.783

Finally, because the data revealed evidence of multivariate kurtosis, a procedure known as "bootstrapping" for testing models based on non-normal data was used to conduct further analyses. Byrne (2016, p. 367) posited that bootstrapping is a resampling procedure by which multiple subsamples from the source sample are generated randomly.

6.2.4 Linearity

Based on Tabachnick and Fidell (2013, p. 83), the linearity assumption states a straight-line relationship between the predictor and dependent variables. One or both variables can be combinations of several variables.

By assessing linearity through bivariate correlation for each pair of variables in the composite database, it is observed that non-linear correlation is null. SPSS output showed significant correlations at 0.05 or 0.01 level, indicating that the linear assumption as Table 6.4 shows was met.

Table 6.4: Correlations

		mean_OK	mean_CC	mean_KSB	mean_TA	mean_KPC	mean_OPP
mean_OK	Pearson Correlation	1	,598**	,214**	,168**	,184**	,418**
	Sig. (2-tailed)		,000	,000	,004	,002	,000
	N	286	286	286	286	286	286
mean_CC	Pearson Correlation	,598**	1	,292**	,200**	,248**	,382**
	Sig. (2-tailed)	,000		,000	,001	,000	,000
	N	286	286	286	286	286	286
mean_KSB	Pearson Correlation	,214**	,292**	1	,564**	,648**	,341**
	Sig. (2-tailed)	,000	,000		,000	,000	,000
	N	286	286	286	286	286	286
mean_TA	Pearson Correlation	,168**	,200**	,564**	1	,540**	,318**
	Sig. (2-tailed)	,004	,001	,000		,000	,000
	N	286	286	286	286	286	286
mean_KPC	Pearson Correlation	,184**	,248**	,648**	,540**	1	,425**
	Sig. (2-tailed)	,002	,000	,000	,000		,000
	N	286	286	286	286	286	286
mean_OPP	Pearson Correlation	,418**	,382**	,341**	,318**	,425**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	286	286	286	286	286	286

**. Correlation is significant at the 0.01 level (2-tailed).

An exponential or parabolic curve pattern in a scatter plots graph represents a non-linear issue. Therefore, as shown in Figure 6.1, the scatter plot matrix did not show the mentioned patterns, so it can be stated that the data meet the linearity assumption.

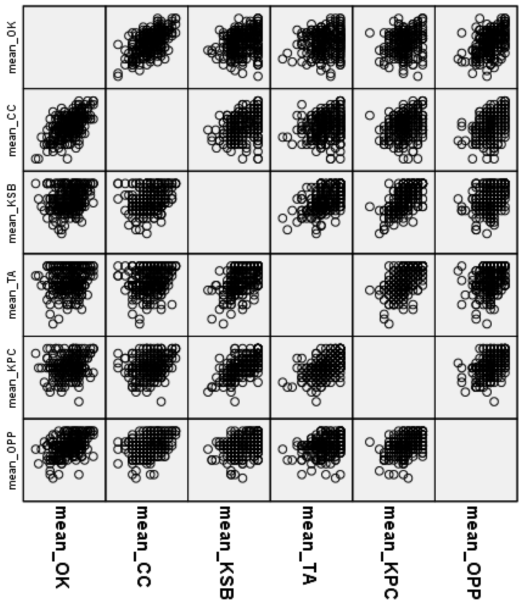


Figure 6.1: Scatter Plots Matrix

6.2.5 Multicollinearity

A multicollinearity problem occurs when variables are too highly correlated. "Singularity" is an extreme form of multicollinearity, which occurs when the variables are redundant. These situations represent a problem because variables contain redundant information; therefore, some variables are not needed for analysis because they will inflate the size or error terms and weaken the analysis (Tabachnick & Fidell, 2013, p. 88). Dealing with collinearity issues researchers can apply different solutions: deleting the variable with the highest variance portion; calculating the sum or average of the collinear variables; computing principal components and using the components as the predictors instead of the original variables; or if the goal of the analysis is prediction, it is possible to ignore it.

Based on Tabachnick and Fidell (2013), any correlation coefficient superior to 0.9 indicates multicollinearity issues. However, for the present study, the correlation matrix between all variables showed values less than 0.8. Therefore, the data set did not show multicollinearity issues.

Additionally, in order to confirm the collinearity assumption, tolerance and variance inflation factor (VIF) values were calculated. Tolerance is defined as the amount of variability of the selected independent variable not explained by the other independent variables. On the other hand, the VIF value indicates the magnitude of inflation in the estimated regression coefficients by the existence of correlation among the predictor variables; this value is calculated as the inverse of the tolerance value. For example, if the value of VIF is less than ten and the tolerance level is above 0.10, this will indicate no multicollinearity among the independent variables (Hair et al., 1999).

Results of the multicollinearity test among independent variables are shown in Table 6.5. Results showed no multicollinearity issues in the data set, as all values accomplished the thresholds suggested by Hair et al. (1999).

Table 6.5: Results of multicollinearity test

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_OK	,598	1,671
	mean_CC	,604	1,657
	mean_KSB	,561	1,783
	mean_KPC	,531	1,882
	mean_OPP	,688	1,454

a. Dependent Variable: mean_TA

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_CC	,824	1,213
	mean_KSB	,502	1,990
	mean_KPC	,501	1,995
	mean_OPP	,731	1,368
	mean_TA	,625	1,600

a. Dependent Variable: mean_OK

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_KSB	,510	1,962
	mean_KPC	,500	2,001
	mean_OPP	,693	1,442
	mean_TA	,625	1,601
	mean_OK	,817	1,224

a. Dependent Variable: mean_CC

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_KPC	,632	1,582
	mean_OPP	,684	1,463
	mean_TA	,697	1,434
	mean_OK	,598	1,671
	mean_CC	,612	1,633

a. Dependent Variable: mean_KSB

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_OPP	,729	1,371
	mean_TA	,664	1,505
	mean_OK	,600	1,666
	mean_CC	,604	1,656
	mean_KSB	,636	1,573

a. Dependent Variable: mean_KPC

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	mean_TA	,629	1,590
	mean_OK	,640	1,564
	mean_CC	,612	1,633
	mean_KSB	,502	1,990
	mean_KPC	,533	1,876

a. Dependent Variable: mean_OPP

Table 6.6 shows this study's constructs and measures after careful data analysis and previous to conduct Confirmatory Factor Analysis and evaluate the Structural Equation Model.

Table 6.6: Study's constructs and measures

	N	Mean		Std. Deviation	Skewness		Kurtosis		VIF
	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error	
OEKLSV	299	3.46	.057	.987	-.597	.141	-.244	.281	1.577
OEKLOV	300	3.54	.052	.893	-.678	.141	.013	.281	1.723
OELC	299	3.09	.059	1.016	-.344	.141	-.566	.281	1.671
OEUT	300	3.07	.059	1.023	-.115	.141	-.661	.281	1.884
OEG	300	3.57	.050	.865	-.379	.141	-.255	.281	1.507
CCTRT	300	3.11	.056	.963	-.267	.141	-.635	.281	1.338
CCLMX	295	3.05	.065	1.109	-.215	.142	-.794	.283	1.433
CCEA	299	3.54	.052	.905	-.576	.141	.183	.281	1.751
CCRCP	300	3.35	.064	1.107	-.436	.141	-.603	.281	1.441
KSBPB1	299	4.30	.035	.600	-.428	.141	.407	.281	1.604
KSBPB2	299	4.38	.034	.593	-.566	.141	.492	.281	2.103
KSBPB3	297	4.27	.035	.605	-.390	.141	.376	.282	1.861
KSBAKS2	299	4.45	.036	.624	-1.025	.141	2.112	.281	2.385
KSBAKS3	299	4.30	.038	.653	-.544	.141	-.002	.281	1.937
KSBSN	299	4.06	.041	.704	-.264	.141	-.409	.281	1.592
TAPU2	299	4.30	.043	.736	-1.414	.141	3.698	.281	1.445
TAPU3	298	4.26	.042	.728	-1.027	.141	1.734	.281	1.746
TAATU1	299	4.26	.041	.717	-.811	.141	.985	.281	1.878
TAAU1	299	4.09	.051	.881	-.954	.141	.685	.281	1.595
KPCKA1	300	3.92	.038	.665	-.392	.141	.502	.281	1.243
KPCKC2	299	4.05	.039	.669	-.528	.141	1.228	.281	1.309
KPCKAP1	299	4.11	.036	.628	-.660	.141	2.305	.281	1.417
KPCKU1	299	4.17	.037	.644	-.473	.141	.631	.281	1.360
OPPS2	299	3.87	.049	.845	-.751	.141	.865	.281	1.738
OPPS3	299	3.83	.042	.732	-.452	.141	.237	.281	1.728
OPPS4	299	3.99	.041	.714	-.825	.141	1.940	.281	2.927
OPPS5	297	4.07	.043	.748	-.994	.141	2.048	.282	2.473

Appendix C (section 2) summarises the applied statistical methods for the preliminary data analysis.

6.3 Measurement Model Assessment

As mentioned in Chapter Four, the measurement model depicts how measured variables (indicators) represent latent variables whose relationships were established based on the previously analysed theories.

The evaluation of the adequacy of the measurement model corresponds to the first part of the Structural Equation Modelling (SEM). Firstly, through a Confirmatory Factor Analysis (CFA), the scales were validated for measuring the theoretical constructs and the Maximum likelihood (ML) method for coefficient estimation.

6.3.1 Overall measurement model fit

According to Hoyle (2012, p. 361), CFA evaluates the relationships between observed measures and latent variables to establish the number and nature of factors that account for the variation and covariation among a set of indicators.

As was mentioned before in section 4.5.2, six latent variables were tested and measured by at least four indicators; the variables were: Organisational Performance (OP), Organisational Enablers (OE), Culture of Collaboration (CC), Knowledge-Sharing Behaviour (KSB), Technology Acceptance (TA) and Knowledge Process Capabilities (KPC).

In the evaluated model, as Figure 6.2 shows, the six latent variables are indicated by ellipses, and the two-headed arrows intercorrelated all of them. In addition, there are 27 observed variables, indicated by 27 rectangles. Each of them loads only one factor, and their errors are uncorrelated. In AMOS software, for model identification, one indicator of each scale in the factor loading is set to 1.0; all other parameters are freely estimated. Therefore, the proposed model was determined as an overidentified model considering the number of variables, indicators and parameters of the variance and covariance matrix. The results showed 378 sample moments, 69 parameters to be estimated, and 309 degrees of freedom. Figure 6.2 displays the model specification.

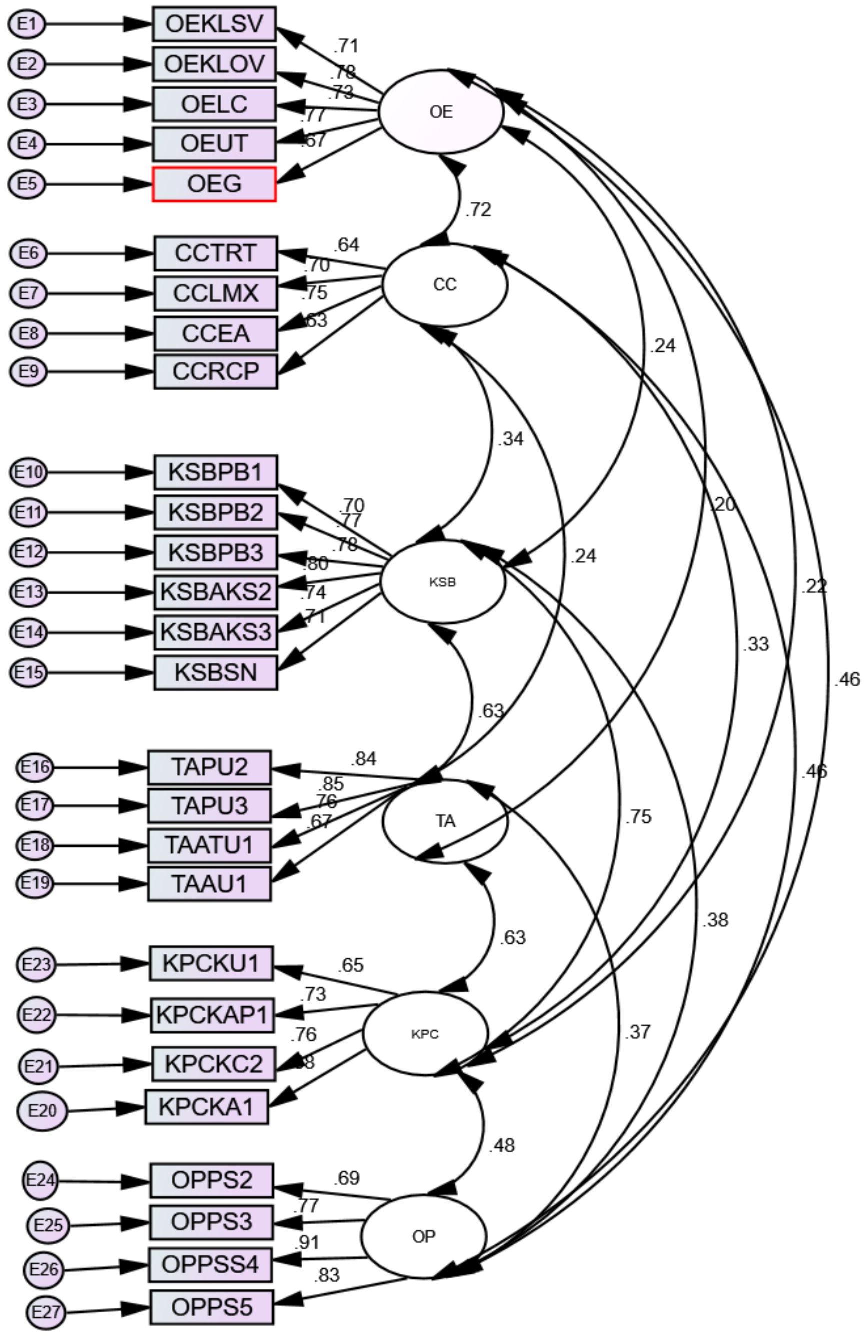


Figure 6.2: Confirmatory Factor Analysis results for the research model

In this model, the unstandardised estimates, the standard errors, the critical ratio and the standardised regression weights showed their strong statistical significance.

However, the X^2 value (502.820) and its probability (p< .001) showed that the model is not entirely adequate. As it was affirmed by Byrne (2016, p. 94) and Hoyle (2012, p. 211) Likelihood Ratio Test statistic (X^2) represents an impractical and unreliable indicator of good fit, therefore, other fit statistics provided by AMOS were evaluated.

For this model, the Standardised Root Mean Square Residual (SRMR) value was .0471, showing a well-fitting model (SRMR < .05). Regarding the Goodness-of-fit Index (GFI) and the Adjusted Goodness-of-fit Index (AGFI), the values obtained were .884 and .859 respectively. For these indexes, values close to 1.00 shows a good fit. Therefore, it is possible to affirm that the hypothesised model fits the sample data well.

Indices such as the Comparative Fit Index (CFI), the Incremental Index of Fit (IFI) and the Tucker-Lewis Index (TLI) provide measures of complete covariation in the data. For all indices, a value close to .95 is advised to indicate that the model describes the sample data. For this model, the values obtained were .949, .950 and .943, respectively, which indicated a good fit. PNFI and PCFI are indices related to the issue of model parsimony. The calculated PNFI of .775 and PCFI of .836 fall in the range of expected values (Byrne, 2016, pp. 94-99; Hoyle, 2012, pp. 215-218).

Continuing with the analysis of other fit statistics, the Root Mean Square Error of Approximation (RMSEA) is one of the most informative criteria in covariance structure modelling (Byrne, 2016, pp. 98, 99). This index considers the error of approximation in the population. Values less than .05 indicate a good fit and values as high as .08 represent reasonable errors of approximation in the population. For this model, the RMSEA point estimate was .047, with a 90% confidence that the true RMSEA value in the population will fall within the bounds of .039 and .054, representing a good degree of precision. The closeness of fit index showed a p-value of .748; considering that the null hypothesis represents a lack of close fit, a situation in which the hypothesis is rejected supports the conclusion that the fit of the model is close (MacCallum et al., 1996).

After a review of an array of indices, the results indicate that the hypothesised 6-factors CFA model fits the sample data well. Subsequently, other analyses were conducted to identify opportunities to obtain a better-fitting measurement model.

6.3.2 Model improvement

In order to determine if there is no evidence of model misspecification, the modification indices (MIs) and the standardised residual analysis were reviewed.

According to Byrne (2016), MIs capture evidence of some indication of misspecification. If the fixed parameters were to be freely estimated in a subsequent analysis, the overall X^2 value would drop in terms of the calculated MI values. Also, the estimated error covariance would drop in terms of the Expected Parameter Change (Par Change), which represents the predicted estimated change (positive or negative) for each fixed parameter in the model. MI values less than 10 will not result in any significant change to the overall fit.

As seen in Table 6.7 in the covariances section, seven MIs has values greater than 10, representing the possible covariances between error terms and factors. Table 6.8 shows three MIs values in the regression weight section arguing for the presence of factors cross-loadings.

Table 6.7: Covariances –error terms and factors

Error covariance			M.I. Covariance value	Par Change
E23	< – >	OP	11.206	.048
E15	< – >	KPC	13.566	.035
E13	< – >	E14	26.676	.052
E24	< – >	E25	17.948	.070
E4	< – >	E6	15.011	.127
E3	< – >	E7	15.166	.146
E1	< – >	E2	11.874	.090

Table 6.8: Regression weights (cross-loadings)

Path			M.I.	Par Change
CCLMX	< – >	OELC	11.086	.170
KSBAKS2	< – >	KSBAKS3	10.845	.120
OEUT	< – >	CCTRT	10.112	.144

Regarding covariance of error terms, the larger MI value is 26.676 between e13 and e14. By verifying the wording of items 13 and 14, this misspecification is derived from a high degree of overlap in item content since both indicators measure the attitude toward knowledge sharing. Also, the obtained MI values between two covariances of errors (e1 and e2, and e24 and e25) also could be explained by a high degree of overlap in item content.

CFA was run again to improve the model fit by adding error covariances between the previously mentioned error terms and deleting a possible problematic indicator

(OPPS2). Deleting the OPPS2 indicator did not affect the measurement specification of the latent variable due to the Organisational Performance variable (OP) is represented for at least three indicators.

After an iterative process, X^2 decreased from 502.80 to 401.666 and RMSEA from .047 to .039. The results revealed that three remaining MIs error covariances could be considered of no concern. In addition, the results did not show any concern regarding regression weights (indicative of cross-loadings). Figure 6.3 depicts the measurement model after refinement.

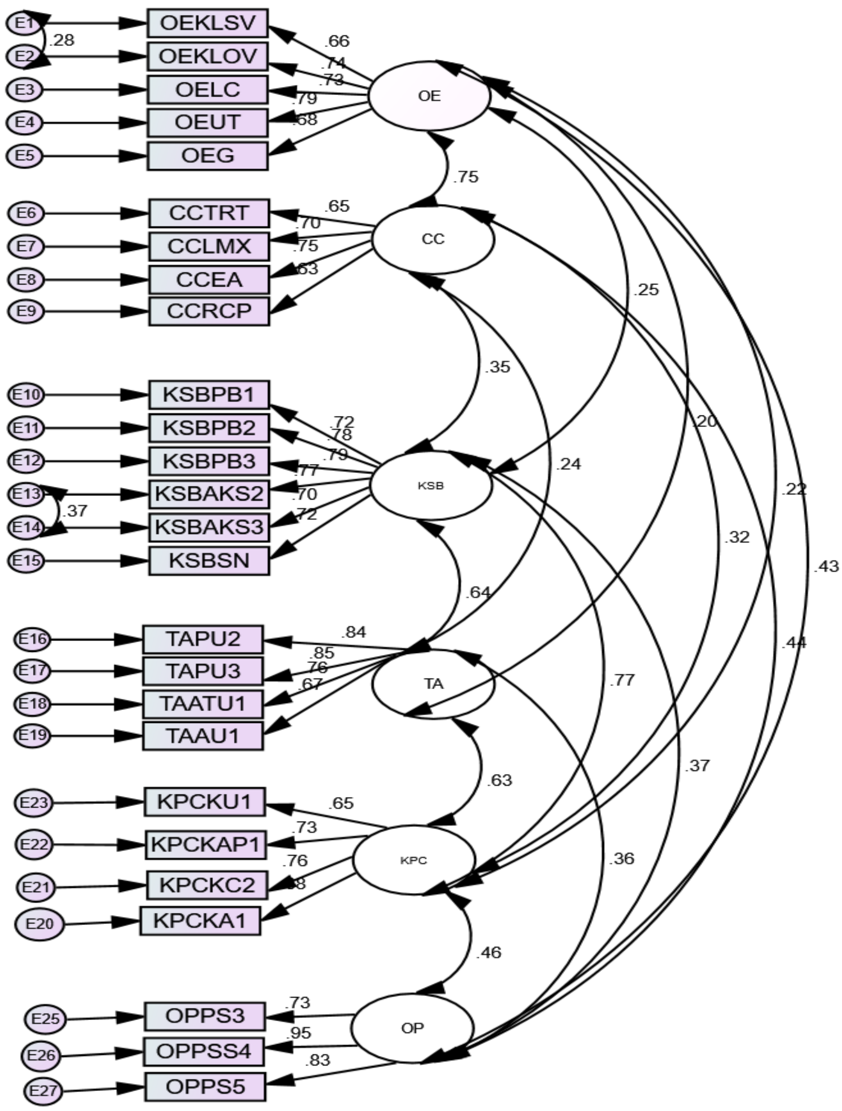


Figure 6.3: Confirmatory Factor Analysis results for the research model (refinement)

Finally, results indicated no identification problems (no negative uniqueness, no factor loadings greater than 1, and reasonable standard errors for parameter estimates). Table 6.9 shows the fit indices that evidence a good model fit.

Table 6.9: Measurement model results (overall model fit)

Index		Cut-off value	Overall model
X^2		>0.05	401.66 (df=282; p=.000)
X^2/df		<3	1.424
Absolute fit indices	RMSEA	<0.05 (good) 0.05-0.08 (moderate) 0.08-0.1 (poor) >0.1 (bad)	.039 (Lo .030; Hi .047)
	SRMR	<0.08	.0442
	AGFI	>0.80	.878
Incremental fit indices	CFI	>0.90	.967
	TLI	>0.90	.962
Parsimony fit indices	PNFI	>0.50	.780
	PCFI	>0.50	.839

6.3.3 Measurement model assessment

The measurement model assessment was conducted through a Confirmatory Factor Analysis (CFA) to determine whether the data are consistent with the measurement model. As mentioned in Chapter Five, it is essential to evaluate reliability and validity to decrease the possibility of offering incorrect results, increase the consistency of findings, and accurately reflect the phenomena under study. Regarding reliability, the indicators of the reflective constructs should share a high proportion of variance because they capture the same construct. Therefore, the composite reliability (CR) was calculated to measure the overall reliability of indicators for a specific latent construct using the following formula. It is explained as the square sum of standardised factor loadings, λ, divided by the square sum of loadings plus the sum of standardised error variance, δ:

$$CR = \frac{\left(\sum_{i=1}^{n} \lambda_i\right)^2}{\left(\sum_{i=1}^{n} \lambda_i\right)^2 + \left(\sum_{i=1}^{n} \delta_i\right)}$$

Based on Hair et al. (1999, p. 639), values greater than .70 show good reliability. Table 6.10 shows that all construct composite reliabilities (CR) had a value higher than 0.70, indicating adequate internal consistency. Hair et al. (2010) posited that *"high construct reliability indicates internal consistency exists, meaning that the measures all consistently represent the same latent construct"*.

The Average Variance Extracted (AVE) was calculated to assess the convergent validity of the construct. AVE reflects the variance that every latent variable can explain about its indicators. An AVE of .50 or higher is a good rule of thumb, suggesting adequate convergence. The Average Variance Extracted was calculated using the formula suggested by Hair et al. (2010). This formula is the total of all the squared standardised factor loading divided by the number of items, *n*.

$$AVE = \frac{\left(\sum_{i=1}^{n} \lambda_i^2\right)}{n}$$

Table 6.10 shows that CC and KPC constructs are lower than 0.50, which indicates validity concerns.

Discriminant validity examines the degree of no similarity between items that theoretically should not be similar. In other words, it is the extent to which a construct is truly distinct from other constructs. The Fornell-Larcker criterion evaluates discriminant validity by calculating each construct's square root of the AVE value. Such estimation should be larger than its correlation with other constructs.

Table 6.10: CR, AVE, MSV, ASV and correlation matrix for all construct

	CR	AVE	MSV	ASV	TA	OE	KSB	CC	KPC	OP
TA	0.865	0.617	0.415	0.207	**0.786**					
OE	0.845	0.522	0.560	0.179	0.198	0.722				
KSB	0.882	0.556	0.588	0.264	0.644	0.246	0.745			
CC	0.776	0.466	0.560	0.207	0.236	0.748	0.348	0.683		
KPC	0.798	0.498	0.588	0.270	0.633	0.222	0.767	0.324	0.705	
OP	0.877	0.706	0.212	0.171	0.359	0.431	0.370	0.441	0.460	**0.840**

Table 6.10 shows some problematic variances between CC and OE constructs and KPC and KSB constructs because some items load highly on other factors than on the constructs that were theoretically assigned.

Considering the previously mentioned validity concerns, the convergent and discriminant values need to be improve; to do this, the lowest standardised loadings and the highest covariances with the indicators with strong cross-loadings to delete the problematic indicators were identified. After an iterative procedure, five problematic indicators were found and deleted (KPCKU1, KSBP1, KSBSN, OELC and CCTRT). Then, the values were calculated again, obtaining the results shown in Table 6.11.

Table 6.11: CR, AVE, MSV, ASV and correlation matrix for all constructs (re-calculated)

	CR	AVE	MSV	ASV	TA	OE	KSB	CC	KPC	OP
TA	0.865	0.618	0.399	0.194	**0.786**					
OE	0.809	0.515	0.489	0.164	0.183	**0.717**				
KSB	0.869	0.572	0.533	0.236	0.632	0.252	**0.756**			
CC	0.749	0.501	0.489	0.188	0.240	0.699	0.351	**0.708**		
KPC	0.774	0.534	0.533	0.247	0.613	0.215	0.730	0.341	**0.731**	
OP	0.877	0.706	0.206	0.161	0.359	0.454	0.361	0.424	0.413	**0.840**

The results showed that every latent variable explains at least half of the variance of its indicators, demonstrating adequate convergent validity at the construct level. The table also showed that every square root of AVE for each construct is larger than its correlations with other constructs, indicating that while every construct captures some phenomena, other measures do not. Column MSV expresses the maximum shared squared variance, and column ASV shows the average shared squared variances; both values should be less than AVE to establish discriminant validity. Results in Table 6.11 showed that both values accomplished this condition for each construct.

Convergent validity, at the level of the indicators, is examined by determining if each item correlates strongly with its assumed theoretical construct and if it is statistically significant through the t-statistic for each factor loading. Hair et al. (2010, p. 685) suggested that loadings should be at least .50 and ideally .70 or higher. The results showed that all factor loadings are greater than .60 and range from .636 to .952. The standardised factor loading (λ) of construct items of the measurement model is presented in Table 6.12.

Table 6.12: AMOS Output Extract: Standardised Factor Loadings of Construct Items

No.	Abbr.	Construct statements	Standardised factor loadings (λ)
Organisational Enablers			
1	OEKLSV	My organisation has a clear vision and strategy to support learning and knowledge activities	0.654
2	OEKLOV	The organisation's mission identifies values to which all employees must conform to facilitate the knowledge practices.	0.723
3	OEUT	Has my organisation established clear objectives for team working?	0.764
4	OEG	In general, considering both the structure and the organisational characteristics, my organisation is a knowledge-based organisation.	0.723
Culture of Collaboration			
5	CCLMX	My immediate supervisor supports and encourages my participation to foster a collaborative environment in my hospital unit.	0.672
6	CCEA	It is important for me to learn from each of my job experiences and from my colleagues.	0.805
7	CCRCP	In our team, people support each other to prevent and learn from mistakes.	0.636
Knowledge-Sharing Behaviour			
8	KSBPB2	I intend to share my knowledge with other organisational members more frequently in the future.	0.785
9	KSBPB3	I always provide my knowledge at the request of other organisational members.	0.787
10	KSBAKS2	My knowledge sharing with other organisational members is valuable.	0.793

11	KSBAKS3	My knowledge sharing with other organisational members is wise.	0.722
Technology acceptance			
12	TAPU2	The use of health technology and information systems will support me in my daily work.	0.841
13	TAPU3	The use of health technology and information systems will make it possible to work more efficiently.	0.856
14	TAATU1	Using the available system for healthcare information is a good idea.	0.761
15	TAAU1	I frequently use the healthcare information system available.	0.671
Knowledge Process Capabilities			
16	KPCKA1	In my practice, I usually encourage the creation of new knowledge from existing knowledge.	0.697
17	KPCKC2	In my practice, I usually transfer my own experiences to other employees	0.787
18	KPCKAP1	I usually apply knowledge available in my organisation to solve new problems.	0.705
Organisational performance			
19	OPPS3	After knowledge management processes are introduced, the capability to predict unexpected incidents on patient safety is improved	0.729
20	OPPSS4	The knowledge management process increases the patient safety capability of our hospital.	0.952
21	OPPS5	The knowledge management process improves the quality of services to high-risk patients.	0.825

6.3.4 Common method variance (CMV) assessment

According to Podsakoff et al. (2003), CMV is a potential problem because it is one of the primary sources of measurement error. Richardson, Simmering, and Sturman (2009) defined it as a "*systematic error variance shared among variables measured with and introduced as a function of the same method and/or source*".

CMV could be a severe problem because it can lead to incorrect conclusions or explanations about the observed relationships between measures of different constructs. In general, CMV could be method effects produced by a common source or rater, item characteristics, item context, or measurement context.

Some procedural remedies to avoid or control CMV can be applied to the design of the study, such as

1. Obtaining measurements of the predictor and criterion variables from different sources, trying to eliminate any tendencies that could affect the measurement of the predictor and criterion variables, using different response formats such as Likert scales, faces scales or open-ended questions via computer-based, paper and pencil and face-to-face interviews in different rooms or sites.
2. Allowing the respondents' answers to be anonymous, assuring respondents that there is no wrong or correct answers reducing people's evaluation apprehension.
3. Counterbalancing question order, and
4. Improving scale items in terms of item ambiguity, unfamiliar terms, vague concepts and complicated syntax.

In general, the main disadvantages of these procedural remedies are that they may require more time and effort and even have a cost for the researcher. In other cases, they can permit the intrusion of potentially contaminating factors (Podsakoff et al., 2003).

Additionally, Johnson et al. (2010) and Podsakoff et al. (2003) suggested using statistical remedies. With these procedures, it is possible to minimise the potential effects of CMV. The first statistical remedy is using partial correlation procedures to control the effect of method biases. This procedure involves partialising two variables, affective states and social desirability, usually identified as a cause of common method variance in respondents. Also, this procedure can be performed using a marker variable grounded on theory and not related to another variable in the study. Any observed relationship with this marker variable is considered CMV. The second statistical remedy is a measured method factor where a variable that is believed to cause CMV is directly measured (commonly used are social desirability, positive and negative affectivity, and others). The third statistical procedure controls the effects of an unmeasured latent method construct in which all manifest indicators load. This technique captures all sources of systematic variance, representing not only CMV but also representing variance due to relationships between constructs even different to those included in the research. The fourth and final statistical procedure suggests using multiple-method factors to control method variance, permitting researchers to examine the effects of several methods factors simultaneously.

For this research, the third mentioned technique was applied, adding to the theoretical model an unmeasured latent method composed of all the measurements as indicators to test whether the shared variance across all items is significantly different from zero.

The results showed that the unmeasured latent method factor loadings accomplished the threshold suggested by Hair et al. (2010, p. 685), where loadings should be at least .50 and ideally .70 or higher. All factor loadings were greater than 0.50. Values of SRMR (.0320), GFI (.948), AGFI (.920), CFI (.994), IFI (.994), and TLI (.991) indicated good fit based on commonly used fit criteria. The PNFI of .679 and PCFI of .714 were in the range of expected values. The results obtained from Root Mean Square Error of Approximation (RMSEA) showed a value of .021 with a 90% confidence interval ranging from .00 to .036, indicating good precision of the index value. The closeness of fit index showed a p-value of .748; considering for RMSEA that the null hypothesis represents a lack of close fit (MacCallum et al., 1996), a situation in which the hypothesis is rejected supports the conclusion that the unmeasured latent method factor showed a good and acceptable model fit.

The difference in $\chi 2$ ($\Delta\chi 2$) compares the unconstrained model with a model constrained to zero to identify differences between them. The results showed that the constrained model ($\chi 2$ (172) =226.398) with the unconstrained model ($\chi 2$ (151) =169.438) yields a difference in $\chi 2$ value ($\Delta\chi 2$ (21)) of 56.96, which was found significant at p-value <.001 which represents a significant shared variance. Hence, the unmeasured latent common factor was kept to consider the CMV effect in the structural model evaluation. Figures 6.4 and 6.5 represent the unmeasured latent factor as the variable CLF (common latent factor).

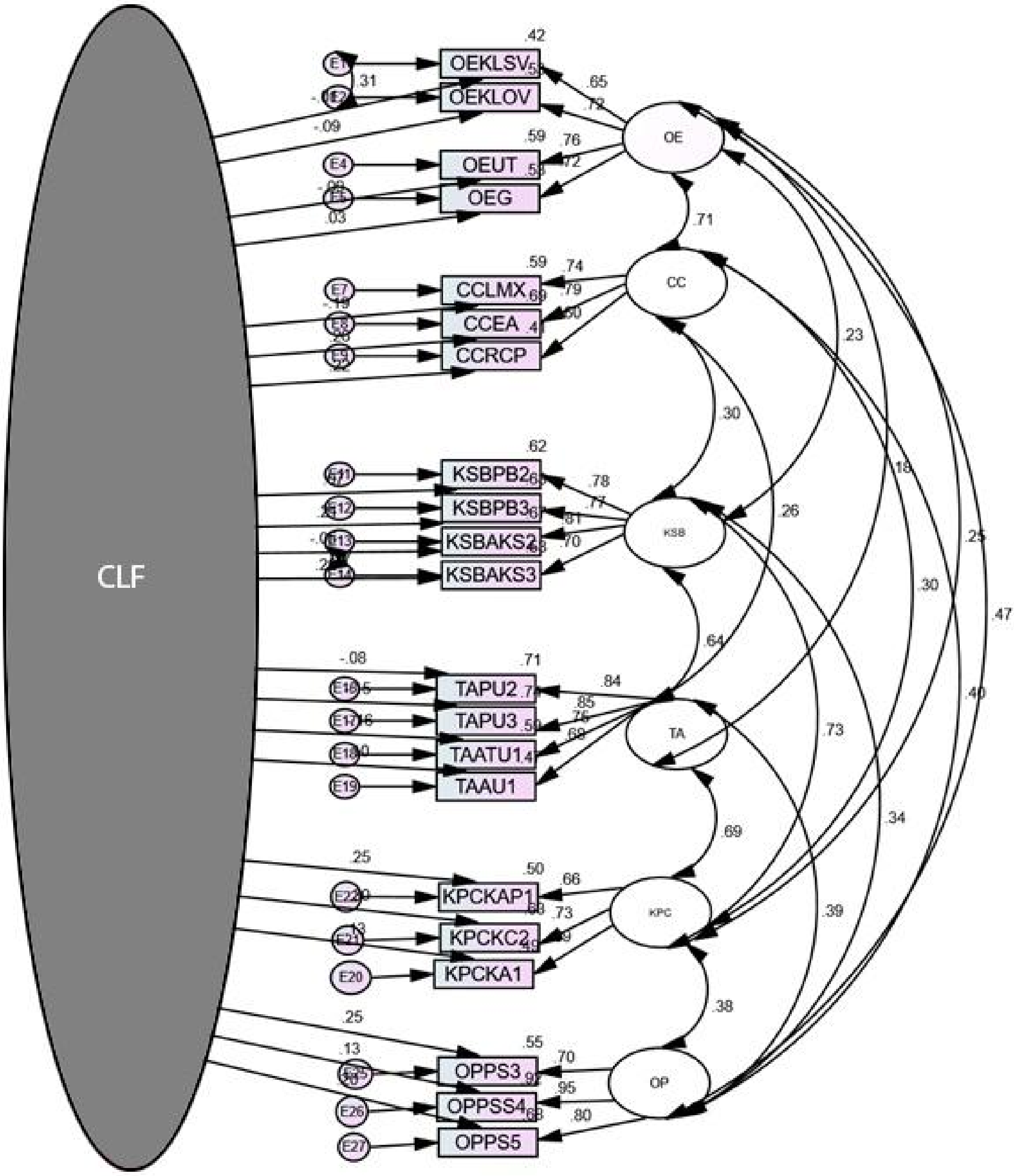


Figure 6.4: A single unmeasured latent method factor

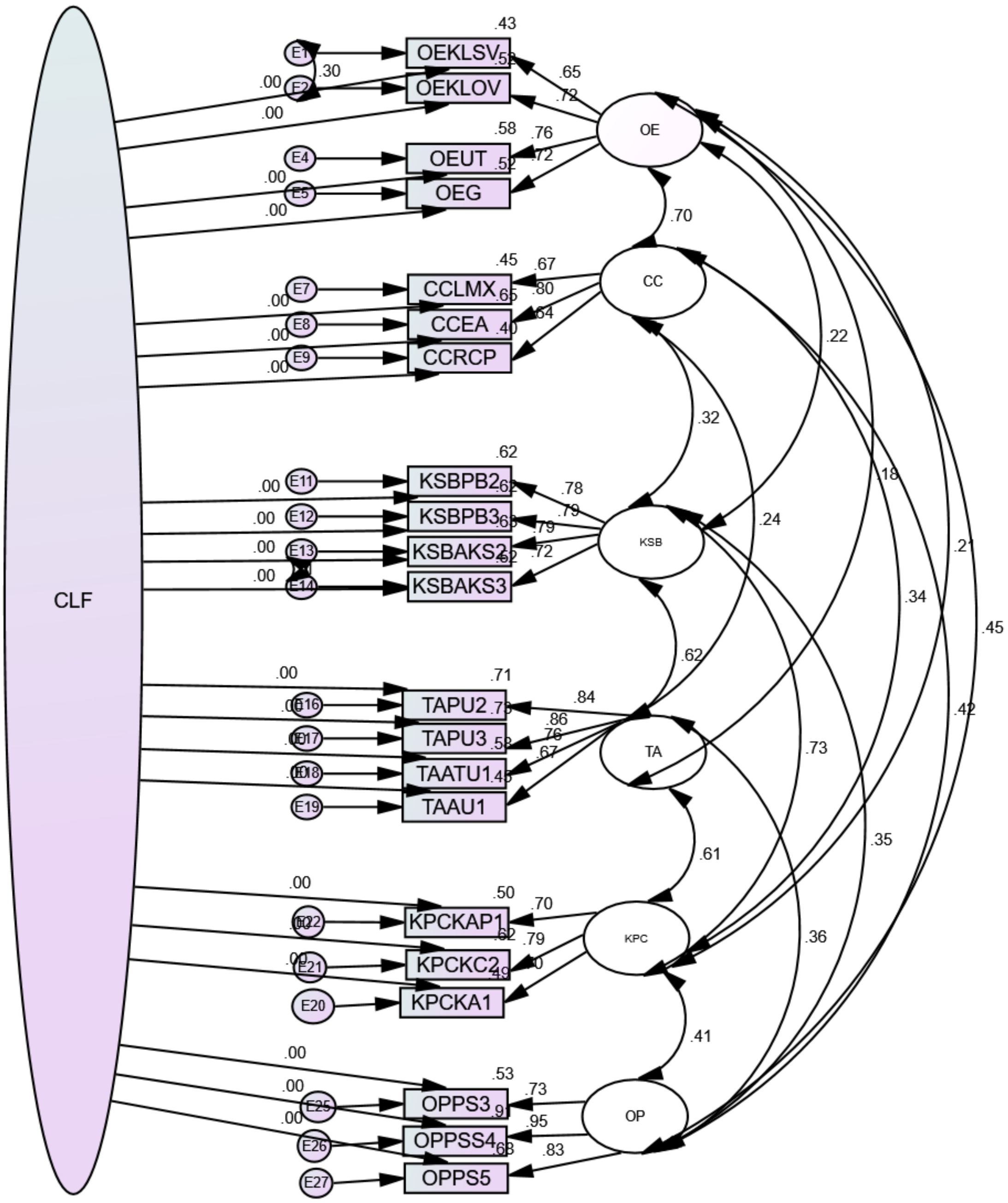


Figure 6.5: A single unmeasured latent method factor (constrained to zero)

Appendix C (section 3) summarises the applied statistical analyses for the Measurement Model Assessment.

6.4 Structural models and hypotheses testing

As mentioned in Chapter Five, Structural Equation Modelling (SEM) is a statistical technique capable of simultaneously examining a series of dependent relationships, combining several traditional multivariate procedures such as factor analysis and regression or path analysis. This chapter presents the results of the test of the causal relationships between the research variables for each defined model. The relationships represented in the structural model were supported in literature from different theoretical streams and presented in Chapter Three.

The theoretical foundations are:

- For the Organisational Enablers (OE) and Organisational Performance (OP) constructs, the Resource-Based View.
- For the Knowledge-sharing behaviour (KSB) and Knowledge Process Capabilities (KPC) constructs, the Knowledge-based view.
- For the Technology Acceptance construct (TA), the Technology Acceptance Model.
- And for the Culture of Collaboration construct (CC), the Social Exchange Theory.

The system of relationships evaluated in this research represents the interrelation of the different variables contributing to the development of knowledge capabilities and improving patient safety as an indicator of organisational performance.

In this research, three structural models were developed and evaluated. Model one was defined to evaluate and predict the factors contributing to Organisational Performance. Model two was defined to evaluate a simple mediation model using the Knowledge Process Capability factor as a mediator variable. Finally, model three was designed to predict and examine a multiple mediation model using the Knowledge-Sharing Behaviour factor and Knowledge Process Capability factor as mediator variables.

6.4.1 Measurement model fit and assessment of validity

Concerning the measurement model, the models incorporated the complete validated scales. The confirmatory analysis developed in section 6.3 supported the measurement model's validation and found no identification problems. Similarly, this analysis revealed a satisfactory measurement model fit (see Table 6.9), and the validity and reliability criteria were accepted (see Table 6.11).

The three defined models used the data set of 286 observations. The Multiple Imputation technique (MUI) was applied during the structural evaluation of each model to avoid some characteristics in data, such as missing values, outliers, normality and multicollinearity, affecting the results and inferences.

6.4.2 Model 1: Direct effect on Organisational Performance (OP)

Chapter One presented Gold et al.'s (2001) model as the reference model for this research which is composed of two variables that represent key capabilities: organisational capabilities and knowledge capabilities. Both variables directly impact organisational performance.

Similarly, the first model of this research defined two organisational capabilities, such as organisational enablers (OE) and culture of collaboration (CC), and three individual capabilities related to enhancing knowledge practices such as the acceptance of technology (TA), knowledge-sharing behaviour (KSB) and knowledge process capability

(KPC). The model evaluated the impact of the previous factors on organisational performance. In general, the first evaluated model in this research established a direct relationship between five exogenous variables with Organisational Performance (OP) as an independent variable. Because this research was developed in a healthcare setting, organisational performance was operationalised as patient safety.

6.4.2.1 The structural model (Model 1)

The SEM path model represents the structural model composed of the regressions among five independent variables: Organisational Enablers (OE), Culture of Collaboration (CC), Technology Acceptance (TA), Knowledge-Sharing Behaviour (KSB), and Knowledge Process Capabilities (KPC), and the regressions from these latent factors to Organisational Performance (OP) (see figure 6.6). Additionally, SEM includes the effect of the common latent factor (CLF) previously evaluated.

The following sections present the SEM analysis to test Model 1 in detail.

6.4.2.2 Model specification and identification

Figure 6.6 shows one-way arrows representing structural regressions which indicate an influence from one factor to another. The double-headed curved arrows represent the correlations between exogenous variables. Finally, the residual error represents an error in predicting the endogenous factor from the exogenous ones.

The variables are composed of at least three and no more than four reflective indicators, representing that the same construct causes them. The hypothesised relationships in the model are based on well-developed theories mentioned in Chapter Three.

Furthermore, an imputed file was created to apply all remedies and accomplish the assumptions that could affect the results and inferences such as missing values, outliers, normality and multicollinearity assumptions.

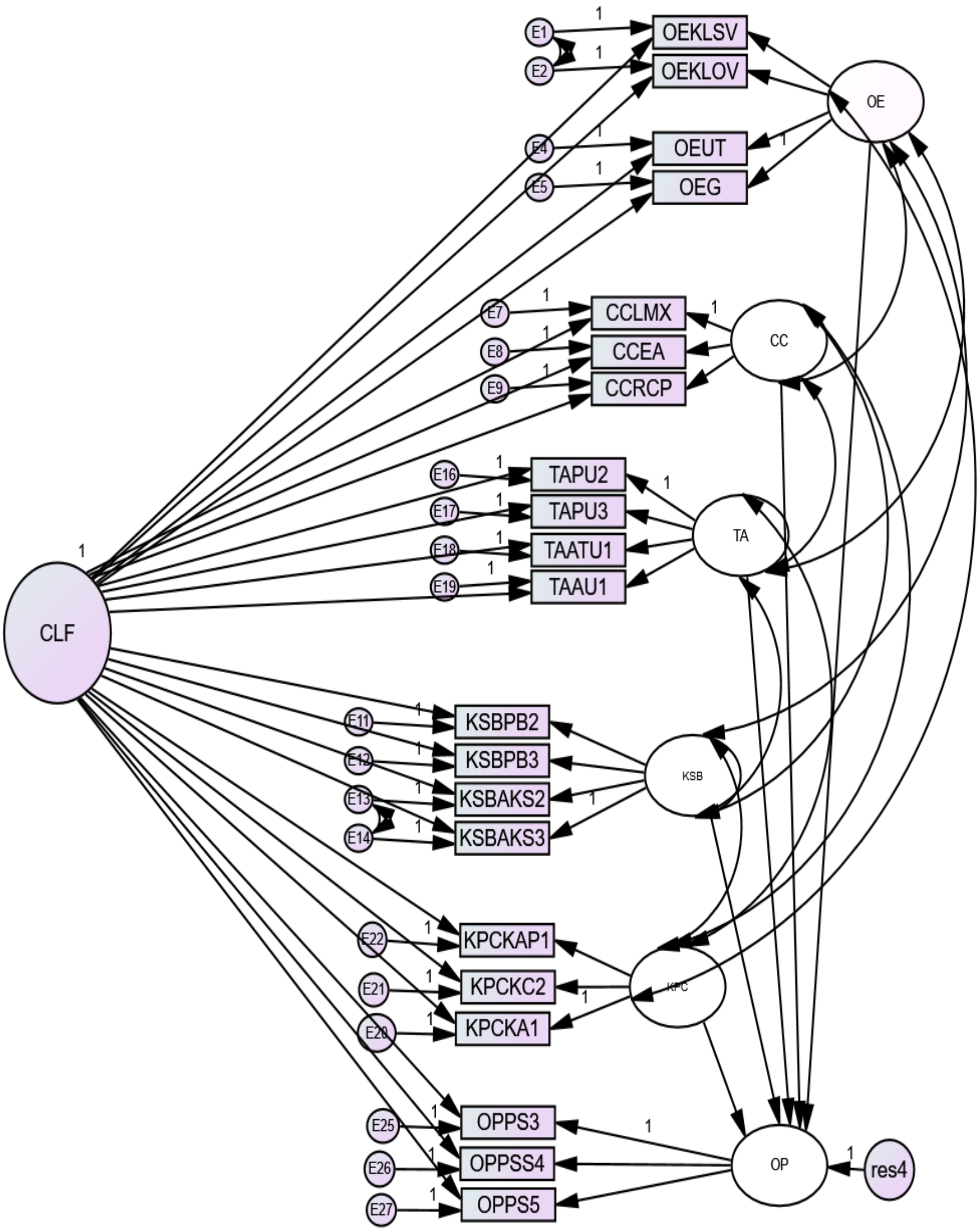


Figure 6.6: Model 1 (Direct Effects on Organisational Performance)

6.4.2.3 Model estimation and testing

IBM AMOS was used to analyse and evaluate the structural model. The Maximum Likelihood (ML) method was employed, albeit with nonparametric bootstrapping. The model has 231 distinct sample moments and 80 parameters to be estimated, leaving 151 degrees of freedom that revealed an overidentified model. Parameter estimates did not show unreasonable estimates such as correlations greater than 1.0, negative variances, or excessively large or small standard errors.

For the measurement model evaluation, all critical ratios (CR) that represent the parameter estimate divided by its standard error were greater than 1.96, indicating that the estimates are statistically different from zero (Byrne, 2016).

Table 6.13 shows the model fit indices statistics for the overall level. Again, the results revealed an acceptable structural model.

For Model 1, the Chi-square obtained was 169.438 with a p-value of .145. Based on Byrne (2016), *"the probability value associated with X^2 represents the likelihood of obtaining a X^2 value that exceeds the X^2 value when H_0 is true. Thus, the higher the probability associated with X^2, the closer the fit between the hypothesised model (under H_0) and the perfect fit"*. However, as Hampton (2015) suggested, given the limitations of the Chi-square test statistic, such as the sensitivity of sample size and data non-normality, researchers need to take a more pragmatic approach to the evaluation process. For this purpose, a group of absolute, incremental and parsimony fit indices were evaluated.

Table 6.13: Structural Model 1. Fit indices

Index		Cut-off value	Structural Model 1 fit indices
X^2		> .05	169.438 (df=151; p=.145)
X^2/df		< 3	1.122
Absolute fit indices	RMSEA	<.05 (good) .05 – .08 (moderate fit) .08 – 0.1 (poor fit) > 0.1 (bad fit)	.021 (Lo .000, Hi .036, P-close 1.0)
	SRMR	< .05 (good fit) < .08 (moderate fit)	.0320
	AGFI	> .80	.920
Incremental fit indices	CFI	> .90	.994
	TLI	> 90	.991
Parsimony fit indices	PNFI	> .50	.679
	PCFI	> .50	.714

The first measure of fit is the X^2/df- ratio. Based on Carmines and McIver (1981), cited by Netemeyer et al. (1991), a value of 3, 2 or less for this measure has been advocated as an acceptable level of fit for confirmatory factor models; for this model, the X^2/df-ratio value is 1.122.

The RMSEA value estimate is below the suggested .05 threshold with acceptable confidence interval ranges. The current model showed a value of .021, which indicated a good model fit. AGFI index is classified in the group of absolute indices of fit because they compare the hypothesised model with no model at all (Byrne, 2016). AGFI index ranges from zero to 1.00, where a value close to 1.00 indicates a good fit. For this model AGFI index value is .920 showing an acceptable value. The Standardised Root Mean Square Residual (SRMR) value for Model 1 is .0320 showing a well-fitting model (SRMR < .05).

The Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) are part of the incremental or comparative indices fit group. CFI and TLI values were .994 and .991, respectively, indicating a good fit considering a cut-off value close to .95. The final two indices, PNFI and PCFI, accomplished model parsimony; both fall in the range of expected values (>.50) with values of .679 and .714 respectively. Overall, the results indicate a good structural model fit for Model 1.

6.4.2.4 Hypotheses testing

Once the fit of the structural model has been demonstrated, the next step is to test the research hypotheses. Hypotheses represent paths or relationships in the structural model between constructs.

The squared multiple correlation coefficient (SMC) represents the proportion of variance explained by the predictor of the variable analysed. Table 6.14 shows SMC values for the dependent factor (OP) in the model and each factor loading regression path. Accordingly, the model explained 32.3% of the variance associated with Organisational Performance in terms of continuous improvement on patient safety.

Table 6.14: Amos output for Model 1: Squared Multiple Correlations

	Estimate
OP	0.323
OPPS3	0.546
OPPSS4	0.917
OPPS5	0.681
KPCKAP1	0.503
KPCKC2	0.628
KPCKA1	0.489
CCRCP	0.405
CCEA	0.685
CCLMX	0.591
KSBAKS3	0.525

	Estimate
KSBAKS2	0.666
KSBPB3	0.631
KSBPB2	0.618
TAAU1	0.475
TAATU1	0.591
TAPU3	0.739
TAPU2	0.708
OEG	0.526
OEUT	0.593
OEKLOV	0.526
OEKLSV	0.425

AMOS software estimates the critical ratio (CR) value to establish the statistical significance between the examined variables. CR represents the parameter estimate divided by its standard error. CR operates as a z-statistic in testing that the estimate is statistically different from zero. Results were analysed using three levels of significance, .05, .01, and .001, that indicate acceptable, strong and high significance, respectively. Table 6.15 shows the results of the hypotheses testing in Model 1.

Table 6.15: Path results and hypotheses testing (Model 1)

Hypothesis	Path (relationship)	Standardised Regression Weights	S.E.	Critical Ratio	Result
H1a	OE → OP	.368	.092	3.266***	Supported
H2a	CC → OP	.042	.068	.380	Not supported
H3a	TA → OP	.220	.095	2.048*	Supported
H4a	KSB → OP	.016	.122	.145	Not supported
H5a	KPC → OP	´.115	.154	.826	Not supported

(*p<0.05, **p<0.01, ***p<0.001)

Organisational performance in terms of continuous improvement on patient safety (OP)

It was found that Organisational Enablers (OE) and Technology Acceptance (TA) were significant predictors of Organisational Performance (OP). The results showed that OE was the strongest, as it explained approximately 36.8% of the variance in OP ($p < .001$). TA explained approximately 22% of the variance in OP at $p < .05$ level. Therefore, results for H2a, H4a and H5a are not supported.

6.4.2.5 Multi-group analysis – Model 1

In this section, a multi-group analysis was conducted to analyse whether the components of the measurement model or the structural model are invariant across particular groups.

Based on Byrne (2016) and Blunch (2013), a series of tests are needed to obtain evidence of multi-group invariance. As a first step, the mentioned authors recommended a global test for the equality of covariance structures across the groups, where rejecting the null hypothesis argues for the non-equivalence of the groups. Then, if the model fits the data well for the groups, it will remain the hypothesised model under test for the subsequent tests of equivalence across groups; on the contrary, it will be modified accordingly, and it will become the hypothesised multi-group model under test.

In order to identify the source of non-equivalence, the analysis of the data is subjected to subsequent tests:

1. Configural invariance refers to the number of similar factors and their loading patterns across groups. For this test, no equality constraints are imposed on any parameters.
2. Measurement invariance refers to the extent to which parameters in the measurement model and each subscale are equivalent across two groups (measurement weights).
3. Structural invariance refers to the extent to which parameters in the structural components of the model are equivalent across two groups (structural weights).
4. Factor covariance invariance refers to the extent to which the theoretical structure is the same across groups (structural covariances).

5. Structural residual refers to the extent to which structural residuals are equal across groups.
6. Error variance (and covariance) invariance refers to the extent to which error variances and covariances are equivalent across two groups.

When conducting the above-mentioned tests, parameters are equally constrained across groups and after each test when parameters known to be group-invariant are equally and cumulatively constrained. Thus, for subsequent tests, more restrictive hypotheses will be able to determine some non-equivalent parameters across groups in the model.

A. Gender Impact

The data set (286) was split into two gender groups: female (204) and male (82). As it can be seen, the sample sizes for the male and female groups are unequal. Hwa et al. (2020) suggested that the unequal distribution of groups decreases statistical power leading to the risk of underestimating moderator effects even though the total sample size is relatively large. However, the authors stated that oversampling a specific small group may misrepresent such a group regarding the actual study population. They also suggest that if the scales are reliable, valid, and well-established, the possibility of underestimating the moderators' effect decreases. Therefore, the results obtained from the analysis of the gender moderating effect should be taken with caution, considering that the female gender biases the sample. As mentioned before, evaluating the structural Model 1 for each group is the first step to conducting a multi-group invariance analysis. Table 6.16 shows the results for both groups.

Table 6.16: Results of Model 1 by group (female and male)

Index		Cut-off value	Structural Model 1 fit indices (Female: N=204)	Structural Model 1 fit indices (Male: N=82)
X^2		P-value > .05	164.640 (df=151; p=.212)	143.757 (df=151; p=.650)
X^2/df		< 3	1.090	0.952
Absolute fit indices	RMSEA	<.05 (good) .05 – .08 (moderate) .08 – .1 (poor) > 0.1 (bad)	.021 (Lo .000, Hi .040, P-close .997)	.000 (Lo .000, Hi .045, P-close .974)
	SRMR	< .05 (good fit) <.08 (moderate fit)	.0373	.0501
	AGFI	> .80	.895	.793
Incremental fit indices	CFI	> .90	.993	1.000
	TLI	> .90	.990	1.012
Parsimony fit indices	PNFI	> .50	.665	.624
	PCFI	> .50	.714	.719

Results showed that both samples have a good model fit, except for the male sample, which has an AGFI value very close to the cut-off value (0.80). As was manifested by Fan Thompson and Wang (1999), cited by Byrne (2016), this measure can be overly influenced by sample size. Despite the obtained AGFI value (.793), in general, fit statistics showed that the model fits the data for both groups.

Using the Multiple Group analysis in Amos software, the baseline, measurement, and structural models were tested simultaneously with an automated procedure for analysing gender invariance. In this procedure, each model is more restrictive than its predecessor in terms of the number of constrained parameters. Table 6.17 shows the results of these models.

Table 6.17: Multi-group Invariance by gender for Model 1 (Goodness of fit Statistics)

Model	X^2 (df)	X^2/df	RMSEA	CFI	TLI	ΔX^2 (ΔDF)	ΔCFI
Configural model	308.396 (302)	1.021	0.009	0.998	0.997		
Measurement weights	343.607 (333)	1.032	0.011	0.996	0.995	35.211 (31) ns	0.002
Structural weights	349.992 (338)	1.035	0.011	0.996	0.995	41.596 (36) ns	0.002
Structural covariances	365.491 (353)	1.035	0.011	0.996	0.995	57.095 (51) ns	0.002
Structural residuals	367.527 (354)	1.038	0.012	0.995	0.994	59.131 (52) ns	0.003
Measurement residuals	391.905 (374)	1.0.48	0.013	0.994	0.993	83.509 (72) ns	0.004

In the configural test, the number of factors, the pattern of factor loadings, the specified factor covariances and the error covariances are considered to hold across female and male groups. Because this model is the same as the baseline model previously evaluated for each group (see Table 6.16), results indicate a well-fitting model that provides the baseline to compare with all subsequently specified invariance models.

The classical approach to look for evidence of non-invariance is the X^2-difference (ΔX^2) test. When the value obtained by the X^2-difference (ΔX^2) test is statistically significant, then evidence of non-invariance is provided. However, as it was mentioned before, X^2 tends to be sensitive to sample size; considering this perspective, other fit indices such as CFI (ΔCFI) and RMSEA are more sensitive goodness-of-fit indices to lack invariance.

In the first test run for measurement invariance, findings showed evidence of non-invariance. Therefore, to identify which parameters contribute to these non-invariance findings, the individual subscales and parameters were evaluated until invariance across groups was obtained. After these iterative tests, five measurement weights were freely estimated across both groups to reach the measurement invariance. Finally, the model under test for measuring invariance was consistent with the configural model (CFI=.996;

RMSEA=.011). The X^2-difference (ΔX^2) and CFI-difference tests showed evidence of invariance. The ΔX^2 –difference test obtained a value of 35.211 with 31 degrees of freedom, which is not statistically significant, and the ΔCFI-difference test obtained a value of .002, which is less than the .01 cut-off point proposed by Cheung and Rensvold (2002) and cited by Byrne (2016). These results confirmed that all loadings related to each factor or subscale (OE, CC, TA, KSB, KPC, and OP) operate equivalently across the female and male groups.

After the measurement model's equivalence was established, a test of invariance related to the structural model was conducted. Results revealed that the structural weights, factor variances and covariances are equivalent across female and male groups. The X^2-difference (ΔX^2) and CFI-difference tests showed insignificant values in testing for the invariance of factor covariances identifying whether the extent to which the theoretical structure underlying Model 1 is the same across groups. The value of X^2 increased from 308.396 to 365.491, and the associated degree of freedom increased from 302 to 353. However, the test showed a non-significant value despite these increased values. The ΔCFI-difference test obtained a value of .002, which is less than the .01 cut-off. Thus, results showed no significant differences in both groups.

As it was observed in Table 6.17, the results for the test of structural and measurement residuals revealed that the parameters estimated are equivalent in both groups after freely estimating three measurement residuals.

In order to look for group differences in the latent means of particular relationships that support a specific hypothesis, the next step in the analysis tested the equivalence of means related to each factor.

Based on Byrne (2016), when an analysis of means and covariance structure is conducted, the following parameters are included: regression coefficients, variances and covariances of the independent variables, intercepts of the dependent variables and means of the independent variables. The values of these parameters are contained in a matrix known as a moment matrix. For this evaluation, it is necessary to impose the restriction that the factor intercepts for one group are fixed to zero, operating as a reference group. In contrast, the other group factor intercepts are freely estimated to establish a comparison. Interpretation of the results is relative in order to establish if the latent variable means of one group differ from those of another because it is not possible to estimate the mean of each factor for each group.

For this study, the female group was used as the reference group, and the latent means were fixed to 0. For the male group, the mean constraints were removed for the parameters to be freely estimated. The values reported in Table 6.18 represent latent mean differences between the two groups.

Table 6.18: Estimated mean difference – Gender impact (Model 1)

Latent variable	**Female (Reference group)**	**Male**			
		Estimate	S.E.	C.R.	P
OE	0	-.078	.094	-.824	.41
CC	0	.125	.123	1.014	.311
KSB	0	.054	.062	.881	.378
TA	0	.249	.073	3.405	***
KPC	0	.099	.072	1.367	.171
OP	0	-.078	.094	-.824	.41

As seen in Table 6.18, the latent factor means related to OE and OP tended to be weaker for the male group sample than for the female group sample, but these inclinations were statistically insignificant. On the other hand, the latent factor means CC, KSB, TA, and KPC tended to be higher for the male group sample than for the female group sample;

however, these inclinations were statistically insignificant, too, except for TA. Given that the latent mean for TA was statistically significant, on average, the male group appears to have significantly higher Technology Acceptance than the female group.

Every individual relationship was analysed to obtain *Δχ2* and identify any non-invariance at a path level. Also, every path was examined separately, and the other paths were freely estimated across the model.

Table 6.19: Standardised estimates for the structural Model 1 (Gender impact)

Hypo-thesis	Path (relationship)			Female		Male		Invariance test	
				Standardised Beta	C.R. (t-value)	Standardised Beta	C.R. (t-value)	X^2 *(df)*	ΔX^2 (Δdf)
H1.a	OE	-->	OP	.194	1.49 ns	.516	2.402 *	309.171 (303)	.775 ns (1)
H2.a	CC	-->	OP	.158	1.2 ns	-.074	-.343 ns	309.45 (303)	1.054ns (1)
H3.a	TA	-->	OP	.054	0.493 ns	.478	2.236 *	310.877 (303)	2.481ns (1)
H4.a	KSB	-->	OP	-.046	-0.384 ns	.124	.655 ns	308.946 (303)	.55 ns (1)
H5.a	KPC	-->	OP	.375	2.39 *	-.353	-1.348 ns	315.746 (303)	7.35** (1)
Squared Multiple Correlation SMC			OP	.301		.447			

*(*p<0.05, **p<0.01, ***p<0.001). ns: non-significant. df: degree of freedom.*
ΔX^2= (unconstrained X^2 - X^2 for each model with constrained path). Unconstrained X^2= 308.396.

Table 6.19 shows that for the female sample, H1a, H2a, H3a and H4a were not supported at all p-value levels, and H5a was supported at p=.017. For the male group, H3a (p=.025) and H1a (p=.016) were supported; on the contrary, H2a, H4a and H5a were not supported by at all p-values. The Δχ2 showed that the path KPC→OP was significantly different between males and females. However, for the male group, the influence of KPC on OP was found insignificant. These results means that the relationships OE → OP, CC → OP, TA → OP, KSB → OP, and KPC → OP are not moderated by healthcare professionals' gender (H6a).

B. Years of practice

The following multi-group analysis evaluated whether the model components (measurement and structural) are invariant across groups determined by years of practice. Concerning years of practice, the data set presented one case with missing values, which was removed for the analysis. Therefore, two groups were defined: healthcare professionals with less than ten years of practice (108) and healthcare professionals with ten or more years of practice (177).

After conducting the multi-group analysis for these groups, Table 6.20 showed the following results:

Table 6.20: Results of Model 1 by group (<10 and >=10 years of practice)

Index		**Cut-off value**	**Structural Model 1 fit indices (Less than 10 years of practice: N=108)**	**Structural Model 1 fit indices (10 years or more of practice: N=177)**
X^2		P-value > .05	199.182 (df=151; p=.005)	156.462 (df=151; p=.364)
X^2/df		< 3	1.319	1.036
Absolute fit indices	RMSEA	< .05 (good) .05 – .08 (moderate) .08 – .1 (poor) > 0.1 (bad)	.055 (Lo .031, Hi .074, P-close .347)	.014 (Lo .000, Hi .038, P-close .997)
	SRMR	< .05 (good fit) <.08 (moderate fit)	.0491	.0436
	AGFI	> .80	.793	.887
Incremental fit indices	CFI	> .90	.960	.997
	TLI	> .90	.944	.996
Parsimony fit indices	PNFI	> .50	.617	.661
	PCFI	> .50	.690	.717

Both samples have a good model fit, except for the healthcare professionals with less than ten years of practice sample that showed an AGFI (.793) and RMSEA (0.55) values very close to their cut-off values. However, as it was manifested by Thompson and Wang (1999), AGFI can be biased and influenced by sample size. Regarding RMSEA index fit, Hu and Bentler (1999) suggested a value of .06 to indicate a good fit, arguing that when the sample size is small, the RMSEA tends to over-reject true models. Regardless of AGFI and RMSEA, Table 6.20 shows that Model 1 fits the data for both groups.

After a good fit was obtained for the structural model, the configural, the measurement, and the structural models were tested simultaneously for analysing years of practice invariance. Table 6.21 shows the results of this analysis.

Table 6.21: Multi-group Invariance by years of practice for Model 1 (Goodness of fit Statistics)

Model	**X^2 (df)**	**X^2/df**	**RMSEA**	**CFI**	**TLI**	**ΔX^2 (ΔDF)**	**ΔCFI**
Configural model	355.644 (302)	1.178	.025	.982	.974		
Measurement weights	391.905 (329)	1.191	.026	.978	.972	36.261 (27) ns	.004
Structural weights	396.095 (334)	1.186	.026	.979	.973	40.451 (32) ns	.003
Structural covariances	413.091 (349)	1.184	.025	.978	.974	57.447 (47) ns	.004
Structural residuals	415.516 (350)	1.187	.026	.977	.973	59.872 (48) ns	.005
Measurement residuals	437.633 (371)	1.18	.025	.977	.974	81.989 (69) ns	.005

Results for this multi-group analysis based on X^2-difference (ΔX^2) and the CFI and RMSEA indices supported that the hypothesised configural model is well-fitting across both groups.

Regarding measurement invariance, after an iterative test to identify which parameters contributed to non-invariance, eight measurement weights were freely estimated across both groups. Finally, the model under test for measurement invariance showed a consistent fit with the configural model (CFI=.978; RMSEA=.026). Furthermore, results of the X^2-difference (ΔX^2) and CFI-difference tests also showed evidence of invariance. These results confirmed that considering the freely estimated measurement weights previously specified, all loadings related to each factor or subscale (OE, CC, TA, KSB, KPC, and OP) operate equivalently across the groups.

The results of the structural model invariance revealed that the structural weights, factor variances and covariances are equivalent across groups.

Table 6.21 shows the results of the test of structural and measurement residuals; they revealed that the parameters estimated are equivalent in both groups after freely estimating two measurement residuals.

In order to look for group differences in the latent means of individual hypothesised relationships, the analysis for the equivalence of means related to each factor was conducted. For this analysis, the less than ten years of practice group was the reference group; therefore, its parameters were constrained. The ten or more years of practice group's parameters were left to be freely estimated. The values reported in Table 6.22 represent the latent mean differences between the two groups.

Table 6.22: Estimated means differences – years of practice impact (Model 1)

Latent variable	**Less than 10 years of practice (Reference group)**	**10 or more years of practice group**			
		Estimate	S.E.	C.R.	P
OE	0	-.306	.084	-3.66	***
CC	0	-.29	.114	-2.543	.011
KSB	0	-.04	.062	-.642	.521
TA	0	-.061	.073	-.833	.405
KPC	0	-.018	.065	-.275	.784
OP	0	.123	.074	1.661	.097

For latent factors OE, CC, KSB, TA and KPC, means tended to be weaker for the ten or more years of practice group sample than for the less than ten years of practice group sample; however, these inclinations were statistically insignificant, except for OE and CC. Given that the latent mean for OE and CC was statistically significant, the present research interprets that, on average, the ten or more years of practice group appears to have significantly lower perceptions about Organisational Enablers and for Culture of Collaboration than the less than ten years of practice group. On the other hand, the OP factor on average for the ten or more years of practice group appears to be slightly positively higher concerning the less than ten years of practice group, but this inclination is statistically insignificant.

Additionally, the analysis for every individual relationship was conducted, detecting differences in Δχ2 to support any non-invariance in a path level (see Table 6.23).

Table 6.23: Standardised estimates for the structural Model 1 (Years of practice)

Hypothesis	Path (relationship)			Less than 10 years of practice group		10 or more years of practice group		Invariance test	
				S.E.	C.R.	S.E.	C.R.	*X^2 (df)*	ΔX^2 (Δdf)
H1.a	OE	-->	OP	.329	1.478 ^{ns}	.367	3.122 **	356.355 (303)	.71 ^{ns} (1)
H2.a	CC	-->	OP	.205	0.949 ^{ns}	.072	.609 ^{ns}	355.869 (303)	.23 ^{ns} (1)
H3.a	TA	-->	OP	.254	1.26 ^{ns}	.188	1.576 ^{ns}	356.601 (303)	.96 ^{ns} (1)
H4.a	KSB	-->	OP	-.149	-1.216 ^{ns}	.191	1.398 ^{ns}	358.834 (303)	3.19 * (1)
H5.a	KPC	-->	OP	.29	2.073 *	-.092	-.633 ^{ns}	360.676 (303)	5.032* (1)
Squared Multiple Correlation SMC			OP	.434		.297			

*(*p<0.05, **p<0.01, ***p<0.001). ns: non-significant. df: degree of freedom.*
ΔX^2= (unconstrained X^2 - X^2 for each model with constrained path). Unconstrained X^2= 355.644.

As seen in Table 6.23, for the less than ten years of practice group, all hypotheses were not supported except for H5a at $p<.05$. For the ten or more years of practice group, all hypotheses were not supported except for H1a at $p<.01$.

By calculating $\Delta\chi 2$, two paths, KPC → OP and KSB → OP, were found significantly different between both groups. However, for the ten and more years of practice group, the influence of KPC on OP was found insignificant, and the influence of KSB → OP was insignificant for both groups. These results mean that the relationships OE → OP, CC → OP, TA → OP, KSB → OP, and KPC → OP are not moderated by healthcare professionals' years of practice (H7a).

6.4.3 Model 2: A simple mediation model using Knowledge Process Capability as a mediator variable.

In Model 2, all variables and scales previously analysed are included, keeping the sample size of 286 observations. Therefore, based on the Confirmatory Factor Analysis developed in section 6.3, which revealed a satisfactory measurement model fit and demonstrated acceptable validity and reliability at the level of the constructs, the structural model evaluation was conducted.

6.4.3.1 The structural model (Model 2)

The structural model is composed of regressions among four independent and one mediating latent factor: organisational enablers (OE), culture of collaboration (CC), technology acceptance (TA), knowledge-sharing behaviour (KSB), and knowledge process capabilities (KPC) as a mediation variable. Model 2 is a simple mediation model using KPC as a mediator between independent variables (OE, CC, TA, and KSB) with organisational performance (OP), as seen in Figure 6.7.

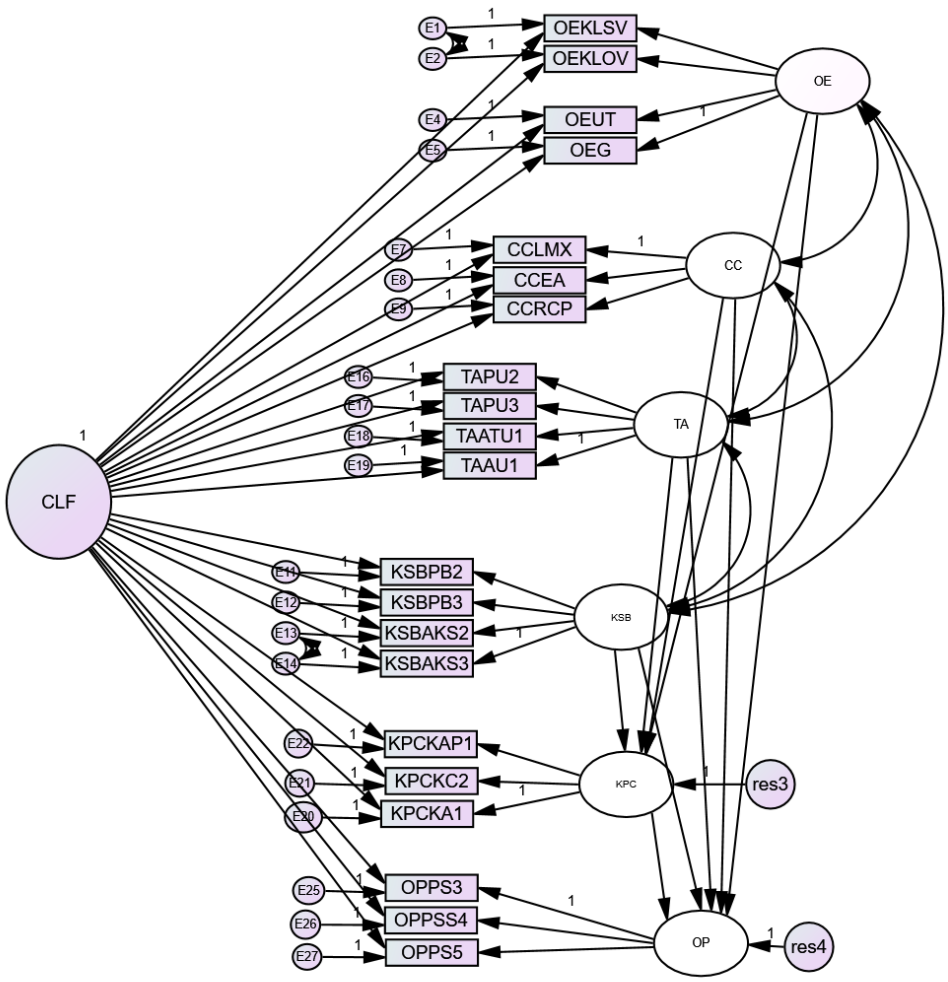


Figure 6.7: Model 2 (Knowledge Process Capability as a mediator variable)

6.4.3.2 Model specification and identification

All latent constructs that composed the measurement model were measured using multi-item scales. Each item was associated with an error term, and a residual term was associated with predicted factors. The scales were composed of at least three and no more than four reflective indicators, representing that the same construct causes them.

As seen in Figure 6.7, the structural Model 2 is a recursive model that specifies the direction of cause from one direction only. Furthermore, suitable remedies to accomplish all assumptions discussed in section 6.2 that may affect the results and inferences of the model estimation, such as missing values, outliers, normality and multicollinearity, were used.

6.4.3.3 Model estimation and testing

The Maximum Likelihood (ML) method was employed in AMOS software. Results of parameter estimates revealed the absence of any identification problems such as correlations greater than 1.0, negative variances, or excessively large or small standard errors.

The model has 231 distinct sample moments and 80 parameters to be estimated, leaving 151 degrees of freedom that revealed an overidentified model.

As with Model 1, all critical ratios (CR) that represent the parameter estimate divided by its standard error were greater than 1.96, indicating that the estimates are statistically different from zero (Byrne, 2016).

As seen in Table 6.24, the model fit indices statistics showed an acceptable and satisfactory structural model for the overall level.

Table 6.24: Structural Model 2 fit indices

Index		Cut-off value	Structural Model 2 fit indices
X^2		> .05	169.438 (df=151; p=.145)
X^2/df		< 3	1.122
Absolute fit indices	RMSEA	<.05 (good) .05 – .08 (moderate) .08 – 0.1 (poor) > 0.1 (bad)	.021 (Lo .000, Hi .036, P-close 1.0)
	SRMR	<.05 (good fit) <.08 (moderate fit)	.0320
	AGFI	>.80	.920
Incremental fit indices	CFI	>.90	.994
	TLI	>.90	.991
Parsimony fit indices	PNFI	>.50	.679
	PCFI	>.50	.714

6.4.3.4 Hypotheses testing

The Squared Multiple Correlation (SMC) results revealed that the model explains 32.3% of OP variation (see Table 6.25). Furthermore, the 62.1% of KPC variation is explained by its four predictors: organisational enablers (OE), culture of collaboration (CC), technology acceptance (TA) and knowledge-sharing behaviour (KSB).

Table 6.25: Squared Multiple Correlation (SMC)

	Estimate
OP	0.323
KPC	0.621
OPPS3	0.546
KPCKAP1	0.503
KPCKC2	0.628
KPCKA1	0.489
OPPS5	0.681
OPPSS4	0.917
CCRCP	0.405
CCEA	0.685
CCLMX	0.591
KSBAKS3	0.525

	Estimate
KSBAKS2	0.666
KSBPB3	0.631
KSBPB2	0.618
TAAU1	0.475
TAATU1	0.591
TAPU3	0.739
TAPU2	0.708
OEG	0.526
OEUT	0.593
OEKLOV	0.526
OEKLSV	0.425

Table 6.26 shows the results of the hypotheses testing in Model 2. The results were analysed using three levels of significance, 0.05, 0.01, and 0.001, that indicate acceptable, strong and high significance, respectively.

Table 6.26: Path results and hypotheses testing (Model 2)

Hypothesis	Path (relationship)	Standardised Regression Weights	S.E.	Critical Ratio	Result
H1.a	OE → OP	.368	.092	3.266***	Supported
H2.a	CC → OP	.042	.068	.380	Not supported
H3.a	TA → OP	.220	.095	2.048*	Supported
H4.a	KSB → OP	.016	.122	.145	Not supported
H5.a	KPC → OP	´.115	.154	.826	Not supported
H1.b	OE → KPC	.062	.083	.546	Not supported
H2.b	CC → KPC	0.18	.065	.151	Not supported
H3.b	TA → KPC	0.373	.077	3.891***	Supported
H4.b	KSB → KPC	0.470	.102	4.716***	Supported

*(*p<.05, **p<.01, ***p<.001)*

As seen in Table 6.26, four paths in the model are supported: OE→OP, TA→OP, TA→KPC, and KSB→KPC. The main results are explained in the following points.

Organisational Performance in terms of patient safety (OP)

Similarly, to Model 1, it was found that OE and TA were significant predictors of OP. OE was the strongest, as it explained approximately 36.8% of the variance in OP ($p < .001$). TA explained approximately 22% of the variance in OP at $p < .05$ level.

Knowledge Process Capabilities (KPC)

KPC has positive and significant paths with TA and KSB. KSB was the strongest determinant, as it explained 47% of the variance in KPC at $p<.001$. On the other hand, TA explained approximately 37.3% of the variance in KPC at $p<.001$. The results showed that H3b and H4b were supported.

6.4.3.5 Mediation Analysis

Sewall Wright's (1922) work about the relative influences of heredity and environment on the breeding of guinea pigs was the beginning of the modern approach to quantifying indirect effects, also known as the mediation process. In his study, Wright used a path diagram integrated with a system of equations to explain the causal relations among the variables. The results of Wright's study demonstrated the contribution of the mediator variables connecting the independent variable with the dependent variable in a complex system of causality using the product of the path coefficients in the chain of paths connecting the independent variable with the dependent variable. The authors proposed that this analysis quantifies the supposed causal relations.

When a relationship between dependent and independent variables is affected by another independent variable, that is, by an intermediate variable called "*mediator*", a mediation process is found. In other words, mediation occurs when a second independent variable changes the relationship between another independent variable and the criterion variable, influencing the result (Hoyle, 2012). Figure 6.8 depicts a pathway of a mediation process.

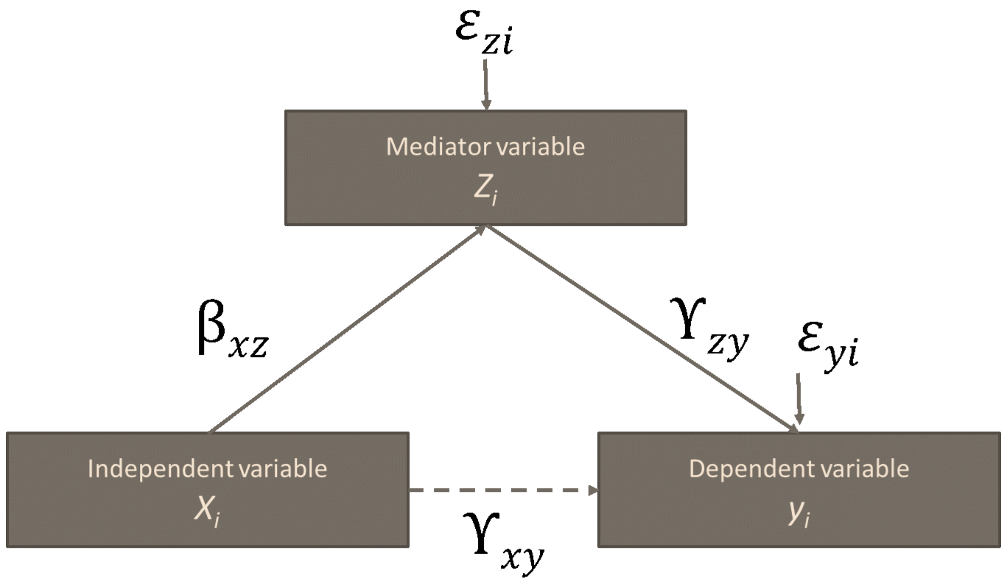


Figure 6.8: Pathway of a mediation process. Adapted from Gunzler, Chen, Wu, and Zhang (2013)

(Υxy): **the direct effect** is the pathway from the exogenous variable to the dependent variable while controlling for the mediator, involving a chain of length one in the sequence of causal relations.

(βxz Υzy): **the indirect effect** is the pathway from the exogenous variable to the dependent variable through the mediator. The relationship is intervened by at least one additional variable (mediator variable) involving two or more chains in the sequence of causal relations.

(Υxy + βxz Υzy): **the total effect** is the sum of the direct and indirect effect of the exogenous variable on the dependent variable.

The main interest in conducting a mediation analysis is to evaluate whether a change in the mediator variable mediates the effect of the independent variable on the dependent variable. Full mediation is identified when the effect is 100% mediated by the mediator variable, when the relationship between the independent variable and the dependent variable, in the presence of the mediator, is wholly affected, the independent variable has no direct effect on the dependent variable. On the other hand, in partial mediation, the independent variable has some residual direct effect when the mediator is introduced into the model. In other words, the mediator variable partially mediates the effect of the independent variable on the dependent variable. Statistically, a second independent variable is considered a significant mediator when the relation between the independent and dependent variables is entirely or partially accounted for by the intermediate variable in the causal chain (Hoyle, 2012).

Therefore, mediation analysis is used when it is necessary to evaluate a causal relationship with a mediation process with simultaneous indirect and direct effects, and when the mediating variable causes a particular result and causes an effect on the intervention (independent variable).

Statistically, for testing partial mediation, Hair et al. (2010) and Salarzadeh Jenatabadi (2015) posited that a strong relationship between the independent and dependent variables (direct effect) is required. Then, a significant relationship between the independent variable and the hypothesised mediator is required too. After that, the mediator and independent variables predict the dependent variable. Finally, for the establishment of partial mediation, the coefficient obtained from the relationship between independent and dependent variables in absolute value needs to be greater than the coefficient obtained in the indirect path via the mediator. For full mediation, a strong relationship between the independent and dependent variables (direct effect) is required prior to including the mediator; the indirect effect is significant when the direct effect with the mediator is not significant.

In their study, Cheung and Lau (2007) affirmed that hierarchical regression models, commonly used for mediation analysis, are susceptible to measurement errors causing serious underestimations or overestimations. The authors analysed models finding that mediation effects skew to the right when the sample size is 100 or 200. The normality assumption, in general, holds when the sample size reaches 500.

Therefore, a bootstrap method is recommended to establish confidence intervals because the generated product is not normally distributed. Hence, for this study, the bootstrap method was conducted with a 1000 bootstrap sample, with bias-corrected confidence intervals at a 95% of confidence level. Table 6.27 shows the results of the mediation analysis for Model 2.

Table 6.27: Mediation analysis for Model 2

Direct path	**Direct effect**	**Indirect path (via mediator)**	**Direct effect (W mediator)**	**Indirect effect**
OE --> OP	0.368 **	OE --> KPC --> OP	0.62 (ns)	0.007 (ns)
CC --> OP	0.042 (ns)	CC --> KPC --> OP	0.018 (ns)	0.002 (ns)
TA --> OP	0.220 **	TA --> KPC --> OP	0.373 (**)	0.043 (ns)
KSB --> OP	0.016 (ns)	KSB --> KPC --> OP	0.470 (**)	0.054 (ns)

*(*p<.05, **p<.01, ***p<.001)*

Results from Table 6.27 showed the positive but non-significant indirect effect through Knowledge Process Capabilities from all evaluated independent variables. In other words, the effects of the independent variables on OP cannot be explained through KPC. Therefore, hypotheses H1d, H2d, H3d and H4d are not supported.

6.4.3.6 Multi-group analysis – Model 2

A. Gender Impact

The data set for Model 2 (N=286) observations was split into two files according to gender: female (204) and male (82). For this analysis, it is necessary to take into consideration that since the female sample biases the distribution of the defined group, this situation could decrease statistical power leading to the risk of underestimating moderator effects (Hwa et al., 2020).

The results confirmed that the multi-group analysis of both groups (female and male) had an acceptable model fit. Table 6.28 shows that the absolute, incremental and parsimony fit indices included in the analysis of both models fitted the data satisfactorily except for AGFI value; however, as was discussed in Model 1, based on Byrne (2016), this index is biased and sensitive to sample size.

Table 6.28: Results of Model 2 by group (female and male)

Index		**Cut-off value**	**Structural Model 2 fit indices (Female: N=204)**	**Structural Model 2 fit indices (Male: N=82)**
X^2		P-value > .05	164.640 (df=151; p=.212)	143.757 (df=151; p=.650)
X^2/df		< 3	1.090	.952
Absolute fit indices	RMSEA	<.05 (good) .05 – .08 (moderate) .08 – 0.1 (poor) > 0.1 (bad)	.021 (Lo .000, Hi .040, P-close .997)	.000 (Lo .000, Hi .045, P-close .974)
	SRMR	<.05 (good fit) <.08 (moderate fit)	.0373	.0501
	AGFI	> .80	.895	.793
Incremental fit indices	CFI	> .90	.993	1.000
	TLI	> .90	.990	1.012
Parsimony fit indices	PNFI	> .50	.665	.624
	PCFI	> .50	.714	.719

The second step in the multi-group analysis was simultaneously modelling the base, configural, metric, and scalar models for gender invariance. Table 6.29 shows the results obtained through the multi-group technique in the AMOS software.

Table 6.29: Multi-group Invariance by gender for Model 2 (Goodness of fit Statistics)

Model	**X^2 (df)**	**X^2/df**	**RMSEA**	**CFI**	**TLI**	**ΔX^2 (ΔDF)**	**ΔCFI**
Configural model	308.396 (302)	1.021	0.009	0.998	0.997		
Measurement weights	351.370 (335)	1.049	0.013	0.994	0.993	42.974 (33) ns	0.004
Structural weights	361.354 (344)	1.050	0.013	0.994	0.993	52.958 (42) ns	0.004
Structural covariances	373.411 (354)	1.055	0.014	0.993	0.992	65.015 (52) ns	0.005
Structural residuals	375.952 (356)	1.056	0.014	0.993	0.992	67.556 (54) ns	0.005
Measurement residuals	388.380 (369)	1.053	0.014	0.993	0.992	79.984 (67) ns	0.005

After the first individual evaluation of the subscales and parameters, the findings showed evidence of non-invariance. During the analysis, three measurement weights that contributed to the non-invariance were identified and were freely estimated to reach the invariance in the measurement model, showing consistency with the configural model.

As can be seen in Table 6.29, the ΔX^2 –difference test and the ΔCFI-difference test showed that all the models are invariant between the samples of the two groups (female and male).

At the level of hypothesised individual relationships, mean and covariance structures (MACS) analysis was used to test the latent mean structures across the two groups. As in Model 1, the female model was constrained and used as a reference group, while the male model was freely estimated. Table 6.30 shows the results of MACS for Model 2's latent variables.

Table 6.30: Estimated mean difference – Gender impact (Model 2)

Latent variable	Female (Reference group)	Male			
		Estimate	S.E.	C.R.	P
OE	0	-.078	.094	-.824	.41
CC	0	.125	.123	1.014	.311
KSB	0	.054	.062	.881	.378
TA	0	.25	.075	3.335	***
KPC	0	.022	.072	.304	.761
OP	0	-.076	.075	-1.014	.311

The latent factor means related to CC, KSB, TA, and KPC tended to be positively higher for the male group sample than for the female group sample; however, these inclinations were statistically insignificant, except for TA. Given that the latent mean for TA was statistically significant, it could be interpreted that, on average, the male group appears to have a significantly higher Technology Acceptance than the female group. OE and OP factors tended to be weaker for the male group sample than for the female group, but they are statistically insignificant too.

The invariance test of every individual path was conducted by calculating $\Delta\chi2$ (see Table 6.31).

Table 6.31: Standardised estimates for the structural Model 2 (Gender impact)

Hypothesis	Path (relationship)			Female		Male		Invariance test	
				S.E.	C.R.	S.E.	C.R.	X^2 *(df)*	ΔX^2 (Δdf)
H1.a	OE	-->	OP	0.194	1.492 ns	0.516	2.458 *	309.288 (303)	0.892 ns (1)
H2.a	CC	-->	OP	0.158	1.204 ns	-0.074	-0.341 ns	309.261 (303)	0.865 ns (1)
H3.a	TA	-->	OP	0.054	0.493 ns	0.478	2.271 *	312.118 (303)	3.722 * (1)
H4.a	KSB	-->	OP	-0.046	-0.384 ns	0.124	0.661 ns	308.954 (303)	0.558 ns (1)
H5.a	KPC	-->	OP	0.375	2.42 *	-0.353	-1.348 ns	314.764 (303)	6.368 * (1)
H1.b	OE	-->	KPC	-0.012	-0.091 ns	0.163	0.832 ns	308.775 (303)	0.379 ns (1)
H2.b	CC	-->	KPC	0.087	0.644 ns	-0.138	-0.632 ns	309.097 (303)	0.701 ns (1)
H3.b	TA	-->	KPC	0.358	3.53 ***	0.398	2.256 *	308.435 (303)	0.039 ns (1)
H4.b	KSB	-->	KPC	0.483	4.812 ***	0.411	2.341 *	308.4 (303)	0.004 ns (1)
Squared Multiple Correlation SMC			OP	0.301		0.447			
			KPC	0.597		0.518			

*-(*p<.05, **p<.01, ***p<.001). ns: non-significant. df: degree of freedom.*

-ΔX^2= (unconstrained X^2 - X^2 for each model with constrained path). Unconstrained X^2= 308.396.

As seen in Table 6.31, for the female sample, H1a, H2a, H3a, H4a, H1b and H2b were not supported at all p-value levels, H5a was supported at p<.05 and H3b and H4b were supported at p=.001. For the male group H1a, H3a, H3b and H4b were supported at p=0.05; on the contrary, H2a, H4a, H5a, H1b and H2b were not supported at all p-values. The Δχ2 test revealed that the path KPC → OP and TA → OP are significantly different between males and females. However, for the male group, the influence of KPC on OP was found insignificant; for the female group, the influence of TA → OP was found insignificant.

The results supported the invariance between males and females. Therefore, the moderating effect of gender (H6a) was not supported for Model 2.

B. Years of practice

Concerning years of practice, one case was removed due to missing values; the data set was split into two files according to the healthcare professionals' years of practice: less than ten years (108) and ten or more years (177) of practice. The results confirmed that the multi-group analysis of both groups had an acceptable model fit. Table 6.32 shows that the overall fit indices included in this analysis fitted the data satisfactorily for both groups.

Table 6.32: Results of Model 2 by group (<10 and =>10 years of practice)

Index		**Cut-off value**	**Structural Model 2 fit indices** **(Less than 10 years of practice: N=108)**	**Structural Model 2 fit indices** **(10 years or more of practice: N=177)**
X^2		P-value > 0.05	199.182 (df=151; p=.005)	156.462 (df=151; p=.364)
X^2/df		< 3	1.319	1.036
Absolute fit indices	RMSEA	< .05 (good) .05 – .08 (moderate) .08 – 0.1 (poor) > 0.1 (bad)	.055 (Lo .031, Hi .074, P-close .347)	.014 (Lo .000, Hi .038, P-close .997)
	SRMR	<.05 (good fit) <.08 (moderate fit)	.0491	.0436
	AGFI	> .80	.793	.887
Incremental fit indices	CFI	> .90	.960	.997
	TLI	> .90	.944	.996
Parsimony fit indices	PNFI	> .50	.617	.661
	PCFI	> .50	.690	.717

Similarly to Model 1, the results showed an AGFI value very close to the cut-off value; however, as was discussed in Model 1, based on Byrne (2016), this index is biased and sensitive to sample size.

The goodness-of-fit statistics for the configural model showed CFI and RMSEA values of .982 and .025, respectively. With these estimations, it is possible to affirm that the hypothesised structure for multi-group Model 2 is well-fitting across groups (years of practice).

Using the Multi-group invariance analysis in Amos software, the baseline, measurement, and structural models were tested simultaneously (see Table 6.33).

Table 6.33: Multi-group Invariance by years of practice for Model 2 (Goodness of fit Statistics)

Model	**X^2 (df)**	**X^2/df**	**RMSEA**	**CFI**	**TLI**	**ΔX^2 (ΔDF)**	**ΔCFI**
Configural model	355.644 (302)	1.178	.025	.982	.974		
Measurement weights	396.794 (334)	1.188	.026	.978	.973	41.15 (32) ns	.004
Structural weights	402.187 (343)	1.173	.025	.98	.975	46.543 (41) ns	.002
Structural covariances	415.333 (353)	1.177	.025	.979	.975	59.689 (51) ns	.003
Structural residuals	420.936 (355)	1.186	.026	.977	.973	65.292 (53) ns	.005
Measurement residuals	445.281 (376)	1.184	.026	.976	.973	89.637 (74) ns	.006

After an iterative process to obtain invariance across groups, the measurement and structural model showed no significant differences from the baseline model.

For invariance analysis at the level of individual hypothesised relationships, the less than ten years of practice group was constrained and used as a reference group. On the other hand, the ten or more years of practice group was freely estimated. Table 6.34 shows the results of MACS for Model 2's latent variables.

Table 6.34: Estimated mean differences – years of practice (Model 2)

Latent variable	Less than 10 years of practice (Reference group)	10 or more years of practice group			
		Estimate	S.E.	C.R.	P
OE	0	-.306	.084	-3.66	***
CC	0	-.29	.114	-2.543	.011
KSB	0	-.04	.062	-.642	.521
TA	0	-.063	.075	-.832	.405
KPC	0	.021	.048	.446	.656
OP	0	.107	.065	1.654	.098

The latent factor means related to OE, CC, KSB, and TA tended to be weaker for the ten or more years of practice group sample than for the less than ten years of practice group sample. However, inclinations for KSB and TA were statistically insignificant, but for OE and CC, they were statistically significant. The results showed that the ten or more years of practice group had significantly lower perceptions about Organisational Enabler and Culture of Collaboration than the less than ten years of practice group. KPC and OP factors tended to be stronger for the ten or more years of practice group sample than for the less than ten years of practice group, but they were statistically insignificant.

As in Model 1, to identify any non-invariance in a path level, analysis for every individual relationship was conducted to obtain Δχ2.

Table 6.35 Standardised estimates for the structural Model 2 (Years of practice)

Hypothesis	Path (relationship)			Less than 10 years of practice		10 or more years of practice		Invariance test	
				S.E.	C.R.	S.E.	C.R.	X^2 *(df)*	ΔX^2 (Δdf)
H1.a	OE	-->	OP	0.329	1.472 ^{ns}	0.367	3.047 **	355.965 (303)	0.321 ^{ns} (1)
H2.a	CC	-->	OP	0.205	0.947 ^{ns}	0.072	0.608 ^{ns}	355.939 (303)	0.295 ^{ns} (1)
H3.a	TA	-->	OP	0.254	1.253 ^{ns}	0.188	1.565 ^{ns}	356.89 (303)	1.246 ^{ns} (1)
H4.a	KSB	-->	OP	-0.149	-1.212 ^{ns}	0.191	1.386 ^{ns}	358.862 (303)	3.218 * (1)
H5.a	KPC	-->	OP	0.29	2.055 *	-0.092	-0.633 ^{ns}	360.645 (303)	5.001 * (1)
H1.b	OE	-->	KPC	0.244	0.967 ^{ns}	-0.046	-0.397 ^{ns}	356.6 (303)	0.956 ^{ns} (1)
H2.b	CC	-->	KPC	-0.039	-0.157 ^{ns}	0.097	0.796 ^{ns}	355.95 (303)	0.306 ^{ns} (1)
H3.b	TA	-->	KPC	0.137	1.057 ^{ns}	0.318	2.675 **	355.675 (303)	0.031 ^{ns} (1)
H4.b	KSB	-->	KPC	0.457	2.98 **	0.461	3.374 ***	356.282 (303)	0.638 ^{ns} (1)
Squared Multiple Correlation SMC			OP	0.434		0.297			
			KPC	0.329		0.535			

*-(*p<.05, **p<.01, ***p<.001). ns: non-significant. df: degree of freedom.*
-ΔX^2= (unconstrained X^2 - X^2 for each model with constrained path). Unconstrained X^2= 355.644.

As seen in Table 6.35, for the less than ten years of practice group, H1a, H2a, H3a, H4a, H1b, H2b, and H3b were not supported at any p-value levels. However, H5a was supported at p=<.05 and H4b at p<.01.

For the ten or more years of practice group, H1a and H3b were supported at p<.01 and H4b at p<.001. By calculating Δχ2, the path KPC → OP and KSB → OP were significantly different between groups. However, for the ten and more years of practice group, the influence of KPC on OP was found insignificant, and the influence of KSB → OP was insignificant for both groups.

Based on the above findings, it could be concluded that the evaluated relationships in those hypotheses are not moderated by years of practice.

6.4.4 Model 3: A multiple mediator model using two mediator variables – Knowledge-Sharing Behaviour and Knowledge Process Capability.

In Model 3, the variables, scales and sample size used in previously examined models are kept; therefore, according to Table 6.9, the measurement model has acceptable levels of goodness-of-fit.

6.4.4.1 The structural model (Model 3)

Model 3 analysed whether the knowledge capabilities defined in this research (KSB and KPC) intervene or cause an effect in the causal relationships of three exogenous variables (OE, CC and TA) and the dependent variable (OP). In other words, this model evaluated whether the influence of organisational capabilities (OC and CC) and individuals' acceptance of technology (TA) on organisational performance is changed by knowledge capabilities (KSB and KPC).

6.4.4.2 Model specification and identification

Model 3 integrated all validated scales in the measurement model (see Figure 6.9); each variable was measured using multi-item scales. In addition, the latent variables were measured by three or more reflective indicators, representing that the same construct causes them. As in previous models, Model 3 is a recursive one that only specifies the cause's direction from one direction. In order to avoid the results and inferences regarding missing values, outliers, normality and multicollinearity being affected, remedies to accomplish all assumptions were applied.

In Model 3, all members were included in the sample, so the same number of 286 observations was kept.

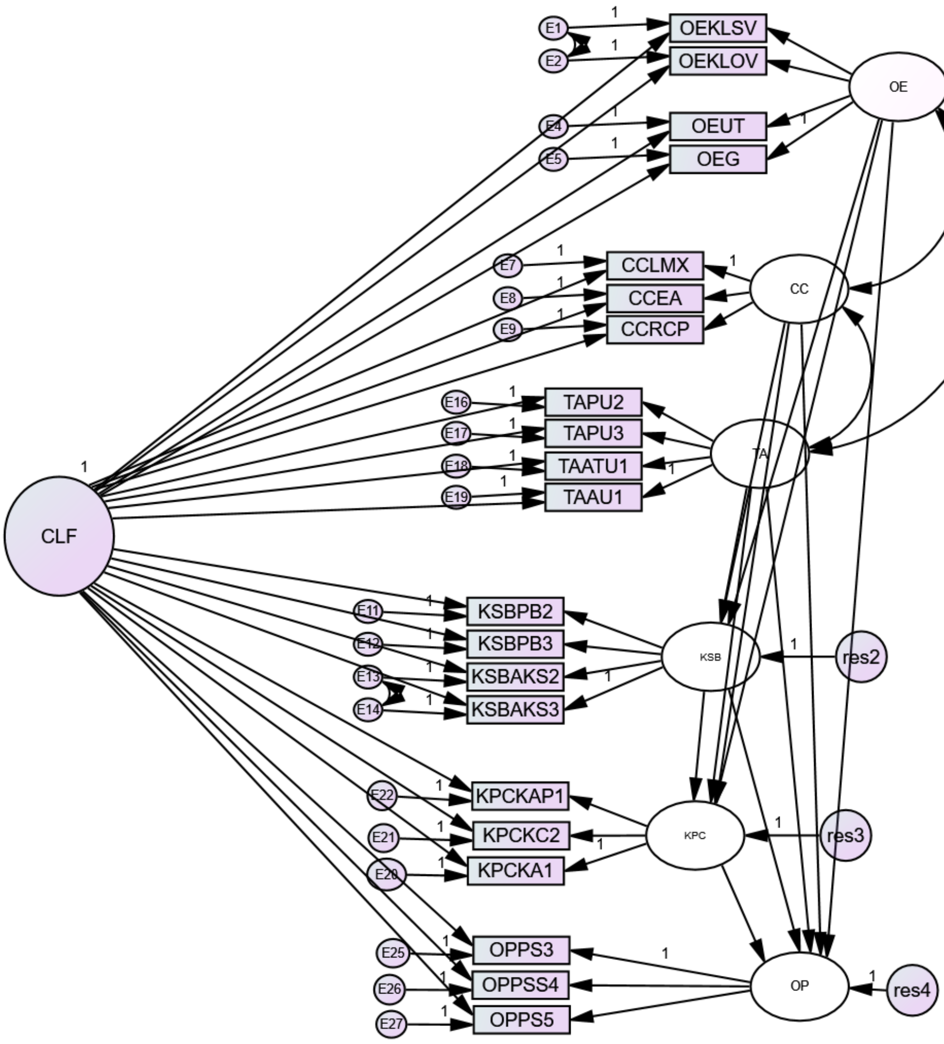


Figure 6.9: Model 3 (Knowledge-Sharing Behaviour and Knowledge Process Capabilities as mediator variables)

6.4.4.3 Model estimation and testing

By using SEM through AMOS software, the structural model was evaluated. The Maximum Likelihood (ML) method revealed an overidentified model. The results of the parameter estimates revealed the absence of any identification problems, such as correlations greater than 1.0, negative variances, or excessively large or small standard errors. Table 6.36 shows the model fit indices statistics for the overall level. Results revealed an acceptable structural model.

Table 6.36: Structural Model 3 fit indices

Index		Cut-off value	Structural Model 3 fit indices
X^2		> .05	169.438 (df=151; p=.145)
X^2/df		< 3	1.122
Absolute fit indices	RMSEA	<.05 (good) .05 – .08 (moderate) .08 – 0.1 (poor) > 0.1 (bad)	.021 (Lo .000, Hi .036, P-close 1.0)
	SRMR	<.05 (good fit) <.08 (moderate fit)	.0320
	AGFI	> .80	.920
Incremental fit indices	CFI	> .90	.994
	TLI	> .90	.991
Parsimony fit indices	PNFI	> .50	.679
	PCFI	> .50	.714

6.4.4.4 Hypotheses testing

In the next step, the research hypotheses are examined. The Squared Multiple Correlation (SMC) represents the proportion of variance explained by the predictor of the variable analysed. Table 6.37 shows SMC values for the dependent factors in the model (OP, KPC, and KSB) and each of the factor-loading regression paths.

Accordingly, it is possible to determine that the model explained 32.3% of the variance associated with Organisational Performance in terms of continuous improvement of Patient Safety. Furthermore, it was found that its four predictors explained 62.1% of KPC variation: Organisational Enabler (OE), Culture of Collaboration (CC), Technology Acceptance (TA) and Knowledge-Sharing Behaviour (KSB). Finally, based on these results, 43% of KSB is explained by TA, CC, and OE.

Table 6.37 Amos output for Model 3: Squared Multiple Correlations

	Estimate
KSB	0.430
KPC	0.621
OP	0.323
OPPS3	0.546
KPCKAP1	0.503
KPCKC2	0.628
KPCKA1	0.489
OPPS5	0.681
OPPSS4	0.917
CCRCP	0.405
CCEA	0.685
CCLMX	0.591

	Estimate
KSBAKS3	0.525
KSBAKS2	0.666
KSBPB3	0.631
KSBPB2	0.618
TAAU1	0.475
TAATU1	0.591
TAPU3	0.739
TAPU2	0.708
OEG	0.526
OEUT	0.593
OEKLOV	0.526
OEKLSV	0.425

The critical ratio (CR) value was estimated to establish the statistical significance between the examined variables, using three levels of significance, 0.05, 0.01, and 0.001, that indicate acceptable, strong and high significance, respectively. Table 6.38 shows the results of the hypotheses testing in Model 3.

Table 6.38: Path results and hypotheses testing (Model 3)

Hypothesis	Path (relationship)	Standardised Regression Weights	S.E.	Critical Ratio	Result
H1.a	OE → OP	.368	.092	3.266***	Supported
H2.a	CC → OP	.042	.068	.380	Not supported
H3.a	TA →OP	.220	.095	2.048*	Supported
H4.a	KSB → OP	.016	.122	.145	Not supported
H5.a	KPC → OP	´.115	.154	.826	Not supported
H1.b	OE → KPC	.062	.083	.546	Not supported
H2.b	CC → KPC	0.018	.065	.151	Not supported
H3.b	TA → KPC	0.373	.077	3.891***	Supported
H4.b	KSB → KPC	0.470	.102	4.716***	Supported
H1.c	OE →KSB	0.047	.077	.440	Not supported
H2.c	CC → KSB	0.103	.061	.907	Not supported
H3.c	TA → KSB	0.606	.063	7.465***	Supported

*(*p<.05, **p<.01, ***p<.001)*

Organisational Performance in terms of patient safety (OP)

Similar to Model 1 and Model 2, Organisational Enablers (OE) and Technology Acceptance (TA) variables were significant predictors of Organisational Performance (OP) in model 3. OE was the strongest, as it explained approximately 36.8% of the variance in OP ($p < .001$). TA explained approximately 22% of the variance in OP at $p < .05$ level. Results for H2a, H4a and H5a are not supported.

Knowledge Process Capabilities (KPC)

Similar to Model 2, Knowledge Process Capability (KPC) was found to have positive and significant paths with Technology Acceptance (TA) and Knowledge-Sharing Behaviour (KSB). KSB was the strongest determinant, as it explained 47% of the variance in KPC at $p<.001$, while TA explained approximately 37.3% of the variance in KPC at $p<.001$. Based on these results, it can be explained that H3b and H4b are supported.

Knowledge-Sharing Behaviour (KSB)

KSB was found to be influenced by TA. The path coefficient value indicates a strong confirmation of a significant and positive relationship between TA and KSB ($B=.606$; $p<.001$); thus, hypothesis H3c was supported. However, the results revealed no significant relationship for hypotheses H1c and H2c.

6.4.4.5 Mediation Analysis

Mediation analysis was conducted to evaluate direct and indirect effects. The two knowledge capabilities analysed in this study, Knowledge-Sharing Behaviour and Knowledge Process Capabilities of healthcare professionals, are evaluated as mediator variables between independent variables (OE, CC and TA) and the dependent variable (OP). Therefore, the evaluation of multiple mediation for Model 3 was developed. The results in Table 6.39 show the total indirect effects.

Table 6.39: Assessing multiple mediation (total indirect effects)

Direct path	Direct effect	Indirect path (via mediator)	Indirect effect
OE --> OP	.368 **	OE --> KSB --> KPC --> OP	.010 (ns)
CC --> OP	.042 (ns)	CC --> KSB --> KPC --> OP	.009 (ns)
TA --> OP	.220 **	TA --> KSB --> KPC --> OP	.085 (ns)

Results showed the positive but non-significant indirect effects of Knowledge-Sharing Behaviour and Knowledge Process Capabilities from all evaluated independent variables to Organisational Performance in Patient Safety. Therefore, hypotheses H1e, H2e, and H3e are not supported.

6.4.4.6 Multi-group analysis – Model 3

Overall, the multi-group analysis of the moderator variables gender and years of practice for model 3 showed similar results to Models 1 and 2.

The results showed that the samples of both moderator variables have an acceptable model fit. The configural, measurement, structural weights, structural covariance, structural residuals, and measurement residuals models showed insignificant differences from the baseline model, supporting invariance between the samples of gender and years of practice groups. The equivalence of means of each factor confirmed that the group of men appears to have significantly higher Technology Acceptance than the female group. It was also confirmed that the ten or more years of practice group appears to have significantly weaker perceptions about Organisational Enablers for Knowledge Management and Culture of Collaboration than the less than ten years of practice group. Finally, after conducting the complete multi-group analysis of both moderating variables and analysing the results, the relationships established in hypotheses H6 and H7 are not moderated by gender nor by years of practice.

Appendix C (section 4) summarises the applied statistical methods for the Structural models and hypotheses testing.

6.5 Summary

This chapter presented the statistical analyses to validate the measurement model (Confirmatory Factor Analysis). The CFA results showed that the measures used in the model are reliable and valid. The three models evaluated in this research were validated through Structural Equation Modelling. Additionally, the mediation analysis showed that two knowledge capabilities, Knowledge-sharing Behaviour and Knowledge Process Capabilities, did not show a full or partial mediation between independent variables and the Organisational Performance dependent variable for models 2 and 3. Finally, the multi-group analysis showed that the moderator variables had no impact on the models evaluated. The next chapter will interpret and discuss the findings of these analyses.

Chapter Seven: Discussion of research findings and Conclusions

7.1 Introduction

The first part of this chapter discusses the findings of the research hypotheses, which represent a system of relationships that promote the development of knowledge capabilities and enhance organisational performance. The definition of such relationships was based on the evidence identified during the literature review and on the theory that guided understanding of the expected behaviours of the critical factors.

Also, this chapter discusses the evidence supporting the consistency of the findings regarding the theoretical framework and past studies' results. Additionally, arguments about inconsistent or contradictory findings are presented and analysed in light of the possible effects of the local environment on critical factors that promote knowledge practices.

This chapter offers insights into the contributions made to the theory and practice of Knowledge Management and its possible contributions to similar contexts to the one analysed in this research.

The findings showed that the context is perceived as relevant and essential for developing knowledge capabilities and improving organisational performance. Therefore, this chapter presents a brief conceptualisation of context effects. The second part of this chapter presents an overview of the research aims and conclusions.

A series of reflections on the results, the limitations identified, and the learning obtained from conducting this research process are offered. Also, arguments supporting the level of certainty and generalisation of the research results, and some recommendations for practice and policy around Knowledge Management, are provided. Finally, considering the limitations of this study, a series of elements to be developed in future research are proposed.

7.2 Validation of the research hypotheses

Based on the results presented in Chapter Six, this section discusses the findings of the research aims, questions and evaluated hypotheses. Chapter One mentioned that previous studies obtained a deep knowledge focused on one particular dimension, providing a limited vision concerning the diversity of factors and interrelations that interact in a Knowledge Management strategy. Consequently, there is a limited number of studies in the health sector that propose models composed of different factors from different perspectives to understand their contribution to Knowledge Management initiatives. Therefore, this research proposed three theoretical models that integrated well-established theories to evaluate the contribution of critical factors from multiple perspectives on the development of knowledge capabilities of healthcare professionals and their impact on improving patient safety.

7.2.1 Organisational Enablers (H1)

Organisational Enablers (OE) refer to the way in which an organisation governs and implements its strategies and defines roles and rules to transform itself into a knowledge-based organisation. In this study, the variable OE is composed of reflective indicators. The selected indicators were identified, adopted and adapted from previous studies grounded on the Resource-Based View (RBV): Knowledge and Learning Supportive Vision, Mission and Learning Values, Use of Teams, and general attributes for this variable. The findings are discussed below.

Consistent with previous studies, it was found that results strongly supported H1a; this hypothesis proposed that a higher level of Organisational Enablers (OE) will lead to a greater improvement of Organisational Performance on Patient Safety (OP). The influence of Organisational Enablers (OE) on Organisational Performance in terms of Patient Safety (OP) was strongly significant for Model 1, Model 2, and Model 3, with a standardised regression weight of B=0.368 at p<.001 for all models. In other words, OE explained approximately 36.8% of the variance of OP for all models (p<.001). These results reflected the positive impact of the Organisational Enablers on Patient Safety which are strongly consistent with previous research findings that have evaluated this relationship in different settings, including healthcare. Such findings affirmed that elements like mission, vision, teamwork and other characteristics of organisations improve Organisational Performance (Curry et al., 2011; Hung et al., 2010; Singer et al., 2009). Based on this result, the Organisational enablers variable strongly influences Patient Safety.

Although the direct effect of Organisational Enablers on Organisational Performance in terms of Patient Safety was found strongly significant, the direct effects of Organisational Enablers on Knowledge Process Capabilities (H1b) and Knowledge-Sharing Behaviour (H1c) were not supported. Results showed B=0.062, p>.05 and B=0.047, p>.05, respectively. These results differ from Yin et al. (2020) and Goh and Richards (1997), who, based on their results, evidenced the influence of teamwork and clarity of purpose and mission on knowledge capabilities for learning organisations.

One possible reason is related to the fact that Hospitals are institutions with a clear and defined mission, where the healthcare professionals' work directly impacts people's lives. Therefore, healthcare professionals must achieve their duties and responsibilities, contributing, in some way, to organisational performance. However, it does not imply that healthcare professionals are willing to develop knowledge activities such as transferring and contributing to the learning of colleagues and the institution. In addition, the results also showed that knowledge capabilities did not mediate the relationships between Organisational Enablers and Organisational Performance.

The local context disturbance analysed in Chapter One, section 1.3, and the control exerted by the federal government of Mexico in the administration of public health institutions (see Chapter Two, section 2.8.1) reinforces centralised and mechanised structures. Based on Argyris (1993) and Levinthal and March (1993), this type of structure promotes beliefs, behaviours and actions that have functioned in past situations. Keeping them unchanged generates a sense of security and compliance but not a real contribution. Additionally, it promotes authoritarian leadership that contributes to subordination and excessive control that impedes the growth of learning and knowledge capacities, maintaining the myopia of organisations.

7.2.2 Culture of Collaboration (H2)

A Culture of Collaboration refers to a shared set of underlying beliefs and values that employees adopt in organisations, affecting their behaviours, actions and expectations towards collaboration and knowledge transfer (Sveiby & Simons, 2002). The Culture of Collaboration is a valuable organisational capability developed through a complex and intangible process which involves interactions among different resources such as people, a system of values and beliefs, information, knowledge and others. The dimensions that reflect this construct are taken from the Social Exchange Theory (SET). This theory establishes that reciprocal activities and social exchange relationships will be developed if employees perceive an organisation with a supportive atmosphere

(Shim, 2010). The selected indicators emerged from SET and were identified, adopted and adapted from previous studies.

The RBV and its extension, the KBV, establish that through developing resource-based capabilities such as a Culture of Collaboration, firms can obtain superior performance. Previous studies have found that a Culture of Collaboration has significant interaction with different indicators of performance and with knowledge capabilities (Bock et al., 2006; Bosak et al., 2017; Casimir, 2014; Lucas, 2010; Nejad & Saber, 2012). Unexpectedly, for this research, the relationship between Culture of Collaboration and Organisational Performance in terms of Patient Safety (H2a) was unsupported ($B=0.42$, $p>.05$).

The null effect of the Culture of Collaboration on Patient Safety can be explained by the type of culture that prevails in public hospitals in Mexico. In the study by Escobar et al. (2011), it was stated that various factors of the internal and external environment of the public hospital in Mexico condition the organisational culture. Such factors are the organisational structure, the legal framework that regulates contractual and labour schemes, and the regulatory policy and budgetary control exercised by the federal government added to a series of social context factors. The authors mentioned above affirmed that the dominant cultures of the public institution are those of power and function whose characteristics drive bureaucracy, resistance and low motivation to innovate, as well as resistance to improving processes and services to patient care. Therefore, the traditional norms, routines and procedures are preserved. The culture of power that inhibits innovation, training, and creativity reinforces defensive routines. Defensive routines are practices developed to protect current stability in threatening situations and contexts. Over time, such routines become frames of reference or mental models that guide individuals' behaviour and actions, perpetuating the organisation's inertia which distorts the vision of reality (Argyris, 1993).

Escobar et al. (2011) affirmed that in a culture of power, healthcare professionals do not have initiative and creativity, accentuating the distance between the health professionals to collaborate and share knowledge. At the individual level, the culture of power inhibits professional development since the lack of technical training inhibits the development of professional skills and, therefore, the chances of achieving high performance. At the organisational level, the lack of innovation means that the institution remains unchanged without improving the organisational processes that allow it to respond to new challenges, transform the challenges of the context, and improve the organisation's performance.

In addition, the culture of power that inhibit innovation, training and creativity also explained that the direct effects of the Culture of Collaboration on Knowledge-Sharing Behaviour (H2c) and Knowledge Process Capabilities (H2b) ($B=0.18$ $p>.05$ and $B=0.103$ $p>.05$, respectively) were not supported. These findings are not entirely consistent with those reported in other studies, such as Al-Alawi et al. (2007) and Chen et al. (2012).

The findings related to the Culture of Collaboration construct confirmed the need to establish an organisational culture that encourages collaboration and professional commitment among employees, replacing the awarding of individual achievements with achievements and improvements developed through teamwork. Also, a leadership that promotes trust and the strengthening of knowledge capabilities, inspiring and generating the commitment to continuous improvement to enhance patient safety, is imperative. Casimir (2014) affirmed that when employees feel that they belong to an organisation with a close relationship with their authorities, they are likely to perform better, contributing to organisational performance.

7.2.3 Technology Acceptance (H3)

Even though Information systems and technology offer potential possibilities to increase performance, users' unwillingness to accept and use available systems is often a critical obstructer. In a healthcare setting, it is crucial to determine the acceptance of technology by healthcare professionals for any successful incorporation of technology. Technology Acceptance (TA) specification resulted in four reflective indicators. Selected indicators were identified, adopted and adapted from previous research grounded on the Technology Acceptance Model (TAM); they are perceived usefulness (support), perceived usefulness (efficient work), intention to use, and actual use.

Results supported H3a, which proposes that a higher level of Technology Acceptance (TA) will lead to a greater improvement of Organisational Performance (OP) in a healthcare setting. The influence of Technology Acceptance (TA) on Organisational Performance in terms of Patient Safety (OP) was significant for Model 1, Model 2 and Model 3, with a standardised regression weight of B=0.220 at $p<.05$ for all models. In other words, TA explained approximately 22% of the variance in OP ($p<.05$). These results reflected the positive impact of healthcare professionals' Technology Acceptance on Patient Safety improvement. Therefore, the results are consistent with previous research findings that have also evaluated the Technology Acceptance Model in a healthcare setting, such as Chen and Hsiao (2012), Kummer et al. (2013) and Wu et al. (2008). Based on this result, it can be concluded that Technology Acceptance influences Patient Safety.

Regarding the evaluated direct effects of Technology Acceptance on Knowledge-Sharing Behaviour and Knowledge Process Capabilities, findings showed a strong influence for both hypotheses. Hypothesis H3b evaluated the impact of Technology Acceptance on Knowledge Process Capabilities developed by healthcare professionals, and hypothesis

H3c evaluated the impact of Technology Acceptance on Knowledge-Sharing Behaviour. H3b showed a strong significance with an estimation of B=0.373 and $p<.001$. H3c showed a strong significance with B=0.606 and $p<.001$. These findings are consistent with previous studies, which found that Technology Acceptance behaviour for adopting health information systems (HIS) facilitates knowledge activities such as knowledge-sharing, learning social interaction, and the production of collective intelligence. Therefore, health institutions should consider this favourable behaviour of Technology Acceptance for greater adoption of HIS to promote knowledge sharing and strengthen the knowledge process capabilities of healthcare professionals (Aggelidis & Chatzoglou, 2009; Ali et al. 2012; Lau, 2011; Yun, 2013). Finally, the strong effect of Technology Acceptance on Knowledge Sharing, Knowledge Process Capabilities and Organisational Performance offer an excellent opportunity to adopt and implement technologies that promote knowledge processes, improve the quality of services, and reduce the likelihood of patient harm.

The results showed that Technology Acceptance is a factor that positively influences the Organisational Performance, Knowledge-Sharing Behaviour and Knowledge Process Capabilities of healthcare professionals. This result indicated that healthcare professionals recognise and accept the value of using technology and its contribution at the organisational and individual levels. However, in daily practice, the effective and efficient use of technology is likely to be inhibited by some factors analysed in past studies. For example, Veloz-Martínez et al. (2012) identified in a study carried out in a public hospital in Mexico City some critical limitations for the efficient use of technology. Such limitations are the lack of access, the different developed capabilities in ICTs usage and the null or elementary proficiency English level since most medical publications are published in this language.

Additionally, healthcare professionals expressed their preference for traditional education and stated low participation in activities such as videoconferences, online courses, learning communities, and blogs, among others. Participants argued that they have not participated in learning activities through technology because they consider it difficult to use. Based on this type of findings, medical schools in Mexico have incorporated the subject of biomedical informatics to develop the necessary skills to use technology for future healthcare professionals.

The authors Rivera-Rodríguez et al. (2012) stated that in Mexico, as in many developing countries, regulation in the area of telemedicine is incipient or practically absent. Also, the authors stated that the health system's information and communication technologies coverage in Mexico still need to be improved compared to current international standards.

The findings in the current study emphasised the perceived utility of the technology and its acceptance. However, it is necessary to develop further analyses to evaluate the efficient use of information systems or information technologies, distinguishing the type, scope, objectives, barriers and opportunities in the public health system of Mexico.

7.2.4 Knowledge-Sharing Behaviour (H4)

Knowledge-Sharing is a behaviour (KSB) that spreads or disseminates the valuable knowledge acquired over time; it is a process from people to people and is part of a KM strategy in which converting individual knowledge into organisational knowledge is the primary concern (Ryu et al., 2003). Understanding the determinant factors to perform a specific behaviour by healthcare professionals, such as Knowledge Sharing, could contribute to more effective and efficient patient care (Godin et al., 2008). Information, skills, knowledge, decision-making processes and networks are part of the intellectual assets that an effective Knowledge Management strategy requires; also, a change in employees' attitudes and behaviours toward knowledge-sharing is required. The selected indicators used to measure the Knowledge-Sharing Behaviour construct were Perceived Behavioural Control, Attitude toward Knowledge-Sharing, and Subjective Norm. These indicators were identified, adopted and adapted from previous studies grounded on the Theory of Reasoned Action (TRA) and its extension, the Theory of Planned Behaviour (TPB).

The evaluated relationships for the Knowledge-Sharing construct were:

- (H4a) a higher level of Knowledge-Sharing Behaviour will lead to a greater improvement in the Organisational Performance of Patient Safety;
- (H4b) a higher level of Knowledge-Sharing Behaviour will lead to a greater level of Knowledge Process Capabilities.

The results for H4a showed an insignificant influence of Knowledge-Sharing Behaviour on Organisational Performance measured by Patient Safety ($B=0.016$, $p>.005$ for all models), which is not consistent with the findings reported in studies such as Godin et al. (2008), Kim et al. (2012), Waring et al. (2013). The differences between these findings and those reported by previously mentioned studies could rely on the fact that the increased demand for health services also increases the time spent caring for patients and on an excessive workload. It, therefore, decreases the possibility of having enough time, energy and willingness for communication and interaction in virtual or face-to-face formal spaces for knowledge exchange. Furthermore, the study by Hernández-García (2018) stated that public health institutions in Mexico are one of the sectors most exposed to psychosocial illnesses among healthcare professionals. The symptoms of such a condition are anxiety, lack of motivation towards work, and loss of energy derived from sustained stress. The mentioned study affirmed that at least 40% of the employees of the analysed hospital had a burnout condition due to organisational factors such as excessive workload, the growing demand for medical services, labour conflicts, loss of cordiality between employees and excessive bureaucracy in the processes. The study showed that this condition worsens under the following factors: women, age over 40 years, and ten or more years of practice. In the current study, 71.3% of the sample were women, 33% were over 40 years of age, and 61.9% of health professionals had more than ten years of practice, representing a considerable percentage of the sample under the risk factors mentioned in the study. Additionally, the authors affirmed that in public health institutions, the common problems are the lack of coordination and collaboration among their members, professional incompetence, lack of support from leaders, lack of resolution to organisational problems, and the difficulty of freedom of action. All of the above contributes to the deterioration of the hospital's social environment, which, coupled with a culture of power, inhibits the intention, will, and energy to engage in collaborative practices, professional development, and knowledge-sharing activities. The authors suggested that years of practice could influence controlling emotions in unfavourable organisational situations. In the current research, the null effect of knowledge-sharing behaviour on organisational performance could be justified by unfavourable organisational conditions, such as the excessive workload in public health institutions.

However, at the individual level, results suggested for hypothesis H4b that Knowledge-Sharing Behaviour had a strong influence on Knowledge Process Capabilities developed by healthcare professionals, with $B=0.470$ at $p<.001$. The findings highlighted that the positive attitude towards Knowledge-Sharing directly influences the development of healthcare professional capabilities to transform and generate knowledge at the individual level, which is consistent with findings in Gider et al. (2015), Kim et al. (2012) and Radaelli et al. (2014).

7.2.5 Knowledge Process Capabilities (H5)

The Knowledge Process Capabilities (KPC) construct was adapted from Gold et al.'s (2001) model and founded on the Knowledge-based View to be analysed as the capability of a healthcare professional to foster his or her knowledge and contribute to the knowledge of colleagues and the organisation. The dimensions that reflect the Knowledge Process Capabilities construct are Knowledge Acquisition, Knowledge Conversion and Knowledge Application.

Past research results suggested that a work environment with specific characteristics such as supportive leadership, organisational processes, technology adoption, supportive environment and culture of collaboration, among others, might facilitate and encourage the knowledge process. The previously mentioned characteristics are described as capabilities or resources that have been evaluated as critical drivers of a Knowledge Management strategy and organisational goals (Ghosh & Scott, 2006; Gold et al., 2001; Orzano et al., 2008; Sibbald & Kothari, 2015). Unexpectedly, for this research, the relationship between Knowledge Process Capabilities and Organisational Performance in terms of Patient Safety (H5a) was unsupported ($B=0.115$, $p>.05$).

The null effect of the knowledge process capabilities on patient safety can be explained by the diversity of qualities of the training processes of healthcare professionals at different levels, undergraduate, postgraduate, specialisation and continuing education. The study of León-Bórquez et al. (2018) suggested that social inequality in Mexico is also reflected in a medical education that produces different qualities. In Mexico, there are both excellent and very deficient medical schools. This same situation occurs in clinical training.

León-Bórquez et al. (2018) affirmed that to resolve the demand for higher education, the government has authorised the opening of low-quality private schools. On the other hand, the government also authorised the increase in admitted students in public schools with severe academic deficiencies as a consequence of the low academic level of the Mexican educational system at its elementary and intermediate levels. In the current study, 75.2% of healthcare professionals are graduates of public schools and 24.1% of private schools. Therefore, in the workplace in Mexico, health professionals with excellent training and a significant number of healthcare professionals with low-quality training are hired, directly impacting patient safety. León-Bórquez et al. (2018) suggested creating a national capacity-building plan for health professionals, investing significantly in educational infrastructure, using new technologies, and training teachers to promote a process of continuous educational innovation. The authors affirmed that because in Mexico, no mechanism regulates medical education, as well as the verification and certification of the skills acquired prior to granting the licences to exercise the medical practice, the training of health professionals present contrasting qualities and orientations.

Finally, León-Bórquez et al. (2018) affirmed that the improvement in the training processes could only occur through the collaboration of teams that share knowledge, work together in the search for solutions, and get involved in a learning and continuous improvement spiral to establish learning organisations.

Additionally, a lack of a culture of collaboration and a supportive formal strategy that facilitates guidelines to nurture, use and share knowledge effectively provokes that the current Knowledge Management activities performed by individual efforts are not reflected in patient safety improvement. Also, the increased demand for services and the overload of daily responsibilities consume the healthcare professionals' time; hence, the scarcity of time and resources to develop appropriate knowledge process capabilities are significant barriers to implementing a KM strategy that improves patient safety.

The results of the current study confirmed the need to promote educational innovation programs to train health professionals capable of analysing, generating, applying and transforming knowledge that constantly improves patient care and promotes the generation of knowledge through collaboration and research.

Finally, the obtained results of each factor suggested that the instrument can be improved by incorporating other indicators in the scales to refine the characteristics of the evaluated constructs. For example, Jyothibabu et al. (2010) analysed individual learning as an indicator of culture, while Prugsamatz (2010) analysed in detail the characteristics of teamwork, such as communication, empowerment, expertise, and trust. Regarding organisational enablers, Lee et al. (2012) analysed the organisational structure's decentralisation and the incentives' management. Rhodes et al. (2008) analysed the flexibility of the organisational structure and the learning strategy. The results suggested that a more in-depth exercise with the hospital during the questionnaire design should be conducted to ensure that the questions are appropriate, clear and understandable.

Therefore, the analysis of the context developed initially in this research (sections 1.3 and 2.8.1) must be developed more deeply, with the participation of a group of health professionals from the hospital where the study will be conducted. The early and precise identification of particular characteristics in the context will make it possible to adapt and refine the measurement scales to improve the healthcare professionals' understanding of the phenomenon analysed. In addition, this exercise will capture a broader range of context-distinguishing features, which contribute to theories becoming more context-sensitive and getting a deep knowledge about how the context alters the expected phenomena's behaviour.

7.2.6 The structural relationships in Models 1, 2, and 3

The three proposed models were designed to represent and evaluate a complex system of relationships between critical organisational and individual factors and their impact on organisational performance. The relationships established in these models emerged from the RBV and the KBV. Additionally, these models reflected the proposal of Nonaka et al. (2000), who suggested that organisations develop knowledge through a system of interactions between individuals, teams, departments, and processes and transcend to the environment outside the organisation. The studies of Ghosh and Scott (2006), Chen (2014), and Kim et al. (2012), among others, have analysed the contribution of various factors to a series of indicators of organisational performance in hospital environments. As mentioned in Chapter Five, this research defined patient safety as a measurement of organisational performance, which refers to preventing medical errors or injuries by improving healthcare professionals' knowledge-based capabilities (Grant, 1996; Stock et al., 2010).

Model 1 measured the direct effects of five factors (OE, CC, TA, KSB, KPC) on patient safety as a measure of organisational performance. Such factors represent organisational and knowledge capabilities, whose effects were already explained in the previous sections (from 7.2.1 to 7.2.5). In models 2 and 3, two knowledge capabilities were evaluated as mediating variables to assess whether they influenced the relationships between the remaining factors (OE, CC and TA) and organisational performance.

Prior studies have evaluated different knowledge capabilities as mediator variables in different settings. For example, Kuo et al. (2014) found that knowledge sharing moderates the effect of job satisfaction and workplace friendship on service innovation. Lin and Kuo (2007) findings showed the significant mediator effect of learning and knowledge on organisational performance. The results of the current study failed to support the findings of prior studies concerning the mediation effect of Knowledge-Sharing Behaviour (KSB) and Knowledge Process Capabilities (KPC) on Organisational Performance (OP); the details of the results are explained below.

Model 2 represented a simple mediation model using Knowledge Process Capabilities (KPC) as a mediator variable between the independent variables Organisational Enablers of Knowledge Management (OE), Culture of Collaboration (CC), Technology Acceptance (TA) and Knowledge-Sharing Behaviour (KSB) with Organisational Performance. Results of hypotheses H1d, H2d, H3d, and H4c showed a positive but non-significant indirect effect through Knowledge Process Capabilities from all evaluated independent variables. In other words, the effects of the independent variables on OP cannot be explained through KPC.

In Model 3, Knowledge-Sharing Behaviour and Knowledge Process Capabilities of Healthcare Professionals mediated the relationships between independent variables (OE, CC and TA) and the dependent variable (OP). Results showed the positive but non-significant indirect effects of Knowledge-Sharing Behaviour and Knowledge Process Capabilities from all evaluated independent variables to Organisational Performance in Patient Safety. Therefore, hypotheses H1e, H2e, and H3e were not supported.

Contrary to evidence provided in past studies (Kuo et al., 2014; Lin & Kuo, 2007), hypotheses that evaluated indirect effects were not supported. However, these insignificant effects of mediators and their lack of support seem reasonable since the present research found that both knowledge-based capabilities (KS and KPC) had insignificant direct effects on patient safety (hypotheses H4a and H5a) in the particular context of the Chiapas healthcare system. Consequently, both knowledge-based capabilities did not mediate the relationships between OE, CC and TA with OP.

Additionally, a multi-group analysis was conducted to analyse if the components of the measurement model or the structural model were invariant across particular groups. For this research, two mediator variables were defined, gender (female and male) and years of practice (healthcare professionals with less than ten years of practice and healthcare professionals with ten or more years of practice).

This analysis revealed that for the three models at a configural level, the pattern of factor loadings, the specified factor covariances and the error covariances were considered to hold across female and male groups. Furthermore, for measurement and structural invariance, the structural weights, factor variances and covariances were equivalent across female and male groups. However, the equivalence analysis of means related to each factor showed that the male group had significantly higher Technology Acceptance than the female group. These results are similar to the behaviour reported by the Inter-American Development Bank in its study named "Inequalities in the digital world? Gender gaps in the use of ICT" (Aguero, Bustelo, & Viollaz, 2020). The study affirmed that worldwide the gaps related to the access and use of ICTs are a reflection of gender inequalities in the labour market. These gaps are related to STEM (science, technology, engineering and mathematics) skills, management, and communication. Iter-American

Development Bank conducted this study in six Latin American and Caribbean countries where at least 60% of the surveyed population lives in urban areas. The gender gap favours men with a difference between one and eighteen percentage points in terms of internet use, computer, laptop and tablet access, and intelligent cell phones. Furthermore, the study identified that the main barriers to the use and acquisition of technology are the cost and the lack of knowledge about its use, with women reporting these gaps to a greater extent. The study concludes by emphasising that "closing gender gaps in the use of ICTs is a priority to equalise opportunities and prevent women from being left behind in a world in which the adoption of technologies occurs more and more quickly and affects each again to more sectors".

Diverse studies have affirmed that gender stereotypes influence the expected behaviour and how knowledge capabilities are developed and performed (Connelly & Kelloway, 2003; Lin, 2006, 2008). Specifically for the gender group, it is crucial to consider that the sample size was unequal, decreasing statistical power and leading to the risk of underestimating moderator effects even though the total sample size was relatively large (Hwa et al., 2020).

The multi-group analysis for the years of practice moderator showed that all components were held across the group of healthcare professionals with less than ten years of practice and ten or more years of practice at configural, measurement and structural levels for the three models. However, at the latent means level, Organisational Enablers and Culture of Collaboration for the ten or more years of practice group appeared to have a significantly lower perception than the less than ten years of practice group. A possible interpretation of this finding is that trust in the institution decreases as the years of practice and service progress. After years of a health system in crisis, the lack of attention to labour demands and an environment that does not enhance collaboration tends to diminish or deteriorate the attitude and commitment of health professionals with more years of service.

In a healthcare setting, past studies have affirmed that years of practice or experience improve the quality of patient care with good knowledge, skills and competencies accumulated and developed through experience; however, knowledge could vary depending upon their education and training (Baktoft et al., 2003; Endacott et al., 2003; Story et al., 2002). For this research, the years of practice group was not a significant moderator between the evaluated relationships for all models. Therefore, the results did not support the group of hypotheses H7a. A possible reason for these results is that structural problems are critical points in the agenda; therefore, any effort to implement a Knowledge Management strategy is diluted to pay attention to the main demands of patients and healthcare professionals.

Chapter Six evaluated the structural and measurement models proposed in this study. These models were evaluated through a series of rigorous statistical analyses, which allowed the present research to identify whether the established relationships behaved according to the theories and previous studies that supported these relationships. In past sections of this chapter, findings of each factor and relationships established in Models 1, 2 and 3 were explained. Based on the results obtained in this research, the context in which the practice of health professionals is carried out strongly affects the development of the organisational and knowledge capabilities and their relationship with organisational performance.

During the literature review, it was identified that developed countries have mainly contributed to the Knowledge Management field and its foundations. However, in this study, it has been observed that the different gaps in the context of a developing country like Mexico, specifically in a state with a high poverty level, such as Chiapas, strongly influence each variable and relationship established. According to Whetten (2009), "*it is the responsibility of those using a particular theory to systematically compare contextual features that distinguish the proposed research setting from the setting which gave rise to the theory*".

Therefore, it was identified that the context is a strong moderator in the organisational and knowledge capabilities development required for implementing knowledge management practices. In other words, for the adoption or adaptation of good knowledge management practices designed and implemented in different contexts to be successful in the current context, specific environmental conditions that affect or inhibit the development of knowledge capabilities must be considered.

7.3 Overview of the research aims and conclusions

This section presents the study's contributions and the answers to the research questions that emerged from the obtained evidence. Then, reflections on limitations, suggestions for research design improvements, and recommendations for future research, practice and policy are provided. Finally, the lessons learned throughout the research process are presented.

Through a systematic review of the literature, the first research question, defined in section 1.4, was addressed, which asks what theories, perspectives, and factors have contributed to the development of Knowledge Management. The five theories that have significantly contributed to this field of study are the Social Exchange Theory, the Theory of Reasoned Action, the Technology Acceptance Model, the Resource-Based View, and the Knowledge-Based View. Additionally, the literature review identified three perspectives from which relevant aspects of KM strategies have been developed; these are the technological, socio-technical, and socio-cognitive perspectives. Each perspective emphasises particular characteristics of the KM initiatives. For example, the technological perspective promotes the development of knowledge assets through effectively utilising ICTs (Sorensen & Kakihara, 2002). The socio-technical perspective promotes the interrelation of social resources (organisational structure, culture and human resources) and technical resources (physical and logical ICT) with the organisational context for the integration of knowledge in the organisation (Ganesh, 2001). Finally, the socio-cognitive perspective analyses the interrelation of cognitive and social aspects to understand how people think, process information, make decisions and interact (Barcellini et al., 2008; Davidson, 2002; Stein, 1997). Through the evidence of past studies, mainly generated in developed countries, different research streams of KM, their primary contributions and gaps were identified. Based on such evidence, the current study defined five critical factors. Organisational Enablers refer to organisational characteristics that facilitate their transformation towards a knowledge-based organisation (Pham & Swierczek, 2006). Culture of Collaboration refers to the promotion of values, actions and the willingness to share knowledge among the employees of an organisation (Sveiby & Simons, 2002). Technological Acceptance identifies the perception of utility and the willingness to use technologies to improve work and knowledge processes (Yarbrough & Smith, 2007). Knowledge-Sharing Behaviour refers to disseminating acquired knowledge throughout the organisation (Ryu et al., 2003). Knowledge Process Capability integrates the acquiring, converting, applying and protecting knowledge processes (Theriou et al., 2009; Zaim et al., 2007). Organisational Performance, measured by Patient Safety, is strongly supported by knowledge to facilitate diagnosis, define treatments, prevent errors and prevent adverse events (Kim et al., 2012; Stock et al., 2010). The knowledge to understand the theoretical bases, the different perspectives, and the practice and policy that have driven the development of KM was generated while answering the first research question. This process contributed to developing the researcher's capability to conduct a critical literature review and critical reading, writing and summary skills.

The knowledge generated through the application of statistical methods allowed the identification of the impact or lack of impact of the critical factors evaluated and their system of relationships. This exercise allowed the researcher to generate the capabilities to develop an in-depth analysis, starting from the generation of a relational model based on theories, the application of advanced statistical tools and their interpretation. The results allowed for generating a critical analysis of the findings in such a way that they can identify and suggest possible improvements to the practice and policy related to the phenomenon studied. Figure 7.1 shows the previously described process inspired by the four intellectual projects for studying aspects of the social world (Wallace & Wray, 2021).

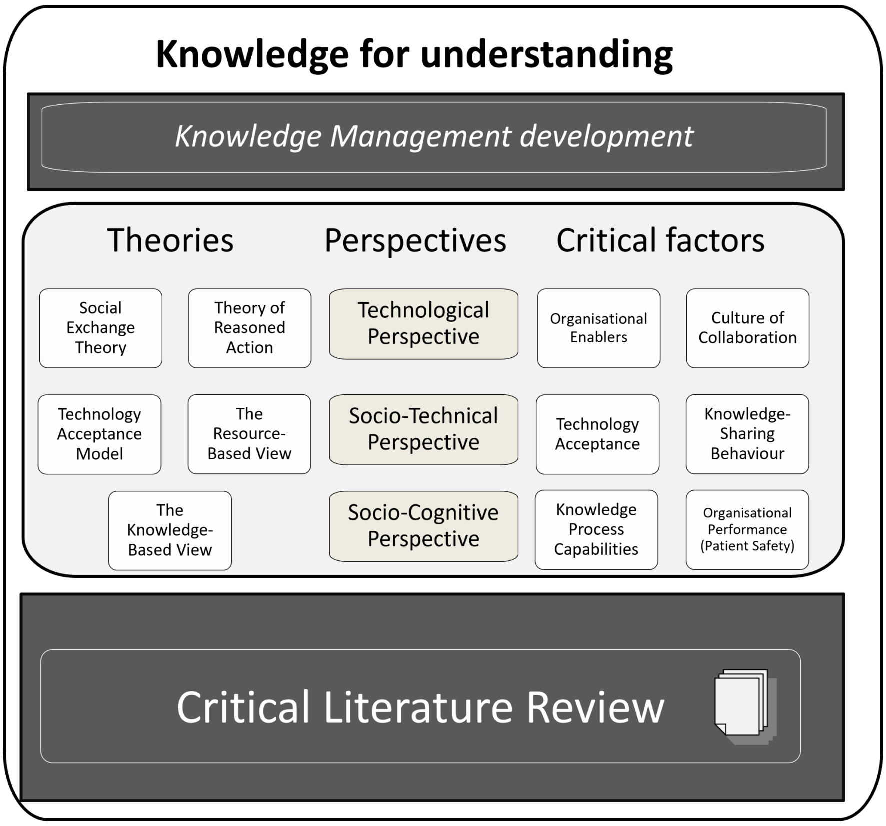


Figure 7.1: Knowledge for Understanding

For answering questions two and three, three models were proposed to evaluate the relationships between critical factors that promote the development of knowledge process capabilities in a healthcare context and can contribute substantially to improving patient safety through the enhancement of knowledge practices which improve the quality of processes and services in the different levels of the organisation. Such relationships were defined based on the theoretical framework developed through a critical literature review. The models were analysed through a rigorous set of statistical analyses to evaluate the direct effects of critical factors and the indirect effects of mediating variables and moderators.

Based on the proposed research models, section 7.2 consolidated the results of each analysed factor and identified the effects that the local context exerts on each one, enabling or inhibiting their ability to contribute to healthcare professionals' developing knowledge process capabilities and the improvement of organisational performance regarding patient safety. Previous relationships have been amply studied based on the Resource-Based View and its extension, the Knowledge-Based View. However, in this study which was conducted in a public health institution of the Mexican Health System, only two critical factors strongly impacted patient safety: Organisational Enablers and Technology Acceptance. Therefore, the established relationships of the three remaining factors (Culture of Collaboration, Knowledge-Sharing Behaviour, and Knowledge Process Capabilities) with Organisational Performance measured by Patient Safety were not supported for this research. Furthermore, taking into account that the Paediatric Specialty Hospital where this research was conducted operates in an environment of uncertainty due to the national Healthcare Institution crisis and the prevailing culture of power, this circumstance is a threat to the flourishing of a Culture of Collaboration and the development of collective knowledge strategies. Therefore, the significant relationship between Knowledge-Sharing behaviour and Knowledge Process Capabilities and the strong relationship between Technology Acceptance and Knowledge Process Capabilities is interpreted as personal knowledge attributes that have not been transformed into collective and organisational capabilities. Based on Merali (2000), the collective learning process that contributes to creating a competitive advantage is more important than the learning gained and the knowledge that remains static. In this study, knowledge at the individual level remains a limited and static object, which does not contribute significantly to patient safety, which is a process that depends on knowledge, interaction and collective action. Therefore, knowing at the individual level does not impact organisational performance that is obtained through cognitive, social and collective processes.

Developing countries can learn and strengthen their health systems from experience obtained by developed countries over the years by adopting and adapting successful strategies of Knowledge Management. However, there is limited evidence about how to evaluate the state of readiness of healthcare institutions in developing countries for implementing KM strategies. Therefore, this research contributes with a model as a diagnostic tool to get a deeper understanding of the impact of a set of critical factors and their system of relationships on the level of knowledge process capabilities developed by healthcare professionals and their contribution to patients' safety.

Existent literature has enlightened the contribution of IT-based systems in KM strategies. However, as Dwivedi et al. (2002) affirmed, implementing a solution that integrates diverse dimensions such as people, process and technology (not only an IT-led solution) is the only way to face the enormous challenge of healthcare institutions, especially healthcare professionals.

Finally, as Mills and Smith (2011) affirmed, identifying knowledge resources and capabilities will facilitate the integration of an effective KM strategy. Therefore, this exploration can act as an indicator of the state of readiness of a healthcare institution, focusing on healthcare professionals' capabilities to implement a formal Knowledge Management strategy that contributes to the accomplishment of its primary objective, to heal patients. Figure 7.2 depicts the previously described process.

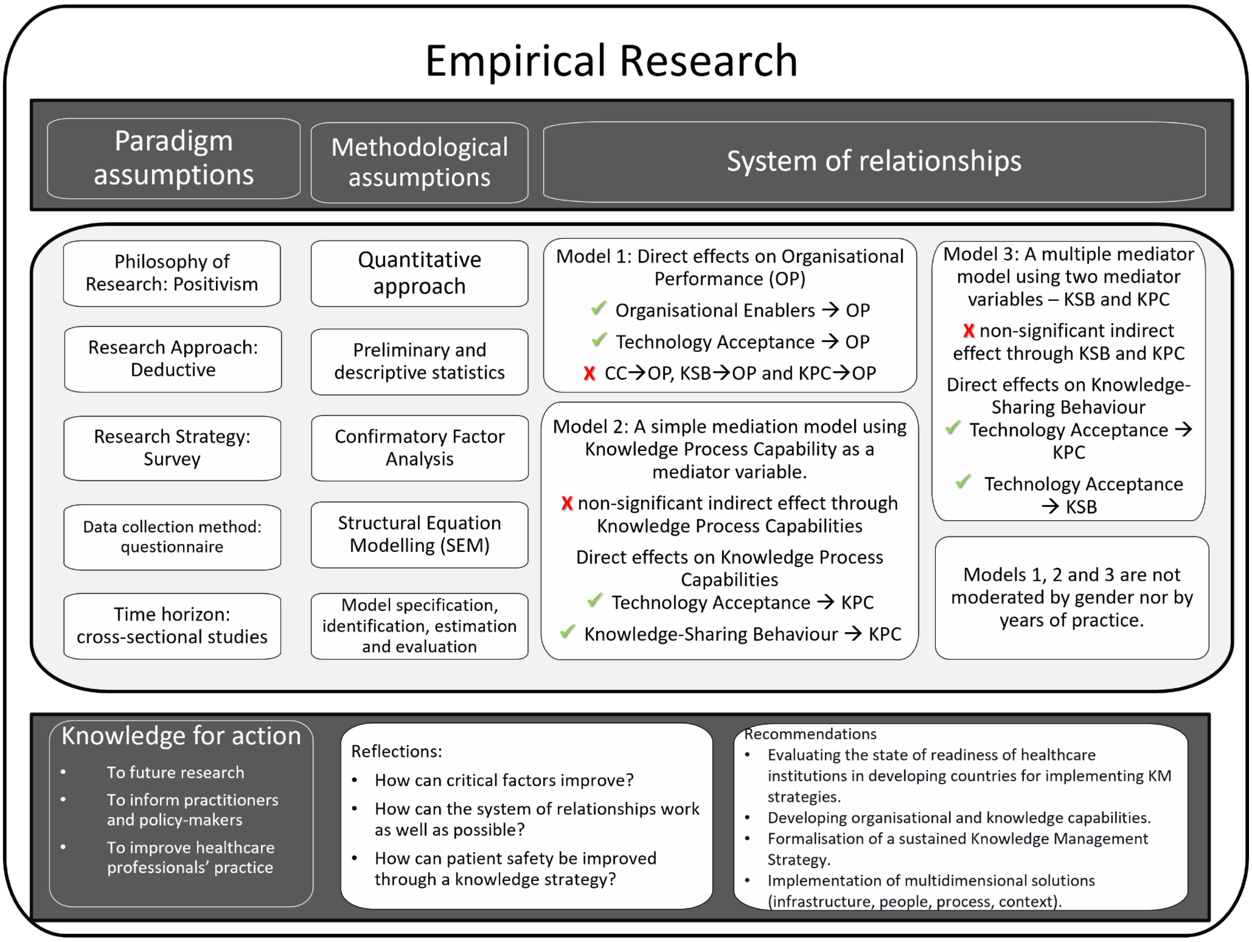


Figure 7.2: Knowledge for action

Chapters two and three presented relevant aspects of the context where the current research was developed; these insights facilitated to address of the fourth research question about how the context of a developing country like Mexico affects the relationships analysed in the proposed models. Davenport and Cronin (2000) affirmed that "*when the context changes, new KM paradigms can be expected*", additionally Stein (1997) affirmed that the socio-cultural context of organisations conditions learning and knowledge-sharing activities between individuals. Therefore, through the analysis of the political, social, economic, and cultural reality that frames the activities of public hospitals in the state of Chiapas, a series of circumstances and situations were identified as inhibitors of the development of organisational and knowledge capabilities to enhance patient safety. Section 1.3 addressed relevant information on the human development of Mexico and Chiapas, which evidenced the population's lack of quality of life. The data and information presented in section 1.3 showed that Chiapas has abundant natural diversity and ancestral culture; however, its population is downtrodden in historical backwardness in education, productivity, well-being and economy. In addition, rural and indigenous populations are physically isolated due to geographical dispersion and the lack of communication infrastructure, which aggravate the lack of services in these localities. The most critical social phenomena are extreme poverty, serious malnutrition problems in the child population, lack of opportunities to access quality education, corrupt practices at various levels of government, and lack of access to quality health services. All these phenomena become a spiral of poverty threatening the health and life of a large part of the population.

Since health services are essential to preserving life, improving the organisational and knowledge capabilities of public health institutions and healthcare professionals is a critical duty of the nation. Therefore, as evidenced in Chapter Two, section 2.8.1, the culture of power exerted by the federal government that has prevailed throughout healthcare political reforms must be transformed towards a culture of collaboration and knowledge-based that favours access and quality in health services to improve the well-being of the population.

Based on the results generated through the statistical analyses developed in Chapter Six, it has been shown that only two critical factors directly influence patient safety improvement. These factors are Organisational enablers and Technology Acceptance. Section 7.2 presented the findings and provided a series of reasoning, supported by previous studies, regarding the context effects that have constrained the development of organisational and individual capabilities and hence, their lack of contribution to improving patient safety.

The knowledge generated in this process led to a critical evaluation of the practice and policy that prevails in public health institutions. For example, the dominant culture of power, the absence of regulation and formalisation of Health Information Systems, a health system in crisis, excessive workload, labour conflicts, bureaucracy and corrupt practices were evidenced in past studies detailed in section 7.2.

The definition of public health policies that promote the development of formal and sustained knowledge strategies will provide the opportunity to close the gaps in the underdevelopment context. Additionally, it will address the urgent need to implement knowledge-based processes for improving the quality of health services and guaranteeing the individual and collective well-being of the population.

As stated above, context is a strong moderator in developing knowledge and organisational capabilities required to implement knowledge management strategies successfully. Regarding the research method, it is suggested that the particular context can be analysed in conjunction with key people from the health institution. This exercise will identify characteristics of the context that could be included in the data collection instrument and be analysed statistically as an indirect effect between critical factors (organisational and knowledge capabilities) and the Organisational Performance measured by patient safety. In this research, the organisational enablers construct was limited to capturing internal organisational characteristics. Therefore, defining a construct that captures specific external context characteristics is required. Figure 7.3 summarises the knowledge generated in this process.

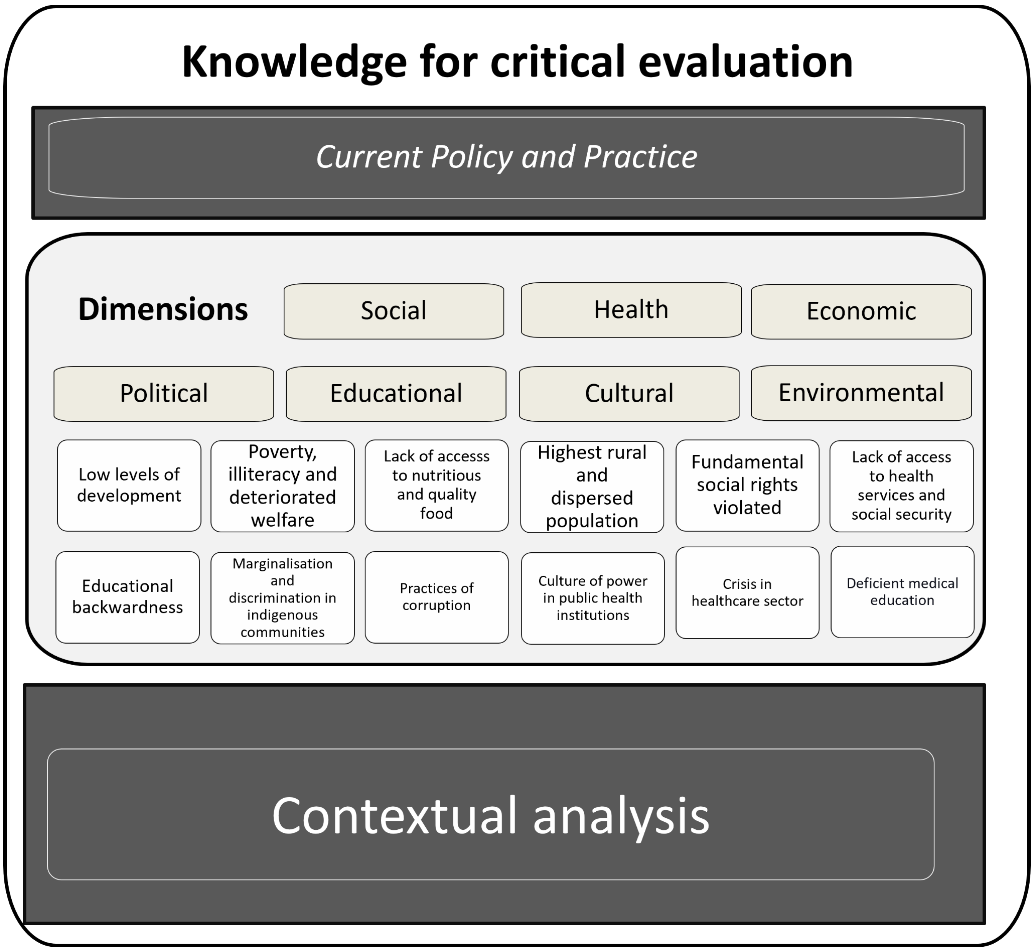


Figure 7.3: Knowledge for critical evaluation

Finally, the fifth research question is addressed in the following sections.

7.4 Theoretical contribution

The Resource-Based View and its extension, the Knowledge-Based View, establish that organisations are a system of relationships composed of a collection of unique competencies and capabilities that allow the implementation of value-creating strategies and influence their growth and performance. However, this research suggests that analysing en evaluating critical factors, such as context and its multidimensional interactions that frame the development of a particular society, could avoid a blind spot when implementing organisational strategies with expected behaviours and results. The integrative methodology proposed in this research offered an approach to the local context and an evaluation of how critical factors behave, particularly in such a context. Based on rigorous statistical analyses, this research evaluated the contribution of the selected critical factors on organisational performance and their influence on Knowledge Capabilities development in a healthcare setting to provide evidence that could improve the decision-making process to practice and institutional policy. The analysed factors are based on different theories studied in different settings. Additionally, instead of focusing merely on one perspective, this research integrated multiple perspectives to obtain a systemic view of the contribution of different factors to organisational performance and knowledge capabilities. Therefore, this research offered a multi-perspective and multi-theoretical approach that established a more comprehensive and integrated model.

Methodologically, this study contributed to developing a model that generates a series of knowledge to analyse both the development of organisational and knowledge capabilities, as well as their impact on organisational performance in public health institutions under the particular context of a developing country. This model identified the theoretical foundations, perspectives, disciplines, models, and practices related to the field of study of knowledge management. This knowledge generated to understand the development of this phenomenon allowed the definition of three structural models that evaluated the relationships of a set of critical factors (organisational and knowledge capabilities) and their impact on organisational performance and the development of knowledge capabilities. The results obtained through rigorous statistical analyses were interpreted under the particular circumstances and effects of the local context, as well as the current practice and policy of the public hospitals. This exercise confirmed that the actual conditions of various context dimensions could inhibit the development of organisational and knowledge capabilities. Figure 7.4 shows the different stages of the proposed methodological model in an integrative framework inspired by the four intellectual projects for studying aspects of the social world (Wallace & Wray, 2021).

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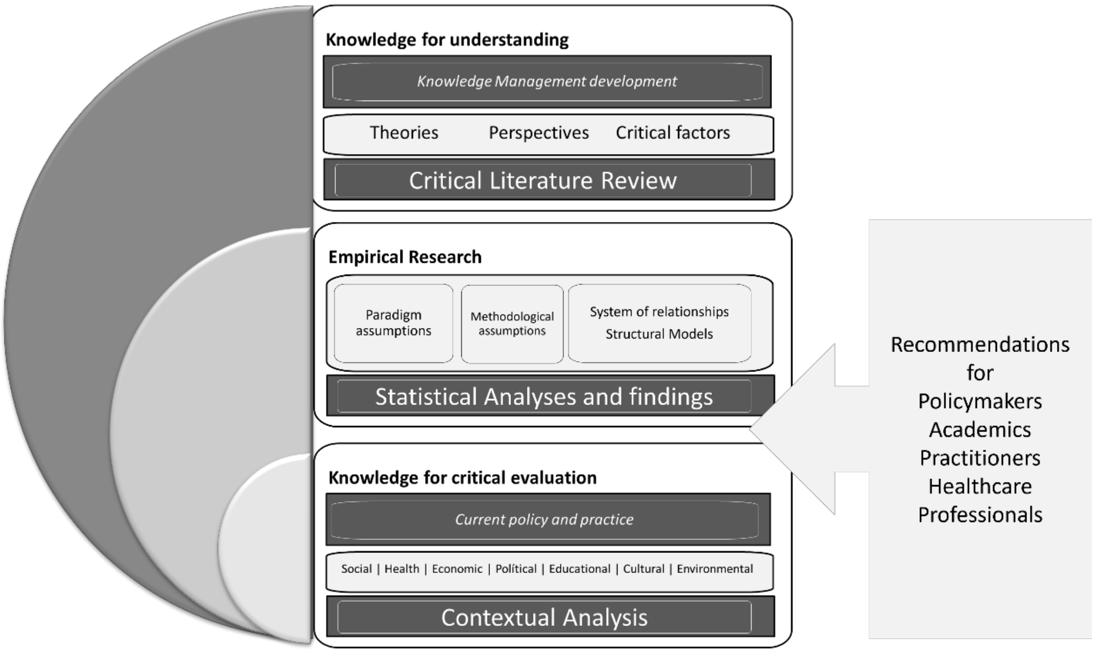

Figure 7.4: Proposed integrative methodological model

7.5 Practical implications

This study can provide healthcare institutions with a integrative methodology to obtain a first insight into critical factors (organisational and knowledge capabilities) and their influence on organisational performance in terms of patient safety and how they contribute to the development of Knowledge Process Capabilities of healthcare professionals. Healthcare Institutions are organisations based on knowledge; therefore, continuous efforts to foster knowledge across all levels of institutions are critical to ensure patient safety. A first evaluation of the conditions of critical factors and their impact on patient safety can let health institutions create strategies and programs to improve their capabilities and strengthen knowledge processes at individual and institutional levels.

Statistical analyses suggested that Technology Acceptance directly affects Knowledge Sharing, Knowledge Process Capabilities and Organisational Performance in terms of Patient Safety. Therefore, Technology Acceptance is a crucial capability in fostering knowledge across different levels of the institution. Thus, evaluating the current implemented Health Information System is suggested to take advantage of the already installed technological capacity and the good acceptance for its use.

Because hospitals have a clear mission, healthcare professionals consider their work essential and directly impact people's lives. Hence, the accomplishment of their duties and responsibilities contributes directly to patient safety; however, this impact is not necessarily promoted by knowledge activities or knowledge capabilities.

The integrative methodological model proposed in Figure 7.4 contributes to the knowledge generation for understanding the Knowledge Management field and its foundations. Such insights facilitated the generation of structural models to evaluate a system of relationships between the identified critical factors and patient safety and their contribution to the organisational and knowledge capabilities development. Furthermore, through a critical analysis of the local context, the findings obtained from the rigorous statistical analyses were complemented to get a deep understanding of the particular context's effects and be able to make recommendations for the practice and policy of public health institutions.

Being aware of the conditions of the local context is required to identify critical and necessary changes for practice and policy to adopt strategies that favour the development of knowledge capabilities and improve organisational performance.

7.6 Limitations and future research

This research proposed an integrative methodological model to explore the contributions of critical factors identified in past studies on organisational performance and knowledge capabilities development in a Knowledge Management field.

While this research makes significant contributions, there are some underlying limitations in this study. Firstly, it is necessary to consider the effects of the local context where the study is conducted; therefore, a construct to capture critical characteristics of the local context must be integrated into the structural model to obtain empirical evidence of their effects. The current study was conducted in a developing country, particularly in a state with a high degree of marginalisation and poverty; the sampling frame was composed of healthcare professionals working for a third-level paediatric hospital caring for children with limited resources from the different municipalities. Therefore, the generated findings by statistical analyses may not be generalisable to other healthcare institutions. However, the proposed integrative methodological model can be applied to different public health institutions in similar circumstances, such as Mexico, a developing country.

Secondly, the designed instrument had a limited scope based on the variance explained by the independent variables. Therefore, future studies can contribute to identifying other factors or characteristics to understand the analysed phenomenon better. Also, substituting, extending or integrating other critical factors will increase the explanatory power, providing rich insights about their influence on organisational performance and knowledge capabilities across different cultures.

Thirdly, gender and years of practice were considered moderator variables in this research. Further studies can include other moderator variables such as level of studies, age, and type of contract in order to get new insights.

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Appendixes

Appendix A: Measurements, methods and hypotheses of past studies

Organisational attributes to support Knowledge Management Strategies

Attributes	Research and measurement	Methods	Evaluated Hypotheses	Findings
Enablers of a knowledge-oriented organisation: Leadership commitment Teamwork Defined roles and responsibilities (degree of formalisation) Recognition Learning supportive mission Organisational learning values	(Lucas, 2010) Survey with items drawn from previous research but it is not specified. Four sub-scales with 4 or 5 items each. • Use of teams • Culture • Capacity • Knowledge transfer	228 respondents. Reliability of the items measured was calculated by Cronbach's alpha. Zero-order correlations and hierarchical ordinary least squares regression analysis used for testing the hypothesis.	H1. The use of teams will have a positive and significant impact on the transfer of organisational practices. H4. The use of teams coupled with the presence of a supportive culture will have a significant positive impact on the transfer of organisational practices. H5. The use of teams couple with the appropriate capacity will have a significant positive impact on the transfer of organisational practices.	Transferring organisational practices is affected by using teams, employing a collaborative culture and possessing capacity, taking in account of the control variables (reputation and incentives).

	(Mahmoudsalehi et al., 2012). Scale construction based on literature review. Five sub-scales. 21 items total. • Knowledge management • Centralisation • Formalisation • Complexity • Integration	122 companies. Pre-test questionnaire was performance. The reliability coefficient was calculated using Cronbach's alpha. For assessing questionnaire validity, factor analysis was used. The effect of exogenous variable with endogenous variable was study using Structural Equation Model (SEM).	H1. Organisational structure relates positively to KM. H-1-1. Organisational structure (centralisation) relates negatively to KM. H-1-2. Organisational structure (formalisation) relates negatively to KM. H-1-3. Organisational structure (complexity) relates positively to KM. H-1-4. Organisational structure (integration) relates positively to KM.	Organisational structure in terms of centralisation, formalisation, complexity and integration is positively related to knowledge management.
	(Ngoc Thuy Pham & Sweirczek, 2006) Scale construction based on operational definitions developed from the literature review. Eight sub-scales. 60 items total. • Performance improvement • Interaction • Knowledge Utilisation • Leadership • Organisational Climate	339 respondents. Cronbach's alpha was used to test the reliability of sub-scales. Factor analysis with a proxmax rotation was used to determine the key dimensions of the 60 variables in the survey. Hierarchical regression analysis was used to assess the relationships of variables.	H1a. The greater the leadership commitment, the higher the performance improvement. H1b. The greater the leadership commitment, the more positive the organisational climate. H2a. The more incentives to support learning, the higher the performance improvement.	The results show that each factor (leadership, incentives, staff interaction and emphasis on knowledge acquisition) has a different role and impact on the performance improvement and the organisational climate.

	• Knowledge Sharing • Knowledge Acquisition • Incentives			
	(S. Goh, 2001) Scale modification Individual learning designed by Sujan, Weitz and Kumas and published in 1994. 6 items selected. The Team Learning Survey (TLS) developed by Edmondson in 1996. 10 items selected. Organisational Learning Survey (OLS) developed by Goh and Richards in 1997. 21 items. Final instrument: 27 items questionnaire.	100 respondents. A principal component factor analysis was carried out for the original 55 items. Internal consistency was measured by Cronbach's alpha. The stability over time as measured by the Pearson correlation coefficient. Relationships between constructs were evaluated by correlation and regression analysis. ANOVA test of the means was carried out to compare a particular characteristic among private and public sector organisations.	H1. There will be a negative relationship between learning organisation attributes and the degree of formalisation in organisation structure. H2. Learning organisation attributes will be positively associated with performance outcomes such as employee job satisfaction. H3. Compared with private sector organisations, public sector organisations will have lower learning organisation attributes.	The overall score for learning organisation attributes was negatively correlated with formalisation. Job satisfaction is positively correlated with the score on overall learning organisation attributes. ANOVA test demonstrated that on overall learning organisation attributes, the two private sector organisations score much better than the public sector organisations.
	(C. Chan, 2003).	189 respondents. The reliability was estimated by the Cronbach's alpha coefficient.	H1. Individual learning would be positively related to the organisational learning facets of clarity of purpose and mission, leadership commitment and empowerment, transfer	The individual learning was not significantly related to any of

	Individual learning: scale modification. 9 items questionnaire. Team learning was measured using the Team Learning Survey (TLS). 11 items questionnaire. Organisational learning: Organisational Learning Survey. 21 items questionnaire.	Factor analysis with varimax rotation was used to assess the construct validities of the instruments. The relationships between the three examined concepts were examined using multivariate analysis of variance (MANOVA) and simple regression.	of knowledge, experimentation and rewards, as well as teamwork and group problem solving. H2. Team learning would be positively related to the organisational learning facets. H3. Individual learning would be positively related to team learning.	the organisational learning facts. Team learning was found to be significantly related to all the five organisational learning facets. Individual learning was found to be significantly related to team learning.
	(Amitay, Popper, & Lipshitz, 2005) The Multifactor Leadership Questionnaire (MLQ) originally constructed by Bass, B.M. in 1985. 8 items questionnaire. 8 items. Organisational learning Questionnaire constructed by Ellis and Globerson in 1996. Two sub-scales: Values and Organisational Learning Mechanism. 8 items questionnaire.	513 respondents. Cronbach's alpha was used to test the reliability of sub-scales. Correlations between leadership styles and OLMs were evaluated.	H1. There is a positive correlation between transformational leadership and organisational learning. The more the clinic managers are perceived as transformational leaders, the more intensive the organisational learning will be. H2. There is a positive correlation between organisational learning values and organisational learning mechanisms (OLMs). The higher the organisational values, the more intensively and effectively will the OLMs operate.	The results show a very high positive correlation between transformational leadership, organisational learning values, and OLMs. The results show a very high positive correlation between organisational values and the centrality of OLMs as perceived by the subject.

	(Prugsamatz, 2010a). Scale modification. Dimensions of the Learning Organisation Questionnaire (DLOQ) originally constructed by Marsick and Watkins in 2003. Learning Environment Questionnaire (LEQ) originally constructed by Armstrong and Foley's in 2003. 59 items questionnaire.	133 respondents. Pearson Correlation was used to identify the relationships that exist between variables. Multiple regression analysis was used to determine the influence that exists between the variables and to test the hypotheses of the study. Pre-test and an initial Cronbach's alpha were run to test the reliability.	Ho2. There is no significant relationship between team dynamics and organisation learning sustainability. Ha2. There is a significant relationship between team dynamics and organisation learning sustainability. Ho4. There is no significant influence of individual motivation to learn, team dynamics, and organisation cultural practices on organisation learning sustainability in Thai-based international non-profit organisations.	Results revealed that individual motivation to learn and organisation learning sustainability are positively correlated. A positive correlation also existed between team dynamics and organisation learning sustainability. A positive correlation also existed between organisation cultural practices and organisation learning sustainability. Finally, when regressed together, individual motivation to learn, team dynamics, and organisation cultural practices all have some form of prediction on organisation learning sustainability.
	(R.-F. Chen & Hsiao, 2012a) Scale modification. 34 items questionnaire. HIS acceptance. 2 items.	124 respondents. An expert panel using a Content Validity Index (CVI) and further revised based on the results of a pre-test to increase study content validity revised the initial questionnaire.	H3. Organisational characteristics affect perceived usefulness of HIS for physicians. H3a. Top management support affects perceived usefulness of HIS for physicians. H3b. Project team competency affects perceived usefulness of HIS for physicians.	The results indicated that top management support had a significant impact on perceived usefulness. Project team competency had a significant impact on physicians' perceived ease of

	The Human characteristics: self-efficacy and compatibility. 5 items. The organisational characteristics: top management support and project team competency. 8 items. The technology characteristics included system quality and information quality. 9 items. Perceived usefulness. 7 items. Perceived ease of use. 3 items.	Cronbach's Alpha coefficient and Confirmatory Factor Analysis assessed the reliability and validity of the final questionnaire. The study used structural equation modelling to analyse the data and causal model.	H4. Organisational characteristics affect perceived ease of use of HIS for physicians. H4a. Top management support affects perceived ease of use of HIS for physicians. H4b. Project team competency affects perceived ease of use of HIS for physicians.	use of hospital information systems.

Culture of collaboration to encourage knowledge practices

Attributes	Research and measurement	Methods	Evaluated Hypotheses	Findings
The Supportive learning environment at different levels in the organisation: Business unit culture Immediate supervisor support Employee attitude Work group support	(Reyhane M. Nejad & Mahdi Saber, 2012) Collaborative Climate Survey constructed by Sveiby and Simons and published in 2002. 20 items questionnaire. Knowledge-Sharing Behaviour constructed by Bock and Kim and published in 2002. 5 items questionnaire.	214 respondents. The researchers cited the results of reliability and validity obtained in the original researches. Pearson Correlation coefficients were calculated for analysing the data. The strength of the relationship was measured by R-square.	H0. The relationship between the collaborative work climate and intention to share knowledge is significant. H1. The relationship between the work group support and intention to share knowledge is significant. H2. The relationship between the support of immediate supervisor and intention to share knowledge is significant. H3. The relationship between employee attitude and intention to share knowledge is significant. H4. The relationship between the business unit culture and intention to share knowledge is significant.	The collaborative work climate positively and significantly influences the intention to knowledge sharing in the organisation. The results demonstrated that work group support, support of immediate supervisor, employee attitude, and business unit culture positively and significantly influence the intention to knowledge sharing in the organisation

	(Shim, 2010a) **Uncivil Workplace Behaviour** Questionnaire (UWBQ) developed by Martin and Hine and published in 2005. 20 items questionnaire. The Collaborative Climate Scale (CCS) developed by Sveiby and Simons and published in 2002. 20 items questionnaire. Knowledge-Sharing Behaviour constructed by Bock and Kim and published in 2002. 5 items questionnaire. NEO-FFI (Five-Factor Inventory) developed by Costa and McCrae and published in 1992 was used to measure an individual's personality. 36 items questionnaire. Short version.	476 respondents. Confirmatory Factor Analysis (CFA) was performed to assess the construct validity of the measurement model. Cronbach's alpha coefficient and correlation coefficients were calculated. Hierarchical multiple regressions were ran to test the hypotheses. An analysis of variance (ANOVA) and post-hoc tests were conducted to show group differences concerning perceptions of workplace incivility.	Hypothesis 1: There will be a negative relationship between the experience of workplace incivility and the intention to share knowledge. Hypothesis 2: A collaborative climate will moderate the relationship between workplace incivility and intentions to share knowledge. Hypothesis3a: Conscientiousness will moderate the relationship between workplace incivility and intentions to share knowledge. Hypothesis3a: Agreeableness will moderate the relationship between workplace incivility and intentions to share knowledge. Hypothesis3a: Emotional stability will moderate the relationship between workplace incivility and intentions to share knowledge.	The main hypothesis that assumed a negative relationship between the experience of workplace incivility and intentions to share knowledge was supported. In addition to the first hypothesis, Hypothesis 3a, which suggested the moderating effect of conscientiousness on the relationship between the experience of workplace incivility and intentions to share knowledge, was supported. The results of the ANOVA tests suggest that the experience of workplace incivility differs from employment type and company size.

	(Cegarra-Navarro & Dewhurst, 2006) Scale construction. 15 items questionnaire. Five sub-scales: **Organisational unlearning (3 items)** Individual context (3 items) Role of management (3 items) Team work (3 items) Relational capital (3 items)	139 respondents. Validity was confirmed using the confirmatory factor analysis for the 15 measurement constructs. Cross-loading and discriminant validity for each pairwise of construct were evaluated. The reliability of measurement scales was analysed by calculating the reliability coefficient.	H1. The individual unlearning context has a significant affect on organisational unlearning. H2. Management has a significant influence on organisational unlearning. H3. Teamwork has a significant influence on organisational unlearning. H4. Organisational unlearning has a significant influence on relational capital.	Results revealed that individual unlearning, management and teamwork have a significant influence on the unlearning process. Results showed that unlearning has a positive significant effect on relational capital also shows a negative effect of unlearning on the creation of relational capital.
	(Lucas, 2010) Survey with items drawn from previous research but it is not specified. Four sub-scales with 4 or 5 items each. • **Culture** • Use of teams • Capacity Knowledge transfer	228 respondents. Reliability of the items measured was calculated by Cronbach's alpha. Zero-order correlations and hierarchical ordinary least squares regression analysis used for testing the hypothesis.	H2. A culture of sharing and participation among employees will have a significant positive impact on the transfer of organisational practices.	Transferring organisational practices is affected by using teams, employing a collaborative culture and possessing capacity, taking in account of the control variables (reputation and incentives).

	(Prugsamatz, 2010a). Scale modification. Dimensions of the Learning Organisation Questionnaire (DLOQ) originally constructed by Marsick and Watkins in 2003. Learning Environment Questionnaire (LEQ) originally constructed by Armstrong and Foley's in 2003. 59 items questionnaire.	133 respondents. Pearson Correlation was used to identify the relationships that exist between variables. Multiple regression analysis was used to determine the influence that exists between the variables and to test the hypotheses of the study. Pre-test and an initial Cronbach's alpha was run to test the reliability.	Ho3. There is no significant relationship between organisation cultural practices and organisation learning sustainability. Ha3. There is a significant relationship between organisation cultural practices and organisation learning sustainability. Ho4. There is no significant influence of individual motivation to learn, team dynamics, and organisation cultural practices on organisation learning sustainability in Thai-based international non-profit organisations. Ha4. There is a significant influence of individual motivation to learn, team dynamics, and organisation cultural practices on organisation learning sustainability in Thai-based international non-profit organisations.	Results revealed that individual motivation to learn and organisation learning sustainability are positively correlated. A positive correlation also existed between team dynamics and organisation learning sustainability. A positive correlation also existed between organisation cultural practices and organisation learning sustainability. And finally, when regressed together, individual motivation to learn, team dynamics, and organisation cultural practices all have some form of prediction on organisation learning sustainability.

Attitudes of Healthcare Professionals towards Knowledge Management

Attributes	Research and measurement	Methods	Evaluated Hypotheses	Findings
Sharing knowledge willingness. Expected rewards Expected associations Expected contribution Attitude Intention Behaviour Intention to use technology Perceived usefulness Perceived ease of use Self-efficacy Trust Behavioural intention to use	(Gagnon et al., 2003) Scale construction. 10 items questionnaire. Intention to use technology Affect Perceived consequences Perceived social norms Personal normative belief Self-identity Facilitating conditions Habit	519 respondents. Test-retest was performed to assess the reliability of the questionnaire with a sample representative of the studied population with a 2-week interval. Reliability was evaluated using Cronbach's alpha. Confirmatory factor analysis (CFA) was performed to assess the measurement model. Structural equation modelling (SEM) was applied to test the theoretical model.	H1. Affect is a predictor of physicians' intention to use telemedicine; H2. Perceived consequences are predictors of physicians' intention to use telemedicine; H3. Perceived social norms are predictors of physicians' intention to use telemedicine; H4 Personal normative belief is a predictor of physicians' intention to use telemedicine; H5.Self-identity is a predictor of physicians' intention to use telemedicine; H6.Facilitating conditions are predictors of physicians' intention to use telemedicine; H7.Habit is a predictor of physicians' intention to use telemedicine; H8.Affect has a mediating effect on the relation between habit and intention.	The model explained 81% of variance in physicians' intention to use telehealth. The main predictors of intentions were a composite normative factor, comprising personal as well as social norms and self- identity. The study has shown that attitudinal components did not significantly influence telemedicine acceptance by physicians. The feeling of professional responsibility is central to physicians' decision-making and therefore, influences their acceptance of telemedicine technology.

	(R.-F. Chen & Hsiao, 2012a) Scale modification. 34 items questionnaire. • HIS acceptance. 2 items. • **The Human characteristics: self-efficacy and compatibility. 5 items.** • The organisational characteristics: top management support and project team competency. Eight items. • The technology characteristics included system quality and information quality. Nine items. • **Perceived usefulness. Seven items.** • **Perceived ease of use. Three items.**	124 respondents. An expert panel using a Content Validity Index (CVI) revised the initial questionnaire. Cronbach's Alpha coefficient and Confirmatory Factor Analysis assessed the reliability and validity of the final questionnaire. The study used structural equation modelling to analyse the data and causal model. Seven model-fit measures were used to assess the overall goodness of fit, as follows: ratio of chi-square (X^2) to degrees-of-freedom (d.f.); goodness-of-fit index (GFI); normalized fit index (NFI); non-normalized fit index (NNFI); incremental fit index (IFI); comparative fit index (CFI); and Root Mean Square Error of Approximation (RMSEA).	H3a. Top management support affects perceived usefulness of HIS for physicians. H3b. Project team competency affects perceived usefulness of HIS for physicians. H4a. Top management support affects perceived ease of use of HIS for physicians. H4b. Project team competency affects perceived ease of use of HIS for physicians. H5. Technology characteristics significantly impact physicians' perceptions of HIS usefulness. H6. Technology characteristics significantly impact physicians' perceptions of HIS ease of use. H6a. HIS quality affects physicians' perceptions of HIS ease of use. H6b. HIS information quality affects physicians' perceptions of HIS ease of use.	The results indicated that top management support had a significant impact on perceived usefulness. Project team competency and system quality had a significant impact on physicians' perceived ease of use of hospital information systems. Physicians' perceptions of the usefulness and ease of use of hospital information systems had a significant impact on the acceptance of the systems. User self-efficacy, and compatibility, and information quality, have no significant effect on both perceived usefulness and perceived ease of use.

	(Tung, Chang, & Chou, 2008a) Scale modification. 18 items questionnaire. **Compatibility**. 3 items. **Perceived usefulness.** 4 items. **Perceived ease of use**. 4 items. **Trust.** 3 items. **Behavioural intention to use.** 2 items. Perceived financial cost. 2 items.	252 respondents. The confirmatory factor analysis was performed to examine the reliability and validity of the measurement model. The structural equation modelling technique was used to evaluate the causality between model parameters. The estimation of parameters used maximum likelihood estimation (MLE). Seven model-fit measures were used to assess the model's overall goodness-of-fit: the ratio of Chi-square (X^2) to degrees-of-freedom (d.f.); goodness-of-fit index (GFI); normalised fit index (NFI); non-normalised fit index (NNFI); comparative fit index (CFI); Root Mean Square Error of Approximation (RMSEA); and Root Mean Square Residual (RMSR).	H4: Perceived usefulness will have a positive effect on behavioural intention to use electronic logistics information system. H5: Perceived ease of use will have a positive effect on perceived usefulness of electronic logistics information system. H6: Perceived ease of use will have a positive effect on behavioural intention to use electronic logistics information system. H7: Perceived ease of use will have a positive effect on trust in electronic logistics information system. H8: Trust will have a positive effect on behavioural intention to use electronic logistics information system.	The results showed that compatibility, perceived usefulness, perceived ease of use and trust all have great positive influence on behavioural intention to use. The data showed that compatibility had a positive effect on both behavioural intention to use and perceived usefulness. Perceived usefulness had a positive effect on the behavioural intention to use. Perceived ease of use had a positive effect on perceived usefulness, behavioural intention to use, and trust. The results confirmed that trust had a positive effect on both behavioural intention to use and perceived usefulness.

			H9: Trust will have positive effect on perceived usefulness to use electronic logistics information system.	Perceived financial cost has great negative influence on behavioural intention to use.
	(Yu, Li, & Gagnon, 2009b) Scale modification. 20 items questionnaire. • Behavioural intention. 2 items. • Perceived usefulness. 4 items. • Perceived ease of use. 4 items. • Subjective norm. 2 items. • Image. 3 items. • Voluntariness. 3 items. • Work experience. 1 item. • Computer skill. 1 item.	Reliability was evaluated using Cronbach's alpha. Structural equation modelling (SEM) was used to analyse the causal relations between model parameters. The estimation of parameters used maximum likelihood estimation (MLE). In order to accurately identify any antecedent factors that determine caregivers' acceptance of health IT applications in long-term care setting and exploratory, iterative approach in structural equation modelling was undertaken. Multiple regression analysis was conducted to determine the existence and extent of impact of the antecedent variables on PEOU, PU and BI.	Perceived usefulness (PU) H1. Perceived usefulness will have a significant positive effect on behavioural intention to use a health IT application. Perceived ease of use (PEOU) H2a: Perceived ease of use will have a significant positive effect on perceived usefulness of a health IT application. H2b: Perceived ease of use will have a significant positive effect on behavioural intention to use a health IT application. Social influences Subjective norm (SN) H3a: Subjective norm will have a significant effect on	The various goodness-of-fit statistical indices suggested a good fit between the data and the proposed measurement model. Both perceived usefulness and perceived ease of use had significant positive impact on a caregiver's behavioural intention to use a health IT application. The impact of perceived usefulness was bigger than that of perceived ease of use. Image had a significant negative impact and computer skills had a significant positive impact on a caregiver's behavioural

			behavioural intention to use a health IT application. H3b: Subjective norm will have a significant effect on perceived usefulness of a health IT application. H3c: Subjective norm will have a significant effect on perceived ease of use of a health IT application. H3d: the effect of subjective norm on behavioural intention to use a health IT application is mediated by voluntariness.	intention to use a health IT application. Two constructs, perceived ease of use and subjective norm, and a measured variable job level contributed significantly to a caregiver's perceived usefulness of a health IT application. Perceived ease of use was the strongest determinant of usefulness, followed by subjective norm, then job level. Subjective norm, image and computer skills were the factors that significantly impacted on caregivers' perceived ease of use of a health IT system. The hypotheses are rejected that age, job level and aged-care work experience impact on caregivers' perceived

				ease of use of a health IT application.
	(Lucas, 2010) Survey with items drawn from previous research but it is not specified. Four sub-scales with 4 or 5 items each. • Use of teams • Culture • Capacity • Knowledge transfer	228 respondents. Reliability of the items measured was calculated by Cronbach's alpha. Zero-order correlations and hierarchical ordinary least squares regression analysis used for testing the hypothesis.	H3. The capacity to acquire and retain the relevant skills will have a significant positive impact on the transfer of organisational practices.	Transferring organisational practices is affected by using teams, employing a collaborative culture and possessing capacity, taking in account of the control variables (reputation and incentives).
	(Bock & Kim, 2002b) Scale construction for independent variables – expected rewards, expected association, and expected contribution. Scale modification for attitude toward knowledge sharing and behavioural intention from Fishbein and Azjen's developed in 1980.	467 respondents. A pre-test was conducted. Internal consistency and discriminant validity were tested. Reliability was tested by Cronbach's alpha coefficient. To validate the final questionnaire item analysis and factor analysis with varimax rotation was performed. For convergent validity, the correlation of each item to the sum of the remaining items was evaluated. Discriminant	H1. Expected rewards will have a positive effect on the individual's attitude toward knowledge sharing. H2. Expected associations will have a positive effect on the individual's attitude toward knowledge sharing. H3. Expected contribution will have a positive effect on the attitude toward knowledge sharing. H4. Attitude toward knowledge sharing will have a	The results showed that expected associations and contribution are positively related to the attitude toward knowledge sharing. The results showed that expected reward is negatively related to the attitude toward knowledge sharing. Attitude toward knowledge sharing has a significant influence on behavioural

	Scale modification for items of knowledge-sharing behaviour and the level of IT usage from previous Information Systems Management studies. Seven sub-scales. Expected rewards. 3 items. Expected association. 5 items. Expected contribution. 5 items. Attitude. 4 items. Intention. 5 items. Behaviour. 6 items. Level of IT usages. 3 items.	validity was checked by using the factor loading values. Internal consistency for all constructs was investigated using Cronbach's alpha values. The hypothesized relationships were tested using regression analysis.	positive effect on the individual's intention to share knowledge. H5. Intention to share knowledge will have a positive effect on the individual's knowledge-sharing behaviour. The results showed that expected associations and contribution are positively related to the attitude toward knowledge sharing. The results showed that expected reward is negatively related to the attitude toward knowledge sharing. Attitude toward knowledge sharing has a significant influence on behavioural intention to share knowledge. An individual's actual knowledge-sharing behaviour is highly correlated with the behavioural intention to share knowledge.	intention to share knowledge. An individual's actual knowledge-sharing behaviour is highly correlated with the behavioural intention to share knowledge. The positive influences of attitude on intention and intention on behaviour are confirmed in the knowledge sharing context.

			The positive influences of attitude on intention and intention on behaviour are confirmed in the knowledge sharing context.	

Knowledge Process Capabilities to improve the Organisational Performance

Attributes	**Research and measurement**	**Methods**	**Evaluated Hypotheses**	**Findings**
Knowledge Management Process capabilities Knowledge creation Knowledge sharing Knowledge store Knowledge utilization	(Monavvarian & Kasei, 2007) 27 items questionnaire measuring the dependent variable, the four KM activities (cycle of KM): • Knowledge acquisition, creation; • Knowledge sharing; • Knowledge store; and • Implementation of KM	198 respondents The document did not specify issues about validity and reliability of the instrument. In order to determine the rate of impact of independent variables on dependent variables, a test of multiple regression analysis by the method of step-by step was carried out.	H1. Each independent variable (culture, technology, human resources practices, organisational structure, document transparency, flow of information and training) has impact on Acquisition-creation of knowledge.	The variables technology, structure, culture and human resources have a significant impact on acquisition-creation of knowledge in the ministry of labour. The variables culture and technology have impact on sharing of knowledge in the ministry of labour. The variables culture, technology and transparency of

	52 items questionnaire measuring the independent variables: • Technology • Human resources practices • Organisational structure • Organisational culture • Document transparency status • Flow of information • Training	Analysis of variance for significance of independent variables was carried out. Standardized and unstandardized coefficients for independent variables were calculated.	H2. Each independent variable has impact on Knowledge sharing. H3. Each independent variable has impact on storing knowledge. H4. Each independent variable has impact on implementation of knowledge management. H5. Each independent variable has impact on all dependent variables (cycle of KM).	documents have impact on store of knowledge in the ministry of labour. The variables technology, structure, culture, training and human resources have impact on implementation of knowledge in the ministry of labour. The variables culture, technology, human resources, training and document transparency have impact on cycle of KM in the ministry of labour.
	(Sangjae Lee, Byung G. Kim, & Hoyal Kim, 2012) Scale modification. 68 items questionnaire. Collaboration. 5 items. Trust. 5 items.	105 respondents. Two KM practitioners, three researches in MIS, 20 graduate students in MIS, revised the items and their comments were used to improve understandability and	H1. Collaboration positively affects knowledge process capabilities. H2. Trust positively affects knowledge process capabilities.	The study showed that knowledge process capabilities are largely determined by knowledge acquisition and application. The effects of collaboration, learning culture, top

	Learning culture. 5 items. Decentralization. 5 items. Top management support. 5 items. Promotion. 5 items. IT support. 5 items. Knowledge acquisition. 5 items. Knowledge conversion. 5 items. Knowledge application. 5 items. Knowledge protection. 5 items. Creative organisational learning. 6 items. Organisational performance. 7 items.	clarity to avoid vague or specialised terms. The structural relations among variables were tested using the partial least squares (PLS) method. The PLS uses confirmatory factor analyses to generate the factor loadings. The reliability of the inherent variable and individual item was tested using internal consistency reliability (ICR) and Cronbach's alpha. The high values of the AVE, loadings, and significant parameter estimates indicated the presence of convergent validity.	H3. Learning culture positively affects knowledge process capabilities. H4. The decentralization of organisational structures negatively affects knowledge process capabilities. H5. Top management support positively affects knowledge process capabilities. H6. Promotion positively affects knowledge process capabilities. H7. IT support positively affects knowledge process capabilities. H8. Knowledge process capabilities positively affect creative organisational learning.	management support, and IT support on knowledge process capabilities are significant. The effect of promotion on knowledge process capabilities is not supported in the study. As the KMS is in the early stage of implementation, it leads to a weak relationship between promotion and knowledge process capabilities. The study showed that the KM processes can mediate between factor in the KM infrastructure and creative organisational learning. This study demonstrated that creative organisational learning positively affects organisational performance. Organisational performance depends on the extent to which the knowledge process capabilities increase organisational learning.

			H9. Creative organisational learning positively affects organisational performance.	
	(Zaim, Tatoglu, & Zaim, 2007b) Scale construction. 30 items questionnaire. • KM processes (knowledge generation, knowledge transfer and sharing, knowledge utilization and knowledge codification and storage) 11 items. • KM infrastructure (culture, technology, organisation, intellectual capital). 15 items. • Performance of KM practices (usability, organisation performance, employee performance and mission). 4 items.	83 respondents. The initial developments of the questionnaire were piloted on a set of experienced managers in KM applications. The data analysis was conducted by an exploratory factor analysis (EFA) with varimax rotation to determine the underlying dimensions of KM process and KM infrastructure. Internal consistency of constructs was measured at both individual and composite level using Cronbach's alpha coefficient. Partial least squares analysis was conducted to measure direct effect of the Knowledge Management process and infrastructure on the performance of KM practices.	H1.Knowledge management process directly and positively affects performance of knowledge management practices. H2.Knowledge management infrastructure directly and positively affects performance of knowledge management practices.	KM process had a positive and moderate direct effect on KM performance. KM infrastructure has a direct and strong impact on KM performance. On the KM process factors, knowledge transfer and sharing was found to be the most important criterion, followed by knowledge generation on KM process. In contrast, knowledge utilization and knowledge codification and storage have comparatively less impact on KM process. Technology was found to be the second most critical factor affecting the KM infrastructure.

	(Adel I. Al-Alawi, Nayla Y. Al-Marzooqi, & Yasmeen F. Mohammed, 2007) Scale construction. 22 items questionnaire. Knowledge sharing. 4 items. Trust. 6 items. Communication between staff. 3 items. Information systems. 3 items. Reward system (aligned with knowledge sharing). 3 items. Organisation structure (supporting knowledge sharing). 3 items.	231 respondents. Fourteen sample questionnaires were distributed to a group with the same characteristics of the target sample to ensure that suggested amendments were suitable. Additionally, two experts in the field tested the survey. Several checkpoints were included in the survey through replicating certain questions in alternative means with the aim to verify reliability. Further, the survey included a combination of positive and negative statements in order to encourage concentration and care while answering. The analysis of variance (ANOVA) procedure with one factor (one-way ANOVA) test was used to compare the means of the five factors.	H1. There is a positive relationship between trust among co-workers and knowledge sharing in organisations. H2. There is a positive relationship between communication (interaction between staff) and knowledge sharing in organisations. H3. There is a positive relationship between the existence of knowledge sharing information systems/technology and knowledge sharing in organisations. H4. There is a positive relationship between the existence of a reward system aligned with sharing knowledge and knowledge sharing in organisations.	The results indicated that: Knowledge sharing is positively related to trust. Communication and knowledge sharing are positively related. As knowledge sharing increases, the existence of information systems also increase. Then, information systems and knowledge sharing are positively related. Knowledge sharing increases with the existence of reward systems aligned with knowledge sharing. Knowledge sharing prospers with the presence of certain positive features in organisation structure.

			H5. There is a positive relationship between certain aspects of organisation structure (participative decision making, ease of information flow, teams and communities of practice) and knowledge sharing in organisations.	
	(Rhodes, Hung, Lok, Lien, & Wu, 2008) Scale modification. Information Technology. 5 items. Learning strategy. 3 items. Trust culture. 5 items. Flexible structure and design. 3 items. Knowledge transfer. Codification knowledge transfer. 4 items.	223 respondents. A pilot study was conducted on 32 EMBA students, who work for high-tech companies. The survey instrument was tested in terms of clarity, reliability and content validity. Results of the confirmatory factor analysis reached the standard level according to the structural equation model. The standardized regression weights of all factors were statistically significant which suggested that all items were significantly correlated with each other. This result	H1. IT positively improves knowledge transfer significantly. H2. Learning strategy has a significant and positive influence on knowledge transfer. H3. Trust culture has a significant and positive influence on knowledge transfer. H4. Flexible structure and design has a significant and positive	IT, learning strategy, trust culture, and flexible structure and design as these four factors directly influence knowledge transfer. Results showed that learning strategy has the greatest impact on knowledge transfer as compared to others. Only personalization knowledge transfer had a significant correlation with innovation capability. Production innovation and process innovation had significant positive relationships

	Personalization knowledge transfer. 3 items. Innovation capability. Product and service innovation. 6 items. Process and technical innovation. 4 items. Organisational performance. Financial performance. 3 items. Non-financial performance. 3 items.	indicated that high convergence existed in these items. Cronbach's alpha coefficient indicated acceptable level in all dimensions.	effect on knowledge transfer. H5. Knowledge transfer has a significant and positive relationship with innovation capability. H6. Innovation capability has a significant and positive effect on organisational performance.	with organisational performance respectively. IT had a significant direct positive effect on product innovation and process innovation respectively.
	(Annette M. Mills & Trevor A. Smith, 2011)	189 respondents. The measurement model was assessed. The results showed one item measuring knowledge acquisition returned a loading of 0.40; this item was therefore excluded. Item loadings for all other constructs ranged from 0.668 to 0.926 exceeding minimum thresholds.	H1. Technology is not (directly) related to organisational performance. H2. Organisational culture is positively related to organisational performance. H3. Organisation structure is positively	The results showed that of the knowledge infrastructural capabilities, only organisational structure was significant vis-à-vis organisational performance; technology infrastructure was not expected to be significant. Hypotheses H1 and H3 were supported. Contrary to expectation, organisational culture was not

		Composite reliabilities and average variance extracted (AVE) were calculated and they exceed the recommended values. Inter-construct correlations and discriminant validity were evaluated. Construct AVEs were greater than the variance shared between the constructs satisfying the criteria for discriminant validity.	related to organisational performance. H4. Knowledge acquisition is positively related to organisational performance. H5. Knowledge conversion is positively related to organisational performance. H6. Knowledge application is positively related to organisational performance. H7. Knowledge protection is positively related to organisational performance. H8. Knowledge infrastructural capability is positively related to organisational performance. H9. Knowledge process capability is positively	significant; H2 was therefore not supported. For knowledge process capability, three processes were significant vis-à-vis organisational performance; knowledge acquisition, knowledge application and knowledge protection; H4, H6 and H7 were supported. Knowledge conversion capability was not significant; H5 was not supported. The composite (second-order) model accounted for 0.748 of the variance observed for organisational performance.

			related to organisational performance.	
	(Mahmoudsalehi et al., 2012). Scale construction based on literature review. Five sub-scales. 21 items total. • Knowledge management • Centralization • Formalization • Complexity • Integration	122 companies. Pre-test questionnaire was performance. The reliability coefficient was calculated using Cronbach's alpha. For assessing questionnaire validity, factor analysis was used. The effect of exogenous variable with endogenous variable was study using Structural Equation Model (SEM).	H1. Organisational structure relates positively to KM. H-1-1. Organisational structure (centralization) relates negatively to KM. H-1-2. Organisational structure (formalization) relates negatively to KM. H-1-3. Organisational structure (complexity) relates positively to KM. H-1-4. Organisational structure (integration) relates positively to KM.	Organisational structure in terms of centralization, formalization, complexity and integration is positively related to knowledge management.

Survey (English version)

A multi-perspective and multi-theoretical approach on the role of Knowledge Process Capabilities in enhancing patient safety.

The main objective of this research proposal is to conduct an exploratory study to evaluate the perform of a set of organisational theories that contribute to the development of knowledge process capabilities of healthcare professionals and its impact on patient safety, under the institutional context of Mexican Hospitals.

Invitation letter

1.- Strongly desagree
2.- Desagree
3.- Neutral
4.- Agree
5.- Strongly agree

DEMOGRAPHIC PROFILE

GENDER	
MALE	
FEMALE	

AGE	
Less than 20	
20 - 29	
30 - 39	
40 - 49	
50 or over	

Years of practice	
Less than 5	
05 - 09	
10 - 14	
15 - 19	
20 or over	

RESPONDENT POSITION	
Attending physician	
Resident doctor	
Intern	

INSTITUTION	
Private	
Public	

TYPE	
GP	
Specialist	
Nurse	
Medical technician	

EDUCATION LEVEL	
Medical Bachelor	
Master	
PHD	

Computer skills	
Poor	
Below average	
Average	
Above average	
Good	
Excellent	

ORGANIZATIONAL ATTRIBUTES TO SUPPORT KNOWLEDGE MANAGEMENT PROCESS	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. My organization has a clear vision and strategy to support learning and knowledge activities					
2. The organization's mission identifies values to which all employees must conform to facilitate the knowledge practices.	①	②	③	④	⑤
3. Your hospital's leaders have a well-defined vision of how promoting and participating in a collaborative environment will advance the strategic goals of the organization	①	②	③	④	⑤
4. My organization have established clear objectives for team working?	①	②	③	④	⑤
5. In general, considering both, the structure and the organizational characteristics, my organization is a knowledge-based organization.	①	②	③	④	⑤
COLLABORATIVE CULTURE TO ENCOURAGE KNOWLEDGE MANAGEMENT PROCESS	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
6. The atmosphere of my organizational unit helps employees trust others					
7. In my organizational unit there is significant cooperation and collaboration amog employees across functional roles.	①	②	③	④	⑤
8. My immediate supervisor supports and encourages my participation to foster a collaborative environment in my hospital unit.	①	②	③	④	⑤
9. It is important for me to learn from each of my job experiences and from my colleagues.	①	②	③	④	⑤
10. In our team, people support each other to prevent and learn from mistakes.	①	②	③	④	⑤
KNOWLEDGE SHARING BEHAVIOUR TO ENHANCE KNOWLEDGE PROCESS CAPABILITIES	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
11. I share my knowledge to any coworker if it is helpful to the organization.					
12. I intend to share my knowledge with other organizational members more frequently in the future.	①	②	③	④	⑤
13. I always provide my knowledge at the request of other organizational members.	①	②	③	④	⑤
14. My knowledge sharing with other organizational members is pleasant	①	②	③	④	⑤
15. My knowledge sharing with other organizational members is valuable.	①	②	③	④	⑤
16. My knowledge sharing with other organizational members is wise.	①	②	③	④	⑤
17. I often have an opportunity to talk to other staff about succesful programs or work activities in order to share my knowledge and experience.	①	②	③	④	⑤
18. I discuss new practices with my colleagues to promote the adoption of new ways to do our jobs.	①	②	③	④	⑤
19. I am always happy to tell my collegues of my involvement in finding new ways to do thigs.	①	②	③	④	⑤
TECHNOLOGY ACCEPTANCE TO FACILITATE KNOWLEDGE	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
20. It is easy to operate the available information system and do anything that I want it to do					
21. I find that the human interface of the available information system is clear and easy to understand	①	②	③	④	⑤
22. I see new potential benefits for my practice by adopting technologies for healthcare information.	①	②	③	④	⑤
23. The use of health technology and information systems will support me in my daily work.	①	②	③	④	⑤
24. The use of health technology and information systems will make it possible to work more efficiently.	①	②	③	④	⑤
25. The use of healthcare information systems increases the quality of medical treatment in my practice.	①	②	③	④	⑤
26. Using the available system for healthcare information is a good idea.	①	②	③	④	⑤
27. Using the available system for healthcare information is unpleasant.	①	②	③	④	⑤
28. I keep a positive attitude toward the implemantion and use of information systems in my organization	①	②	③	④	⑤
29. I frequently use the healthcare information system avalilable.	①	②	③	④	⑤
30. I am very satisfied with the use of the healthcare information system avalilable.	①	②	③	④	⑤
KNOWLEDGE PROCESS CAPABILITIES	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
31. In my practice, I usually encourage the creation of new knowledge from existing knowledge.					
32. In my practice, I constantly learn useful lessons from previous work experiences.	①	②	③	④	⑤
33. In my practice, I usually contribute to the distributing and organizing knowledge throughout the organization.	①	②	③	④	⑤
34. In my practice, I usually transfer my own experiences to other employees.	①	②	③	④	⑤
35. I usually apply knowledge available in my organization to solve new problems.	①	②	③	④	⑤
36. In my practice, using knowledge contribute to the improve the organizational efficiency.	①	②	③	④	⑤
37. In my practice, I am aware of the processes to protect knowledge from inappropiate use inside and outside the organization.	①	②	③	④	⑤
38. I know clearly the importance of protecting knwoledge.	①	②	③	④	⑤
39. The integration and application of knowledge in my daily activities is a normal practice.	①	②	③	④	⑤
ORGANIZATIONAL PERFORMANCE	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
40. My organization meets its performance targets on patient safety promoting knowledge management processes					
41. There is continuous improvement on patient safety by implementing knowledge management practices in my organization	①	②	③	④	⑤
42. After knowledge management processes are introduced, the capability to predict unexpected incidents on patient safety is improved	①	②	③	④	⑤
43. The knowledge management process increases the patient safety capability of our hospital.	①	②	③	④	⑤
44. The knowledge management process improves the quality of services to high-risk patients.	①	②	③	④	⑤

Encuesta (Versión en Español)

Una aproximación multi-perspectiva y multi-teórica en el rol de las capacidades del proceso del conocimiento en el impulso de la seguridad del paciente. El objetivo principal de la propuesta de investigación es conducir un estudio exploratorio para evaluar el rendimiento de un conjunto de teorías organizacionales que contribuyen al desarrollo de las capacidades del proceso de conocimiento de los profesionales de la salud y su impacto en la seguridad del paciente, bajo la lógica institucional de los hospitales Mexicanos.

Carta invitación

1.- Fuertemente en desacuerdo
2.- En desacuerdo
3.- Neutral
4.- De acuerdo
5.- Fuertemente de acuerdo

PERFIL DEMOGRÁFICO

GÉNERO	
FEMENINO	◯
MASCULINO	◯

EDAD	
Menos de 20	◯
20 - 29	◯
30 - 39	◯
40 - 49	◯
50 o superior	◯

AÑOS DE PRÁCTICA	
Menos de 5	◯
05 - 09	◯
10 - 14	◯
15 - 19	◯
20 o superior	◯

POSICIÓN DE QUIEN RESPONDE	
Médico tratante	◯
Doctor residente	◯
Interno	◯

INSTITUCIÓN	
Privada	◯
Pública	◯

TIPO	
Médico General	◯
Especialista	◯
Enfermera	◯
Técnico médico	◯

NIVEL EDUCATIVO	
Médico Licenciado	◯
Maestro	◯
PHD	◯

Habilidades computacionales	
Pobre	◯
Abajo del promedio	◯
Promedio	◯
Arriba del promedio	◯
Bueno	◯
Excelente	◯

CARACTERÍSTICAS ORGANIZACIONALES PARA APOYAR A LOS PROCESOS DE LA ADMINISTRACIÓN DEL CONOCIMIENTO	Fuertemente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Fuertemente de acuerdo
1. Mi organización tiene una visión y estrategias claras para apoyar las actividades de aprendizaje y conocimiento					
2. La misión de la organización identifica los valores con los cuales todos los empleados deben alinearse para facilitar las prácticas de conocimiento	①	②	③	④	⑤
3. Los líderes de tu hospital tiene la visión clara de que al promover y participar en un ambiente colaborativo se contribuye al avance de las metas estratégicas de la organización.	①	②	③	④	⑤
4. Mi organización ha establecido objetivos claros para el trabajo en equipo	①	②	③	④	⑤
5. En general, considerando ambas, la estructura y las caracteríticas organizacionales, ¿mi organización es una organización basada en el conocimiento?	①	②	③	④	⑤
CULTURA COLABORATIVA Y EL IMPULSO DE LOS PROCESOS DEL CONOCIMIENTO	**Fuertemente en desacuerdo**	**En desacuerdo**	**Neutral**	**De acuerdo**	**Fuertemente de acuerdo**
6. El ambiente de mi unidad organizacional ayuda a los empleados a confiar en otros					
7. En mi unidad organizacional existe una significativa cooperación y colaboración entre los empleados y a lo largo de los roles funcionales	①	②	③	④	⑤
8. Mi supervisor inmediato apoya y alienta mi participación para contribuir al ambiente colaborativo en mi hospital.	①	②	③	④	⑤
9. Es importante para mi aprender de cada experiencia de mi trabajo y de la de mis colegas.	①	②	③	④	⑤
10. En nuestro equipo, las personas se apoyan unas a otras para prevenir y aprender de los errores.	①	②	③	④	⑤
COMPARTIR CONOCIMIENTO PARA IMPULSAR LAS CAPACIDADES DEL PROCESO DE CONOCIMIENTO	**Fuertemente en desacuerdo**	**En desacuerdo**	**Neutral**	**De acuerdo**	**Fuertemente de acuerdo**
11. Yo comparto mi conocimiento a cualquier colega si hacerlo ayuda a la organización.					
12. Yo intentaré compartir mi conocimiento con otros miembros de la organización más frecuentemente en un futuro.	①	②	③	④	⑤
13. Yo siempre proporciono mi conocimiento cuando otro miembro de la organización me lo socilita.	①	②	③	④	⑤
14. Compartir mi conocimiento con otros miembros de la organización me agrada.	①	②	③	④	⑤
15. Compartir mi conocimiento con otros miembros de la organización es valioso.	①	②	③	④	⑤
16. Compartir mi conocimiento con otros miembros de la organización es acertado	①	②	③	④	⑤
17. A menudo tengo la oportunidad de platicar con otros compañeros sobre los programas y las actividades exitosas con la finalidad de compartir mi conocimiento y experiencia.	①	②	③	④	⑤
18. Debato nuevas prácticas con mis colegas para promover la adopción de nuevas formas de realizar nuestro trabajo.	①	②	③	④	⑤
19.Me agrada comentarle a mis colegas sobre mi participación en la búsqueda de nuevas formas de hacer las cosas.	①	②	③	④	⑤
ACEPTACIÓN DE LA TECNOLOGÍA PARA FACILITAR EL CONOCIMIENTO	**Fuertemente en desacuerdo**	**En desacuerdo**	**Neutral**	**De acuerdo**	**Fuertemente de acuerdo**
20. El sistema de información disponible es de facil manejo y hace lo que quiero que haga					
21. Considero que la interface o el entorno del sistema de información disponible es clara y facil de entender.	①	②	③	④	⑤
22. Veo nuevos beneficios potenciales para mi práctica con la adopción de las tecnologías de información para la salud	①	②	③	④	⑤
23. El uso de la tecnología para la salud y los sistemas de información me apoyarán en mi trabajo diario.	①	②	③	④	⑤
24. El uso de la tecnología para la salud y los sistemas de información harán posible trabajar más eficientemente.	①	②	③	④	⑤
25. El uso de los sistemas de información para la salud incrementan la calidad del tratamiento médico en mi práctica.	①	②	③	④	⑤
26. Utilizar el sistema disponible para obtener información de salud es una buena idea.	①	②	③	④	⑤
27. Utilizar el sistema disponible para obtener información de salud me desagrada.	①	②	③	④	⑤
28. Mantengo una actitud positiva sobre la implementación y el uso de los sistemas de información en mi organización.	①	②	③	④	⑤
29. Frecuentemente utilizo el sistema de información para la salud que está disponible.	①	②	③	④	⑤
30. Estoy muy satisfecho con el uso del sistema de información para la salud que está disponible.	①	②	③	④	⑤
CAPACIDADES DEL PROCESO DEL CONOCIMIENTO	**Fuertemente en desacuerdo**	**En desacuerdo**	**Neutral**	**De acuerdo**	**Fuertemente de acuerdo**
31. En mi práctica usualmente aliento a la creación de nuevo conocimiento partiendo del conocimiento existente.					
32. En mi práctica constantemente aprendo lecciones últiles de las experiencias de trabajo pasadas.	①	②	③	④	⑤
33. En mi práctica usualmente contribuyo a la distribución y a la organización del conocimiento a lo largo de la organización.	①	②	③	④	⑤
34. En mi práctica usualmente transfiero mis propias experiencias a otros empleados.	①	②	③	④	⑤
35. Usualmente aplico el conocimiento disponible en mi organización para resolver nuevos problemas.	①	②	③	④	⑤
36. En mi práctica, utilizar el conocimiento contribuye a la mejora de la eficiencia organizacional.	①	②	③	④	⑤
37. En mi práctica, estoy consciente del proceso para proteger al conocimiento del uso inapropiado dentro y fuera de la organización.	①	②	③	④	⑤
38. Conozco claramente la importancia de la protección del conocimiento.	①	②	③	④	⑤
39. La integración y la aplicación del conocimiento en mis actividades diarias las considero una práctica normal.	①	②	③	④	⑤
RENDIMIENTO ORGANIZACIONAL	**Fuertemente en desacuerdo** ①	**En desacuerdo** ②	**Neutral** ③	**De acuerdo** ④	**Fuertemente de acuerdo** ⑤
40. Mi organización alcanza sus objetivos de rendimiento con respecto a la seguridad del paciente promoviendo los procesos de la administración del conocimiento.					
41. Existe una mejora continua en la seguridad del paciente implementando las prácticas de la administración del conocimiento en mi organización.	①	②	③	④	⑤
42. Después de que los procesos de la administración del conocimiento son introducidos, la capacidad para predecir incidentes inesperados en la seguridad del paciente se mejora.	①	②	③	④	⑤
43. Los procesos de la administración del conocimiento incrementan la capacidad en la seguridad del paciente en nuestro hospital.	①	②	③	④	⑤
44. El proceso de la administración del conocimiento mejora la calidad de los servicios en pacientes de alto riesgo.	①	②	③	④	⑤

Appendix C: Summary of statistical techniques applied.

Section 1. Pilot Study

Technique: Partial Least Squares (PLS-SEM)
Software: SmartPLS

Sample Size for Pilot Study *"Sub-group or part of a larger population"* (Saunders, Lewis & Thornhill, 2009)				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Five (p. 195)	Recommendation in PLS-SEM for a Statistical Power of 80%	The importance of a good sample relies on its capacity to ensure that the results of the statistical method, such as PLS-SEM, are robust and that the model is generalisable.	Given that the proposed model, the pilot study, had four independent variables, the sample size recommended using the table shown in section 5.5; forty-one observations are needed to achieve a statistical power of 80%, with an R^2 value of at least 0.25 and a 5% probability of error. Accordingly, 50 questionnaires were distributed, and 47 were returned for this pilot study.	Hair et al. (2016)

Reliability *"Refers to whether scores to items on an instrument are internally consistent, stable over time, and whether there was consistency in test administration and scoring"* (Creswell, 2009)				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Five (p. 198)	Internal consistency reliability was analysed using **Cronbach's alpha criterion.**	Cronbach's alpha reliability is the most common measure for estimating internal consistency reliability, and it measures the scale's stability.	For Cronbach's alpha criterion, values indicated that the internal consistency reliabilities of the constructs are above the 0.70 thresholds (See Table 5.6).	Hair et al. (2016)
Chapter Five (pp. 198-199)	Composite reliability was evaluated using **outer loadings** of the indicator variables.	Composite reliability considers each indicator's contribution to its related construct by considering each indicator's outer loading. The threshold value of 0.70 suggests a good level of reliability.	Table 5.6 shows that composite reliability values exceeded the threshold level of 0.70	Hair et al. (2016)
Validity To evaluate "*the extent to which the research findings accurately reflect the phenomena under study*" ((Collis & Hussey, 2003)				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Five (p.186)	Content Validity	Content validity could be accomplished by careful definition of the research through the literature review and by the judgement of a panel of individuals.	The content validity of the questionnaire was addressed through a rigorous literature review (see Chapters Two and Three), and items were anchored in prior studies and validated surveys (see Chapter Four). For this research, scales were assessed by experts' judgements regarding the length and clarity of questions.	Saunders et al. (2009)

Chapter Five (pp. 198-199)	Convergent validity The average variance extracted (AVE) criterion	Convergent validity examines the degree of similarity between operationalised items that should theoretically be similar, suggesting that all items integrate a single construct. The average variance extracted (AVE) is a criterion that calculates the grand mean of the squared loadings of the indicators related to the same construct; this criterion explains the variance that a construct exerts on its indicators.	The AVE values for reflective variables showed the required minimum level of 0.50, ranging from 0.640 (KPC) to 0.780 (TA).	Hair et al. (2016)
Chapter Five (pp. 201-202)	Discriminant validity 1. Cross-loadings examination. 2. Fornell-Larcker criterion. 3. Heterotrait-monotrait ratio (HTMT)	Discriminant validity examines the lack of similarity between operationalised items. This evaluation validates that a latent variable differs from the other latent variables when theoretically they should not be similar. 1. Assessing cross-loadings is the first approach to evaluate that a construct is unique and that other constructs in the model do not represent the same phenomenon. 2. A second approach to evaluate discriminant validity is the Fornell-Larcker criterion, which is based on the premise that the square root of the AVE value for each construct should be larger than its correlation with other constructs.	1. The results showed that all indicators' outer loadings on the associated construct are greater than any of their cross-loadings, as shown in Table 5.7. 2. Regarding the Fornell-Larcker criterion, the AVE value's square root for each construct is larger than its correlation with other constructs. Correlations among the reflective constructs are displayed in Table 5.8.	Hair et al. (2016)

		3. Assessing the heterotrait-monotrait ratio (HTMT) is a third approach to evaluate discriminant validity. "*HTMT is the mean of all correlations of indicators across constructs measuring different constructs relative to mean of the average correlations of indicators measuring the same construct*". Therefore, a bootstrapping procedure was conducted by computing 5,000 bootstrap samples to verify that reflective measures are conceptually different using the Heterotrait-Monotrait Ratio (HTMT) statistic.	3. The HTMT ratio evaluated the pairwise correlation between constructs to verify that reflective measures are conceptually distinct. As seen in Table 5.9, the results are lower than the more conservative threshold value of 0.85; thus, this requirement is met. Testing whether the HTMT value is significantly different from value one to establish that the six variables are empirically different, a bootstrap confidence interval is obtained by computing 5,000 bootstrap samples. The result in Table 5.10 shows that value one falls outside the interval's range; this suggests that the evaluated constructs are empirically distinct.	

MAIN STUDY

Section 2. Preliminary data analysis

Technique: Data screening
Software: SPSS

Sample Size for Main Study *"Sub-group or part of a larger population"* (Saunders, Lewis & Thornhill, 2009)				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Four (p. 156)	Cochran's formula $n_0 = \frac{Z^2pq}{e^2}$	Cochran's formula allows calculating the sample size given a desired level of precision and reliability and the estimated proportion of the attribute present in the population.	Based on the stratified sample, considering a sample frame of 803 healthcare professionals (representing 83% of the population), a confidence level of 95%, a 5% margin of error, and a Z value of 1.96 for the confidence level desired, Cochran's formula calculated a sample size of 217. Taking into account the 72% of response rate, the suggested formula by Saunders et al. (2009) was used to calculate the number of questionnaires to apply to obtain the minimum sample size. Therefore 301 questionnaires were distributed, of which 299 completed questionnaires were obtained for the analysis.	**Saunders et al. (2009)**

Preliminary data analysis Tabachnick and Fidell (2013, p. 60)"F*ollowing data collection, researchers have to deal with a set of issues that need to be resolved through data careful examination, prior to conducting the fundamental analysis*" (Tabachnick &Fidell, 2013, p. 60)				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Six (p. 205)	Missing Value Analysis (MVA)	Researchers have to analyse and understand the causes of missing data and detect any pattern in observations to avoid influenced or biased results.	All variables have less than 1% missing values, except for the CCLMX, which has 1.4%. Ten cases with missing values (2.9% in nine cases and 5.9% in another) were identified; since these incidences were very low, they could not be considered offending cases.	Blunch (2013); Hair et al. (1999); Tabachnick and Fidell (2013).
Chapter Six (p. 206)	Little's test	Little's test confirms the randomness of missing data (missing completely at random - MCAR) through a comparison between missing and valid data.	The results demonstrated that missing values are missing completely at random.	Byrne (2016, p. 394)
Chapter Six (p. 206)	Multiple imputation (MUI) solutions	The MUI method uses several imputations for estimating each of the variables with missing values, creating several complete data sets, performing the desired analysis on each data set and finally combining the various analyses into one.	Since the MUI method is recommended by far as the best imputation method and is an excellent alternative to FIML, this method was used for this research.	Blunch (2013, p. 227)
Chapter Six (p. 207)	Boxplots	Allows identifying outliers within a dataset. An outlier is defined as "*a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that it distorts statistics*"	Some potential outliers were identified. For example, cases 17, 128, 195, 197, 260, 277, and 296 were outliers in different variables.	Tabachnick and Fidell (2013, p. 72)

Chapter Six (p. 208)	Mahalanobis squared distance (D^2)	For detection of multivariate outliers. This test measures "*the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all variables*".	The test revealed that thirteen cases (17, 24, 46, 47, 77, 91, 104, 128, 155, 195, 197, 221, 260) are potential outliers. Considering that the sample size surpasses the minimum sample size to obtain adequate power of model testing, the thirteen identified cases were eliminated.	Tabachnick and Fidell (2013, p. 74)
Chapter Six (pp. 210-211)	Normality (Descriptive statistics in SPSS) 1. Skewness 2. Kurtosis	An essential requirement in SEM analysis is that the data are multivariate normal. Two components of normality are skewness and kurtosis. 1. Skewness indicates the symmetry of the distribution. 2. The kurtosis value indicates the peakedness of the distribution.	1. Seventeen variables had skewness in absolute values between 0 and 0.5, which are approximately symmetric distributions, and the rest (10) had skewness values between 0.5 and 1, representing moderately skewed distributions. 2. The results of the sample showed that fourteen variables had moderate peaked distributions with kurtosis values > 0 (Leptokurtis), and thirteen variables had less peaked with thin tails distributions with kurtosis values < 0 (Platykurtis). 3. Table 6.2 shows values below .05, so the data significantly deviate from a normal	Tabachnick and Fidell (2013)

	3. Shapiro-Wilk's W test	3. The Shapiro-Wilk's W test is a standard normality test.	distribution. However, as Hair, Black, Babin, and Anderson (2010) posited, the non-normality has negligible effects on samples > 200; additionally, when maximum likelihood (ML) estimation is used, the non-normality issue is controlled and has negligible impacts.	
Chapter Six (p. 213)	Mardia's test (AMOS software)	Mardia's test measures multivariate distribution. This index and its critical value represent the normalised estimate of multivariate kurtosis.	Table 6.3 shows that the z-statistic of 19.783 is highly suggestive of multivariate non-normality. Because the data revealed evidence of multivariate kurtosis, a procedure known as "bootstrapping" for testing models based on non-normal data was used to conduct further analyses.	Byrne (2016, p. 367)
Chapter Six (pp. 213-215)	Linearity Scatter plots	*"The degree to which change in a dependent variable is related to change in one or more independent variables"*. An exponential or parabolic curve pattern in a scatter plots graph represents a non-linear issue.	The scatter plot matrix (Figure 6.1) did not show the mentioned patterns, so it can be stated that the data meet the linearity assumption.	Saunders et al. (2009, p.462)
Chapter Six (pp. 215-216)	Multicollinearity 1. Correlation coefficients	*"The extent to which two or more independent variables are correlated with each other".* 1. Any correlation coefficient superior to 0.9 indicates multicollinearity issues.	1. The correlation matrix between all variables showed values less than 0.8. Therefore, the data set did not show multicollinearity issues.	Saunders et al. (2009, p.463 Tabachnick and Fidell (2013) Hair et al. (1999)

	2. Tolerance	2. Tolerance is defined as the amount of variability of the selected independent variable not explained by the other independent variables.	2. Results showed no multicollinearity issues in the data set. All values showed a tolerance level above 0.10.	
	3. Variance inflation factor (VIF)	*3.* The VIF value indicates the magnitude of inflation in the estimated regression coefficients by the existence of correlation among the predictor variables; this value is calculated as the inverse of the tolerance value.	3. Results showed no multicollinearity issues in the data set. All values showed a VIF of less than ten.	Hair et al. (1999)

Section 3. Measurement Model Assessment

Technique: Structural Equation Modelling (SEM)
Software: AMOS

Measurement Model Assessment				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Six (pp. 218-219)	Confirmatory Factor Analysis (CFA) with reflective indicators The Maximum likelihood method (ML) was used to estimate coefficients.	CFA evaluates the relationships between observed measures and latent variables to establish the number and nature of factors that account for the variation and covariation among a set of indicators	The results revealed an over-identified model. The unstandardised estimates, the standard errors, the critical ratio and the standardised regression weights showed their strong statistical significance.	(Hoyle, 2012, p. 361)
Chapter Six (p. 220)	Overall measurement model Fit Statistics 1. Standardised Root Mean Square Residual (SRMR)	The model-fit measures were used to assess the model's overall goodness of fit. 1. "*The SRMR is defined as the root mean square discrepancy between the observed correlations and the model-implied correlations*". This value will be smaller than .05 or less in a well-fitting model.	After a review of an array of indices, the results indicate that the hypothesised 6-factors CFA model fits the sample data well. 1. SRMR value was .0471, showing a well-fitting model (SRMR < .05).	Byrne (2016, pp. 94-99); Hoyle (2012, pp. 215-218). Hair et al. (1999, p.192)

	2. Goodness-of-fit Index (GFI) and the Adjusted Goodness-of-fit Index (AGFI)	2. "*Model fit indices enable judging how well hypothesised model structure fits the empirical data and, thus, help to identify model misspecifications*". For these indexes, values close to 1.00 shows a good fit.	2. The GFI and AGFI values obtained were .884 and .859, respectively. Therefore, it is possible to affirm that the hypothesised model fits the sample data well.	Hair et al. (1999, p.193)
	3. Comparative Fit Index (CFI), the Incremental Index of Fit (IFI) and the Tucker-Lewis Index (TLI)	3. CFI, IFI and TLI provide measures of complete covariation in the data. For all indices, a value close to .95 is advised to indicate that the model describes the sample data.	3. The values obtained were .949, .950 and .943, respectively, which indicated a good fit.	Byrne (2016, p. 94).
	4. Parsimony Normed Fit Index (PNFI) and Parsimony Comparative Fit Index (PCFI)	4. PNFI and PCFI are indices related to the issue of model parsimony.	4. The calculated PNFI of .775 and PCFI of .836 fall in the range of expected values (>.50).	
	5. Root Mean Square Error of Approximation (RMSEA)	5. Values less than .05 indicate a good fit, and values as high as .08 represent reasonable errors of approximation in the population.	5. For this model, the RMSEA point estimate was .047, with a 90% confidence that the true RMSEA value in the population will fall within the bounds of .039 and .054,	

			representing a good degree of precision.	
Chapter Six (pp. 221-224)	Model improvement	CFA was run again to improve the model fit by adding error covariances or deleting possible problematic indicators. The modification indices (MIs) and the standardised residual analysis were reviewed.	After an iterative process, X^2 decreased from 502.80 to 401.666 and RMSEA from .047 to .039. Table 6.9 show the measurement model results (overall model fit)	Byrne (2016)
Chapter Six (pp. 224-230)	Measurement model fit assessment. Composite reliability (CR) Average Variance Extracted (AVE) Fornell-Larcker criterion	To determine if the proposed measurement model has acceptable levels of goodness-of-fit. The composite reliability (CR) was calculated to measure the overall reliability of indicators for a specific latent construct. The Average Variance Extracted (AVE) was calculated to assess the convergent validity of the construct. The Fornell-Larcker criterion evaluates discriminant validity by calculating each construct's square root of the AVE value.	Table 6.10 shows that all construct composite reliabilities (CR) values were higher than 0.70, indicating adequate internal consistency. Table 6.10 shows that CC and KPC constructs are lower than 0.50, which indicates validity concerns. Table 6.10 shows problematic variances between CC and OE constructs and KPC and KSB constructs. After an iterative procedure, five problematic indicators were found and deleted (KPCKU1, KSBP1, KSBSN, OELC and CCTRT). Then, the values were calculated again, obtaining the results shown in Table 6.11	Hair et al. (1999, p. 639)

			and demonstrating adequate convergent and discriminant validity at the construct level.	
	Standardised Factor Loadings of Construct Items	Convergent validity, at the indicators level, is examined by determining if each item correlates strongly with its assumed theoretical construct and if it is statistically significant through the t-statistic for each factor loading.	The results showed that all factor loadings are greater than .60 and range from .636 to .952 (See table 6.12). Hair et al. (2010, p. 685) suggested that loadings should be at least .5 and ideally .7 or higher.	
Chapter Six (pp. 230-234)	Common method variance (CMV) assessment	It is possible to minimise the potential effects of CMV by adding to the theoretical model an unmeasured latent method composed of all the measurements as indicators to test whether the shared variance across all items is significantly different from zero.	The unmeasured latent common factor was kept considering the CMV effect in the structural model evaluation. The unmeasured latent method factor showed a good and acceptable model fit. All factor loadings were greater than 0.5. Values of SRMR (.0320), GFI (.948), AGFI (.920), CFI (.994), IFI (.994), and TLI (.991) indicated good fit based on commonly used fit criteria. The PNFI of .679 and PCFI of .714 were in the range of expected values. The results obtained from Root Mean Square Error of Approximation (RMSEA) showed a good degree of precision.	Podsakoff, MacKenzie, Lee, and Podsakoff (2003)

Section 4. Structural models and hypotheses testing.

Structural models and hypotheses testing				
Chapter (page)	**Statistical method**	**Purpose for use**	**Results**	**Reference**
Chapter Six (pp. 236-241)	**Model 1 Direct effect on Organisational Performance (OP)**			
	Model estimation and testing	To evaluate the structural Model 1.	The results revealed an over-identified model. Parameter estimates did not show unreasonable estimates such as correlations greater than 1.0, negative variances, or excessively large or small standard errors.	(Hoyle, 2012, p. 361)
	Structural Model Fit indices (X^2/df- ratio, RMSEA, AGFI, SRMR, CFI, TLI, PNFI, and PCFI).	"*Model fit indices enable judging how well hypothesised model structure fits the empirical data and, thus, help to identify model misspecifications*."	Table 6.13 shows the model fit indices statistics for the overall level. The results revealed an acceptable structural model 1.	Byrne (2016, p. 94).

Chapter Six (pp. 241-242)	**Hypotheses testing** Squared multiple correlation coefficient (SMC) Critical ratio (CR) value	The next step is to test the research hypotheses. Hypotheses represent paths or relationships in the structural model between constructs. SMC represents the proportion of variance explained by the predictor of the variable analysed. To establish the statistical significance between the examined variables.	Model 1 explained 32.3% of the variance associated with Organisational Performance. Table 6.15 shows the results of the hypotheses testing in Model 1. H1a and H3a were supported.	Byrne (2016, p. 212)
Chapter Six (pp. 254-257)	**Model 2: A simple mediation model using Knowledge Process Capability as a mediator variable.** **Model estimation and testing** Structural Model Fit indices (X^2/df- ratio, RMSEA, AGFI, SRMR, CFI, TLI, PNFI, and PCFI.	To evaluate the structural Model 2. "*Model fit indices enable judging how well hypothesised model structure fits the empirical data and, thus, help to identify model misspecifications.*"	The results revealed an over-identified model. Parameter estimates did not show unreasonable estimates such as correlations greater than 1.0, negative variances, or excessively large or small standard errors. Table 6.24 shows the model fit indices statistics for the overall level. The results revealed an acceptable structural model 2.	(Hoyle, 2012, p. 361) Byrne (2016, p. 94).

Chapter Six (pp. 257-259)	**Hypotheses testing** Squared multiple correlation coefficient (SMC) Critical ratio (CR) value	Hypotheses represent paths or relationships in the structural model between constructs. SMC represents the proportion of variance explained by the predictor of the variable analysed. To establish the statistical significance between the examined variables.	Model 2 explained 32.3% of OP variation (see Table 6.25). Furthermore, the 62.1% of KPC variation is explained by its four predictors: organisational enablers (OE), collaborative culture (CC), technology acceptance (TA) and knowledge-sharing behaviour (KSB). Table 6.26 shows the results of the hypotheses testing in Model 2. H1a, H3a, H3b, and H4b were supported.	Byrne (2016, p. 212)
Chapter Six (pp. 271-272)	**Model 3: A multiple mediator model using two mediator variables Knowledge-Sharing Behaviour and Knowledge Process Capability.** **Model estimation and testing**	To evaluate the structural Model 3.	The results revealed an over-identified model. Parameter estimates did not show unreasonable estimates such as correlations	(Hoyle, 2012, p. 361)

	Structural Model Fit indices (X^2/df- ratio, RMSEA, AGFI, SRMR, CFI, TLI, PNFI, and PCFI.	"*Model fit indices enable judging how well hypothesised model structure fits the empirical data and, thus, help to identify model misspecifications.*"	greater than 1.0, negative variances, or excessively large or small standard errors. Table 6.36 shows the model fit indices statistics for the overall level. The results revealed an acceptable structural model 3.	Byrne (2016, p. 94)
Chapter Six (pp. 273-275)	**Hypotheses testing** Squared multiple correlation coefficient (SMC) Critical ratio (CR) value	Hypotheses represent paths or relationships in the structural model between constructs. SMC represents the proportion of variance explained by the predictor of the variable analysed. To establish the statistical significance between the examined variables.	Model 3 explained 32.3% of the variance associated with Organisational Performance in terms of continuous improvement of Patient Safety. Furthermore, it was found that its four predictors explain 62.1% of KPC variation: Organisational Enabler (OE), Culture of Collaboration (CC), Technology Acceptance (TA) and Knowledge-Sharing Behaviour (KSB). Finally, based on these results, 43% of KSB is explained by TA, CC, and OE. Table 6.38 shows the results of the hypotheses testing in Model 3. H1a, H3a, H3b, H4b, and H3c were supported.	Byrne (2016, p. 212)

Chapter Six (pp. 243-254, 262-270, 276-277)	**Multi-group analysis** 1. Configural invariance 2. Measurement invariance 3. Structural invariance 4. Factor covariance invariance 5. Structural residual 6. Error variance	A multi-group analysis was conducted to analyse whether the components of the measurement model or structural models' components are invariant across particular groups.	These results showed that the relationships OE → OP, CC → OP, TA →OP, KSB → OP, and KPC → OP are not moderated by gender or healthcare professionals' years of practice for all models.	Byrne (2016) Blunch (2013)
Chapter Six (pp. 259-262, 275-276)	**Mediation Analysis**	Mediation occurs when a second independent variable changes the relationship between another independent variable and the criterion variable, influencing the result.	Table 6.27 shows that for Model 2, the effects of the independent variables on OP cannot be explained through KPC. Therefore, hypotheses H1d, H2d, H3d and H4d are not supported. Table 6.39 shows that for Model 3, the positive but non-significant indirect effects of Knowledge-Sharing Behaviour and Knowledge Process Capabilities from all evaluated independent variables to Organisational Performance in Patient Safety. Therefore, hypotheses H1e, H2e, and H3e are not supported.	Hoyle (2012)

Please find below four figures which depict Appendix C detailed above. Appendix C provides a summary of each statistical procedure's results, indicates the appropriate references, and provides the page number where each statistical procedure is discussed in the PhD Thesis.

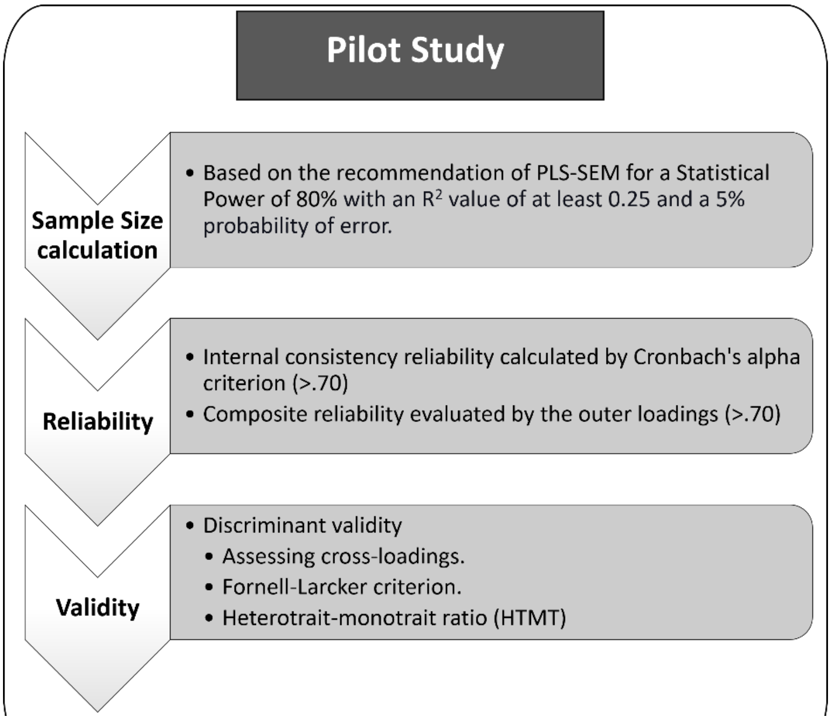

Figure Appendix C1: Statistical procedures for Pilot Study

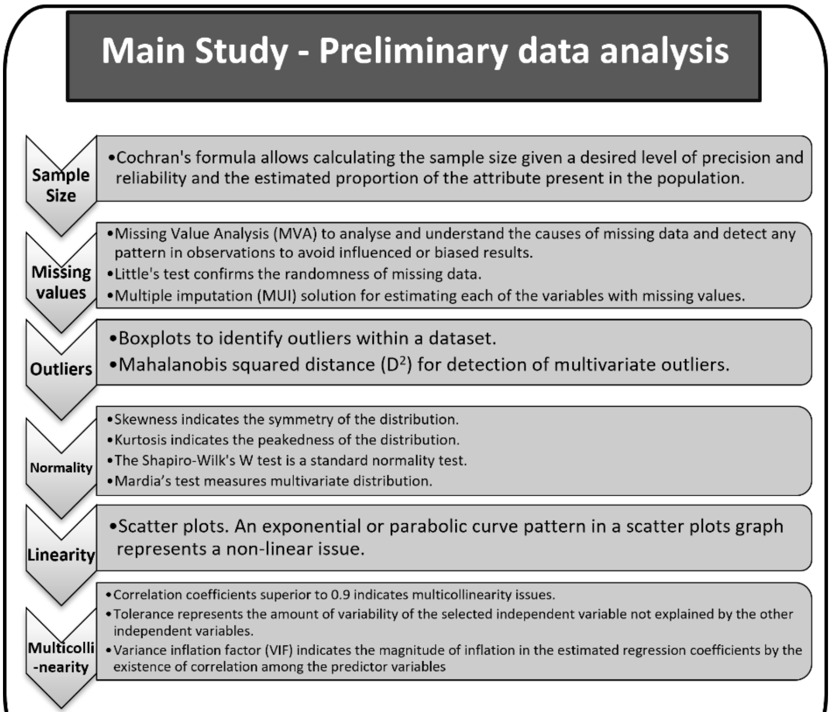

Figure Appendix C2: Statistical procedures for the Preliminary data analysis

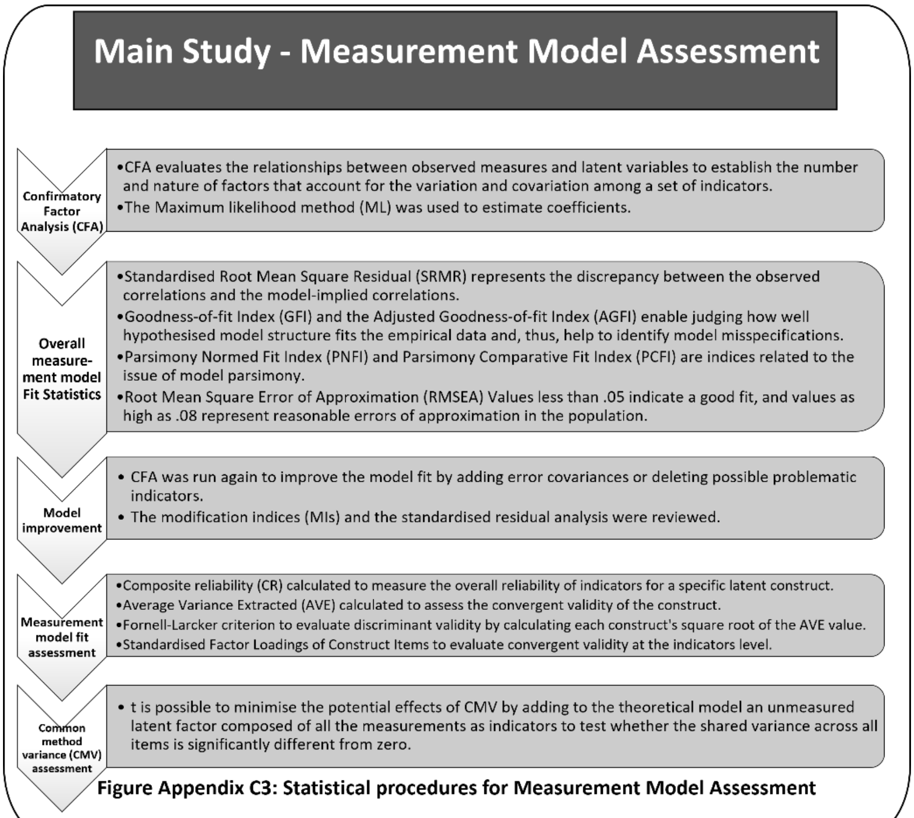

Figure Appendix C3: Statistical procedures for Measurement Model Assessment

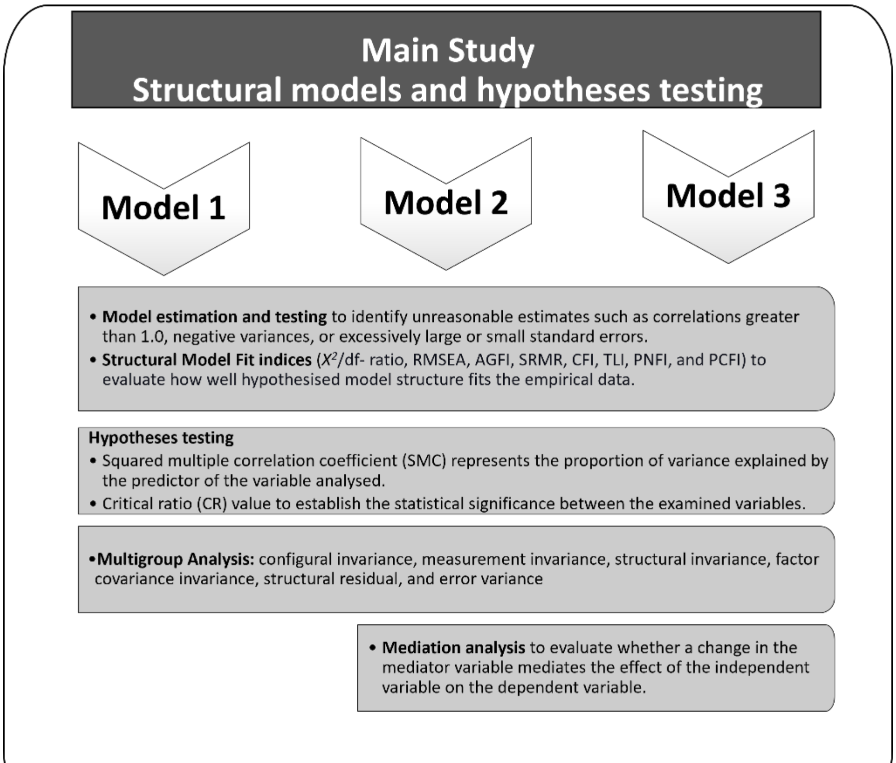

Figure Appendix C4: Statistical procedures for Structural models and hypotheses testing