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IMPROVING KNOWLEDGE ACQUISITION WITH OBSOLESCENCE PLANNING: THE CASE OF THE ZAMBIAN CIVIL SERVICE

by

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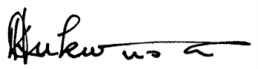
DECLARATIONS

I declare that this thesis, submitted by me, is my own work, that I have referenced all the sources that I have used and that no part was previously submitted at any tertiary institution.



Katongo Lukwesa

ABSTRACT

Background: This research addressed the challenge of knowledge obsolescence in the context of the knowledge economy. As the global community increasingly relies on intangible assets, including technology and digital platforms, Knowledge Management Systems have become essential. Intellectual capital, representing the value of knowledge, is a key driver of efficiency, innovation, and competitiveness. However, managing obsolescence in knowledge acquisition remains a significant challenge.

Methodology: A mixed-method approach was used, employing a research template as a tool and observing input from knowledge experts without direct influence. Data was collected from various Civil Service activities involving experts in different fields. New constructs were designed for analysing the attributes of knowledge structures.

Framework: The research drew on mathematical principles to develop a framework for analysing knowledge obsolescence. By defining and explaining concepts mathematically, clarity was ensured in subsequent analysis. The novelty of this framework was in its integration of obsolescence planning in knowledge acquisition, to ensure that outdated or at-risk knowledge is identified and updated in real time, making it dynamic. This was coupled with active acquisition as opposed to many models that emphasise passive documentation. Additionally, its use of IT integration and a forward-looking proposition to the use of other tools such as artificial intelligence made it stand out as more comprehensive, proactive, and scalable. This provided a more effective solution for complex environments such as the civil service.

Limitations: Challenges included defining attributes uniformly, accessing information sources and dealing with logistical issues in bureaucracy. Future research could explore these issues further and seek improvements. While some limitations were from methodological and resource gaps, as well as external factors, these could be mitigated by ensuring that different design approaches are taken, such as the use of more coding in templates to ensure forecasting and speed of collection and analysis is done.

Results: The study demonstrated that using the framework and models developed can result in useful tools for maximising the value of intellectual capital. Of the 19

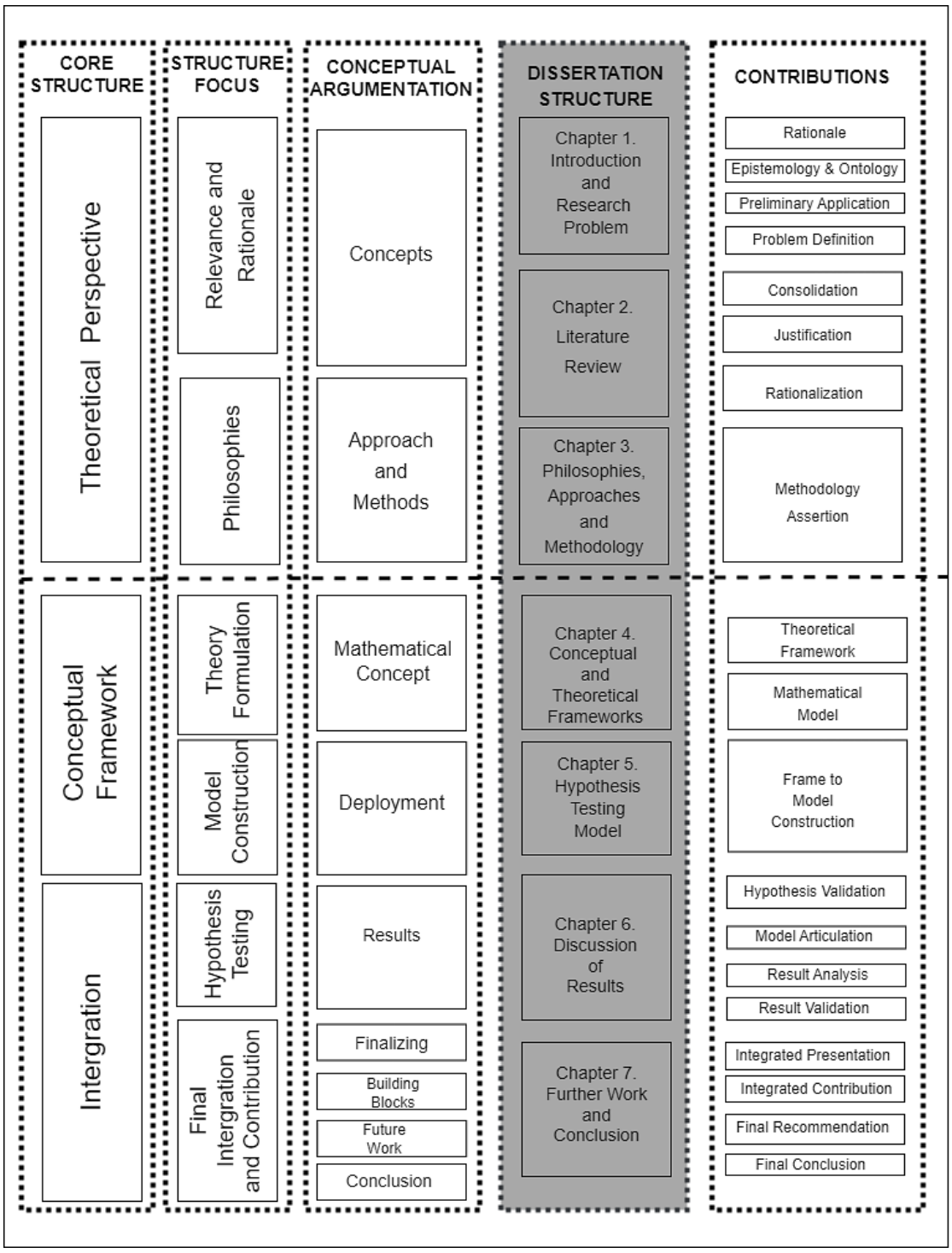
participating ministries or units, 74% were recommended for review of their obsolescence status, indicating the effectiveness of the approach.

Future Work: While this study focused on the civil service, its implications extend to academics, professionals, and modellers. Academics can incorporate new knowledge into classrooms, professionals can use techniques to address the concept, and modellers can benefit from new paradigms in this area. Despite that this was centred on the civil service, the research framework and model is applicable across different sectors of the public and private enterprises, respectively.

Keywords: Framework, Information and Communication Technology, Intellectual Capital, Knowledge, Knowledge Management Systems, Obsolescence, Planning

OVERVIEW AND THESIS MAP

Map 1 -- Main Chapter Map



This thesis is divided into seven chapters. To aid the flow of getting around this thesis, a thesis map is presented along with brief discussions of what each chapter covers. In this chapter, and throughout the thesis, the terms 'author' and 'researcher' are used interchangeably. Also, the terms 'research' and 'study' are used functionally and in most cases can also be regarded as interchangeable in their application. In Chapter 2, the researcher made some comments as corollary to the literature review that may themselves stimulate other researchers to read more into the whole concept of knowledge acquisition in particular and knowledge management in general.
The map is shown in the previous page. These comments are in italic after citations.

This research dissertation is laid out functionally as follows:

The Abstract gives a synopsis of the entire dissertation; including the setup, methodology, and anticipated and realised results. The main aim was to answer the problem statement made in Chapter 1, which examines whether knowledge acquisition can be enhanced with obsolescence planning. The aspect of obsolescence is considered a previously unaddressed concept laying the foundation for this study.

Chapter 1 is an overview of the research, offering a summarised introduction to the subject matter, and the problem at hand. The problem statement was presented as a major question, with sub-questions and hypothetical scenarios derived from it. The objectives were outlined, suggesting approaches to conducting the research.

Chapter 2: This chapter presents a literature review on Knowledge Management, focusing on obsolescence planning during knowledge acquisition. Various sources were used to discuss the historical fundamentals of knowledge and the impact of intellectual capital. Considerations for how knowledge is created, managed, and stored were made to examine the concept of obsolescence.

Chapter 3: This chapter outlines the methodology plan, exploring different methodological philosophies, approaches, and methods. The researcher reviewed different philosophies and approaches to establish and justify the choice made for the research.

Chapter 4: This chapter introduces the theory and framework on which the hypothesis is based, discussing two central cases related to the research question. The discussion

lays the foundation for developing models to address the research problem identified earlier.

Chapter 5: This chapter discusses the results from the hypothesis testing model based on the framework set up in Chapter 4. A model including various aspects of consideration for artifacts is made and discussed.

Chapter 6: This chapter analyses and tests the research problem hypothesis, along with designing further solution components in spreadsheet form. A workbook integrating inputs, processing, and summarising input information is designed and deployed. This is based on Chapter 4 (from Section 4.6)'s framework, and the design discussed in Chapter 5.

Chapter 7: This chapter concludes the research, discussing limitations and contributions to the body of knowledge. Recommendations for future work are also suggested based on the research output as well as limitations and challenges encountered during the study.

ACKNOWLEDGEMENTS.

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Stella: Thank you! To my wonderful daughter, Mukobe, and my buoyant, cool son, Muhenda, the two people in my life who have dared to follow me through the straight and narrow and learnt to understand that papa, too, is only human. Thank you for your patience. Kasaija – quietly observing, quietly encouraging. You've always been a wonderful son. Thank you! To Tomas Kapiye – my wonderful son, and comrade in arms and brother to my guys – you are truly #BeTomas. I owe you one! Thank you!

Muhenda, although you are no longer here to physically see and experience this accomplishment, I am keeping your memory alive specially to celebrate this milestone about which you often asked progress.

To the multitude of folks out there who urged and cheered me on. I cannot mention each one of you by name but trust me I owe you one. Thank you!

Finally, to those that asked me to walk my talk: I got up, dressed up, and showed up. You can too.

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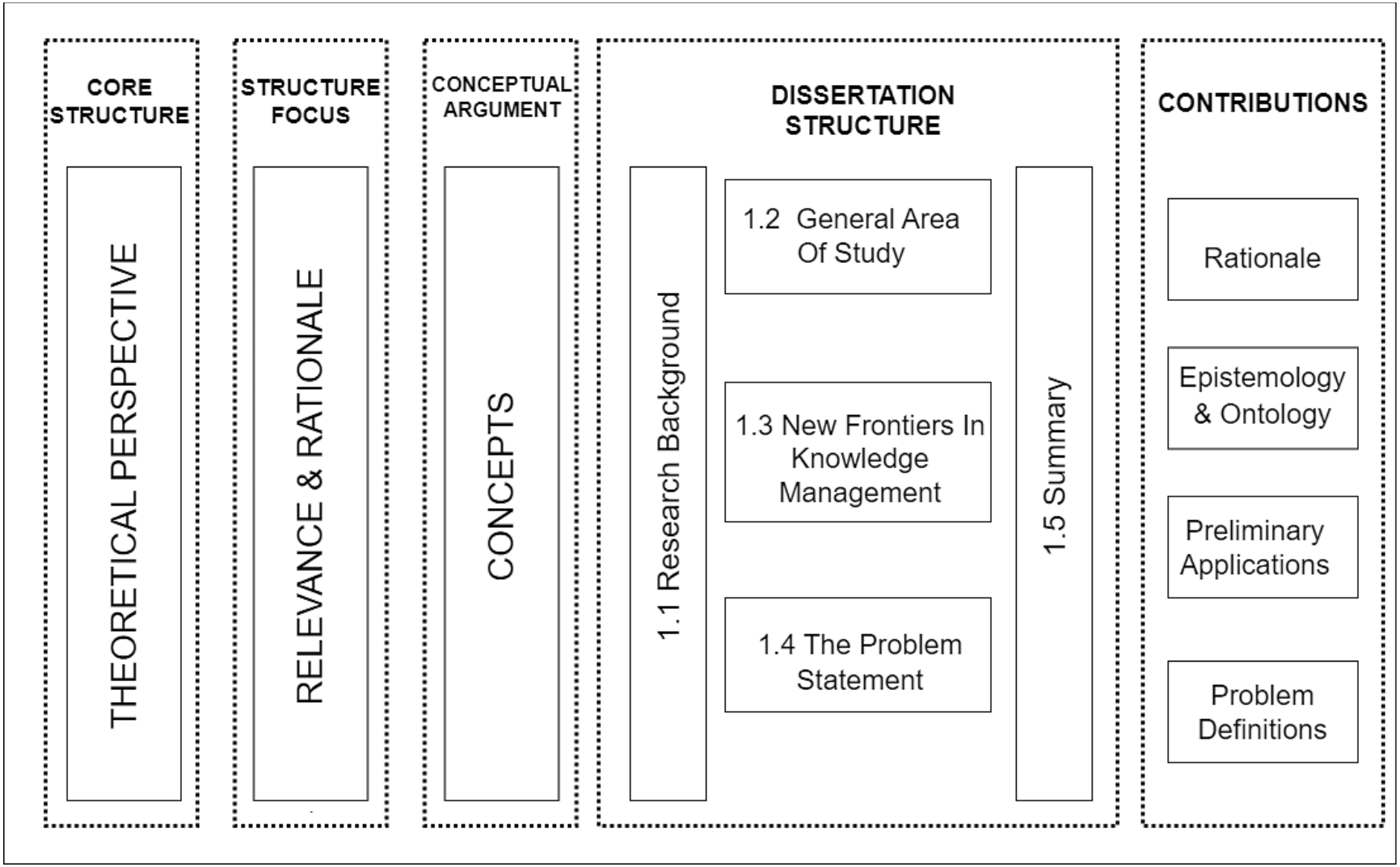
CHAPTER ONE INTRODUCTION AND RESEARCH PROBLEM

Map 2 -- Introduction and Research Problem



CHAPTER ONE INTRODUCTION AND RESEARCH PROBLEM

Layout:

1.1 Research Background.

The aim of this research was to enhance the existing knowledge base in the field of knowledge management. The study investigated two broad aspects of knowledge: the importance of timing in gathering qualitative knowledge and the effective utilisation of sound strategies for knowledge maintenance. Obsolescence is considered as the decision of whether or not to use the knowledge acquisition artefact based on its attributes over time or as a perception of the expert using a particular knowledge acquisition strategy. A few considerations were made based on background knowledge from literature and from the research. The only way one would be able to measure obsolescence is with the function of time, regardless of definition of that interval. In this sense, therefore, a framework was developed to deal with this.

The research aimed to create a framework that endeavours to establish a clearer approach to the manner in which improved knowledge acquisition is made by progressively zeroing in on obsolescence planning; the gap is noted as that which exists between any two progressions of how knowledge is acquired (especially in phases of different aspects and functions of how the correlated human enterprise moves forward with efficiency and effectiveness). This is done with the knowledge that has been acquired consistently over time. It is the considered view of the research that aside from definitions of obsolescence based upon auxiliary aspects of the knowledge, not much is said about the intrinsic process that is involved in this *sub-process* itself. By auxiliary aspects, the research refers to those peripheral influences on knowledge such as information technology or software applications developed to manipulate data, and information.

Further, this research endeavoured to use mathematical concepts in order that clarity of the framework is made. The researcher's initial mathematical background instructed that any phenomenon that can be explained mathematically would be simpler to articulate and consistent to return to for future modelling and analysis. A detailed discussion was made on this in Chapter 4 of this thesis.

It is also a good idea to deal with the concept of knowledge, knowledge management, and its artefacts in order to clearly understand the research theme. It is the deliberate purpose and proposition of this research to delve into first principles including how different concepts of knowledge have been presented over time. This is done in the literature Chapter of this research.

Etymologically, knowledge encompasses a progression from data collected, processed to create information and progressively aiding know-how (and know-what was discussed). It is sometimes controversially argued that knowledge is as a result of a fad, and this is examined. It is also sometimes argued that knowledge is an elevated but horizontally related aspect to information which in itself should be the end game. Again, this is examined in literature and discussion.

The epistemology of knowledge has brought about debate as to what the whole frame of knowledge management is and what the various efficacies entail. As shown in this

thesis, a discussion on this and how it affects various aspects of society is made and presented. This includes the methods and validity of the scope of knowledge and knowledge management.

This then boils down to how knowledge is acquired. In order that the idea is understood well the concept is treated in some detail including some accessory views as well as some specific concepts. Some concepts arise from using technology, others from the implicitly and explicitly studied phenomena of knowledge itself. This is the discussion that introduces concepts that attempt to fill the gaps resulting from observing the behaviour of a number of processes and frameworks. For the expediency of the research, a concentrated discussion is taken using two formal and preliminary sources: The National Planning Commission as well as the Building Archives, both within the Republic of Namibia. The suitability of each of these is the fact that one has a sophisticated, complex framework that cuts across disciplines, whereas the other, though still complex, concentrates on a singular aspect of the Civil Service function, that is, buildings archiving. These were specifically used as instances and not as research input. They respectively represented the two broad categories that the researcher forecast to use in the eventual collection stage.

The other suitable option for this situational observation was found to be the Zambian civil service. Most functions of the Namibian Civil service are similar to those that the Zambian civil service practice. As the author is indigenous to Zambia it is a very good alternative to consider carrying out the research. The research discusses both the Zambia and Namibia Civil Service sectors as either could provide useful input to the successful performing of the research. The eventual source that was settled for was the Zambia Civil Service through a coordinator at one of the Institutions overseeing the automation and digitalisation of the civil service units in the country.

1.1.1 What Knowledge Entails.

Over the past few decades, knowledge has gained significant prominence, primarily due to its connection with the rise of digital businesses. Ashok Jashapara notes that a consistent definition of knowledge remains elusive. Consequently, there has been a tendency to conflate information systems and information management with the

concept of knowledge and its associated knowledge management (Jashapara, 2011). Clearly, there has been a notable confusion between Information Systems, Information Management, and the concepts of Knowledge and its corresponding Knowledge Management.

Knowledge exhibits an interdisciplinary character, leading various fields to endeavour to define and lay claim to it within their respective domains. Libraries, among others, have traditionally served as repositories of knowledge, offering unique perspectives on knowledge management. However, this has resulted in diverse approaches to the paradigms of knowledge and knowledge management, lacking a unified perspective. (Jashapara, 2011).

In a meticulously crafted paper, Lyn Margherio elucidates that the burgeoning digital economy is propelling the evolution of the knowledge management paradigm. It is noteworthy how the surge in digital delivery, as outlined, is subsequently driving down capital and distribution costs while expanding revenue streams that are progressively shifting towards the internet. Furthermore, it is evident that information has assumed heightened significance and is now perceived in a more comprehensive manner (Margherio, 1998). As this has advanced, the distinction between information and knowledge has become more apparent.

In spite of certain challenges, careers in Information Systems and Information Technology have demonstrated a consistent and gradual growth trajectory over the years, driven by the increasing migration of systems and services to digital platforms.

A good question to ponder is what knowledge and its attendant concept of its management entails. It means that most studies including this one needs to look at knowledge in terms of establishing a premised and more refined definition that is set in a more clarified way of conceptualising and acquiring it. This study delved into a contextualised approach to knowledge and knowledge acquisition, aiming to illustrate how knowledge can be effectively harnessed and maintained to prevent obsolescence or the acquisition of outdated information, thus reducing redundant maintenance efforts.

Regarding the obsolescence of knowledge, the research aimed to establish a practical definition and foundational premise, which would serve as the basis for the framework developed later in the study.

1.2 General Area of Study.

This study falls within the domain of Knowledge Management. It was inspired by a previous investigation into expert systems, which fuelled the desire to expand upon and delve deeper into this research area. The impact of expert systems on the researcher's prior work played a significant role in sparking the interest to embark on this study. It was from the study of Expert Systems and how they are used to store expertise that was fast becoming scarce that the extended consideration of how acquisition could be done more accurately was made. It can therefore be seen that the establishing of expert systems as a means to store experts' skills sets led to this pursuit of narrowing down to knowledge acquisition.

Expert Systems primarily rely on explicit knowledge to handle specific routine tasks and address skill shortages across various professional domains.

The idea that a knowledge base could collect information and add to the functioning of a problem-solving model enabling less knowledgeable or skilled individuals carry out functions and tasks as nearly or as completely skilfully as an expert was a good starting point to the curiosity of what it means to actually acquire knowledge. But more than this, what was at issue as a curiosity mostly was what happens to knowledge *progressively*? Knowledge acquisition systems do not seem to have a good enough posit beyond the fact that attendant obsolete systems are replaced with new, well-functioning ones. This, as the author mused, was not a satisfactory enough answer. Perhaps that was a reason why it appeared to be that some aspects in phenomena appeared to be disjointed in the way that knowledge was articulated.

A valuable outcome of the study was the intriguing exploration of which aspects of knowledge required ongoing articulation and connectivity. This led to the recognition that certain processes related to knowledge acquisition, its processing, and the resulting outputs needed to undergo thorough scrutiny and examination. The focus

was to take care of these outputs and whether some 'ageing' of sorts could be studied, examined and explained. These outputs from raw data earlier was information useful to be used in a knowledge construction that would analyse them for this purpose.

1.2.1 Conceptualisation of Knowledge.

Throughout history, the essence of knowledge has been a topic championed by various thinkers. Jashapara points out that Plato offered three different interpretations of knowledge, categorising it as perception, true judgment, and true judgment accompanied by an explanation (Plato, 1992). Aristotle, in contrast to his teacher Plato, took a somewhat different path in his philosophical approach. He delved into the rational and natural aspect of the world, working from complexities down to fundamental beliefs that formed the core of his philosophy (Aristotle & Lawson-Tancred, 1998). So, whilst Aristotle pointed to judgement as a central theme in asserting knowledge, Plato appeared to have moved towards rationalisation and observing natural phenomena in defining his concept of knowledge (Jashapara, 2011). So when judgement wavers, does that mean knowledge becomes obsolete or does untruth take its place in dropping it away? What happens when rationality *changes* so to speak? Does knowledge 'shift' into a new phenomenon or are the old knowledge points dropped and therefore obsoleted?

Furthermore, numerous proponents have championed the exploration of the concept of knowing. Rene´ Descarte famously introduced his *Cogito ergo sum*, "*I think, therefore I am*" (Descartes, 1996) offering an intriguing perspective on the nature of knowledge. This concept sparked the development of several interesting ideas surrounding knowledge. This study did not endeavour to provide an exhaustive or indepth consideration of the concept of knowledge beyond those concepts that would aid this research. It was crucial to gain a deeper understanding of the various approaches to collecting and preserving knowledge.

1.2.2 Rationale of Study.

The motivation behind this study was primarily influenced by the transition from a predominantly 'mechanistic' approach to knowledge production to one characterised

by a 'knowledge-intensive' approach. This shift not only underscores the importance of placing knowledge at the forefront of all endeavours but also emphasises the necessity of ensuring that what is collected and retained is adequately articulated and accounted for.

The researcher considers ‘mechanistic’ to imply those aspects of knowledge gathering or manipulation that involve mostly drivers such as technology and other system components that have traditionally been the premise of Information Technology as such. These are defined as contentions by this research. ‘Knowledge-intensive’ in this case tries to look more closely at the epistemology of knowledge as a part of the system itself; as a component that otherwise is working in its own right. Aided by technology it defines concepts such as storage, learning and disbursement. There has to be a driver of different human endeavours and technology and automation as such have proven themselves to be universal contentions in this regard.

As further observation revealed, there has frequently been a conflation between information and knowledge, and at times even with data. Consequently, the ongoing endeavour in knowledge research involves addressing and resolving some of these conceptual ambiguities. A number of definitions have been made of knowledge. Knowledge has been precisely difficult to pin down as a definition because of its two-part definition of explicit and tacit knowledge. Even then, tacit knowledge has its two components of cognitive and technical.

Generally defined, knowledge is ‘processed information that is actionable’, or simply actionable information. (Jashapara, 2011). This definition is, of course over-simplified as it does not do justice to some aspects of knowledge that would otherwise expand on this fairly practical definition.

In his book on knowledge creation of management consulting, Francesco Ciampi notes that knowledge creation theory is based on the categorisation of two essential dimensions, essentially helping to define knowledge, namely, epistemological and ontological dimensions, respectively (Ciampi, 2008). In order to appreciate this, some definitions from early proponents of knowledge management are worth looking at.

1.2.3 Epistemology.

Epistemologically, it is possible to define knowledge beyond the variety of postulates to look at knowledge as comprising two dimensions, namely, tacit and explicit knowledge. **Figure 1** below discusses some epistemological concepts around knowledge and its broad classification.

Explicit knowledge is expressible and codified. It can also be transferred quite easily through formal and systematic means or languages (Polanyi, The Tacit Dimension, 1966). Tacit knowledge, on the other hand is best described in Polanyi's well-known idea that "we know more than we can tell" (Polanyi, Personal Knowledge, 1985). Whilst explicit knowledge looks to codification and easy transfer of knowledge, tacit knowledge on the other hand relies on personal experiences such as insights, personal experience, and other skills that are way too cognitive to be coded. Polanyi aptly notes from his iceberg presentation below; how explicit knowledge is only the tip of an iceberg. Tools to explain tacit knowledge as a measured aspect are still an interesting and increasingly Holy Grail in the field of psychometric analysis.

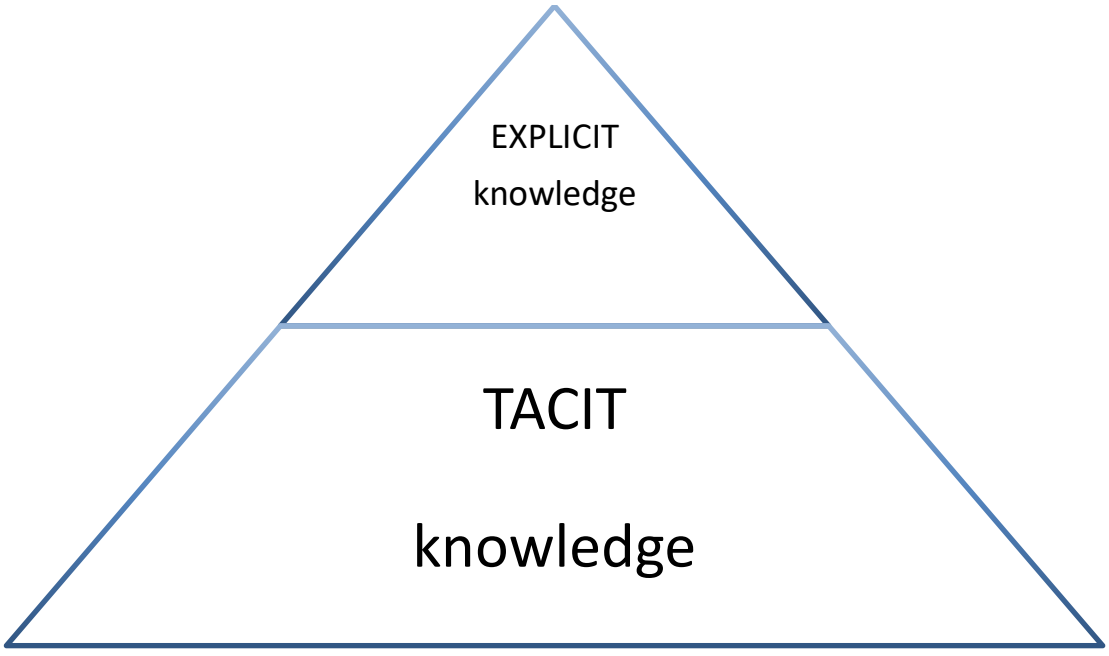


Figure 1 – Polanyi's knowledge iceberg.

To understand the nature of tacit knowledge, however, it is worth noting that there is a dual nature to it (Nonaka & Takeuchi, 1995). Nonaka and Takeuchi note that the

technical part of tacit knowledge includes all "informal skills" that comprise "technical know-how" needed to carry out an activity or operation. The cognitive part is what comprises the cognitive elements such as beliefs and mental makeup that a person uses to perceive what (Nonaka & Takeuchi, 1995) is before them in order to be able to imagine how to manipulate the task at hand. Tacit knowledge is only observed when it is expressed. Despite being observed when expressed, however, tacit knowledge is not easy to share, much less to express in precise ways. In the paired collection of information from experts, this research observed the different ways in which each expert viewed the artefacts they were working with giving rise to the same knowledge structure and result. The treatment of the result was similar, but the view of attributes within the equally differing artefacts differed in most cases.

1.2.4 Ontology.

The ontological dimension enables knowledge categorisation with reference to the components involved in its creation, such as individual, group, organisational, and inter-organisational knowledge (Ciampi, 2008). It is worth noticing from these components that a paradox pointed out by Argyris and Schön arises. According to them:

"*There is something paradoxical here. Organisations are not merely collections of individuals, yet there are no organisations without such collections. Similarly, organisational learning is not merely individual learning, yet organisations learn through the experience and actions of individuals. What, then, are we to make of organisational learning? What is an organisation that it may learn?"* (Argyris & Schön, Organizational learning: A theory of action perspective, 1978).

It is clear to see that even as the clarifications are brought out, there is still a lot of room available to definitively define knowledge. That said, however, this is a good incentive to investigate and research further into the idea of knowledge, how it is acquired as well as how it is maintained.

Despite these seeming paradoxes, the relationship between explicit knowledge and tacit knowledge is apparent. It is clear that tacit knowledge forms the basis for explicit

knowledge (Polanyi & Prosch, "Personal Knowledge", 1975). This further explains that knowledgeable individuals are able to express and share knowledge, in effect exchanging such knowledge amongst themselves. This research aimed to enable both explicit and tacit contributions from respondents. Explicit in the way that the procedures a respondent is dealing with are used. Implicit in the way that an expert attempts to describes, in remark form, their viewpoint on the case at hand – be it an artefact, or attribute

Takeuchi and Nonaka illustrate knowledge conversion but especially the close linkage between explicit and tacit knowledge in **figure 2** reproduced below:

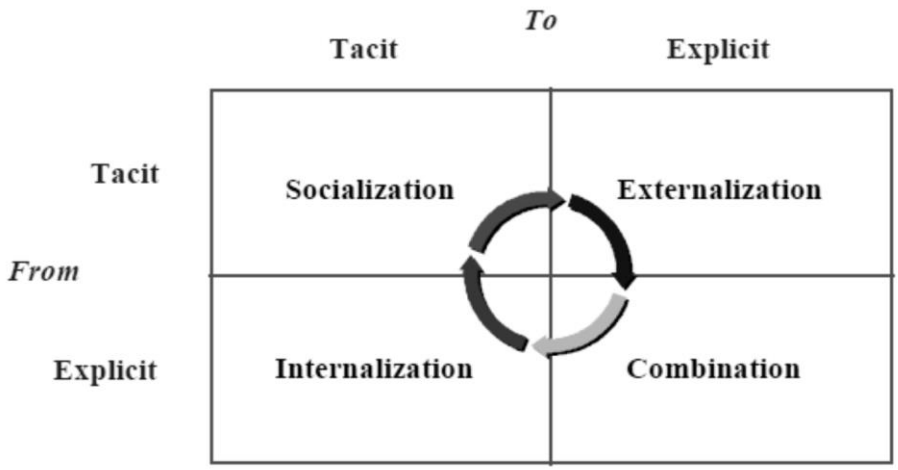


Figure 2 – Knowledge Conversion Illustration (Adapted from Nonaka and Takeuchi, 1995)

This tends to show that the two dimensions of tacit and explicit knowledge are two sides of the same coin, so to speak.

In terms of the role that Information Technology (IT) plays in enabling the sharing and storing of knowledge, there appears to be a proportionate relationship. Alavi and Leidner note that higher explicit knowledge value appears to affect the higher value of IT applied to it; on the other hand, smaller shared knowledge space appears to render the application of IT less than would be necessary (Alavi & Leidner, 2001).

Alavi and Leidner show a good illustration of how knowledge is created and stored. The **figure 3** below shows this.

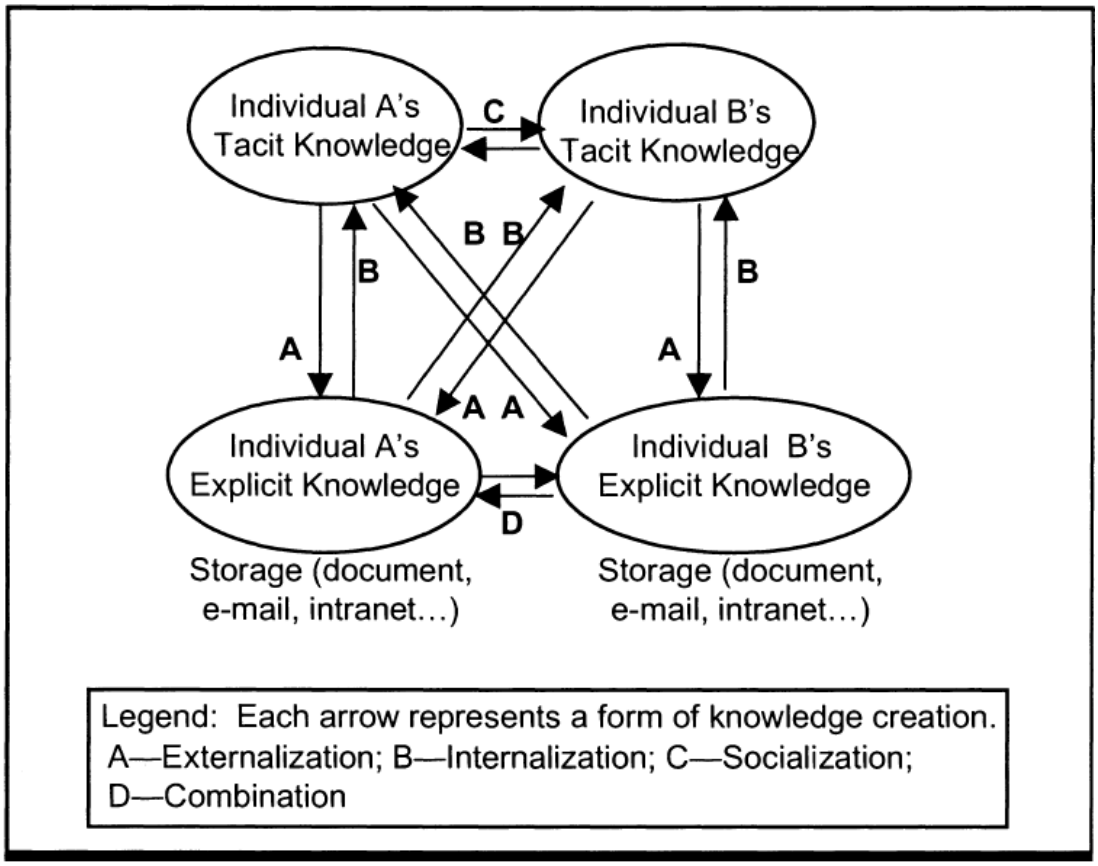


Figure 3 – Knowledge Creation Modes (Adapted from Alavi & Leidner, 2001)

In discussing this model, what is of note is how tacit knowledge flows socially between individuals (hence creating group knowledge sharing) creating explicit knowledge of each individual, A and B, respectively. This explicit knowledge resulting from the interaction of tacit knowledge of A and B combines to create a larger storage base for knowledge thus created (by inference, 'acquired') (Alavi & Leidner, 2001). It was the aim of this research to allow this interaction to play out during the course of carrying out the research. The methodological design of the research instrument strove to put this into practice.

Information Technology is a catalyst in enhancing the efficiency of the combination mode of knowledge. As earlier noted this higher interaction of knowledge sharing implies an increased use of Information Technologies that are used to enable its storage and retrieval.

This research leans towards the practicable definition of knowledge, namely its codification, as well as the actionable value of it. In this way, therefore, it is justifiable

to begin examining the time factor relating to knowledge acquisition and maintenance as well as what it means to 'age' knowledge in relation to its artefacts and the epistemological considerations. Additionally, allowing experts in their field as respondents, to work with the research instrument independently, would give a glimpse into what tacit behaviour each would have in their approach to their work function.

In considering the rationale of this study, hence, it is important to consider that organisations and other entities overtly or covertly cover these aspects of knowledge as it is acquired. There are instances where tacit knowledge is sought from individuals of skill and expertise and there are also instances where knowledge is sought from already processed information such as in manuals and instructional guides. These in turn help to acquire and consolidate knowledge. Over time, there is a cycling between the tacit and explicit knowledge seamlessly.

1.2.5 Sustaining Knowledge Management and Systems.

Defining knowledge is a challenging task, and similarly, defining knowledge management poses its own difficulties. Numerous attempts have been made to define knowledge management, and as Michael Earl highlights, one approach is to categorise knowledge management into broad "schools" or perspectives, such as the Technocratic, Economic, and Behavioural schools (Earl, 2001). These categories or schools are regarded as fundamental components that contribute to the foundation of knowledge management. They represent domains where knowledge articulation is undertaken with the aim of enhancing the well-being and significance of communitiesties.

The Technocratic school of thought focuses on technologies and their role in assisting knowledge workers in their daily tasks. Conversely, the Systems school of thought is acknowledged as a firmly established approach in knowledge management, closely linked to, yet not always interchangeable with, the methodologies of knowledge-based systems. The idea underpinning knowledge-based systems revolves around the capture of specialised or expert knowledge, which can subsequently be accessed by other experts within the same field (Earl, 2001).

The concept of knowledge-based systems aligns with the Economic school of thought, with a particular emphasis on financial outcomes, as opposed to the other two schools. Additionally, there's the Behavioural school, which takes into account factors like organisational networks, spatial considerations, and strategic mindsets. This approach frequently returns to the core inquiry of how to efficiently manage knowledge and how systems can contribute to supporting the diverse perspectives within the field of knowledge management. **Table 1** below, adapted from Earl, shows the various schools of knowledge management.

It is clear that knowledge cuts across various disciplines with the underlying characteristic consistent amongst each one of them being the desire or need to activate some form of gain. This gain can be in the form of profit if it is commercial, effective decision-making if some process is required or some feedback demanded. It could be the realisation of a capability especially in the natural sciences, or creating a realisation of a higher consciousness in behavioral areas.

In all these, the table shows us how important it is that knowledge is dedicated to ensuring that all threads leading up to its acquisition is fed with both quality information as well as reliable timelines.

Also, worth noting is that knowledge philosophical etymologies underpin its activation. Codification in systems ensures an action is reliably informed and grounded in fact while a capability in an engineering science ensures the highest efficiency is realised out of a system. In the commercialisation of knowledge, it is noteworthy to see how the various conceptualisations of information required to achieve otherwise mundane goals lend profitability in its sharable value to a society that would not otherwise be interested in the details of its foundations. It is clear here, too, that it is important that knowledge so acquired still realises a value that will take advantage and hold a timeline for relevance.

SCHOOL / ATTRIBUTE	TECHNOCRATIC			ECONOMIC	BEHAVIORAL		
	SYSTEMS	CARTOGRAPHIC	ENGINEERING	COMMERCIAL	ORGANIZATIONAL	SPATIAL	STRATEGIC
FOCUS	Technology	Maps	Processes	Income	Networks	Space	Mindset
AIM	Knowledge Bases	Knowledge Directories	Knowledge Flows	Knowledge Assets	Knowledge Pooling	Knowledge Exchange	Knowledge Capabilities
UNIT	Domain	Enterprise	Activity	Know-how	Communities	Place	Business
EXAMPLE	Xerox Shorko Films	Bain & Co AT&T	HP Frito-Lay	Dow Chemical IBM	BP Amoco Shell	Skandia British Airways	Skandia Unilever
CRITICAL SUCCESS FACTORS	Content Validation Inventives to Provide Content	Culture/Incentives to share Knowledge Networks to Connect People	Knowledge Learning and Information Unrestricted Distribution	Specialist Teams Institutionalized Process	Sociable Culture Knowledge Intermediaries	Design for Purpose Encouragement	Rhetoric Artifacts
PRINCIPAL IT CONTRIBUTION	Knowledge-based Systems	Profiles and Directories on Internets	Shared Databases	Intellectual Asset Register and Processing System	Groupware and Intranets	Access and Representational Tools	Eclectic
"PHILOSOPHY"	Codification	Connectivity	Capability	Commercialization	Collaboration	Contactivity	Consciousness

Table 1 – Schools of Knowledge Management (Adapted from Earl, 2001)

Alavi et al. assert that the contemporary perception of knowledge as an organisational resource has led to the emergence of the phenomenon known as the knowledge management system, abbreviated as KMS (Alavi & Leidner, 2001). It's important to recognise that data plays a pivotal role in knowledge management and KMS. Although data is typically regarded as the fundamental building blocks, Tuomi contends that knowledge should precede data. In this context, knowledge must exist prior to the measurement and processing of any data to generate information (Tuomi I. , 1999). Tuomi's assertion lays a fascinating foundation for contemplating sustainability issues related to knowledge management. Consequently, it highlights how systems can be applied in this context. It becomes evident that certain overlooked concepts could be reexamined to reposition knowledge management and decide on the appropriate means to develop the necessary capabilities for acquiring and preserving knowledge, regardless of its source. This concept was important for this study in coming up with a testable model for the hypotheses advanced.

When evaluating the design of any management system, it is essential to consider that the design methodologies should be closely coordinated with organisational change initiatives. This includes changes in roles, leadership approaches, reporting processes, and even conflict resolution mechanisms in the organisation. Lederer and Nath delved into these aspects as part of their examination of the nine-phase development cycle (Lederer & Raghu, 1990). This approach has maintained a relatively consistent framework over time, with occasional minor adjustments to the contents of the steps or occasional merging of certain steps, resulting in slight alterations. It is therefore not surprising to note the typical Systems Development Life Cycle (or SDLC) being used in different situations to show progression of a developing system, including a knowledge management system. **Figure 4** below illustrates the SDLC typical to information systems development.

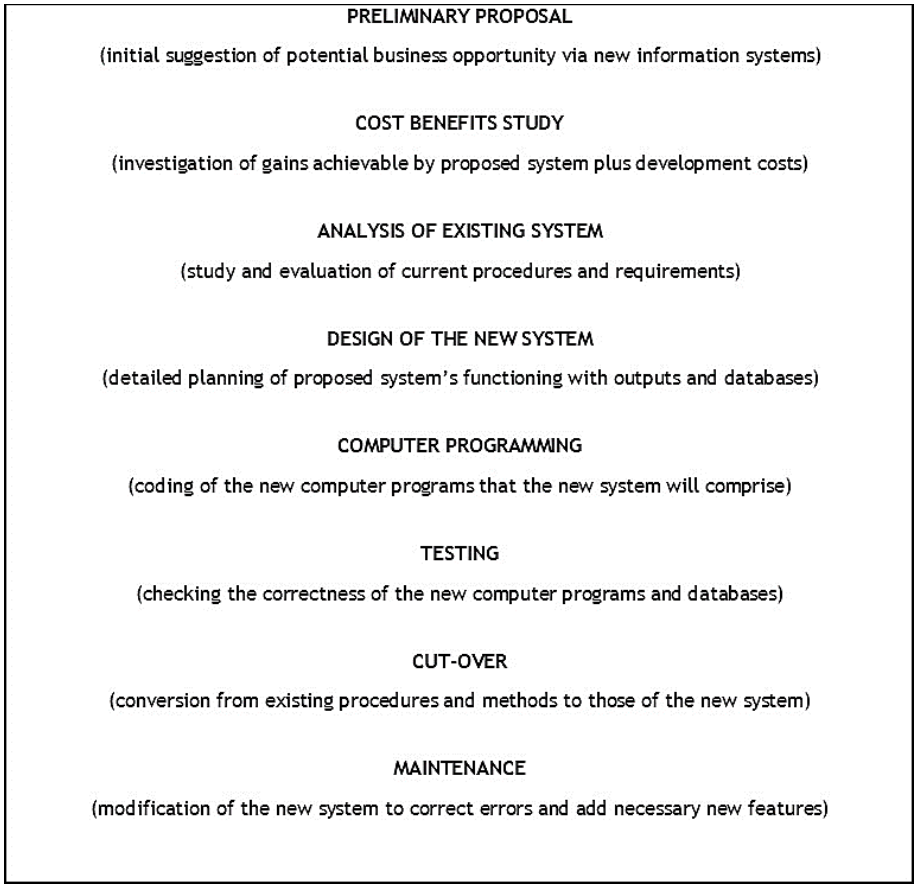


Figure 4 – The Systems Development Life Cycle (SDLC) (Adapted from Lederer & Nath, 1990)

In considering a generic SDLC, it is worth noting that there will be inputs into the system that will enable it function. Further, there will be functions that will apply to this system in order that any errors are corrected and any new changes are made to the existing system or its contents and operations. It is these two activities that are of interest in this research. Errors could mean outmoding of what was initially considered in vogue. Changes could imply something no longer works or is no longer viable and must therefore be superseded or replaced.

The architecture of the knowledge management system was crucially considered. In reviewing the book titled *Designing Knowledge Management Architecture* written by Shukla and Srinivasan, S. Mohanty highlighted four crucial considerations for generating knowledge, especially within organisations. These considerations involve unloading past experiences, drawing upon Lewin's 'unfreezing' concept, overcoming tunnel vision, challenging established norms of behaviour, and reshaping constructed models (Mohanty, 2003). Further exploration of these approaches led to a detailed

examination of the various options available for structuring these architectural constructs. This investigation proved to be beneficial in providing insights into how new methods of knowledge acquisition and articulation could be effectively implemented. The researcher is of the view that widening the horizons on how to view knowledge management begins with how it is treated as the obsolete components are reviewed, analysed, and in some cases improved or replaced.

Some technologies were recognised as necessary in acquiring and maintaining knowledge. These approaches encompassed traditional data mining techniques, as well as more contemporary methods rooted in Web 2.0 and subsequent developments. These tools act as contemporary and efficient methods of accessing and expressing data, information, and knowledge (Jashapara, 2011). There is also an integration of some concepts in terms of software methodologies with a twist. These include such as reusability, alignment and merging approaches into hybrid applications as solutions. It can therefore be see that whilst some of these can be taken as is without change, others could be used in integrated fashion. Despite the availability of these enabling factors, cultural and situational barriers often present challenges, as noted by Edwards and Kidd in 2003. They emphasise the importance of recognising both the facilitators and the obstacles that are inherent within these constructs (Edwards & Kidd, 2003).

Hasah and Crawford acknowledge the presence of a codifying or enabling challenge within knowledge management systems. This perspective provides an additional lens through which to view these facilitators and their associated barriers. The intricate interplay between technology and individuals in the knowledge management domain highlights complexities that merit thorough examination (Hasah & Crawford, 2003). In this study, it was valuable to explore certain interactions between enablers and barriers to gain a clearer understanding of the need to refine certain goals outlined for the research. An important aspect to consider was the role of Information Technology within the context of knowledge management. To what extent does the concept of Information Technology overshadow the notion of knowledge management systems? This question was thoughtfully examined and discussed as a defining point of contention by the researcher. The researcher identified and defined these as

contentions in order to exclude them from the core analysis and development of this study.

A crucial discussion that added depth to the study involved distinguishing between the characteristics of tacit and explicit knowledge. This differentiation helped in comprehending fundamental concepts within the research. Explicit knowledge, on one hand, seemed to have a relatively straightforward ability to be contained and articulated. In contrast, tacit knowledge was closely linked to the human condition or state, making it challenging to codify and express (Brelade & Harman, 2003). It's important to highlight that articulating tacit knowledge in terms of codification often presents a significant challenge. Close studies of these differences or distinctions between explicit and tacit knowledge further helped to in the discussion of this study. As fundamental concepts, this certainly helped contribute to the forming of a premise for this study.

1.2.6 What happens to Obsolete Knowledge?

In the process of dealing with knowledge, the concepts of acquiring or creating knowledge naturally runs in the cycle of whether or not this knowledge is *current* or *lapsing*.

Thus far, concepts of obsolete knowledge have been intimately tied up with the idea of artefact obsolescence, technological obsolescence as well as the difficulty of individuals to let go of knowledge that is no longer useful (Weerasuriya & Wijayanayake, 2014). It is clear that when organisations learn, they do so in relation to what will serve them and be in their best interests – usually of a goal or project nature. Once this is achieved, it is not unusual for organisations to abandon the premise for which they put up learning structures and embark on new exploits. This concept tends to render accumulated "knowledge" obsolete in a loose sense. This also means that anyone getting back to any knowledge that is no longer useful may be doing so for referencing or historical purposes only. The pertinent question, however, is whether this abandoned knowledge is wholesale. Can parts of it even be remotely salvaged? Indeed, why should we look to salvage from obsolete knowledge? By

considering attributes of artefacts in a knowledge structure, the research endeavoured to clarify this in the study.

Gregory notes what he refers to as 'purposeful obsolescence' that he puts in two conceptualisations: "induced perishability" resulting from limiting durability; and "forced fashion" that arises from artificial style changes (Gregory, 1947). This implies that some obsolescence is induced or artificially influenced.

In the consideration of obsolescence of knowledge most research looks into the broad categories of software and hardware. Obviously as software is developed and enhanced or updated it soon becomes apparent that outside influences have overtaken their efficacy in terms of what will relevantly apply to it or the software resources' capacity to keep up. New programming paradigms, popularity, vendor support among others would influence the obsolescence of systems connected to these software.

In the same vein, hardware obsolescence lends itself to technological advancements as well as vendor support. Hardware fares less well than software especially in terms of incompatibility issues and new software advances that no longer work with the hardware designed for a particular purpose. Externally, hardware manufacturers that are acquired or merged with others result in new infusions discarding the old. These will impact the way in which hardware and software will interact to deliver components or requirements in any information system.

The attendant human resources required to work with the systems available are also a factor in bringing about obsolescence. When upskilling no longer works for a particular target group in an organisation, obsolescence might be the result. The need for more employee turnover may also fail to keep up with the need to modernise and therefore obsolescence may be the result.

Some approaches to knowledge obsolescence deals with how "sticky" it is and how to then go about unlearning this obsolete knowledge. At a higher level, most learning is considered cognitive in the sense that there is a possibility of a change of state of knowledge than in the response elicited by its acquisition (Bruner, Goodnow, & Austin, 1956). It is at this stage that we begin to notice the different ways that the

unlearning could occur. This ranges primarily from what Tsang applies terminologies such as unlearning, forgetting, abandoning, and so on to refer to this phenomenon (Tsang & Zahra, 2008).

Literature is replete with concepts defining the nature of obsolete knowledge but it appears that not much is said about how this happens on the continuum of knowledge acquisition itself, especially through frameworks of recurring knowledge articulation.

Most discussions surrounding obsolescence is around the technology surrounding the knowledge or information being processed. This was earlier defined as contentions for this research, and will be referred to as such throughout this study.

This research found that obsolescence in this integrated manner does little justice to considering the intricacies of the knowledge acquired itself. It may well be that obsolescence is shadowed by the effects of software, hardware and the dearth of knowledge workers to either sustain the knowledge acquired or definitively declare it obsolete by some methodical or systematic way or manner.

1.3 New Frontiers in Knowledge Management.

Given the absence of a reasonably consistent definition, it's noteworthy to mention that the frontiers of knowledge management systems remain wide open, allowing for greater flexibility and potential advancements in the future. What this means is that a good working definition is feasible with most studies including this one.

As recently as 2005, Monsou et al. acknowledged that knowledge management was not done. The authors observed that numerous questions regarding how knowledge could be effectively managed still remain, particularly in light of the definition of knowledge management presented in the journal paper. This discussion showed how management of knowledge could *actually* be done by considering its delivery and measurability in the first place (Gorelick & Monsou, 125-139).

The primary objective of this study was to explore the continuously expanding boundaries of the knowledge management paradigm and how it was being implemented, particularly in unique contexts like developing economies, where knowledge and technology frequently diverge. Additionally, the study aimed to investigate the perception of the 'age of knowledge' as an intriguing area of research.

Several studies delve into the interplay among people, processes, and technology in the realm of knowledge management. It's crucial to recognise that considering all these aspects has been instrumental in charting potential new frontiers in the ongoing pursuit of effective knowledge management. This way, the identification of the various areas that knowledge management has been applied was going to be easier.

Intellectual capital is undeniably one of the central concepts within the field of knowledge management. It has gained increasing significance, serving as a valuable currency that both organisations and individuals have harnessed. This is evident not only in the practices of leading Fortune 500 companies but also in the enhancement of various products and services attributed to the effective management of intellectual capital. Managing intellectual capital plays a vital role in ensuring the long-term success of knowledge-based organisations. In today's data and information-driven economy, where the internet provides unprecedented accessibility, knowledge-based organisations have become virtually indistinguishable from one another. Therefore, effective management of intellectual capital is a critical factor in their sustained success.

Ronen and Pasher observed that even if managers may not be familiar with the term "knowledge management," they are still capable of discussing the significance of knowledge and recognising the necessity to store and refresh it as a means of ensuring their organisation's survival (Ronen & Pasher, 2011). Integrating the concepts of intellectual capital and strategic leveraging was essential to emphasise the most effective way to articulate knowledge management. Most societies have now recognised the essential identity of knowledge as having intellectual capital by advancing the concept of the knowledge economy.

Two similarly structured countries that are neighbours and share government structures in common are examined in the manner that they have gone about embracing the Knowledge Economy. These are the Republic of Namibia, and the Republic of Zambia, respectively. Although differing in the manner that they were colonised (Germany, South Africa for Namibia; Britain for Zambia) Namibia interestingly structured most of its governance entities after the British/Zambian system. Both of these countries belong to the British Commonwealth of Nations. The author spent a lot of time in both countries, one being his country of birth. The next two considerations bring up the approaches that each of these countries has applied the Knowledge Economy Proposition.

1.3.1 The Namibian Knowledge Economy Proposition.

Namibia has, for a while now, put forward the idea of a knowledge economy, where the driver of the economy and activity within that nation is envisioned and intended to be knowledge. The e-Government Strategic Plan for 2014 – 2018 asserts that the driver of achieving the knowledge economy for Namibia is Information and Communications Technologies (ICTs). This, according to the strategic plan, is the tool that will deliver a knowledge-based economy and technology-driven nation (Office of the Prime Minister, GRN, 2014). Despite the fact that this is a policy document that has opened a discussion on the knowledge economy and technology-driven nation in achieving some twenty-odd goals, there doesn't appear to be adequate coverage on the factors that will enable the knowledge management aspect of this policy.

It is noted further, however, that this notion of a knowledge economy has had debate both in the print media such as the widely read private newspaper, The Namibian as well as in other policy websites such as political party articles. Discussions on the knowledge economy have occupied graduation or commencement speeches, government policy documents and captioned in research papers by Namibian officials, plans, and researchers, respectively for some time. In an article by one Metusalam Nakale (Director at Leicester), he argues that care needs to be taken with regard to embracing the knowledge economy. He argues that the challenge of the knowledge economy is to ensure that the nation does not become a dumping ground of ideas, services and products of other nations (Nakale, 2004).

It is clear to note that like any other paradigm that has taken the stage and affected the way nations and communities carry out their endeavours, knowledge and its attendant knowledge economy has been received with mixed feelings as it continues to be rolled out in every area and space. It would appear that Namibia, despite being receptive to the idea of a knowledge economy does have its critics and cautionary.

In a foreword of a paper by Mmantsetsa T. Marope, Arvil Adams, Snr Advisor for Social Protection for the Africa Region of the World Bank notes that Namibia is conducive to the transformation into a knowledge economy because it does provide an enabling environment for this transformation to take place (Marope, 2005).

Marope notes that among the key enablers, Namibia has a broad recognition of knowledge as a key driver in its development agenda, infusing it in most areas of its economic endeavours.

In this working paper, Marope notes that conceptually, belonging to a knowledge economy (KE as abbreviated) entails a population with the ability to use and apply knowledge in the various activities in a bid to facilitate social development. To this end, according to Marope, this requires the ability to "access; assimilate; adapt; create; *constantly renew*; diffuse; advocate for the application of knowledge; and apply knowledge to facilitate economic and social development." (Marope, 2005).

This working paper noted in questioning the variables where the key gaps possibly lay.

Some of these gaps include skills shortages and a fledgling Research and Development (R&D) investment. Perhaps, quite telling is the fact that key drivers of a knowledge and innovation system need strengthening. Marope notes that this system is conceived of key players such as higher educational institutions and consultants, among others, with the ability to access knowledge at a global level. In addition to the aforementioned conceptions, the ability to *dismantle* obsolete knowledge and an ability to put together activities to bring about new ones is key.

What is essential in addition is to channel this towards development (Marope, 2005).

In acknowledging Namibia's well positioned intent as well as its environment, it was noted that critical constraints such as low education levels of players and limited capacity of articulating knowledge through ICTs remain. In a table of preparedness, Namibia's readiness is shown and indicates that there is still effort required to bring Namibia to a comparable level as other Southern Africa Development Community (SADC) middle-income countries. It is clear from **Table 2** below that there is still room for improvement and development of these Knowledge Economy indicators.

Country	KEI	Ecn. Incen.	Innovation	Education	ICT Infra
Sweden	9.25	8.36	9.67	9.20	9.78
Finland	9.12	8.61	9.56	9.17	9.13
U.S.	8.69	7.81	9.47	8.43	9.03
Australia	8.66	8.14	8.68	9.14	8.67
Japan	8.26	7.23	9.30	8.09	8.40
Singapore	8.22	9.53	8.60	5.61	9.13
South Korea	7.70	6.10	7.88	7.80	9.03
South Africa	5.36	5.22	6.19	4.56	5.46
Malaysia	5.32	5.52	4.43	4.51	6.81
Botswana	4.96	6.49	5.17	3.75	4.43
Mauritius	4.32	4.41	2.64	3.81	6.44
Namibia	3.42	5.19	1.83	2.65	3.97

Table 2 – Namibia's Knowledge Economy Index; Economic Incentive & Institutional Regime; ICT Infrastructure (Source WBI 2002)

This table shows that a representative economy such as that of Namibia has a lot of promise but also a lot of challenge going for it in the arena of becoming a knowledge economy. Most of the background reading done does point to the fact that its ambitions far outweigh the reality on the ground. Most important, however, the manner in which frameworks are manipulated render a lot of continuity and what the researcher terms 'orderly obsolescence activity' difficult considering different approaches to each cycle as shown later in the thesis.

Namibia has had a development agenda structured in Development plans and this guides its march towards implementation of development strategies both for its economy as well as its social wellbeing. Like most countries in the SADC region, this approach makes it feasible to see where some goals have fallen short and which ones are meeting their intended targets. Data is collectable, especially that which is at two key points: at the operational level as well as at the historical level.

In a paper presented to the International Federation of Library Associations (IFLA) in Cape Town, Selma Iilonga explores the gaps in Namibia's Fourth National Development Plan (NDP4). She recommended a benchmarking of the Singapore model from a 2009 UNESCO source that showed how that country had surpassed industrialised nations' growth rates by promoting knowledge through education and creativity (Iilonga, 2015).

Other researchers have explored the leverage of knowledge in poverty alleviation, among other things. This too is in keeping with how conducive is the nature of the Namibian governance landscape of embracing the knowledge economy.

Dr Kingo Mchombu while at the University of Namibia, explored the role of information and knowledge in poverty eradication as a particular case study of Namibia in his 2014 paper to the IFLA. The paper targets poverty reduction in Namibia and in his final instalment he deals with how access to information and knowledge can promote sustainable development and contribute to the reduction of poverty. Using a case of resettled farmers practicing communal farming, he notes how knowledge of the skills required to practicing their farming made a difference among the various farmers surveyed (Mchombu, 2014).

It is clear to see that a study of Knowledge Management Systems and its composite parts and processes makes for a good setting in an environment such as Namibia where the enablers are already in motion and where both government structures and educational research encourage it.

Leveraging knowledge for the growth of an economy is a well-known aspect to any developing economy's strategy and therefore the importance of understanding how these frameworks operate at the level of knowledge accumulation (or acquisition) as well as how this knowledge is cycled from scenario (development plan) to successive scenario (next development plan) is important. A caveat to observing this through development plans is not unique to only this setup however; it is the researcher's intention to use this as a case in point and not as a specific panacea. A good framework is one that can be tailored to work with other similar strategies and functions within a society, or nation.

What is at issue and worth considering is not necessarily the content of the National Development Plan documents or the strategic plans that run their course but what happens to this knowledge as it is cycled to the next plan. It is the research's view that cycles between these plans or phases is an important factor to ensuring that the knowledge acquired is kept relevant and useful. In assessing some of the gaps hitherto pointed out such as the dismantling of obsolete knowledge, this makes the research even more persuasive. Aside from intentional positioning, the researcher has found little evidence to show how the gap between phases and obsolescence planning is done. This is why the function of obsolescence, or time framing in knowledge acquisition forms the central theme of this thesis.

It is the researcher's hypothesis that a lot of frameworks are missing the true obsolescence component in the way that they tackle knowledge acquisition and its continuum. Literature shows a lot of concepts including unlearning and obsolete artefacts but usually fall short of treating obsolescence along a continuum of knowledge acquisition.

1.3.2 The Zambian Knowledge Economy Proposition.

Zambia was into its 7th national development plan (7NDP) as of this writing. These development plans prescribe the country's developmental agenda in periods of five years. This 7NDP plan ended in 2021. A blueprint for this period had the aim of becoming a prosperous middle-income economy that endeavours to offer employment opportunities covering different skills and backgrounds by focusing on diversification particularly away from the traditional mining activities.

This 7NDP as it was referred to had, at its core, the idea of merging the digital world with the tangible everyday functioning of the country's economic activities. It included digital infrastructure, enhancing digital skills through imparting skills to harness the infrastructure. Digital entrepreneurship was envisioned by encouraging new business to use digital technology in driving value for business activity. Also envisioned was the deployment of digital platforms covering government and commercial activity. Included further was the financial service sector which hitherto had enjoyed most of the digitalisation even before the advent of the 4th Industrial Revolution, 4IR (Bank, 2020).

According to the SMART Zambia Electronic Government Master Plan, Zambia is expected to connect government services and infrastructure fully alongside the Vision 2030 target. The program is ambitious in that it targets the period 2018 – 2022/**2030** as the transition from establishment to integration and implementation. See **Table 3** below:

Description	Foundation Stage 2018–21	Integration Stage 2022–26	Connected Government Stage 2022–30
Policy, legal, regulatory, and institutional arrangements	• Establishment of policy, legal, and regulatory environment • Institutional frameworks • Human resources development • Development and adoption of ICT standards and guidelines	• Enhancement of the policy, legal, regulatory, and institutional framework	• Review of the policy, legal, regulatory, and institutional framework
ICT infrastructure	Implementation of • Cloud computing national data center • National optical fiber broadband backbone • Metropolitan area networks • Local area networks • Information security • Universal access mobile communication services	Integration and enhancement of • ICT network connectivity infrastructure to unserved and underserved districts • Value added services on cloud computing • Information security	Enhanced integration of • Infrastructure and value added services to unserved and underserved areas • Information security
E-services (enhancing country competitiveness and social well-being)	Development and adoption of • E-applications and online services • Core e-government foundational e-applications • Common applications • Sector-specific applications • Multiple channels of electronic service delivery	• Enhanced integration of e-applications to cloud computing environment and more online services on government transactional portal	• Seamless and highly customized interactive systems on the cloud with value added services

Table 3 – SMART Zambia Electronic Government Master Plan (Source: SMART Zambia E-Government, Office of the President, 2019)

A lot of activity that refers to knowledge management in Zambia interacts at the frontier of two aspects: applying IT to governance and in the microfinancing areas respectively.

Organisations that have tacitly embraced Knowledge Management include non-governmental organisations, micro lenders and human rights organisations. With the push to smart city structures and aspects it is clear that SMART Zambia Institute has been set up to explicitly implement e-governance, IT governance on the one hand while implicitly implementing knowledge management in their implementations. The Civil Service in Zambia has indeed had focus on e-governance as the overarching strategy (Sikaonga & Tembo, 2020)

Specifically, libraries in most institutions actively pursue Knowledge Management and the implementations of systems because information management has been a traditional base for the articulation of this discipline. In fact, most documentation on Knowledge Management refers specifically to Library services and how this is used to address the various library functions such as for cataloguers (Chitumbo & Kanyengo, 2017). The World Health Organisation (WHO) regards knowledge management in its system-based components comprising *people*, *processes*, and *technology*. Perhaps it is worth noting that in most approaches there is the central articulation of technology. Bolarinwa et al notes in the Overview of Knowledge Management how lacking the literature is in this area of articulation; however most IT interventions such as telemedicine have started gaining ground especially in more advanced economies such as South Africa (Bolarinwa, Salaudeen, & Tanimola Makanjuola, 2012).

An important aspect that is being dealt with in almost all the implementation is the *process*. In ensuring that most of the initiatives are implemented, the SMART Institute Zambia is looking at existing structures and how Information and Communication Technologies can be applied to those existing structures.

1.3.3 Development Plans and the Quest for sustained Knowledge.

A lot of entities or societies work on strategic plans. Individuals will work out annual plans (resolutions for a better person); organisations will forge strategic plans; governments will work out development plans. All of these instances require some knowledge acquisition strategy that must be sustained through the life of the plan. It is also particularly interesting to note that a lot of government and quasi-governmental organisations still use basic knowledge management without recourse to technology. These are a very good case to study in view of how obsolescence is dealt with. Little has been done in this direction.

The particular case of interest would be archives such as the Windhoek Building Archives. It appears to be an efficient yet non-computerised entity complete with land line and drawers for organising building plans. The researcher was inspired at the outset before embarking on the research by a visit and preliminary look at the archives. The actual research did not include any input from this preliminary study.

Like most countries in the Southern African region, Namibia has been leading its economic and social plans by way of National Development Plans and strategic positioning as a way of gauging sustainable delivery of services and rollout of policy. These have successively been renewed at the end of each cycle and new ones enacted. It is worth noticing that comparing most of these plans yields the underlying fact that a few of the actions are re-enacted – some with subtle changes, and others with radical rethink. This is not unique to Namibia. It is not even unique to a development plan. A lot of strategic plans undergo the same treatment. The crucial question is: What has the time factor got to do with this re-enactment? Another question is: How is one set of activity in a cycle declared done or obsolete and what has time got to do with it?

As of the writing of this thesis, the Namibian government would be undergoing the deployment of the 5th National Development Plan, also known by its moniker of NDP5 (successive plans have been called NDP1, NDP2, etc.).

This thesis examined this question alongside some other subtle knowledge management strategies of knowledge acquisition that have been employed in ensuring that the timing function of knowledge acquisition is rationalised – or not.

In this thesis, the case of either the Namibian or Zambian situation was to be used. The backdrop to this was chiefly the National Development Plans, particularly those cycles that appear to re-appear in different iterations of successive plans. The main thrust was to examine the time-span versus the knowledge acquired in each case. Because of the essence of time, the research drilled down the actual activities of experts in various ministries and government institutions to get the research done. The framework developed in this research is one that can be adequately applied to any size of knowledge acquisition activity including the scale of a National Development Plan.

1.3.4 Collecting Knowledge at Specific Points:

A good preliminary examination of a less likely source of how knowledge is dealt with involves areas that have not yet been touched by typical technological facets. A prior visit to a section of the Namibian Civil Service, in this case, the Buildings Archive brought to sharp focus an elegant set up that deals with knowledge acquisition and processing of obsolescence without the use of computing power. At its core is meticulous, painstaking collection of information and processing this to enable a well-kept archive. Changes around the building codes, structures, and ownership were methodically made. Any erasure of a structure was noted and records manually updated as such. Without giving any details as this was preliminary and to demonstrate the gap, it was clear that this practice was more of an exception, rather than a rule. The practitioners at this office did not call their activity knowledge acquisition; nor did they refer to their correcting of old knowledge as knowledge obsolescence. Additionally, no timeline in a uniform way other than necessary legal document retention strategy requirements, were followed.

1.3.4.1 The Buildings Archives.

The Buildings Archive of Namibia was a good preliminary instance of considering this research. As a good case to observe this involved a small staff, well arranged cabinets and files of plans and their updates. It showcased an implementation of processes devoid of any automation. For a good Information Systems research this was considered a prime candidate to observe knowledge management outside of any

automation, or other contentions as the researcher defined earlier. A well-conditioned interval of when to make changes and how to make changes was put in place.

This thesis examined the question of how knowledge is acquired and how obsolescence in the process can be used to further better the way in which this knowledge is upgraded and kept.

One of the prime considerations according to the framework was the "Triggering" component as set out by the researcher. This means, what is at the outset of a process as knowledge is being considered as part of a process? The triggering is further defined and discussed in the development of a framework later in this thesis.

1.3.4.2 The National Development Plans.

National Development Plans are what most governments in Southern Africa and other parts of the world use to implement government programmes. Clearly, this is a trove of knowledge management and how it is articulated to reach goals set out in these plans.

Both Namibia and Zambia use National Development plans set out in strategic intervals of about five (5) years – sometimes shorter if it is an ad hoc or emergency plan such as for recovery purposes.

This thesis considered an instance of this in considering some hypothesis testing particularly in a process-based consideration. As a representative to this, civil service functions were used.

1.3.4.3 The Smart Zambia Institute (SZI) Initiative.

The Smart Zambia Institute, established as an officially recognised organisation within the Office of the President of the Republic of Zambia, provides valuable insights into the operations of the civil service. It encompasses the major components that would facilitate testing the hypotheses of the research. The Secretary to the Cabinet set out the mandate and aims of the Smart Zambia Institute as providing for an efficient

running of government by providing information and communication technologies to the various aspects of government function (Msiska, 2016).

The major goals of the SZI when it was set up was to roll out e-Government structures and processes and help improve spending agencies' functions within the government.

This unique positioning enabled the success for the implementation of some of the various government programmes but most important to help with delivery to the citizens. Smart Zambia was arrived at as the most suitable candidate and collaborator in carrying out this research.

1.4 The Problem Statement.

Organisations, governments and individuals roll out plans and resolutions to live by or to achieve goals or to deliver to a population or a targeted sector in public or private enterprise. This happens in cycles and will manifest as 'resolutions', or 'strategic plans', or 'development plans'. Whatever they are called, there is a fascinating cycling that happens from one to another. Isn't it evident from the numbering in sequence hence? A cursory look at some aspects will evidently show that there is a disjoint aside from the seemingly orderly numbering that occurs.

The proposition that successive knowledge acquisition strategies are conclusive may have more than meets the eye. It should be evident that a close study of how cycles in the way knowledge is acquired could lend more substance to the idea of how to deal with cycles of knowledge with time.

A thread such as an aspect of technological implementation of an Information Communication and Technology aspect can easily be considered in its continuing form through different planned implementations. The point of interest in such an instance is how this knowledge continues from one set of goals to the next, if at all, or as evidenced in its reuse. What, within the time cycles, does this point to in terms of how this knowledge has been acquired and whether it is being cycled in increments of new processes or in their adjustment?

It will be worthwhile to closely examine *why* and how one cycle is woven into the next and how these cycles are 'retired' before being ceded to the next set of rules, resolutions, or plans. This is considered timing or obsolescence of the old cycle and handover to the next. It is this 'retirement', or timing of knowledge that is of particular interest and fascination for this study.

This concept can be considered as timing of knowledge, but more appropriately, obsolescence of knowledge.

1.4.1 Research Aim.

The overall question that this study addressed as a **research aim** is:

> **Why is obsolescence an important and positive factor in knowledge acquisition?**

1.4.2 Objectives of the Research.

The objectives derived from the problem statement and hypotheses to this research are:

1. To establish attributes that will be used to address obsolescence.
2. To determine the timeline within which a specification of obsolescence will subsist. In doing so this will:
    a. Influence competitiveness
    b. Foster innovation
    c. Give an overview of what technology and systems turnover has to do with knowledge obsolescence.
3. To demonstrate currency of information contributing to knowledge acquisition.
4. To establish a maintenance recommendation based on the analysis of the knowledge acquisition and attributes so established.

1.4.3 Research Questions.

These are some specific questions this study considered in addition to the main question:

1. What attributes of knowledge are key and important to identify between phases in planning for its collection?
2. Why should an obsolescence strategy be used with acquisition of knowledge?
3. How can cyclic obsolescence affect acquisition to impact currency of the knowledge acquired?
4. Why is it important to consider the characteristics of information when contemplating planning for obsolescence with knowledge acquisition?

These questions provide valuable insights into the various aspects of knowledge management and the strategies involved in acquiring and maintaining knowledge within an organisation.

1.4.4 Relating Research Questions to Research Objectives.

The table below presents a link between the Research Questions in 1.4.3 to the Research Objectives in 1.4.2.

Research Question (RQ)	**Research Objective (RO)**
RQ1: What attributes of knowledge are key and important to identify phases in planning for its collection?	**RO1:** To establish attributes that will be used to address obsolescence
RQ2: Why should an obsolescence strategy be used with acquisition of knowledge?	**RO2:** To determine the timeline within which a specification of obsolescence will subsist. In doing so, this will (a) influence competitiveness, (b) foster innovation, (c) give an overview of what technology and systems turnover has to do with knowledge obsolescence.
RQ3: How can cyclic obsolescence affect acquisition to impact currency of the knowledge acquired?	**RO3:** To demonstrate currency of information contributing to knowledge acquisition.
RQ4: Why is it important to consider the characteristics of information when contemplating planning for obsolescence with knowledge acquisition?	**RO4:** To establish a maintenance recommendation based on analysis of the knowledge acquisition and attributes so established.

Table 4 – Relating Research Questions (RQs) to Research Objectives (ROs)

1.4.5 Statement of Hypothesis.

The overarching hypothesis of this thesis was that obsolescence could be systematically analysed and characterised as a factor that, when considered, can enhance the process of acquiring knowledge.

Furthermore,

1. Attributes of knowledge once identified, serve as critical factors in obsolescence planning.
2. The acquisition of knowledge must incorporate well-thought-out timing strategy, especially in the context of:
    a. Competitiveness
    b. Innovation, and
    c. Technology and systems turnover
3. The currency of acquired knowledge can be actively maintained and enhanced, recognising the central roles played by information systems and technologies.
4. Maintenance represents a vital feedback mechanism within any cycle, and it's imperative to emphasise the importance of addressing maintenance in the earlier phases of any cycle.

These statements of hypothesis underscore the multifaceted nature of knowledge management and the significance of timely strategies, currency, and maintenance in ensuring the continued relevance of knowledge within organisations.

1.5 Summary.

This chapter served as an introduction to the overarching subject of knowledge management, delving into various aspects related to knowledge and its associated influences.

A detailed examination of the concept of knowledge was undertaken as an initial step in directing the focus toward the problem to be investigated. Understanding the attributes of knowledge was deemed a crucial prerequisite for addressing the problem under investigation in this study. Additional to this was the position of the artefacts of the knowledge acquisition structure.

In order that an appreciation of the question could be more roundly made, some concepts of what it means to have obsolete knowledge were examined and introduced. This is one of the main themes around how improving knowledge acquisition is best dealt with.

A central theme to this question was considered in the way of formulating a problem statement on the acquisition of knowledge within the cycles of timing. This theme revolved around the role of time in knowledge acquisition. An appropriate approach was to look at implementations of plans of a strategic nature whose insight provides the behaviour and treatment of knowledge acquisition over time.

The target civil service sectors were considered, arriving at the suitable source. This choice was more of facility than preference.

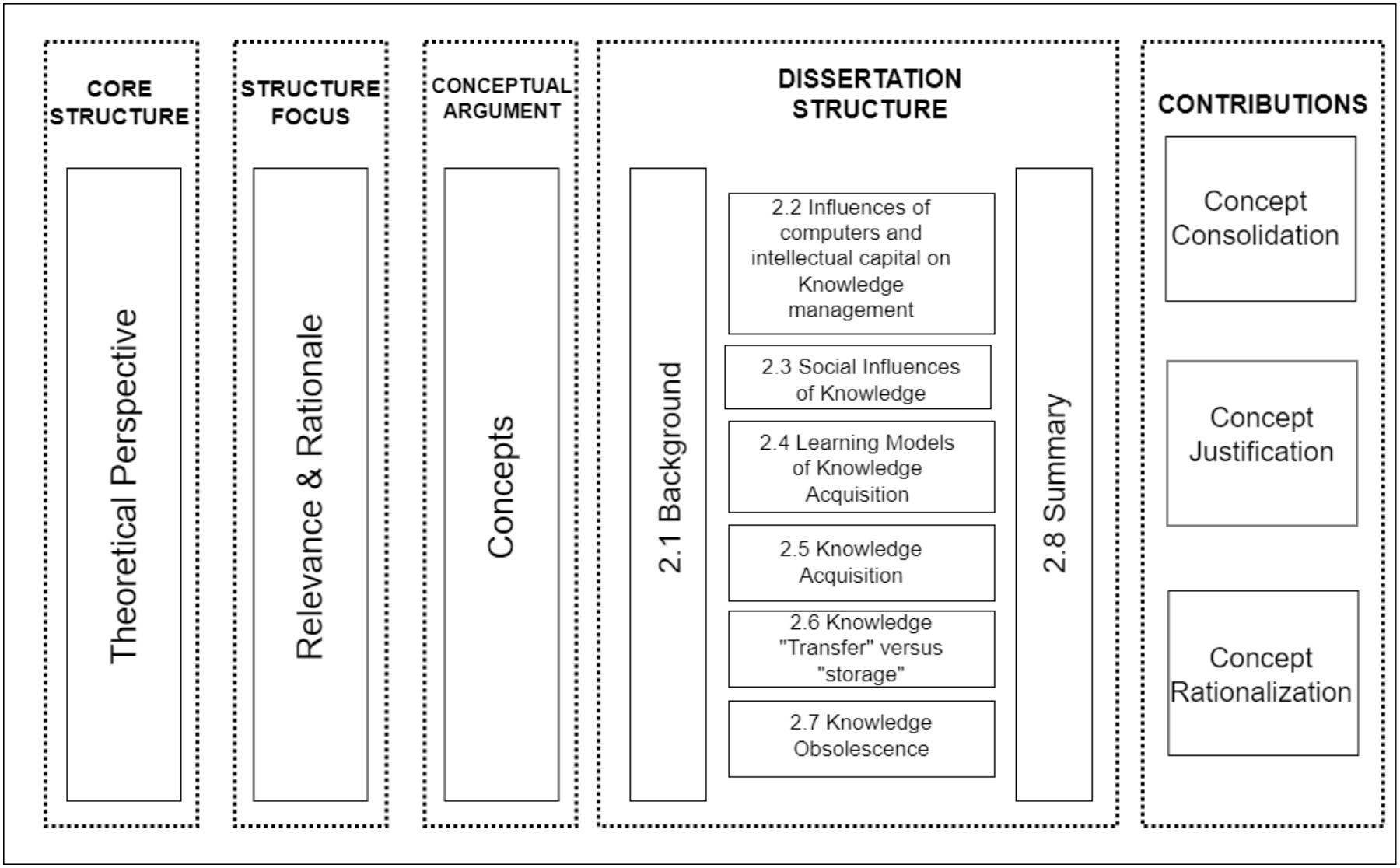
There were some specific questions that were articulated further to the problem statement in order that the study could be carried out.

Hypothetical assumptions were made in establishing some suggested expectations of this study.

Finally a set of objectives, setting the ground for possible methodological design, was made.

CHAPTER TWO LITERATURE REVIEW

Map 3 -- Literature Review



CHAPTER TWO LITERATURE REVIEW

Layout:

2.1 Background.

Indeed, the field of knowledge management is rich with resources and continues to evolve, even in its relatively young age. The ongoing intrigue and interest in exploring various angles and approaches within this area reflect the dynamic nature of knowledge management and its significance in contemporary organisational contexts. The definition of information is as problematic as most information systems' terms. Swanson carried out a study into the various definitions of information as a derivative of its attributes (Swanson, Winter, 1985-86). He came up with a composite list of attributes from a survey of several MIS textbooks. **Figure 5** below shows these attributes ascribed to the seven sources that he surveyed. After this collection and analysis, he observed that there were synonymous behaviours among the attribute terms that could be summarised into five broad terms.

Information Attribute	Burch et al	Senn	Taggart	Murdick	Ahituv-N
accessibility	x				
accuracy	x	x	x	x	x
aggregation					x
appropriateness	x				
benefit					x
bias (freedom from)	x				
breadth		x			
clarity	x				
compactness				x	
completeness		x			
comprehensiveness	x				
concreteness			x		
content					x
cost				x	x
currency				x	x
determinancy				x	
exhaustiveness					x
form		x			
format				x	x
frequency		x	x	x	x
graphics					x
horizon (time)		x	x		
medium					x
mode				x	
ordering					x
origin		x			
precision	x			x	
purpose				x	
quantifiability	x				
rate (transmission)				x	
redundancy			x	x	x
relevance		x			x
reliability				x	
response time					x
scope			x		
source			x		
timeliness	x	x	x		x
validity				x	
value				x	
verifiability	x				

Figure 5 – Composite List of Information Attributes (adapted from Swanson, B.E.)

Swanson grouped these synonymous terms as shown in **figure 6** below:

- completeness (Senn), comprehensiveness (Burch et al.) and exhaustiveness (Ahituv-Neumann)
- concreteness (Taggart) and quantifiability (Burch et al.)
- origin (Senn) and source (Taggart)
- breadth (Senn) and scope (Taggart)
- appropriateness (Burch et al.) and relevance (Ahituv-Neumann)

Figure 6 – Attribute Synonyms (adapted from Swanson B.E.)

The following behaviours could be observed:

Senn defined completeness (Senn, 1982) synonymous with Burch & Grudnitski's definition as that of comprehensiveness (Burch & Grudnitski, 1989), while Ahituv &Neumann's definition was exhaustiveness (Ahituv & Neumann, 1982).

Taggart considered the definition of concreteness as an attribute of information (Taggart, 1980), which was found to be synonymous with Burch & Grudnitski's quantifiability (Burch & Grudnitski, 1989).

Origin as defined by Senn (Senn, 1982) is synonymous with Taggart's definition as source (Taggart, 1980).

Senn's breadth (Senn, 1982) is synonymous with Taggart's scope (Taggart, 1980).

Appropriateness from Burch (Burch & Grudnitski, 1989) is synonymous with relevance from Ahituv & Neumann (Ahituv & Neumann, 1982), and Senn (Senn, 1982).

These synonyms show various definitions of the attributes of information that can be summed to a few cardinal attribute names that are synonyms of one another in their group or category.

Broadly, therefore, there is a semblance of convergence when one considers the generally taught attributes of timeliness, reliability, and relevance. Randomly picking these synonymous terms yields that timeliness can be appropriateness (for how else

would something be appropriate if it wasn't delivered in time); reliability as concreteness; and relevance as origin and scope.

Swanson further examined the frequency of the terms that were used to describe information attribute, and produced a frequency table showing the number of times synonyms of attributes appear, condensing them in **figure 7** below:

Frequency	Terms
5	accuracy
4	frequency, timeliness
3	redundancy, completeness (comprehensiveness, exhaustiveness), relevance (appropriateness)
2	concreteness (quantifiability), cost, currency, format, horizon, origin (source), precision, scope (breadth)

Figure 7 – Frequency of Multiple Textbook Mention of Information Attribute Terms (adapted from Swanson B.E.)

This figure, which could also be regarded as a table, shows that accuracy and timeliness are cardinal among the attributes that were observed across the textbooks studied by Swanson. The researcher found this corroborating with the focus on time as the overriding attribute from which various constructions could then be derived. The attributes of information so derived represented both the quantitative, and qualitative characteristics that were used in this study.

Knowledge comes from the basic building blocks of information; itself a result of organised data or raw facts. The definition of a fact has the underlying property of being believable, or true. Hence, it should be reasonable to conclude that information should also be believable in addition to the classical attributes it carries with it.

The lack of a universally agreed-upon definition for terms like knowledge, knowledge management, and knowledge management systems is a common observation in the

literature. Many authorities in the field tend to put forth their own definitions and subsequently build their arguments based on these definitions. This variation in definitions underscores the complexity and multidisciplinary nature of the knowledge management domain.

Alavi and Leidner's observation regarding the existence of at least five definitions of knowledge, drawn from various perspectives such as Information Technology, strategic management, and organisational theory literature, highlights the diverse lenses through which knowledge management is approached. These distinct perspectives play a significant role in shaping how knowledge management is conceptualised and studied in research (Alavi & Leidner, 2001).

According to Alavi and Leidner, knowledge can be conceptualised in various ways, including as:

1. A state of mind.
2. An object.
3. A process.
4. A condition of having access to information.
5. A capability.

These different perspectives reflect the multifaceted nature of knowledge and the varied ways it can be understood and applied within the context of knowledge management (Alavi & Leidner, 2001). Each of these perspectives results in different perspectives being put forward according to different protagonists of knowledge:

1. State of Mind. This is considered as enabling individuals to apply and expand personal knowledge or that which has been "perceived, discovered, or learned" (Schubert & Lincke, 1998).
2. An object. This considers the object that can be manipulated and stored. Also, the process of knowing whilst acting can also be perceived in this object perspective of knowledge (Carlsson & El Sawy, 1996).

3. A Process. This perspective considers expertise as an application in attaining knowledge (Zack, 1998).

4. Having access to information. This perspective looks into how knowledge (usually organisational) can be arranged in such a way that it facilitates retrieval. This can also be considered as an extension of the object perspective as it has emphasis on accessibility of the knowledge objects (MacQueen, 1998)

5. Capability. As a capability that has the potential of influencing some action in the future (Carlsson & El Sawy, 1996).

It should be noted how these different perspectives influence Knowledge Management and Knowledge Management Systems. **Table 4** below adapted from Alavi and Leidner, illustrates this reality well.

The perspectives here create an interesting input to a thought experiment; could it be that the change in shift in state of mind, the different manipulations on objects, changing expertise, restrictions to access to information and declining capability can be classed as part of obsolete knowledge? The author considered process and artefact as the same in conducting this research.

Knowledge Types	Definitions	Examples
Tacit	Knowledge is rooted in actions, experience, and involvement in specific context	Best means of dealing with specific customer
Cognitive tacit:	Mental models	Individual's belief on cause-effect relationships
Technical tacit:	Know-how applicable to specific work	Surgery skills
Explicit	Articulated, generalized knowledge	Knowledge of major customers in a region
Individual	Created by and inherent in the individual	Insights gained from completed project
Social	Created by and inherent in collective actions of a group	Norms for inter-group communication
Declarative	Know-about	What drug is appropriate for an illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization	Best practices, business frameworks, project experiences, engineering drawings, market reports

Table 5 – Knowledge Taxonomies and Examples (Adapted from Alavi & Leidner, 2001)

The diverse perspectives on knowledge underscore the importance of having a clear and comprehensive discussion about knowledge management as a foundational step before delving into related studies.

The classification of knowledge into two broad taxonomic groups – tacit and explicit – provides a clear framework for understanding the nature of knowledge. Tacit knowledge is the kind of knowledge that resides in a person's mind and is typically expressed through storytelling and patterns. On the other hand, explicit knowledge is codifiable and can often be found in instructional manuals, explaining how something works and how to optimise its performance.

This categorisation indeed lays a solid foundation for discussing knowledge management. By distinguishing between these two forms of knowledge, it becomes easier to explore the processes and systems that facilitate the acquisition, manipulation,

and dissemination of knowledge, leading to the development of knowledge management systems.

The adoption of an integrated view of knowledge management that encourages discussion and exploration is often preferred over a concise and axiomatic view. This approach recognises that knowledge management is a complex and multifaceted field with various definitions and approaches. Embracing this diversity and engaging in constructive discussions can lead to a more comprehensive understanding of knowledge management and its various dimensions (Jashapara, 2011).

It should be noted that most of the definitions of knowledge could be traced back to philosophers such as Plato, Aristotle, Descartes and more recent philosophers such as Locke, Hume, Hegel, and Kant, among many others. Each of these presented a contribution to how knowledge is viewed and further helped to shape the different approaches that have been used over time to bring about an understanding as well as a working definition of what knowledge constitutes.

Plato's definition: As a pupil of Socrates, Plato (427 – 347 BC) expressed his exploration of knowledge in a dialogue, *Theaetetus* (360 BC). Plato provided three answers to the question of what knowledge is. He answered:

- Knowledge is perception
- Knowledge is true judgement
- Knowledge is true judgement together with an account.

He used Socrates' way of leaving a concept without full consensus (Plato, 1992). This kind of definition provides a way of setting a discussion based on gradual and perceptive consideration of a phenomenon without necessarily asking that it be validated.

Aristotle's definition: Aristotle (384 – 322 BC) was one of Plato's best students; however, he sharply disagreed with Platonism and pointed out that philosophy was an on-going exploration of complexities of human experience (Jashapara, 2011). In his works, *The Metaphysics* (350 BC), Aristotle pointed out that there is a synthesis of the

natural and rational aspects of the world (Aristotle & Lawson-Tancred, 1998). In Aristotle's view, therefore, it was left to an observation of both the respective natural and rational aspects to bring about a synthesis of defining what knowledge was to be defined as.

Descartes' definition: René Descartes (1596 – 1650) approached the concept of knowledge by the method of doubt. He pointed out that 'certainty' was a state of the mind of the observer, and 'truth' was a result of the view of the external world expressed as statements. His question was 'Can we know anything for certain, and if so, how?' In *Meditations* (1641), Descartes provided three stages of doubt in order for something to be known:

1. Lay aside things on common sense grounds that are doubtful.
2. Doubt that at any given moment you are awake or perceiving anything at all (you may be dreaming)
3. Imagine that a malign spirit or a malicious demon has the sole intent of deceiving you.

This led to his first certainty: '*Cogito ergo sum'* or *'I think, therefore I am'* (Descartes, 1996). From Descartes' view, we see that knowledge was quite subjective and required a clear understanding on the state of mind as well as elimination of anything that was held in doubt. This then could result in something being defined as knowledge after this three-step process.

There is a temptation to get into the philosophical questions of syllogism and deduction which the researcher will not get into at this juncture; suffice it to say there is a school of thought that posits that the Cogito should be aptly translated as '*I am thinking, therefore I am*' as a move away from a syllogistic argument.

John Locke's definition: John Locke (1632 – 1704) was an empiricist who believed that everything we conceive or construct is a result of experience. His dictum was: *"Don't blindly follow convention or authority. Look at the facts and think for yourself"*. He wrote, in his essay, *An Essay Concerning Human Understanding* (1690)

that an idea was sensory with properties of a sensory image before the mind. This image could also cover thoughts and emotions (even pain). Therefore, reasoning for him was something of a mental operation based on these images, which led to knowledge or belief. (Locke, 1998)

Hume's definition: David Hume (1711 – 1776) followed the 'inductive inferences' about 'matters of fact'. He believed that one factor causes another, such as day is followed by night. He believed that past experience could not be used as a conclusion about what future outcomes or behaviours would be justifiable or correct (Jashapara, 2011). What Hume set out to dispel was the known fact that scientific laws arrived at through observation were not applicable to universally held statements any longer (Hume, 2000). The doctrine of 'logical positivism' is largely attributed to Hume and his proposition, leading to the 'truths of reasons' namely *a priori* (analytical, from theory), and *a posteriori* (practical, after synthesis). Hume argued that although 'inductive inference' of one thing causing another; resulting from another; or following from another (such as A followed by B, or A causing B) could be considered, past experience was no longer necessarily a justification to conclude something for future behaviour

Hegel's definition: George Wilhelm Friedrich Hegel (1770 – 1831) viewed greater development of the mind towards freedom as the main goal of knowledge. In *The Philosophy of History* (1837), he looked at all concepts in historical terms as part of what he called a 'dialectic process.' He used the Greek society's example where the dialectic process began with a 'thesis', with harmony between reason and desire in society. Over time, however, this condition could not persist or be sustained, giving rise to the 'antithesis', a result mainly of Socratic questioning. This, according to Hegel, resulted in the dialectic process of synthesising opposing views to give a new thesis. Hegel called this reality *'Geist'* (mind or spirit) attributed to mental or intellectual forms (Hegel, 1997).

Kant's definition: Immanuel Kant (1724 – 1804) added a third proposition to what Hume had put up. He combined synthesis and *a priori* concepts to form what he called Sensibility (Jashapara, 2011). According to Kant in his *Critique of Pure Reason* (1781), he argued that experience is a result of combining space and time – hence

postulating that knowledge is bound by all 'possible experience' (Kant, 1999). Kant appropriately assigned space to geometry and time to arithmetic in describing what he termed inescapable modes of experience.

As can be seen, the quest for an understanding of knowledge is not new at all. However, it has helped to shape the discipline of knowledge management. With the advent and ubiquitous nature of Information Technology, this has only furthered the development of the knowledge management discipline and fuelled the further understanding of the various aspects of what knowledge really is, and how it can be collected, and preserved, or maintained.

It is a good idea to consider knowledge as both an acquisition as well as an awareness. Acquisition because it will show up after some deliberate conceptualisation of phenomena around in a way that goes beyond mere perception and information-worthiness. Awareness because it kicks up a sense that there is something to be recognised in as far as its sentient capital is concerned. Sentient capital here refers to a very individualistic capacity to form value out of a phenomenon made formative.

In all of these definitions of knowledge or 'knowing', what is clear to see is how it is that a case for preserving useful knowledge and also allowing 'old' knowledge to play a role in subsequent 'new' knowledge is important. This also helps to define the knowledge worker.

Additionally, it is worth noting that knowledge is a result of action on information that results in either explicit or implicit utility.

It is the researcher's view that this view of knowledge as information in action sets a fairly good grounding for the discussion of the research and findings from hypothesis testing further on. In keeping with system theory, it is also important to note that accommodating the various concepts in a way that allows objectivity is a good idea particularly in functional disciplines that the area of Knowledge Management aptly embraces.

Formally, therefore, the establishment of knowledge as a functional acquisition of observed, implemented, and reasonably repeatable processes and exercise affects both

the implication of what an expert carries out from learned experience as well as instructive knowledge that establishes grounded theory and practice in any area.

2.1.1 The Knowledge Worker.

Peter Drucker's observation about the changing workplace, where manual workers are distinct from knowledge workers, underscores a fundamental shift in the nature of work. He distinguished between manual workers, who primarily use their hands for tasks, and knowledge workers, who rely on their intellectual capabilities to generate ideas, information, and knowledge that contribute value to the organisation. This distinction reflects the growing importance of intellectual capital and the role of knowledge in modern enterprises (Drucker, 1993). Druker's definition paved the way for a new segment in the workplace that was characterised by professionals with advanced skills in critical thinking. This shift highlights the increasing demand for individuals who can leverage their intellectual abilities to generate and manage knowledge effectively. The significant rise in the employment of knowledge workers in the UK in 2006 reflects this evolving landscape and the growing recognition of the value they bring to organisations (Brinkley, 2006). Over the years, the concepts of knowledge and knowledge management have evolved into distinct disciplines within their own right. The coexistence of various definitions and perspectives on these topics has contributed to cementing knowledge management as a well-established branch of information systems. This multidisciplinary nature, along with its growing importance in contemporary organisations, underscores the significance of knowledge management as a field of study and practice.

It is true that knowledge management, like many management concepts, has faced its share of criticism and scepticism. T.D. Wilson's objection that knowledge management is nothing more than a fad is one such perspective (Wilson, 2002). Wilson's point about this interchangeability of the terms 'knowledge' and 'information' in some cases is a valid critique because in practice, these terms are sometimes used loosely or interchangeably. He referred to this as 'replacement marketing'. Clarifying the distinction between the two is essential in the field of

knowledge management, as it can help organisations better manage their intellectual assets and to make more informed decisions.

Despite the criticism and debates, it's evident that Knowledge Management has not faded away as a passing fad. Instead, it has continued to grow and evolve over the years. This field has played a significant role in shaping and influencing our understanding of knowledge as distinct from the concepts of data and information. The enduring relevance and growth of Knowledge Management underline its importance in modern organisations and its ongoing contribution to the management of intellectual capital.

It is important to emphasise that Knowledge Management is not a merely a fad; rather, it has demonstrated its relevance over a substantial number of years. This longevity its significance as a discipline and continues to impact how organisations leverage knowledge for their benefit (Ponzi & Koenig, 2002). The fact that Knowledge Management has its roots in organisational learning and strategy literature further solidifies its foundation as a legitimate discipline (Etzioni, 1964). It is often observed that the academic research and literature in the field tend to have a higher degree of rigor compared to the knowledge derived solely from consultancy practices (Wilson, 2002). Scholars have indeed engaged in extensive debates and discussions around the knowledge-based perspective of the digital firm. The digital age has brought about significant changes in how organisations operate, emphasising the importance of effectively managing knowledge in the context of digital technology and information systems (Barney, 1991). The lack of a universally agreed-upon definition for knowledge and knowledge management, coupled with th esolid foundation provided by scholars and the increasing importance of tacit knowledge, indeed makes the study of knowledge and knowledge management an attractive and vital area of inquiry. The challenge of dealing with tacit knowledge, which remains elusive for various reasons, represents a notable gap that warrants exploration.

The knowledge worker will be synonymously linked to the knowledge economy and knowledge management paradigm. It is important to note that a lot of considerations relating to matters such as Intellectual Property have been enhanced in recent years as a result of this concept.

As work became more mental and intangible, the ideas of knowledge as a label began with classifying purveyors variously. 'White collar' or 'fad of information' could fit this mold. As the rarification of consultancy and its tacit characteristics grew the redefinitions of knowledge management and work became clearer.

How are the components of computers (as artefacts) and Intellectual Capital (as works of the mind) impacting knowledge and its acquisition?

2.2 Influences of Computers and Intellectual Capital on Knowledge Management.

The early definitions of knowledge management indeed had a close association with information technology, and this alignment might have influenced criticisms from scholars like T.D. Wilson. However, it's important to recognise that knowledge management encompasses not only information technology but also various artifacts and tools that are used to facilitate the acquisition, storage, dissemination, and application of knowledge (Jashapara, 2011). Re-classifying the traditional hierarchy of 'data,' 'information,' and 'knowledge' can indeed help clarify the role of artifacts in the processes of leveraging knowledge. This reclassification recognises that data can be transformed into information and further into knowledge through various processes and the use of technologies.

As noted by Alvin and Heidi Toffler in *Revolutionary Wealth,*

*"*If the First Wave wealth system was chiefly based on growing things, and the second Wave on making things, the Third Wave wealth system is increasingly based on serving, thinking, knowing and experiencing*"* (Toffler & Toffler, 2003).

This evolving relationship among data, information, knowledge, and technology highlights the intricate interplay between artifacts and the knowledge management process, reflecting the complex nature of managing knowledge in the digital age.

This evolution has been a result of the distinct ages or eras as represented by the plow, assembly line, and computer. This is a well-discussed framework in which to understand the evolution of human productivity and knowledge management (Baker, 2008).. The extrication (or intrication) of any one of the artefacts in order to clarify the research process is key to the hypotheses tested in this research.

The questions of what happens to acquired and articulated knowledge, as well as the state of knowledge on a chronological time-frame, are indeed pertinent in the context of the rapidly evolving models and technologies of the modern age. These questions prompt a deeper examination of how knowledge is managed, utilised, an devolves over time:

1. What happens to acquired and articulated knowledge? This question delves into the lifecycle of knowledge within organisations. Knowledge can be created, captured, stored, shared, and eventually may become obsoleve or evolve into many forms. Effective knowledge management strategies aim to ensure that knowledge remains relevant and valuable throughout its lifecycle.

2. In what state is knowledge on a chronological time-frame? Understanding the temporal dimension of knowledge is crucial in a fast-paced environment. Knowledge can become outdated or lose its relevance over time, particularly in fields that experience rapid changes. Therefore, organisations need to consider how to keep knowledge up-to-date and ensure that it aligns with current needs and circumstances.

The coceptualisation of 'waves' makes for a good argument of the evolution of definitions of knowledge alongside intellectual capital. In the 21st Century this has become even more relevant with the Internet. The richest entities at the time of this research are knowledge-based corporations that have used the 'Third Wave' to found and deploy Internet-based companies in all areas of endeavor, be it social platforms, logistics and even manufacture among others.

It's important to clarify that this study will not necessarily focus on the physical age of the individuals or entities involved in knowledge management but rather on the

conceptual states of data, information, and knowledge within the context of information systems and knowledge management.. If it is to be so, it will be incidental to and not apparent to the study. The inputs to the research in this instance will be looking at information as the starting point, and not data as is traditional in the data-to-information paradigm.

The social considerations in the manner in which knowledge accumulation has impacted lives is often overlooked. Here, too, an example of how members of society wish for their 'knowledge' and 'information' to 'lapse' lends an interesting food for thought in dealing with these concepts, especially at a knowledge management level.

2.3 Social Influences of Knowledge.

In preliminary fashion, this consideration has a few pointers to note. Two lawsuits can be cited in discussing this. Maria Belen Rodriguez, an Argentine Model, filed a lawsuit against Google and Yahoo regarding "forgotten search results" (Zeckman, 2014). This is a notable example of social influences presenting legal and ethical issues surrounding data, information, and knowledge managegement, particularly in the digital age. The "forgotten search results" refers to the right to be forgotten, which allows individuals to request the removal of certain search results or information from search engine results pages (or SERPs). Another lawsuit was filed by Jeffrey Kantor, who was terminated by Appian Corporation due to an accidental Google search revealing his criminal past in his search history; another example of legal and ethical complexities surrounding data, information, and knowledgement, especially in the context of workplace privacy and employment decisions. This lawsuit highlights the need for organisations to establish clear policies and ethical guidelines regarding the use of online information in employment decisions and emphasise the importance of individual privacy and data protection in the digital age (Cushing, 2013). One of the aspects that stands out in these cited reports is the *age* of the information (or knowledge) contained in these repositories. More than that is the ubiquitous nature of the Internet and repositories on the Internet itself. It is practically impossible to control what is put on the Internet most especially if it is something that a user does not him

or herself own and control. Although Google has a support page with instructions on how to deal with such matters, it does throw a cautionary that it is not easy to control what has been posted on the Internet, especially if it is material that comes from outside of the user's jurisdiction (Google, 2016). The way in which information is eventually put forth as knowledge does have social implications and endures well beyond what is considered 'current' or even 'relevant'.

An important question to bring forward is: Is it appropriate to allow for knowledge to become obsolete? What would be the best way to preserve knowledge with relation to timestamp or perceived obsolescence (especially in publicly accessible repositories)? Is there even a time-related knowledge characteristic? What implications are there in terms of the *collection* and *expression* of knowledge outside of extraneous influences? This study will, inter alia, consider a further look at this aspect. It will be sufficient to provide a clearer context for this consideration as we move forward and to illustrate how it impacts both knowledge providers and knowledge consumers. This will be done by dealing with the civil service which uses information and knowledge purposefully for delivery but also beyond perceived usefulness.

What does it mean to have corrected conceptions replace initial assertions? Clearly there would and is conflict between keeping track and correcting initial conceptions. In terms of keeping information, jurisprudence would insist we keep a trail; reputation principals would insist correcting and expunging misconceptions would do journaling justice.

It is worth considering some models of knowledge acquisition at this stage. Most of what is known as knowledge acquisition in literature is referred to as learning; either at an individual level or at organisational level. Consequently, there is also the possibility of 'unlearning' or declaring acquired learning fit for replacement or renewal or simply obsolete.

2.4 Learning Models of Knowledge Acquisition.

The concept of knowledge is closely interconnected with the fundamentals of data and information. Knowledge is built upon data and information, and it represents a higher level of understanding and meaning. As a result, many of the practices and techniques used in knowledge management draw from the tools and technologies traditionally employed for data and information gathering, storage, processing, and dissemination. The synergy between computing technologies and knowledge management practices has led to the development of knowledge management systems, content management systems, and collaborative platforms, among others. These tools and technologies enable organisations to capture, store, retrieve, and apply knowledge effectively, fostering innovation and improving decision-making processes.

Developing an ontology for the field of knowledge management is a valuable endeavour that helps establish a structured and systematic framework for understanding and advancing the discipline. Knowledge management draws from various forms of knowledge, whose ontology development can clarify the relationships and components within this complex field. These categories consist of structured, semi-structured, and unstructured forms of knowledge. Structured forms encompass elements like financial data and customer data, among others. Semi-structured forms encompass aspects such as cases and procedures, and more. Unstructured forms encompass elements like emails, presentations, video, and others. Beginning with this classification, it becomes possible to categorise knowledge and construct a conceptualised set of terms and relationships for its representation, often referred to as a 'knowledge map' or 'ontology.' (Jashapara, 2011). The recognised fact that different practitioners would organise knowledge in different ways means that ontologies have been developed for improvement of levels of information organisation, management

and understanding (Jashapara, 2011). This process aids in establishing a standardised lexicon for describing a specific domain. Over the years, several knowledge capture tools have been created and acknowledged. These encompass cognitive mapping tools, information retrieval tools, search engines, agent technology, personalisation systems, and more (Jashapara, 2011). All of these tools contribute to the development and effective manipulation of a coherent knowledge acquisition domain.

Most organisations align to these models in their dealings with information and knowledge acquisition.

2.4.1 The Piagetian Model.

Piaget proposed a model – hitherto known as the Piagetian model whereby the main components were assimilation, accommodation and equilibrium (Piaget, 1952). In the Assimilation process adjustment was key; whereas in the accommodation process a reinterpretation happens in which cognition used to configure this learning is changed. When these two states are satisfied, whereby the assimilation properly adjusts to the accommodation, an equilibrium is said to be reached.

From this theory, Argyris and Schön created two loops out of these two components of the Piagetian model (**Figure 8**); direct adaptation (or assimilation) was referred as "single-loop learning" and the accommodation was called "double-loop learning"

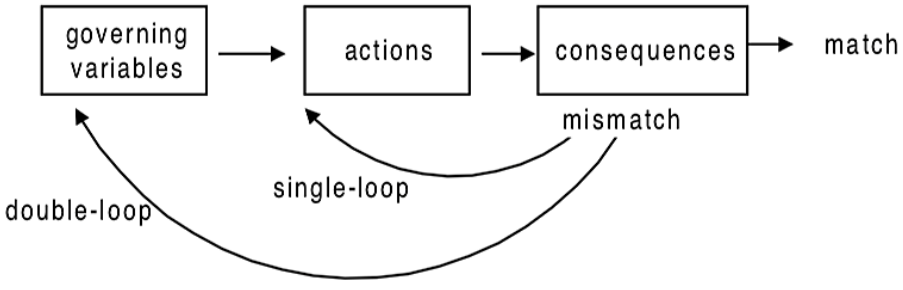


Figure 8 – Organisational learning as system error correction (Argyris and Schön)

In summary, a single-loop refers to an automatic change from one state to the other based on detection of a trigger or stimulus – such as turning on the light when it grows dark and vise versa. This is also known as 'learning by following the rules'. A double-loop on the other hand considers other factors *besides* what is triggering the action. It could be that an incremental demand is made on the brightness of the light once it is turned on, based on the ambience of the surrounding; something that modern gadgets do frequently. The double-loop is also known as 'Changing the Rules'.

A triple-loop learning approach is also a possibility. In this case, consideration would be made on how the changing of the ambience of light affected the intensity of the light's brightness and what new inputs could be gathered to further enhance the experience. This is also known as 'Learning about learning' (Argyris & Schön, 1974). This shows a layering over the double loop that itself derives from the single loop as discussed earlier and shown in **figure 8**. This research can borrow some concepts from this in dealing with cycles of knowledge acquisition.

2.4.2 Kolb's Learning Model.

Kolb devised his own cyclic learning model. In this model, Kolb pointed out four types of skills needed to make the learning cycle effective. These four skills are shown in the **figure 9** below.

For learning to work well, there has to be open engagemnet without prejudgement in terms of new eperiences based on a presentation of several perspectives. Observation and reflection of these perspetives is made in order that concepts and observations are incorporated into the formalisation of theories. These theories are then tested for efficacy and good effect. After this, the result can then be applied to decision making and problem solving (Kolb, 2015).

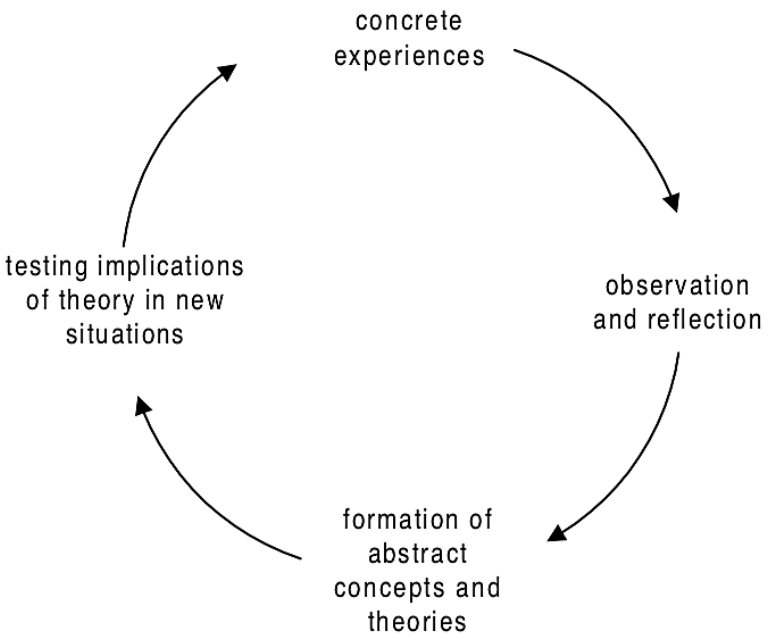


Figure 9 – Kolb's Learning Model (adapted from Kolb, 1984)

Kolb modified this model from Dewey and Lewin's learning theories; he however departed from this model by separating experience as two independent modes. Meittinen formally illustrated Dewey's model to show this distinction (Miettinen & Peisa, 2005). Miettinen illustrated the cycle as shown in the **figure 10** below. The distinction that Miettinen (and Engeström after that) was the fact that Kolb's cycle did not necessarily point to individual learning but to organisational learning. His model, therefore was more clarified as shown in the figure below.

Also, whereas Kolb's appeared to be a mental process, Dewey's was more pragmatic in approach. Their views appeared different in terms of the learning process (Miettinen & Peisa, 2005).

Knowledge concepts have primarily drawn inspiration from data concepts, and subsequently, from information concepts as well. When dealing with knowledge acquisition or creation, certain attributes of information become crucial. Among these attributes are timeliness, denoting currency, and integrity, indicating completeness and accuracy. Planning for knowledge acquisition continues to confront the challenge of whether to allow knowledge to age and the implications of maintaining knowledge as 'current'.

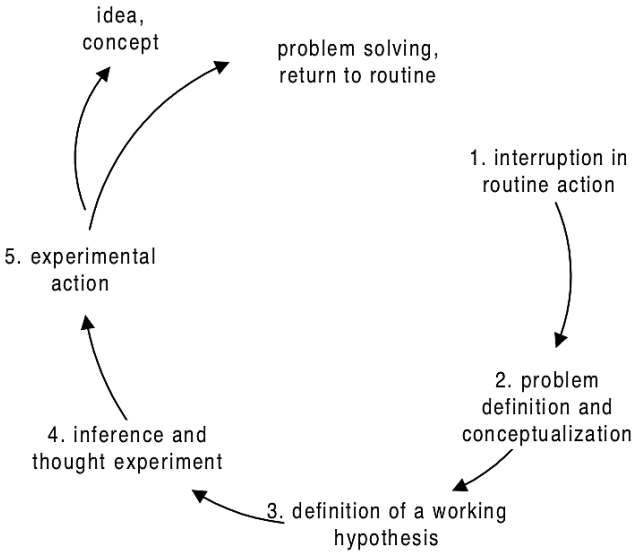


Figure 10 – Learning Cycle according to Dewey (as defined by Miettinen – 1998)

This study aimed to advance this concept by developing an approach to address the aspect of obsolescence planning within the context of knowledge acquisition. This approach involves examining the artifacts employed in knowledge manipulation and determining how they can be integrated with the models and practices associated with knowledge acquisition.

As a traditional mainstay, this is where analysis and acquisition has kept sway; organisations still use the data-information model in addition to artefacts to pursue their information and knowledge processing goals.

In his research on corporate knowledge, Illka Tuomi observes that knowledge creation or acquisition has frequently been approached from the perspective of learning (Tuomi I. , 1999). He points out that the majority of knowledge acquisition occurs within the lifespan of an individual entity, and the process of maturation may result from inheriting ongoing ontogenic development. Furthermore, he emphasises that structural learning encompasses both ontogenic time-scales and generational time-scales, blurring the boundaries between individual and social dimensions, making it challenging to attribute learning exclusively to either of these two processes. Consequently, this facilitates an understanding of the dynamics involved in

acquisitions from the perspectives of social learning, organisational learning, and how these two mutually influence each other over time (Tuomi I. , 1999). Several learning cycles exist and will be elaborated upon in greater detail. As a valuable resource for studying knowledge creation models and frameworks, it's important to highlight that the interactions among these artifacts during the acquisition and maintenance of what eventually becomes 'knowledge' are central to this study. The study aims to investigate how time-scale considerations and related issues come into play, and how they impact knowledge management.

The researcher noted how cyclic models of learning tend to introduce a semblance of a locked system of learning without let. Simplistic as it may seem, a literature is available on the difficulty of getting out of some cycles of learning. Some have social factors, while others have a 'formalisation' or cultural sleight to them.

In many instances, time is considered in cycles of deployment of knowledge in frameworks, or plans. It is not evident whether or not the time-to-knowledge ratio is given prominence or the time is regarded as merely a cycle for milestone purposes. What is clear however is that most goals are hardly achieved as desired.

2.5 Knowledge Acquisition.

The centrepiece of knowledge acquisition lies in the concept of learning. This brings with it a myriad of frameworks to describe this process, having its roots or origins in a diverse number of disciplines. Some of these are psychology, sociology, strategy, management science as well as culture (Easterby-Smith M. , 1997).

One of the approaches given for psychology-based learning approach proposes a four-quadrant approach to learning, which encompasses the individual and group learning approaches. (Shipton & DeFillippi, 2011). The **Figure 11** below summarises their proposition and is discussed further in this thesis.

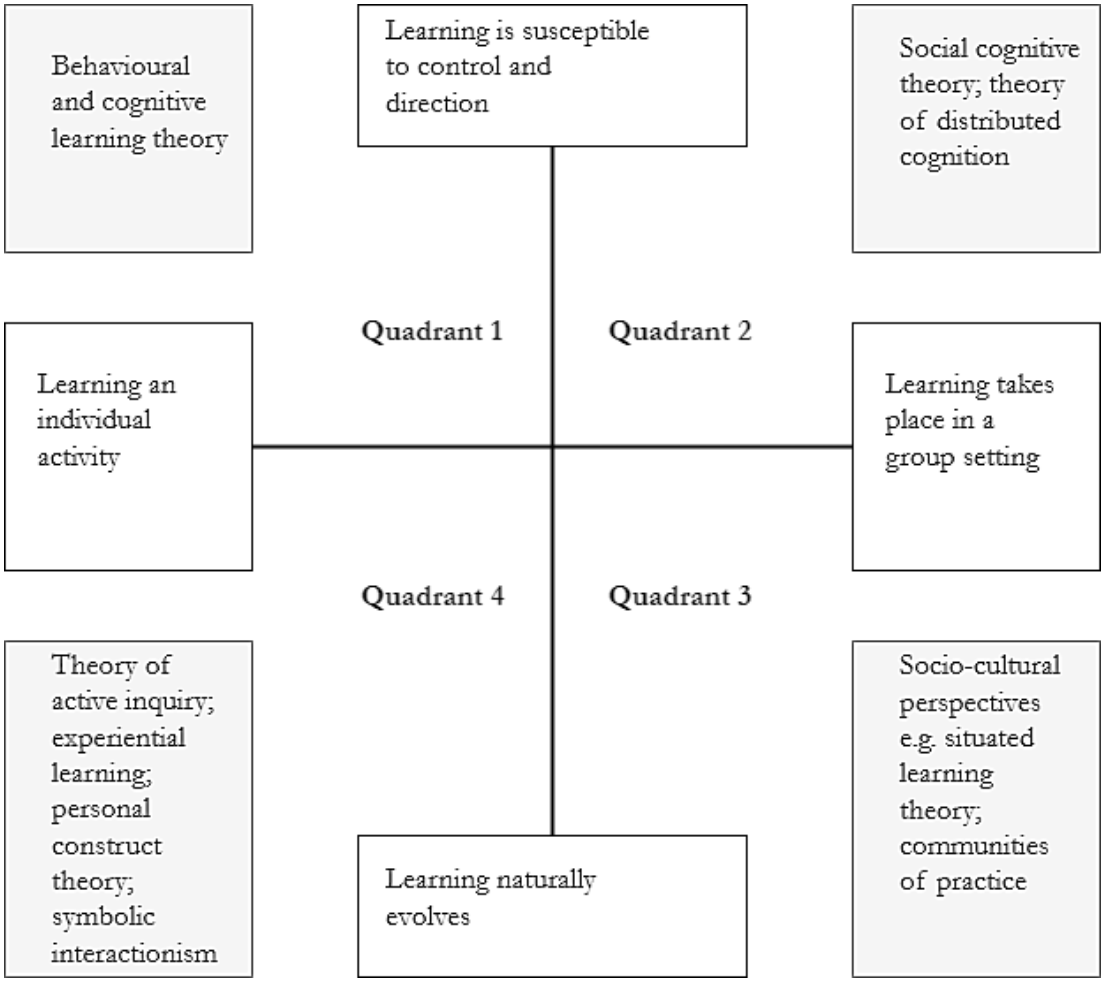


Figure 11 – The 4-Quadrant Framework (adapted from Easterby-Smith & Lyle)

In smaller organisations, learning can be considered as individual by the very nature of the size of the entity, sometimes referred to as a micro-firm. However, as the firm grows, it is clear that most of the learning results from a collective approach, sometimes in clusters or departments that we refer to as team or group learning (Jashapara, 2011). Most organisations and governments gravitate towards team learning in their approach to developing or acquiring knowledge.

Jashapara argues that the drivers of organisational learning can be failure predominantly; the traditional approach is not to tolerate failure but to only look at success drivers. It is the position of this thesis that failure, well timed, will result in faster, and seamless knowledge acquisition as, from Jashapara's model, failure engenders exploration, innovation, and resilience (Jashapara, 2011). In considering

this aspect, it is worth noting that the cycles of knowledge and its acquisition admittedly factors in trial aspects that would aptly be described as the failure driver.

2.5.1 The Success vs. Failure Concept of organisational learning.

It is often the case that successful organisations eventually become moribund because they become ensconced in contentment, self-assuredness and a sense of achievement. These organisations have tailored training programs that will help their recruits learn the ropes of the organisation, how knowledge is articulated towards achieving the goals of the organisation, as well as what the culture of the organisation is and how the new entrants can fit into it. **Figure 12** below illustrates the next discussion.

Unbeknownst to such organisations, a certain sense of inertia creeps up on it whereby outside influences are ignored, time-shifts are overlooked and product differentiation is taken for granted. Despite the levels of success and reliability realised from such states, it is often the case that such organisations leave very little room for growth and progress as speedily as could have been.

On the other hand, failing organisations often exhibit a sense of either resignation – in which case there is little to explore here – of a high resilience of ploughing back the failure lesson into further exploration and innovation. Jashapara's model of success and failure shown in the figure below illustrates this point well. It must be pointed out however that unless failure is taken as a knowledge acquisition point, most organisational learning lay a high premium on making mistakes and often resolve their situations by ensuring that as little failure allowance as possible is given by tailoring their functions and knowledge based on what has already been acquired and articulated in the past.

This concept of success and failure introduces an interesting study gap. It is worth noting that failing organisations will inadvertently discard some aspects in resolving to get better. When "little failure" is being allowed evidently a lot of adjustment is being made to ensure that obsolete aspects are seamlessly let go. Are these considered? To what degree can this be observed?

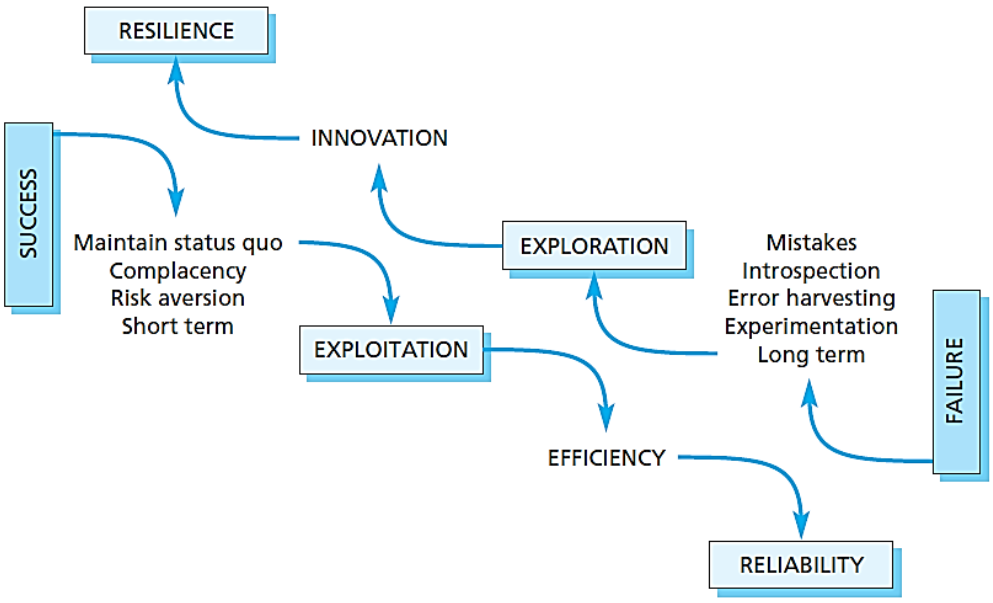


Figure 12 – Success versus Failure in Organisational Learning (adapted from Jashapara)

2.5.2 Acquisition vs Creation of Knowledge.

Is it safe to assume that acquisition is equivalent to learning? This appears to be a holy grail still as arguments about what it means to acquire knowledge rages on. When knowledge is created it could also mean that it has been acquired. Conversely, acquired knowledge can continuously be a result of created knowledge as new aspects are discovered and added, and old aspects shed.

The different ways in which the learning process is presented and articulated shows the various ways in which knowledge is acquired.

2.6 Knowledge 'Transfer' versus 'Storage'.

Knowledge is effectively acquired by various means, chief of which is referred to as *transfer*. This happens when an actor obtains knowledge (actionable information) from another who has hitherto kept it as tacit knowledge until it is shared.

The strategies and reasons for knowledge to be preserved or stored are varied but largely point to insulation against organisational turnover. It is also regarded as a way to enhance an organisation's competitive advantage. Overall, however, this capacity to keep an organisation's knowledge is also referred to as organisational memory. A good model to show transfer of knowledge within an organisation is given by Pautzke and is shown in the **figure 13** below

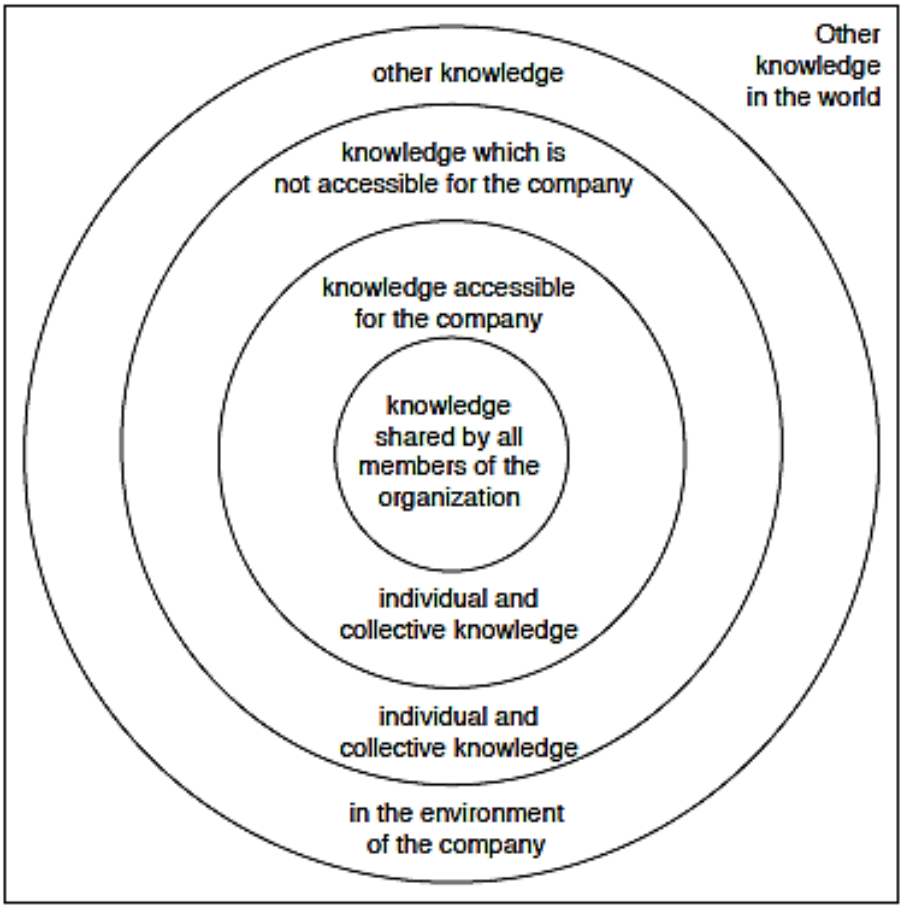


Figure 13 –Pautzke's Organisational Knowledge Model

Pautzke's model shows a layered model of knowledge and how it can be shared and stored. According to Lehner and Maier, the first two layers need to be expanded so

that the sharing and accessibility of knowledge is made possible in an organisation (Lehner & Maier, 2000).

Lehner and Maier point out in their paper on organiational memory that there are three ways in which the third layer, regarding the individual's and collective knowledge can be acquired, namely that

1) the employees use their private knolwedge to aid the organisation until they leave (which in itself poses a challenge if their knowledge is not availed to the organisation beforehand).

2) Knowledge is distributed through discussions; this is with the assumption that actors offering such knolwedge are willing to share such knowledge.

3) That knowledge is included in the results of workers' knowledge. This is limited only to what can be formalised, however.

According to Lehner and Maier, the second strategy shows promise in that meetings and asyncrhonous discussions can be used to collect and store this knowledge for later access by users. This knowledge can hence be re-created or re-enacted as required.

Walsh also presents a model that tries to show orgaisational memory as a technological entity. As **figure 14** below shows, it is the purpose of organisations to store knowledge for the goal of making or taking decisions. He believes this entity can be fed by outside information.

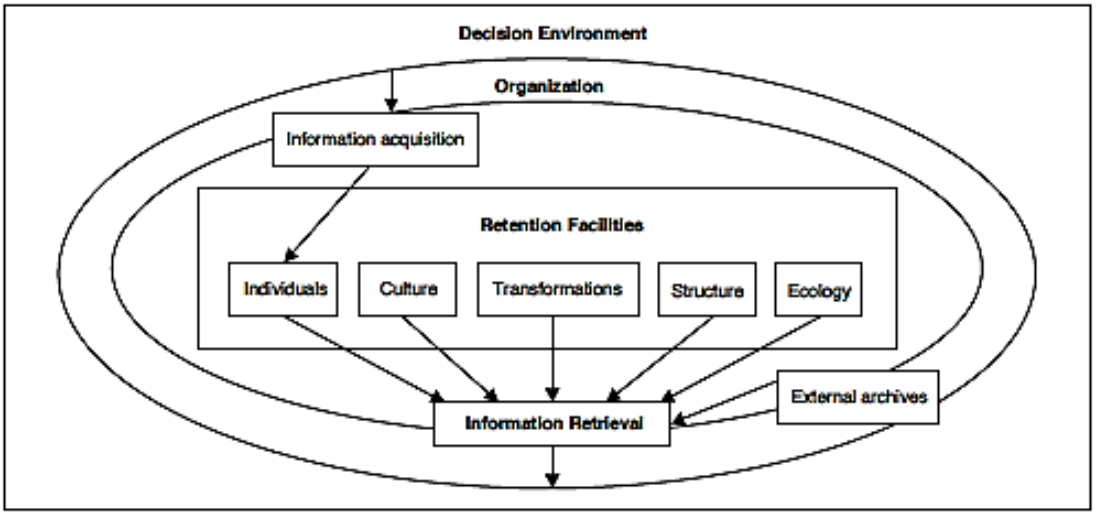


Figure 14 – Organisational Memory Model according to Walsh and Ungson

According to Walsh and Ungson, knowledge is stored in bins comprising individual knowledge, culture of the organisation, transformation mechanisms such as procedures and steps, roles and rules (structure), and the general ecology or arrangement of the workplace in question (Walsh & Ungson, 1991).

Increasingly, the idea of storing knowledge or transferring it for that matter is so that it can aid in decision-making. A third model is viewed from the point of view of Watson's arrangement of organisational memory in the form of a database. In the two figures (**Figure 15 & Figure 16**) below, Watson shows how these are arranged.

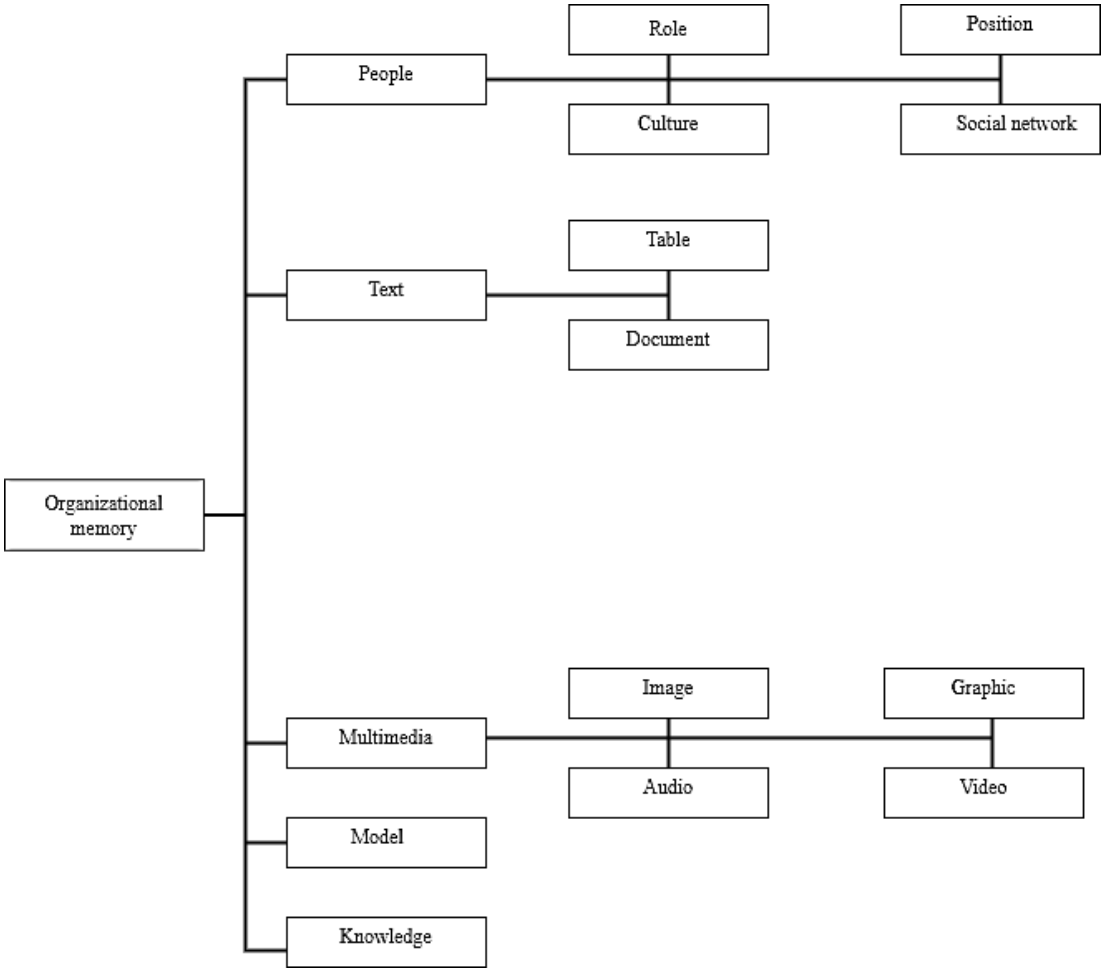


Figure 15 – Watson's Organisational Memory Model

Watson takes the traditional view of looking at data as raw facts, information as processed data (within the context of the target), and knowledge as the ability for the information to be used (Watson, 1998). This model looks to information and knowledge as decision-making enablers or facilitators. "Informed" decisions therefore a key especially in Management Information Systems and the hierarchies of middle management and above.

According to Watson, therefore, the model shown in **figure 15** culminates in the relationships shown in **figure 16** below:

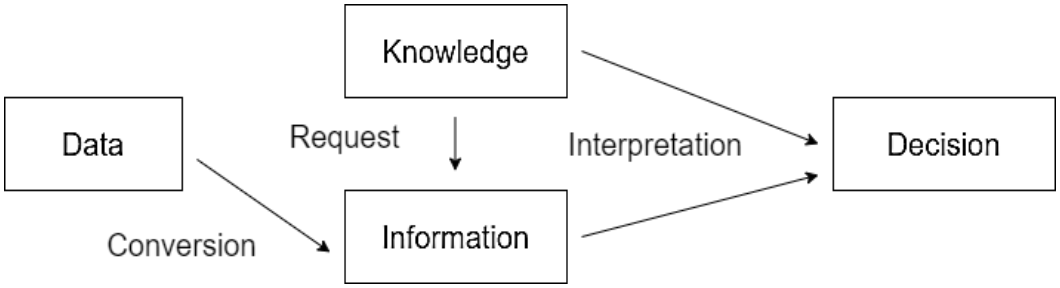


Figure 16 – Relationships of data, information, and knowledge, according to Watson

Knowledge acquisition as it relates to transfer and storage is an important aspect of how it can be re-used and how the age of such knowledge can be considered and conceptualised further. Regardless whether knowledge acquisition is for decision-making, it is prudent that these are stored for future reference, or reliable and consistent decision-making.

When knowledge is stored it can be used in various ways and without much change. This perhaps is what constitutes the beginning of obsolescence when the 'comfort zone' state is achieve. It is often noted that when something is in equilibrium attempts at improving it become even more strongly opposed. Obsolescence can happen unknowingly because the stored knowledge has been accepted beyond question.

2.7 Knowledge Obsolescence.

Knowledge acquisition cannot be discussed in isolation of an obvious question: Does knowledge become obsolete? If so, how and when and why? A few commonly cited concepts are outlined from literature here.

In looking at the concept of knowledge obsolescence as a factor to improving how kowledge is acquired, it is worth noting that correlation between how knowledge is acquired and how it is retired could be a good consideration. Further, the different ways in which knowledge is considered obsolete may be taking away a whole area of study that requires both quantitative and qualitative analysis going forward.

2.7.1 How Kowledge becomes obsolete

Most literature cite obsolete knowledge as arising out of attendant artefacts such as technology or procedures going out of sync with currency.

One of the triggers for signaling obsolete knowledge is when there are drastic or noticeable changes in systems such that some artefacts or components no longer work with the information and knowledge in use. The inertia of a learned method or way of doing things sometimes causes stagnation to occur and change becomes very difficult. However, in cases where this requires continuity with change, some re-arrangement is necessary.

Knowledge can be considered obsolete for a number of reasons and due to a number of hitherto defined conceptions. Tsang attributes abandoning knowledge to obsolete technologies and methods (Tsang & Zahra, 2008). Other attributions to the unlearning and therefore obsolescence concepts apply to organisational unlearning (Martin de Holan & Phillips, 2005). This relates to how organisations may then change from one strategy of knowledge alignment to another. Another approach is defined as *structure* in that as the structure of organisations change, the structure therein forces the unlearning process to take place, thereby rendering knowledge in the previous structure obsolete (Bettis & Prahad, 1995). In other cases it is the technology that obsoletes. Most causes of knowledge becoming obsolete is a result of closely tied technology to information processing and decision making; once that technology

becomes unmaintanable the processes tied to it equally drop out. (Starbuck, 1996). Another cause is when artefacts change. These would include identity, stories and myths, rituals, logos and mission statement sa as well as the champions behind a particular knowledge acquisition cause (Fiol & Lyles, 1985). Others besides include behavior change as noted by Yildiz and Fey (Yildiz & Fey, 2010), the routines involved in acquiring and managing the knowledge (Barkema & Vermeulen, 1998), and value systems (Yildiz & Fey, 2010).

A focus of this research centers around artefacts and how they behave within an acquired knowledge system. It is reasonable to assume that despite the identification of what constitutes artefacts and how they change, not much attention has been paid to considering how to manipulate these changes. Why would an artefact change necessarily? Is it a matter of subjectivity? *Yes* to this seems reasonable. Is it a matter of objectivity? *Yes*, again, seems reasonable.

What this entails is that within a hierarchy there would be those that would notice the obsolescence playing out and if they have their way would effect the change; but there would also be those without any power to effect any change but would objectively concede that a particular artefact has run its course.

This research looks into the implications of artefacts affecting obsolescence from the point of view of a characteristic's significance. In the civil service perspective the common themes are around laws, treaties, and sustained practices that may have relevance but no longer lend much weight to why it should still subsist.

2.8 Summary

This chapter delved into the existing literature on the topics of knowledge and knowledge management to provide a rationale for the gap identified by the study and its subsequent exploration. It included a comprehensive discussion on the definition of knowledge and traced the evolution of the knowledge management discipline, drawing from the viewpoints presented by both its proponents and opponents.

Broadly, an understanding of knowledge from early formations as well as ongoing definitions was researched, including how different classifications came about. The a priori considerations against the a posteriori ones were considered in order that an understanding of what various definitions out there imply was made.

In particular, the researcher attempted to define knowledge in understanding the various definitions by bringing about a premised view. This view would help to further discuss and choose a methodology for the research at hand.

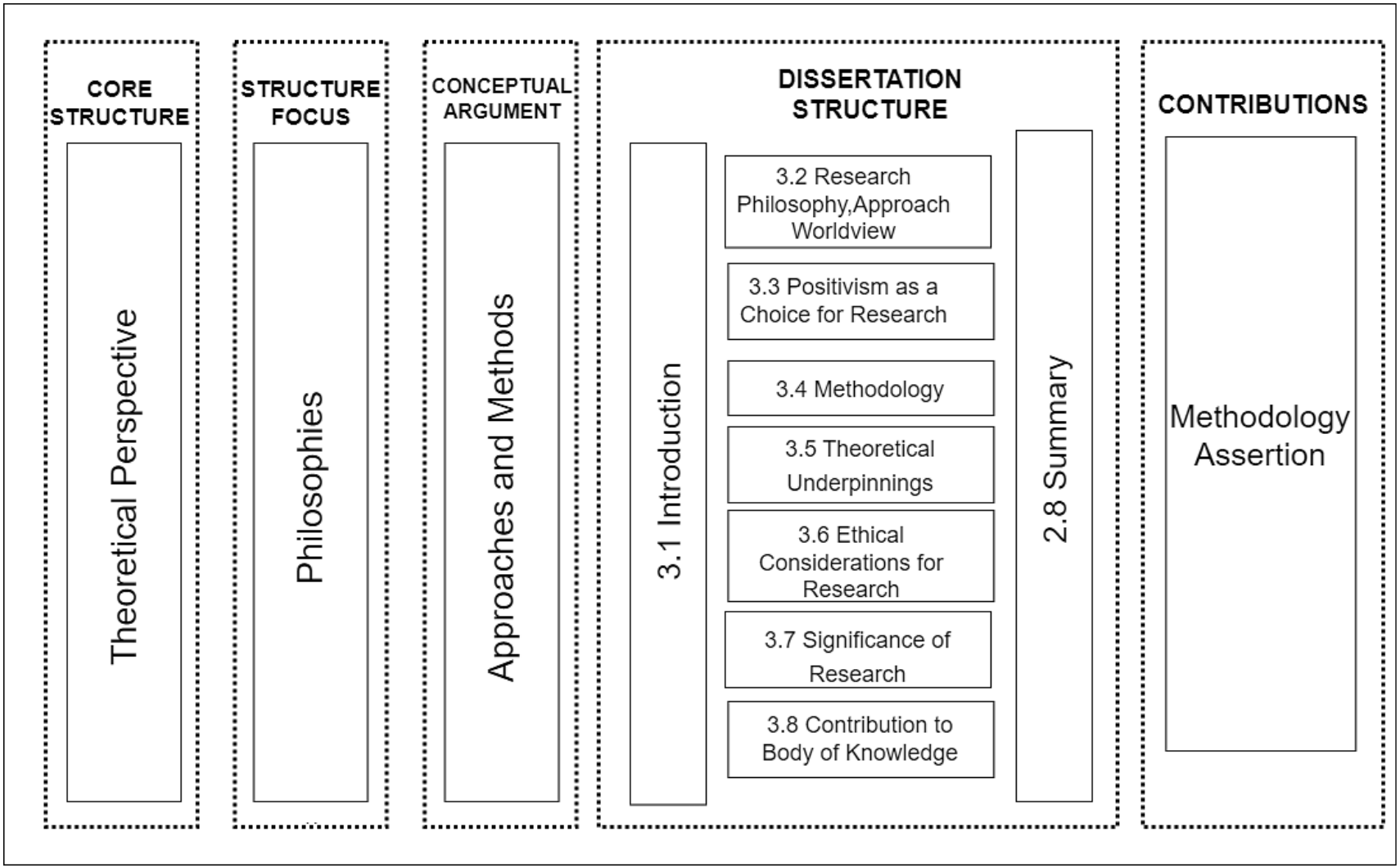
The chapter also considered the future prospects of knowledge management and introduced various models of knowledge acquisition. Knowledge acquisition begins with the learning paradigm. This can be individual or team based learning. The drivers that enable learning to take place can be considered to be success or failure; however, a driver that impacts learning and knowledge acquisition but is often not factored, is failure. It was noted that this factor enables exploration to take place and this feeds into the failure thread in the final analysis.

Obsolescence in consideration looked at what brings it about. In its typical form, it was drilled down to the behavior of artefacts of an information system within which knowledge is acquired. The normative influences on an artefact that result from such as ritual, practice, and other myths and stories affect the way in which a knowedge base will be assessed in terms of currency.

Linkages in the concepts of how knowledge is acquired are made in this chapter and a consolidation of the need to undertake this study is further confirmed. The point that few articles deal with the concept of obsolescence in the way that the researcher proposes lends more credence to the need for this research to be carried out.

CHAPTER THREE PHILOSOPHIES, APPROACHES, AND METHODOLOGY

Map 4 -- Philosophies, Approaches, and Methodology



CHAPTER THREE PHILOSOPHIES, APPROACHES, AND METHODOLOGY

Layout:

3.1 Introduction.

This chapter centres on the philosophical perspectives that have shaped the research approaches and the subsequent strategies and methods employed to address the research problems. The primary aim of this study was to establish a research approach and a worldview that would provide clear guidance for the overall direction of the research. This approach aimed to ensure that the field of study was well-defined, allowing for reliable and consistent results aligned with the intended objectives.

An exploration of obsolescence, as addressed in this thesis, in conjunction with global phenomena, is best pursued with an objective that remains as unbiased as feasible. This entails conducting investigations without any external influences or direct involvement to ensure the attainment of a clear and independent outcome.

The research philosophy employed in this study aimed to establish the essential assumptions that would form the foundation for the strategy chosen to accomplish the research objectives (Saunders, Philip, & Thornhill, 2009). Saunders et al. provide a graphical representation known as the 'research onion' to depict how philosophies influence research approaches, subsequently affecting the selection of research strategies, methods, and the approach to data collection and analysis (Saunders, Philip, & Thornhill, 2009). **Figure 17** below depicts the research 'onion,' adapted from Saunders et al.

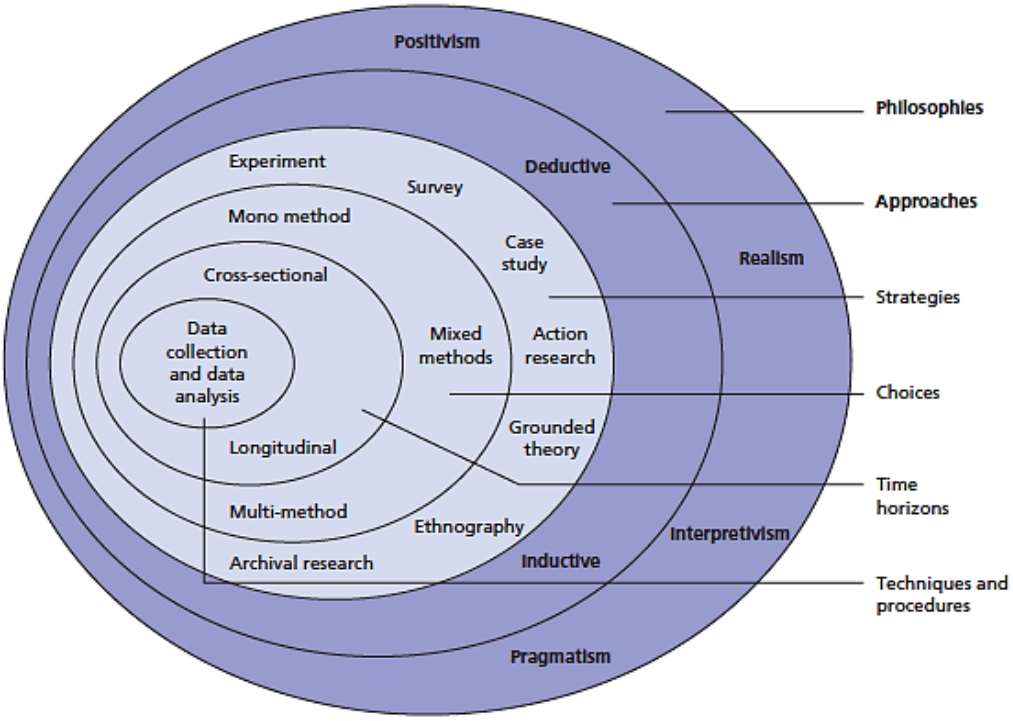


Figure 17 – The Research Onion (Adapted from Saunders, Lewis & Thornhill, 2009)

The aim of this chapter was to outline the research approach employed in this study, as well as the theoretical perspective that guided the investigation of the proposed research question. As depicted in the 'onion' model, philosophies and approaches play

a pivotal role in shaping the strategies, choices, and methods employed to obtain an accurate research solution.

To fulfil the primary objective, an approach based on a template, complemented by context-specific interview questions, was employed. This approach sought to address both quantitative aspects, such as the extent of knowledge collection and its recognition by the researcher, as well as qualitative aspects. In particular, the research delved into the examination of existing models utilised in Knowledge Management, particularly within organisations with a service-oriented or research-focused nature. In such cases assigning a measurable metric was not immediately evident. This is seen eventually in the discussion of the model developed for testing the hypotheses of this research.

It's important to emphasise that this study aimed to address questions through a comprehensive quantitative approach, while also incorporating elements of qualitative analysis when necessary.

In this chapter, we delve into a detailed discussion of the various research approaches. While researchers often navigate a broad spectrum of approaches, they acknowledge the primary thrust of their approach based on the research's methodology, setup, and subsequent analysis of results. The intention of this research study was to provide a clear presentation of the philosophy, approach, methodology, and tools utilised throughout the research process. Implicit within the research question was an interdisciplinary connection, as articulated by Karl Popper:

"We are not students of some subject matter, but students of problems. And problems may cut right across the borders of any subject matter or discipline." (Popper, 1963).

Addressing many of society's challenges often requires a multifaceted approach, giving rise to the development of new disciplines that are better equipped to tackle contemporary methods of knowledge application.

Supporting this statement, this research demonstrates that the examination of obsolescence in knowledge collection and maintenance draws upon interdisciplinary

sources, even though the primary focus lies within the realms of information systems and technology.

3.2 Research Philosophy, Approach and Worldview.

When conducting research, it is crucial to begin by discussing the research approach and how it is shaped by a specific worldview. While this may not be readily apparent in lower-level research, it becomes a significant driver of philosophical thought at more advanced levels, such as the one undertaken in this study. In many research approaches, the underlying philosophy guiding the research ideas often remains concealed (Cresswell, 2014).

The aim of this study is to explicitly articulate this aspect. Researchers, while aware of various methods and approaches, often do not explicitly consider the role of their approach and worldview as they conduct their work.

This research explicitly aimed to acknowledge the aspects of approach and worldview that would be embraced throughout the research process.

3.2.1 Philosophies considered.

Several philosophies and paradigms are available, depending on the chosen research activity. While Saunders et al. address general philosophies, Burrell and Morgan propose a structured four-paradigm model of research philosophy. This section discusses a few prominent philosophies in detail.

Burrell and Morgan identified four broad paradigms and examined various epistemologies within these paradigms, as illustrated in the figure below (Burrell & Morgan, 1979). These paradigms encompass various approaches that continue to influence research today (Jashapara, 2011). The figure below illustrates some of these paradigms. Additionally, Saunders et al.'s 'onion' provides a clearer view of the

primary philosophies used in contemporary research (refer to the previous figure 17 on the research onion).

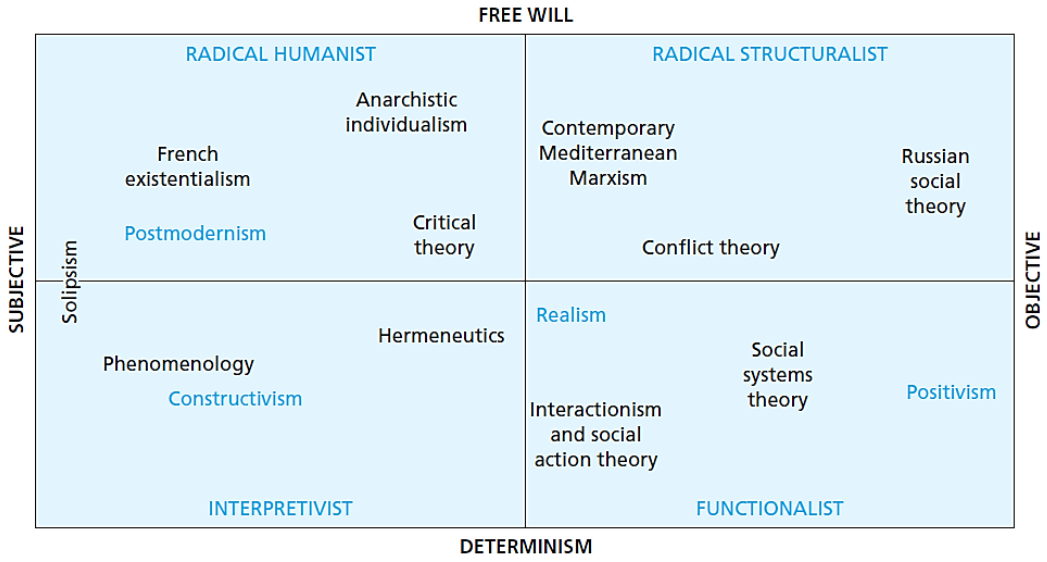


Figure 18 – Adapted from Burrell and Morgan's four Paradigms and epistemologies (Burrell & Morgan, 1979)

Figure 18 shows four paradigms introduced by Burrell and Morgan, initially considering them as mutually exclusive. However, they later refined this view to include transitions and overlaps. Examples of theories associated with these paradigms include structuration theory, Marxism, Weberian theory, solipsism, and critical theory. While not extensively elaborated upon, this perspective suggests that these approaches can exist in more than one paradigm simultaneously. (Gioia & Pitre, 1990).

It's worth highlighting the ontological significance of how the world is perceived. To understand what each paradigm or philosophy embraces, let's briefly define objectivism and subjectivism. Additionally, we should discuss the concepts of 'Free Will' and 'Determinism,' which are situated on opposite sides (top and bottom) of the four-paradigm figure adapted from Burrell and Morgan.

'Free Will' can also be referred to as the sociology of radical change, while 'Determinism' is alternatively known as the sociology of regulation. In the context of Burrell and Morgan's presentation, they are simply termed radical change and regulation, respectively (Burrell & Morgan, 1979).

The figure illustrates how the various paradigms have influenced and categorised the different approaches, which, in turn, impact research methods. Broadly, subjectivity rises towards the radical humanist and structuralist respectively as does objectivity; free will and determinism increase along the scale towards the functionalist and the radical structuralist. A cursory at each suffices:

The functionalist paradigm is situated within the objectivist and regulatory dimensions. In terms of ontology, it is primarily focused on providing rational explanations for the occurrence of specific problems. This paradigm aims to formulate recommendations and solutions within a particular research area (Saunders, Philip, & Thornhill, 2009).

The interpretivist paradigm emphasises gaining a deep understanding of the meaning within a research area, often without the explicit goal of instigating change (Saunders, Philip, & Thornhill, 2009). It leans more towards objectivity.

The radical humanism paradigm adopts a critical perspective on a research area, with a primary focus on challenging and changing the existing status quo. This is stated as "to articulate ways in which humans can transcend the spiritual bonds and fetters which tie them into existing social patterns and thus realise their full potential." (Burrell & Morgan, 1979).

The radical structuralist paradigm aims to bring about fundamental change through the analysis of phenomena and their relationships, especially in conflict patterns and hierarchical structures that may lead to dysfunctionality. It is considered an objectivist perspective because it does not necessarily involve direct engagement with social actors (Saunders, Philip, & Thornhill, 2009). Situated at the opposing ends, the left representing the subjectivist dimension and the right representing the objectivist dimension, according to Burrell and Morgan's paradigms.

Saunders et al succinctly define objectivism as the representation of social entities existing in an external reality separate from the social actors who are aware of their existence. In contrast, subjectivism is depicted as the creation of social phenomena

through the perceptions and actions of the social actors who acknowledge their existence (Saunders, Philip, & Thornhill, 2009).

What do these terms entail?

Objectivism pertains to social entities that exist independently of social actors. In this context, researchers are considered observers who do not need to actively participate or engage in the subject under study. This approach is often employed in natural sciences as it involves verifying or validating existing laws through experimentation and potentially extending or adding value to established theories (Saunders, Philip, & Thornhill, 2009).

Subjectivism on the contrary focuses on social phenomena that emerge from the perceptions and actions of social actors. It acknowledges that these phenomena are continually evolving and, as a result, may require adjustments and alterations as the research progresses. Consequently, researchers in a subjectivist paradigm play a significant role in influencing how the social actors engage in their roles during the research activities. This active involvement of the researcher can contribute to achieving the desired research outcomes (Saunders, Philip, & Thornhill, 2009).

Examining Burrell and Morgan's four paradigms illustrates these definitions in action. When considering these major philosophies in the context of determining research approaches, it becomes clear that research ideas, the research environment, and overarching goals are significantly influenced by these ontological concepts or perspectives.

Throughout years of research, the adoption of the functionalist paradigm has become increasingly prevalent. As a result, approaches within this paradigm have gained prominence. Goles and Hirschheim's work offers a notable and proportional representation of Burrell and Morgan's four paradigms within knowledge management research, depicted in **figure 19** below.

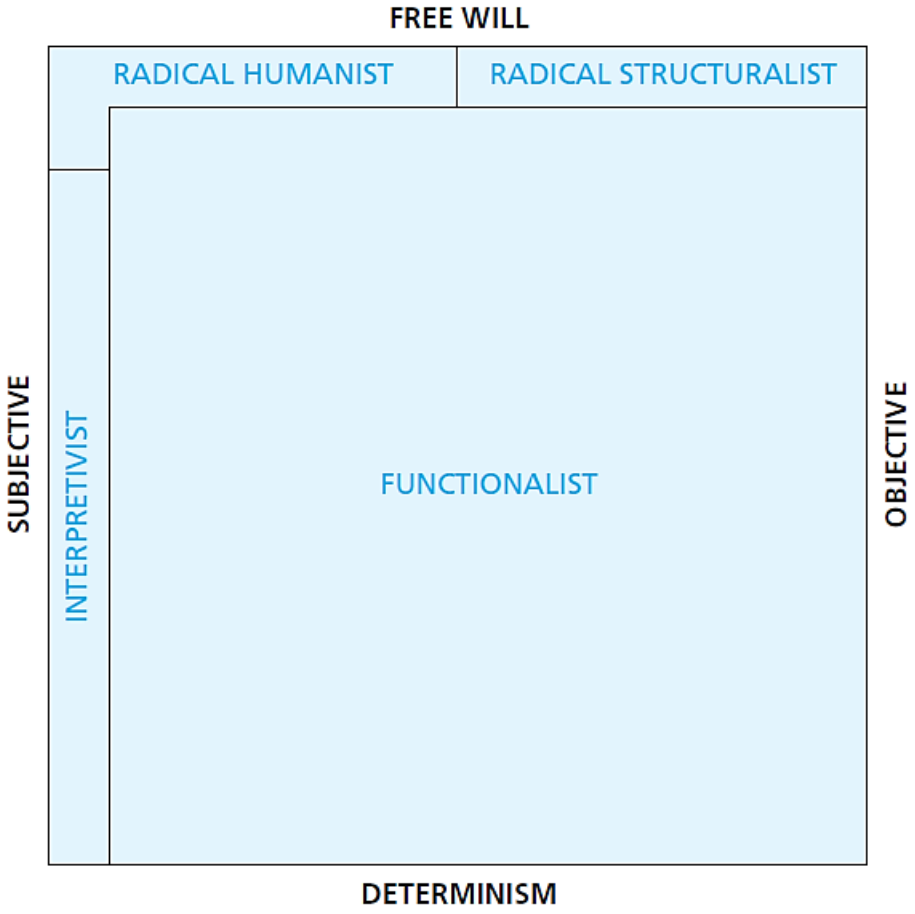


Figure 19 – Proportional Representation of Paradigms Adapted from Goles and Hirschheim (Gioia & Hirschheim, 2000)

In this figure, Gioia and Hirschheim highlighted that Burell and Morgan's paradigm presentation appeared to favour the functionalist paradigm, particularly the positivist approach (Gioia & Hirschheim, 2000). Positivist approaches are preferred within the functionalist paradigm, as they have been extensively tested and successfully employed by researchers over an extended period (Jashapara, 2011).

The philosophies closely examined for this research are effectively encapsulated within the research 'onion (Saunders, Philip, & Thornhill, 2009) are respectively Pragmatism; and Interpretivism. These philosophies correspond to constructivism, hermeneutics, and phenomenology within Burrell and Morgan's paradigm (Burrell & Morgan, 1979), as well as realism, and positivism. Realism and Positivism are categorised as Functionalist paradigms in Burrell and Morgan's paradigm

representation. Let's briefly examine each of them and then discuss the preferred approach.

As these philosophies are presented, it should be noted (and agreed with Saunders et al) that no philosophy is inherently better than the other; rather, each is suited for achieving different aims depending on the context (Saunders, Philip, & Thornhill, 2009). This discussion was, therefore, not meant to be discriminatory; instead, it aimed to provide information and rationale for the choice of philosophy adopted in this research.

The following **Table 5**, adapted from Saunders et al. provides concise summaries of the various aspects of the philosophies discussed. These summaries align with the work by Burrell and Morgan depicted in the figure above.

In a 1982 presentation, Burrell and Morgan referred to 'Determinism' as 'Regulation,' and 'Free Will' as 'Radical Change.' The purposes of the four paradigms are as follows (Burrell & Morgan, 1979):

- To assist researchers in clarifying assumptions about the nature of science and society.
- To provide valuable insights into how other researchers approach their work.
- To aid researchers in mapping and navigating their own research journeys.
- To facilitate an understanding of possible research directions and their current trajectory.

	Positivism	Realism	Interpretivism	Pragmatism
Ontology: *the researcher's view of the nature of reality or being*	External, objective and independent of social actors	Is objective. Exists independently of human thoughts and believes or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: *the researcher's view regarding what constitutes acceptable knowledge*	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology: *the researcher's view of the role of values in research*	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Values play a large role interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

Table 6 – Comparing four research philosophies (adapted from Saunders et al)

3.2.1.1 Pragmatism.

Saunders et al. highlight that while the predominant choices often boil down to positivism and interpretivism, opting for either in isolation is often impractical in

practice. This is where the pragmatic philosophy comes into play (Saunders, Philip, & Thornhill, 2009). Pragmatism asserts that the primary factor influencing epistemology, ontology, and axiology should be the research question itself, rather than rigid adherence to a specific philosophical standpoint. Moreover, it recognises that different questions may warrant different philosophical approaches. In cases where the research question doesn't unequivocally align with either a positivist or interpretivist philosophy, a pragmatic approach suggests the adoption of mixed methods, which are more suitable for accommodating the diverse spectrum of research needs, rather than adhering to polarised positions (Saunders, Philip, & Thornhill, 2009).

Tashakkori and Teddlie emphasise that pragmatism's attractiveness lies in its avoidance of futile debates regarding abstract concepts like truth and reality. They advocate for studying topics of interest or value through various appropriate methods and utilising the outcomes to bring about positive consequences within the framework of one's value system (Tashakkori & Teddlie, 1998).

3.2.1.2 Interpretivism.

Interpretivists subscribe to the notion of a constructed reality, asserting that individuals actively construct or shape their own perception of reality. In this perspective, the responsibility for understanding, reconstructing, analysing, and interpreting this constructed reality lies with the participants themselves.

Interpretivists contend that, in contrast to research philosophies like positivism that rely on scientific principles, the intricate nature of the social world defies reduction into definitive, law-like procedures. Instead, they emphasise that researchers adopting an interpretive approach take on the role of social actors who must actively interpret and engage with their subjects, aligning their actions with the interpretation they construct (Saunders, Philip, & Thornhill, 2009). Interpretivism draws its roots from the traditions of phenomenology and interactionism. Phenomenology pertains to how individuals perceive their surrounding world, while interactionism posits that the interpretation of the social world is an ongoing process, necessitating continual

adjustments in deriving meaning and actions. Empathy plays a pivotal role within Interpretivism (Saunders, Philip, & Thornhill, 2009).

3.2.1.3 Realism.

Realism is closely associated with scientific inquiry. It is based on the idea that truth is determined by what we perceive as reflecting reality. Realism assumes that objects have an independent existence apart from the human mind or influence (Saunders, Philip, & Thornhill, 2009). Therefore, it is not surprising that realism aligns with positivism in its scientific approach to knowledge development. Both philosophies involve data collection and the analysis of that data to understand and explain the world.

In contrast to positivism (which includes post-positivism as a separate perspective), realism encompasses two main types: direct realism and critical realism.

Direct realism focuses on the immediate reality as perceived through the senses, considering the world as it is portrayed by sensory experiences.

Critical realism, on the other hand, emphasises examining the experiences and sensations of the real world without solely relying on direct perceptions of the world. It takes a more critical and analytical approach to understanding reality. (Saunders, Philip, & Thornhill, 2009).

This philosophy is well-suited for management science research as it seeks to portray the world as a dynamic and evolving entity. This perspective proves valuable in the context of change management or when making recommendations for adapting to evolving phenomena or shifting circumstances.

3.2.1.4 Positivism.

Positivism also involves adopting the perspective of natural science, which entails observing social reality and generating law-like generalisations, much like the approaches used in the physical and natural sciences. (Remenyi, Williams, Money, & Swartz, 1998). In this context, credible results are derived solely from observable

phenomena, and the process involves building on existing theories to formulate testable hypotheses, which can be either fully or partially confirmed (Saunders, Philip, & Thornhill, 2009).

After hypotheses are formulated, data is collected to serve as the foundation for subsequent hypothesis testing. Research conducted in this manner is characterised by its value-free approach, which means that, unlike the interpretivist perspective, the researcher and the resources employed do not exert direct influence on each other. This stance emphasises the researcher's independence from the subject of the research, thereby ensuring objectivity (Remenyi, Williams, Money, & Swartz, 1998).

It is commonly assumed that positivist research employs structured methodologies to facilitate replicability. The focus is on quantifiable methods that inevitably necessitate some form of statistical analysis (Gill & Johnson, 2000). However, this does not preclude the use of other methods, such as data collected from interviews (Saunders, Philip, & Thornhill, 2009).

3.2.2 Research Approaches.

As indicated in the research onion, the two primary approaches that can be identified are the deductive and inductive research approaches, which also influenced the study's methodology. Here's a brief outline of each:

3.2.2.1 Deductive approach.

The deductive approach is often associated with scientific research and involves the testing of theories. It entails the formulation of a hypothesis to establish a relationship between concepts or variables. Laws derived from this approach provide the basis for explaining phenomena and enable the prediction and control of their occurrence (Collis & Hussey, 2003). When discussing the deductive approach, Robinson identifies five stages involved in its application (Robson, 2002). These are:

1. Formulating a hypothesis derived from an existing theory.

2. Translating the hypothesis into measurable and operational terms.

3. Conducting experiments or research to test the operational hypothesis
4. Analysing and scrutinising the specific results and outcomes of the investigation.
5. Adjusting or revising the original theory based on the discoveries made during the research process.

The cyclical nature of this process often requires revisiting the first step as needed, depending on the outcomes and findings of the research cycle. The deductive approach focuses on operationalising the concepts being studied, and it is primarily quantitative in nature, emphasising measurable aspects of the research (Saunders, Philip, & Thornhill, 2009). Deduction also involves simplifying elements as much as possible through a process known as reductionism. Another important aspect of deduction is the ability to make generalisations from a suitable sample of sufficient size (Saunders, Philip, & Thornhill, 2009).

Clearly, the deductive approach is preferred within the positivist philosophy.

3.2.2.2 Inductive approach.

While the deductive approach aims to test theory, the inductive approach is geared towards theory construction. The origin of this approach can be traced back to the early days of the social sciences. According to Saunders et al., social scientists grew increasingly cautious of deduction due to its establishment of cause-and-effect relationships between variables without a comprehensive understanding of how individuals interpreted their social surroundings (Saunders, Philip, & Thornhill, 2009). This forms the foundation of inductive research. Unlike the deductive approach, inductive research does not adhere to a rigid methodology that restricts alternative explanations of phenomena or different perspectives. It is believed that these alternative explanations can lead to a deeper comprehension of events within the research domain.

Inductive research is primarily focused on the contexts in which activities occur, which often leads to smaller sample sizes. Consequently, this approach predominantly

utilises qualitative data, employing a variety of methods for its collection (Easterby-Smith, Thorpe, Jackson, & Lowe, 2008).

Easterby-Smith et al argue that having knowledge of different research methods empowers researchers to adapt their research designs effectively, allowing them to address various constraints encountered in their research endeavours.

3.2.2.3 Mixed approach.

The **Table 6** below outlines the key distinctions between the deductive and inductive research approaches.

Deduction emphasises	Induction emphasises
• scientific principles • moving from theory to data • the need to explain causal relationships between variables • the collection of quantitative data • the application of controls to ensure validity of data • the operationalisation of concepts to ensure clarity of definition • a highly structured approach • researcher independence of what is being researched • the necessity to select samples of sufficient size in order to generalise conclusions	• gaining an understanding of the meanings humans attach to events • a close understanding of the research context • the collection of qualitative data • a more flexible structure to permit changes of research emphasis as the research progresses • a realisation that the researcher is part of the research process • less concern with the need to generalise

Table 7 – Differences between Deduction and Induction (adapted from Saunders et al, 2009)

Recognising that there are clear boundaries or distinctions, it is indeed possible and advantageous to integrate both deductive and inductive approaches within the same research study (Saunders, Philip, & Thornhill, 2009). In cases where established frameworks and models are available, a deductive approach is fitting, while a novel and contentious topic might be better suited for an inductive approach – and both can be applied within the same research study on a given topic (Cresswell, 2014).

Timing is a crucial factor to consider. Deductive research may be completed more swiftly due to the initial setup required before data collection and analysis. Conversely, inductive research tends to be more time-consuming, as it involves the gradual

accumulation and analysis of ideas over an extended period (Saunders, Philip, & Thornhill, 2009).

Regarding risk, the deductive approach carries lower risk compared to inductive research. For instance, the risk in deductive data collection may involve the non-return of questionnaires. In contrast, inductive research bears a higher risk, where the concern lies in the possibility that valuable data patterns may not emerge as expected (Saunders, Philip, & Thornhill, 2009).

A metaphor, echoing Saunders et al, is presented by Hakim through an architectural analogy. This analogy likens the choice of research approach to an architect's style, highlighting that it mirrors the researcher's preferences and ideas. In a similar vein, it underscores that those funding the research must ultimately contend with the chosen approach's implications (Hakim, 2000). Buchanan et al (Buchanan, Boddy, & McAlman, 1988) add: “the needs, interests and preferences (of the researcher) are typically overlooked but are central to the progress of the fieldwork”.

However, this does not suggest that researchers do not take care to articulate their preferences clearly, as failing to do so could potentially alter the essence of the research question (Saunders, Philip, & Thornhill, 2009).

3.2.3 Research Strategies

There are various strategies available for research approaches, and the choice of strategy often aligns with the chosen approach. As mentioned earlier regarding paradigms and philosophies, there is no strict rule about which strategy to use. Nevertheless, certain strategies are better suited to specific approaches. As Yin points out, each strategy can be applied to exploratory, descriptive, and explanatory research. Some strategies are closely associated with deductive research, while others are more aligned with the inductive research approach (Yin, 2003). Some common research strategies include experiments, surveys, case studies, action research, grounded theory, ethnography, and archival research. Provided below is a brief overview of each strategy to illustrate how they are suited to either approach.

3.2.3.1 Experiment.

The **Figure 20** below summarises the Experiment process.

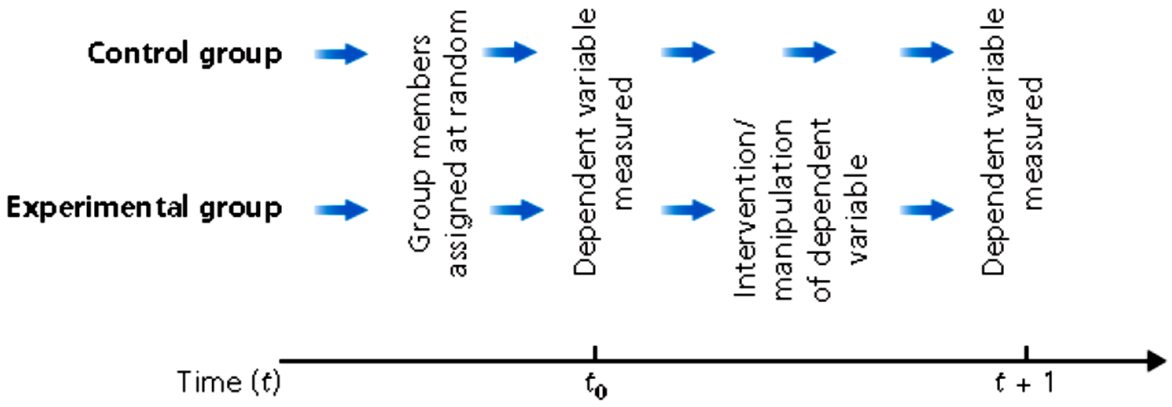


Figure 20 – Experiment Strategy (adapted from Saunders et al, 2009)

The experiment, as a research strategy, is commonly associated with natural science research but is also utilised in social science research (Saunders, Philip, & Thornhill, 2009). In a classic experiment, as illustrated in the figure above, two groups are utilised, and their members are randomly assigned. One group serves as the experimental group, in which a planned manipulation is introduced, while the control group undergoes no intervention. The dependent variable is measured both before and after the manipulation, allowing for a before-and-after comparison (Saunders, Philip, & Thornhill, 2009).

Some ethical concerns can limit the application of experiments in social settings, as conducting experiments that involve issues like workforce redundancy may raise ethical questions (Saunders, Philip, & Thornhill, 2009).

3.2.3.2 Survey.

The survey strategy is typically associated with the deductive research approach, commonly used in business and management research to answer questions related to "who," "what," "where," "how much," and "how many." (Saunders, Philip, &

Thornhill, 2009). This strategy enables the collection of quantitative data that can be analysed using various tools, including statistical methods, among others.

The survey strategy offers good control over the research process, and when sampling is done correctly, it can be representative of the population being studied. However, setting up a representative sample requires time and effort. One limitation of this strategy is that the data collected may not be as comprehensive as in other strategies. Additionally, relying too heavily on the goodwill of respondents can be a potential issue (Saunders, Philip, & Thornhill, 2009).

3.2.3.3 Case Study.

According to Robson a case study is a research strategy that involves empirically investigating a specific contemporary phenomenon within its real-life context (Robson, 2002).

The case study is valuable when employed to gain insights into the context of the research and the underlying processes within that context. It is well-suited for addressing questions related to “why”, “what”, and “how” (Morris & Wood, 1991).

3.2.3.4 Action Research.

The term "action research" was initially coined by Lewin in 1946 (Saunders, Philip, & Thornhill, 2009). Four common themes follow this. Firstly, there is an emphasis on research in action rather than action in research (Coghlan & Brannick, 2005). Secondly, it involves how practitioners are involved in the research. Thirdly, there is an emphasis on the iterative nature of the process, including diagnosing, planning, acting, and evaluating (see the figure below). Fourth and finally, action research should have implications beyond the immediate scope of the research (Coghlan & Brannick, 2005).

The **Figure 21** below illustrates how action research operates by progressing through a sequence of diagnosing, planning, acting, and evaluating the outcomes within a specific context and for a defined purpose.

It is important to observe that each cycle seamlessly transitions into subsequent cycles, and this iterative process is reiterated as the research advances. Each spiral is regarded and articulated as an objective in itself. (Robson, 2002).

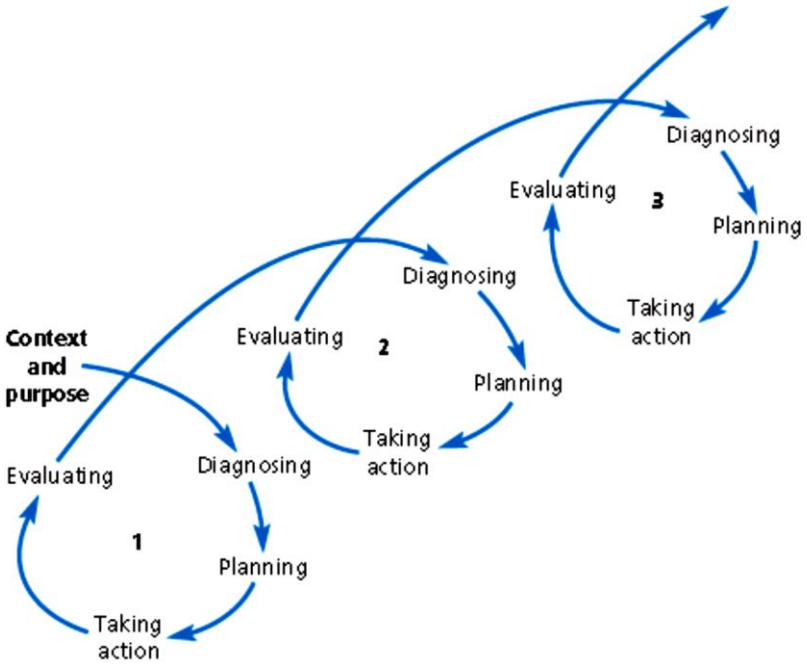


Figure 21 – Action Research (Adapted from Saunders et al, 2009)

3.2.3.5 Grounded Theory.

Grounded theory stands as a prime example of inductive research (Glaser & Strauss, 1967). It is also regarded as somewhat simplistic because it incorporates both inductive and deductive elements.

Goulding explains that this strategy is beneficial for research aimed at predicting and explaining behaviour (Goulding, 2002). Grounded theory begins without a pre-established framework, and theory is developed from data generated through ongoing observations during the research process. The continuous reliance on data for theory development and testing aligns it with both inductive and deductive approaches (Collis & Hussey, 2003).

3.2.3.6 Ethnography.

Ethnography is closely associated with the inductive approach and has its roots in anthropology (Saunders, Philip, & Thornhill, 2009). This research strategy is recognised for its time-consuming nature and often necessitates an extended study period for the researcher to fully immerse themselves in the social environment under investigation.

This research strategy is also referred to as naturalistic because it inherently incorporates the contextual aspects of the research environment (Saunders, Philip, & Thornhill, 2009).

3.2.3.7 Archival Research.

Archival research primarily relies on administrative records and documents as its main source of data (Saunders, Philip, & Thornhill, 2009). Despite the historical associations of this research strategy, it can utilise both recent and historical documents as sources of information (Bryman, 1989). This is often referred to as secondary data analysis because these data were initially intended for a different purpose than their use in this type of research.

3.3 Positivism as a Choice for Research.

This research made a choice based on the positivist philosophy for several specific reasons.

The primary rationale behind this choice is that the phenomenon under study was observable and objective. It involved a well-defined objective built upon existing theories that required expansion and augmentation. The majority of the collected data were quantifiable, eliminating the need for the researcher's direct influence to yield specific results. Instead, it relied on observable facts and the recalibration of existing theory to draw conclusions.

Another factor influencing the selection of positivism was that the hypotheses put forth aimed to introduce novel insights based on existing knowledge, addressing aspects that might have been overlooked or underestimated in both practical application and theoretical frameworks.

This research study follows a deductive approach, outlining quantifiable aspects to be investigated in advance. This approach not only facilitated timely research but also guided the study in re-evaluating prevailing theories and definitions related to the subject matter under investigation.

When considering the strategies, it's important to note that although some elements of qualitative methods were incorporated and utilised, this research primarily adopted a quantitative approach that involved direct data collection from participants through a predefined template. This data could then be subjected to statistical analysis. The inductive elements were primarily utilised in the context of evaluating various existing models. The framework and models are discussed in Chapter 4 and Chapter 5 of this dissertation by the researcher.

3.4 Methodology

The basic methodology involved formulating a framework and devising models and practices as well as gathering data from existing real-life settings. Several service and research organisations assert their presence in the 'knowledge economy' or adoption of the 'digital firm,' showcasing an awareness of the concept of knowledge. Research sources have explored various approaches and methodologies, assessing their suitability for addressing research questions. The research question is initially focused on verifying the existing gap and subsequently analysing these findings.

Although a comprehensive level of detail was maintained throughout the study, one method employed was the probabilistic random sampling technique. Participants were selected randomly based on their job roles and their knowledge domains. This research method aligned well with the requirement for reasoning through inference, as supported by the research question (Krathwohl, 2004).

3.4.1 Methods Considered for this research.

The main strategy used was observations and measures in testing the main hypothesis of the research. Two main methods were considered suitable in the approach of this research. One was the Observation method, and the other was an interview method. Both are feasible; however, the main method preferred particularly for the hypothesis under consideration was the observation approach. This was mainly because this research is objective and most of the phenomena being observed were of an objective nature without influencing the outcome in any way.

For the benefit of efficiency and non-bias, the interview method was evolved into a template that collected the respondent's input. This way both the observation and the 'interview' was kept as clear of bias as was possible by the researcher. The researcher endeavoured not to collaborate personally with the respondents to maintain clean template entries and not bias the correspondents in the way they viewed the artefacts they were submitting. Additionally, to clarify the collection method, the design of the template was such that there was an explanatory of each of the entries to be made as

well as a demo entry that would guide the respondent when submitting his or her template.

3.4.2 Ensuring Objectivity for this research.

What this suggested was that no influencing of current setups was being attempted; rather, a new way of considering the behaviour of these setups was being considered and recommended. This then implied that as far as possible, a methodological approach that favoured little intervention was found suitable.

The methods are considered here, along with their efficacies.

3.4.3 Observation method

The primary research strategy employed in this study was observation and measurement. Given the nature of the research question, it was essential to conduct observations using established applications to model the hypotheses being tested. Functions within the model were developed to validate the hypotheses in alignment with the research question. The observation method not only facilitated the visualisation but also contributed to the conceptualisation of a model to provide a well-informed response to the research question.

A preliminary quest was made whereupon publicly available phenomena and data were observed and examined. The public data collected in this instance was information gathered from the units and ministries of the civil service as coordinate through the contact person.

This method was true to the idea that no subjectivity be brought to bear on the research question; however, in the same vein it also cemented the idea that improvements to existing functions and frameworks could be considered based on sound principles within the body of knowledge.

3.4.4 Interview Method.

An Interview/Survey was considered initially but considered not central to the research. As an analytics tool to consider awareness of knowledge acquisition this

would be appropriate; however, in instances where phenomena were being observed, these would be extra to the research process. This was possible by way of a designed template with Microsoft Excel with instruction on how to fill out the template as well as a sample spreadsheet filled out for reference purposes. This ensured that the respondent had something to work from as well as explanatories of the various aspects of what was expected.

The biggest gain of this method was that population targeted for collection of data was more actively involved in constructing an acquisition model and methodology under the study.

Specifically, for a facility such as the building archives which has largely non-automated ways of knowledge acquisition, an interview to create a method would be an additionally good approach; however, in order to focus the hypothesis testing, an implementation involving existing functions was preferred. The option to carry out a person-to-person interview as well as observe how knowledge is manipulated would be a way to get a full understanding of how functions of a particular approach is carried out but would then involve some subjectivity which is not the orientation of this methodology approach.

3.4.5 Reliability and Validity of Methods Used.

Reliability and validity of the methods used depended on the consistency of the data collection and how accurate the information gathered was. In this sense, reliability refers to the method's ability to produce consistent results across the different observations and observers. This could be ensured through structured observation protocols, and the use of a standardized template that minimized subjective interpretation. Validity, on the other hand, measured how well the method captured the intended knowledge and whether the template accurately represented the real-world conditions under investigation. Ensuring validity required the design of the template that aligned with the study's objectives, as well as cross-referencing with other data sources, such as interviews or document reviews and methods. As this was properly implemented, the observation and template method provided both reliable and valid insights into the knowledge acquisition and obsolescence planning. The

template was not designed for any specific entity or Civil Service Department per se. It had the objective aim of ensuring that this could be used in any setting, whether public or private sector (See Section 7.2). The design of the research methods and approach ensured that this research was not necessarily only for the Civil Service but could be used for any enterprise, public or private. The selection of which tasks to use were not determined by the researcher but supplied to the concerned department or service unit to decide which tasks to target.

3.5 Theoretical Underpinnings.

An underpinning is a foundation or support that reinforces a concept or structure. This is a fundamental definition, as found in dictionaries like the Oxford Dictionary (Thompson & al, 2003).

The following factors influenced or fortified this research. These factors encompassed:

- The dissertation highlights the challenge of defining information and knowledge, emphasising the lack of clarity that can impact their role in decision-making;
- The study is grounded in the interdisciplinary nature of knowledge applications, providing a strong foundation for the research;
- Observations and literature suggest that knowledge and knowledge management continue to evolve while retaining their essential characteristics, underscoring their growing significance;
- Additionally, the study is guided by the theory of how information systems and technology interact, which the researcher identifies as a significant factor.

3.6 Ethical Considerations for Research

This research adhered to the University of Pretoria Ethics Committee requirements as set out in the guidelines and policy documentation of the university. The process of getting this in place was in part based on the fact that the founding idea of gathering evidence was at first considered as a data collection activity; however, the unfolding reality was such that the observed phenomena were already set and in motion. Interpretation was not going to be a big component. An *interpretation* while at the same time keeping the observed phenomena *as is* (that is, positivist) was the main component and focus of this consideration.

3.7 Significance of Research

The primary goal was to redefine the Knowledge Management paradigm concerning how knowledge is phased out, referred to as "obsolescence" in the research question. By addressing this issue, the study sought to answer a persistent question related to the factors influencing knowledge creation, particularly data and information, including their temporal attributes. This rationalisation aimed to provide a clearer understanding of knowledge acquisition and its implications for the field of knowledge management.

A clear way to consider this is to consider what unnecessary aspects of the knowledge acquisition process can actually be declared or deemed obsolete in making the fair argument for efficiency and a clearer way to carry out actions with the refined knowledge hitherto acquired.

New knowledge was to consider how obsolete knowledge could be orderly in terms of framework commitments as well as modelling. The profession as well as the academic bodies could certainly draw from this new knowledge and roll out a new angle of considering how knowledge is managed and considered.

This would have far reaching influence on policy makers, on academics as well as the professions. This so because there are not many articulated treatments on how to make knowledge obsolete in itself by focusing on the artefacts involved.

3.8 Contribution to Body of Knowledge.

Contribution to the Knowledge Management body of knowledge are to help further clarify the definition of the acquisition of knowledge as well as its relationship with how this knowledge can be managed in terms of empowering the societies, systems and functions that use this knowledge in a continuing fashion. This research aims to contribute to the refinement and enhancement of disciplines that teach Knowledge Management, focusing on the conceptualisation and utilisation of knowledge. It also seeks to provide insights for digital enterprises operating within the "knowledge economy" paradigm, helping them improve their efficiency and effectiveness in service delivery.

The concept of maintenance is intricately linked to the notion of acquisition. This research aims to integrate the acquisition concept with the feedback implications that maintenance introduces into any cycle. Addressing the issue of maintenance within a system or cycle is challenging to separate from earlier components, as it plays a crucial feedback role in those preceding cycles.

More specifically, it is anticipated that the contribution to the body of knowledge will impact the following areas:

Technology.

As it is often profoundly influenced by knowledge, this study will benefit the field of data science by inevitably affecting the concepts related to the behaviours of data, information, and the processes that produce knowledge.

Policy.

Policy makers will have a clearer and more effective way to utilise knowledge in their decision-making processes and strategic planning as a result of this study.

Information Systems' Theory

The primary domain of focus for this study is information systems, and it aims to make significant contributions within this domain. This includes academia, professional fields involved in application and software development, as well as knowledge work.

Academia and Practice.

The academic community will gain valuable insights into obsolescence planning and strategy through this study, enhancing their understanding and ability to articulate these concepts. Additionally, the consultancy sector will benefit by gaining a clearer understanding of the functions and operations of knowledge management systems.

3.9 Summary.

This chapter explored the philosophies, methodologies, strategies, and approaches relevant to research. Engagement was made in a comprehensive discussion of the significant paradigms and philosophies, including pragmatism, interpretivism, positivism, and realism, while also delving into the primary research approaches: deductive (associated with positivism) and inductive (typical of interpretivism). Furthermore, we examined various research strategies to provide clarity regarding the specific approach adopted for this research.

An examination of the researcher's decision to adopt a specific philosophy, which in turn guides the selection of research strategies and methods, is presented here. In this particular case, a positivist philosophy has been chosen, consequently shaping the utilisation of a deductive approach in conducting this research.

After going through a few considerations this research arrived at the approach of using a template as a survey/collection tool in addition to minimal inquiry through a contact person. The spread of the civil service in any country is vast, and the activities more so. The other consideration was that the input that was needed was not as raw as data normally would be, but activity descriptors of what various experts in their work environments were doing. The term experts was used to describe the respondents who would agree to provide information about what their work knowledge was and the various attributes that were requested of them.

The approaches settled for included observation and interview because two entities were being considered; one that uses massive data and frameworks and the other that uses off-line means of manipulating their knowledge. These two methods are empirical in nature and ensured that no bias was influenced; also that hypothetical assumptions could be considered and examined much clearer according to the positivist and interpretivist philosophies.

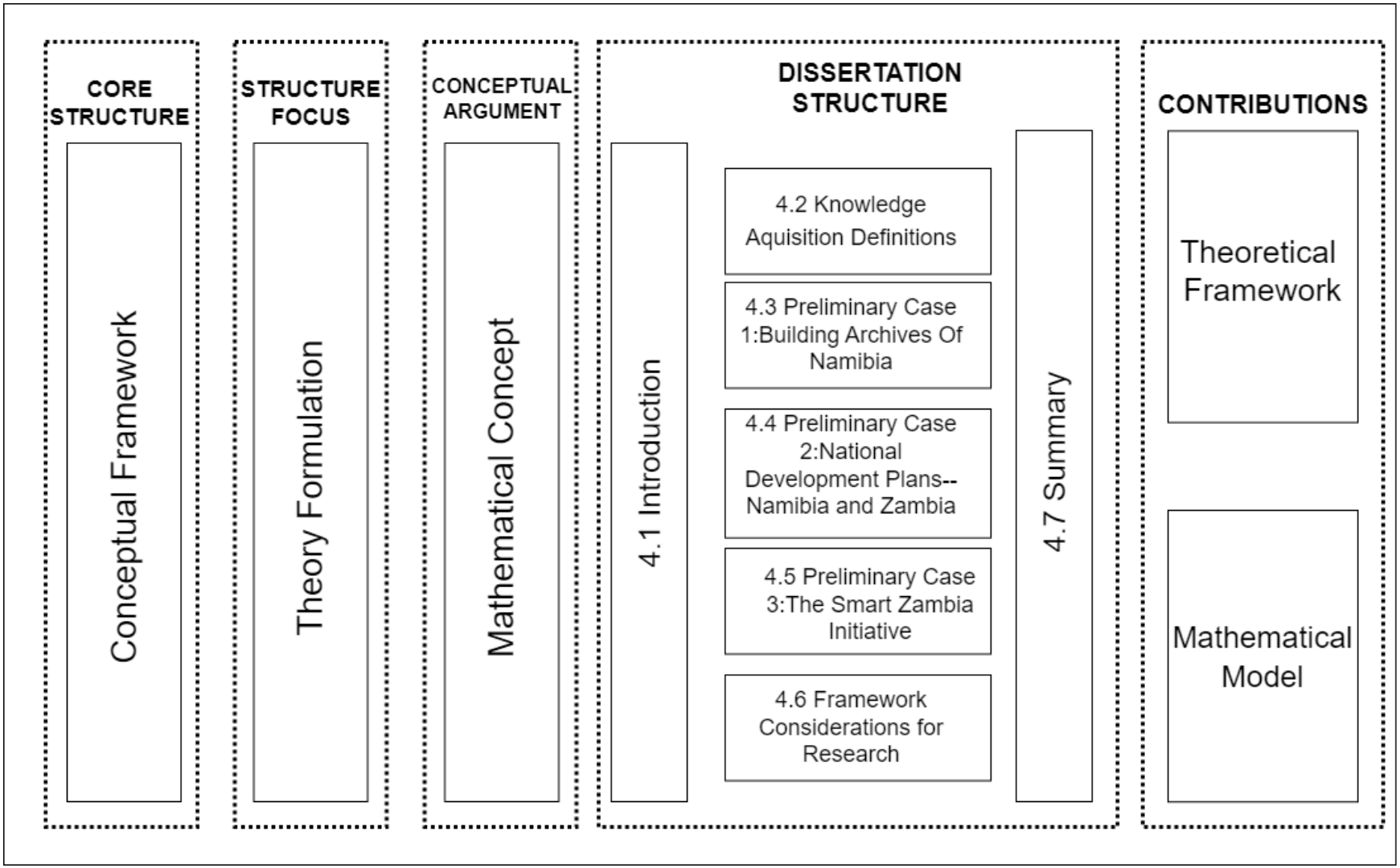
The cardinal significance of this study was to observe the obsolescence or ‘retirement’ of knowledge and the various factors that could be considered in determining that.

Finally, the underpinnings of this research were discussed and put forward; this in order to lay the groundwork for the research as well as to provide a clarification to the contribution to the body of knowledge. These underpinnings included:

- The problematic behaviour of information and knowledge which would influence the behaviour of artefacts in the process of planning obsolescence.
- The manner in which knowledge is interdisciplinary as evidenced from the collections made.
- There is a growing support for the significant role that knowledge (management) plays in the various activities across sectors, particularly in the civil service in the case of this research.

CHAPTER FOUR CONCEPTUAL AND THEORETICAL FRAMEWORKS

Map 5 -- Conceptual and Theoretical Frameworks



CHAPTER FOUR CONCEPTUAL AND THEORETICAL FRAMEWORKS

Layout:

4.1 Introduction.

In the process of understanding how knowledge is acquired, it is valuable to examine learning frameworks. Many frameworks follow the pattern of either individual or team learning patterns. For example, the stimulus-response model for individual learning was proposed by Guthrie (Guthrie, 1935). Guthrie emphasised contiguity as a theory that is a replacement to Pavlov's conditioning and Thorndike's connectivism theory which he considered too complex for the learning process. Contiguity addresses the relationship between time and space in learning, which is a fundamental aspect in knowledge acquisition.

Pavlov believed that organisms learn through conditioning; the more they are exposed to a stimulus the more conditioned they become, especially in with positive reward or responses. Thorndike discussed the reinforcement of learning in his 1921 book 'Principles of Learning', a concept that remains influential in instructional learning theory today (Thorndike, 1921).

Citing these early approaches establishes the groundwork for understanding the evolution of knowledge acquisition and how learning models and theories have influenced later concepts in Knowledge Management Systems, particularly in acquisition.

Another theory closely tied to Guthrie's theory on learning is that of Skinner. Unlike Guthrie's approach, Skinner considered learning as a function of behavioural change, particularly observable behaviour. According to Skinner, this meant that a learning organism could give responses explicitly rather than solely in response to external stimuli (Skinner, 1938).

Organisational learning assumes that learning improves an organisation's performance. The idea is that the more an organisation learns, the better it becomes. It is evident that learning involves accumulation – of information and consequently of knowledge. How does the function of knowledge acquisition factor into this?

4.2 Knowledge Acquisition Definitions.

New knowledge is acquired in a variety of ways and may be defined according to the approaches that are taken by a particular organisation. Huber's construct provides insight into how knowledge is acquired, as shown in **Figure 22**. These constructs include congenital, experiential, vicarious, grafting and searching-and-noticing (Huber, 1991). Each is examined in context.

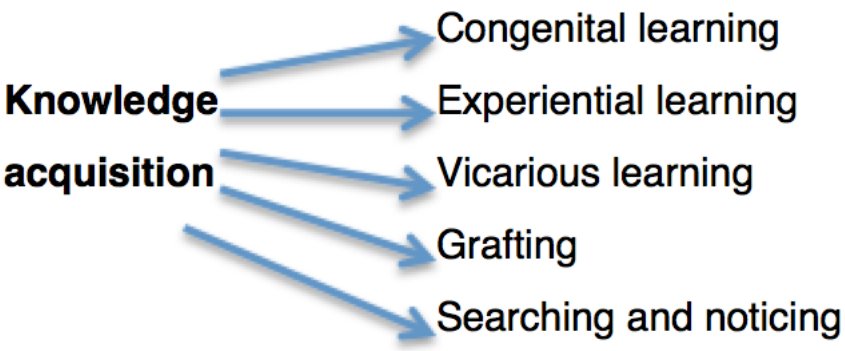


Figure 22 – Knowledge acquisition constructs (adapted from Huber, 1991)

4.2.1 Congenital Learning.

Congenital learning is original knowledge that founders introduce and present in a way that it forms the basis for learning in the organisation until new knowledge comes along. (Jashapara, 2011). This type of knowledge is based on the assumption that original ideas and forms are inherently true and relevant, simply by virtue of being the baseline knowledge.

According to Agarwal et al., congenital learning, as it relates to knowledge, includes knowledge exchange and knowledge production (Agarwal, Raj, Franco, & Sarkar, 2002). Quoting Schulz, these two subsystems form the basis for acquiring and disseminating knowledge in an enterprise (Schulz, 2001).

Most congenital learning frameworks are established at the onset of an organisation; they subsequently give rise to other models that are intricately linked with the original platform. This inherited knowledge can often become part of the competitive edge of

subsequent firm rollouts depending on the quality of the initial model (Ingraham & Baum, 1997). However, the pitfall of such learning is that it can lead to a competency trap, which, while promoting efficiency in the short term, poses risks of failure in the long run, especially as new entrants challenge the existing status quo.

The acquisition of congenital knowledge is considered based on assumptions and values. Typically, founders establish the framework for acquiring such knowledge. It is assumed that this knowledge is driven by values and mission and derives much of its relevance from the momentum established at the inception of an organisation.

4.2.2 Experiential Learning.

Simply put, experiential learning is the process of getting to know something by learning from it. This is typically contrasted with classroom (Kolb, 2015). This theory explains how experience can be transformed into learning and reliable knowledge. Kolb based his work on the Lewinian experiential learning model, as shown in **Figure 23** below.

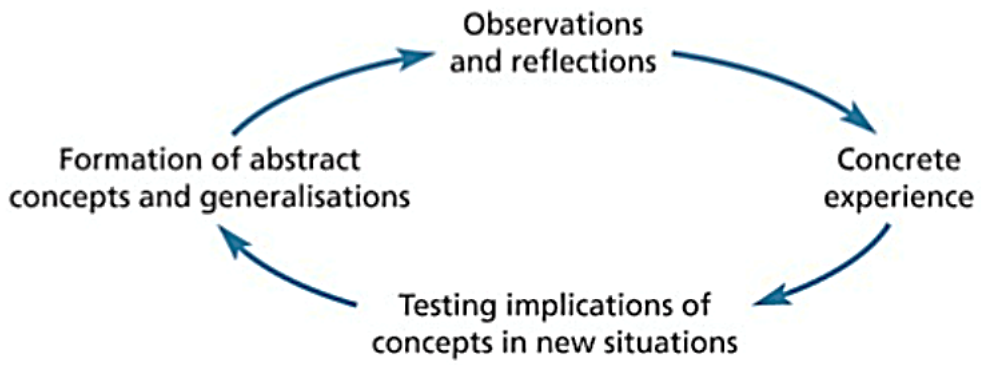


Figure 23 – The Kolbe (Lewinian) Experiential Learning Model (Kolb 1984)

One of the pitfalls of experiential knowledge is how it easily lead to conformity and dogmatism, potentially stifling novelty and innovation. However, as noted by Dewey, profound learning experiences can lead to deeper quests for knowledge and understanding (Dewey, 1933).

Knowledge gained through experience has led to the development of frameworks and theories, such as the Experiential Learning Theory (ELT) articulated by Kolb. His framework examines four stages learning cycles and four distinct learning styles,

incorporating concepts such as experience, perception, cognition, and behaviour (Kolb, 2015).

4.2.3 Vicarious Learning.

Vicarious learning, as a knowledge gathering approach, refers to indirect ways of acquiring knowledge through hearing or observing; excluding hands-on or instructional techniques.

According to Bandura's Social Learning Theory, SLT, observed experiences lead to imitations, especially when the observed experience is positive. This method of acquiring knowledge is fundamental to basic concepts of traditional learning theory (Bandura, 1965). One of these concepts is the Social Cognitive Learning Theory, or SCLT.

SCLT relies on behaviour, personal factors and environmental factors. Bandura's model can be summarised in **Figure 24** below.

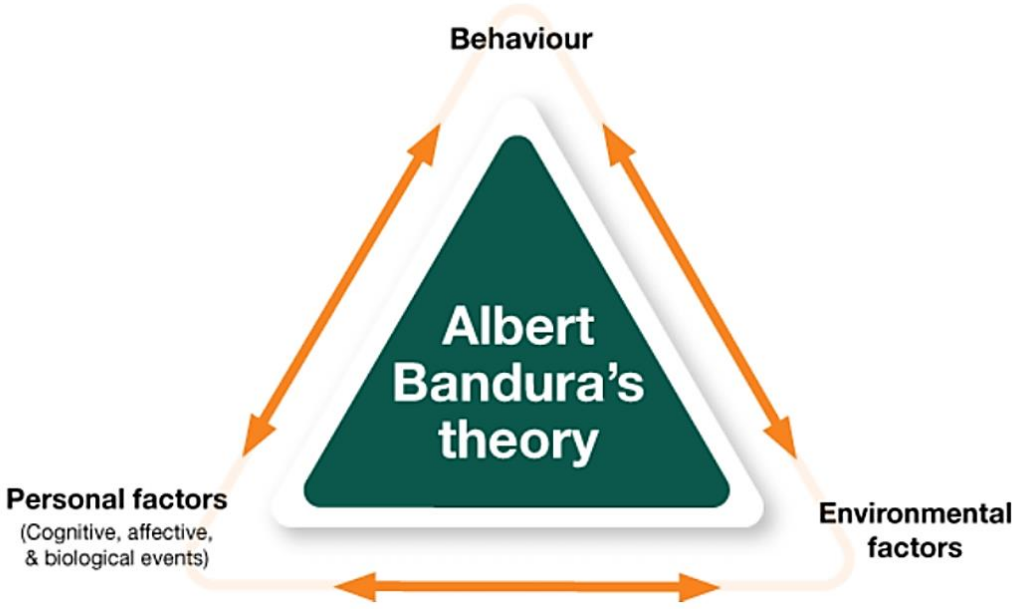


Figure 24 – Bandura's Theory encompassing SCLT

Although praised for being open to change and constantly evolving, this theory has its pitfalls, including its lack of unity and organisation. There still appears to be room for study and engagement in this regard. The fact that it garners attention in mainstream psychology makes it a theory open for further exploration.

4.2.4 Grafting.

This form of learning results from acquiring new members of an organisation and, by extension, the knowledge they bring. Huber posited that this form of learning advances an organisation's knowledge base quickly (Huber, 1991). However, this way of learning is not limited to acquiring members; it also includes cooperating with customers or alliances (Håkansson, 1990); joint ventures (Lyles, 1994); licensing (Killing, 1978); and technological acquisition (Granstrand & Sjölander, 1990).

These are just some of the ways in which knowledge can enhance the competitive edge of firms and is widely used in organisations.

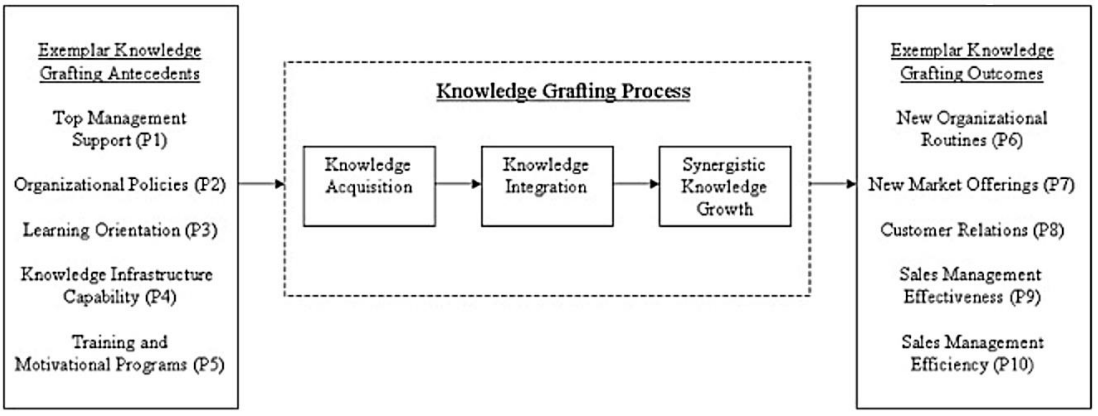


Figure 25 – Knowledge Acquisition by Grafting (from Madhavaran and MacDonald 2009)

An example of the grafting can be seen in **Figure 25** above. Here, we observe how knowledge from an existing organisation is integrated into a new organization.

Some limitations include processes involving licensing, difficulties in securing meaningful joint ventures (which can be problematic), or being unable to access alliances as intended.

4.2.5 Searching and Noticing.

Huber notes that Searching and Noticing involves the subcomponents of scanning, focused search and performance monitoring as one of the four ways in which knowledge is acquired (Huber, 1991).

A notable pitfall of this is that organisations often search for more information than is necessary.

4.2.6 Relevance to Current Problem.

Clearly observable in different frameworks is a process that allows for incorporation of new frameworks or sub-frameworks to enhance existing ones. There is also the opportunity to redesign some models to fit a new paradigm, incorporating an active obsolescence plan to make the end result or the cycle more responsive and improve the way of acquiring and articulating knowledge.

A good example is how Bandura's framework can benefit from observing and eliminating obsolete behaviours from the process, particularly those of an artefactual nature. Another example is grafting, which would benefit from enhancing the elimination of certain training and motivational program elements that have outlived their purpose by a model insertion.

The idea is that the proposed model or framework should be able to be integrated into any existing model or framework and make sense. This approach encourages both tacit and explicit applications.

Tacitly, experts can identify and eliminate obsolete components based on their expertise. Conversely, the explicit approach would involve redesigning procedures and steps while consciously removing obsolete components. However, the explicit nature of knowledge acquisition cannot be ignored. The researcher advocated for a research approach that equally valued user or adopter involvement in determining the obsolescence declaration, considering their preferences and influential perceptions.

The researcher believes the using tacit approaches would primarily rely on the expert's idiosyncrasies to determine obsolescence, preserving this uniqueness while capturing expertise. When experts are involved in determining the duration of an exercise, the ordering of such an exercise becomes easier to decide. Additionally, expert engagement would result in tested, previously undocumented input for system optimisation.

Regardless of the learning method applied, there is a common thread regarding how knowledge is manipulated or managed. It is evident that obsolescence is a central theme that is rarely taken into account in these learning methods, aside from recognising when knowledge as a whole is no longer viable or current.

4.3 Preliminary Case 1: Buildings Archives of Namibia.

The Namibian Archives for building designs and architectural drawings has, as recently as 2015, been using manual methods to maintain up-to-date archives of the changes made to government and institutional buildings regarding their architectural changes and alterations.

This approach has kept the system intact and up to date despite the very small staff complement available for this task. The archive has a maximum of two lead archivists and three assistants.

The process involves meticulous attention to trust, communication and technical know-how. It also requires an intuitive sense of when to update a design for which update information is not available. Additionally, successive change documents are stored iteratively, with newer documentation kept at the front and older documentation at the back of the filing system, as noted by the researcher. This approach was a suitable candidate for the hypothesis testing envisioned.

However, the prospect of further hypothesis testing was hindered by the lack of a coherent process to obtain permission to proceed. This could be a great post-doctoral

opportunity for further exploration. The author believes that additional hypothesis testing would provide valuable contributions to improving setups like this one, which are prevalent throughout the region. This consideration was an important inclusion in preliminary stages of formulating the dissertation problem.

As this was an initial premise for the research and hypothesis determination, the researcher's recommendation is to further consolidate the model as it is implemented in other areas with similar archive installations.

4.4 Preliminary Case 2: National Development Plans (NDP) – Namibia and Zambia.

Namibia, like most countries in the region, uses strategic plans to prepare for national development. These are variously known as National Development Plans (*NDPn* in Namibia and South Africa, where *n* is the ordinal value of the plan), *n*th National Development Plan (e.g., in Zambia, where *n* denotes the plan's ordinal number), and National Development Strategy (working with frameworks, as in the Democratic Republic of Congo, DRC). These plans select areas of national importance that require investment, development and rollout to progress various sectors of their countries.

The *n* represents the iteration of a development plan, usually occurring once every three to five years before a new plan is introduced. These plans outline the direction a country elects to take in various sectors identified as drivers of societal and economic progress. This is a key consideration in studying how knowledge is acquired and managed. Observing and analysing the development plan process offers an opportunity to understand the processes involved in acquiring new knowledge and retiring obsolete knowledge, known as the 'obsolete' knowledge, from the retired plan.

The thesis is based on this phenomenon and how it enables the knowledge acquisition. A current framework was presented, followed by the formulation and introduction of a comparative, improved framework.

These plans themselves are strategies for acquiring knowledge. The way in which a succeeding plan takes over typically involves reviewing what has been done or achieved in the preceding plan. This allows for strategies that still require action to be incorporated into the new plan with tweaks and adjustments to ensure sectors continue to receive attention.

Currently, the Namibian government is implementing the 5th National Development Plan which runs from 2016/18 to 2021/22 under the theme '*Working Together Towards Prosperity'* (NPC, 2017).

Similarly, the Zambian government is implementing the 7th National Development Plan, which runs from 2017 to 2021 under the theme *'Accelerating Development Efforts towards Vision 2030 without Leaving Anyone Behind'* (ZNPC, 2018).

These plans serve as policy guiding implementations that help civil service departments to implement government activity and delivery to their populations. They encompass frameworks, implementation plans and review periods, requiring significant knowledge management and information articulation to realize set goals.

The civil service departments, which partially automate and partially use manual approaches in their multi-faceted, multi-sectorial practice were deemed a suitable candidate to test the researcher's hypothesis. This sector provides a rich source of testing knowledge management, especially in handling obsolete knowledge.

Similar to the case with regards the buildings archive, no consistent correspondence materialised from this effort despite preliminary studies being conducted to establish a way to carry out hypothesis testing in this regard.

Likewise, the model developed and deferred to another setup would be revisited in dealing with similar implementations of development plans.

4.5 Preliminary Case 3: The Smart Zambia Initiative.

As a gateway to the civil service in the Zambian government, the Smart Zambia initiative was established to introduce eGovernment services to the Zambian Civil service. Established under Gazette notice No. 836 of 2016 in the Office of the President, the Smart Zambia Institute (SZI) aims to transform the country through information and communication technologies, deploying electronic Government services and processes for effective public service delivery (PMRC, 2018).

The mandate of the SZI is to implement electronic government services to improve service delivery across all government ministries (Msiska, 2016). Although the mandate focuses on electronic services and processes, it does not explicitly discuss the need to manage knowledge. Typically, e-Government mandates do not specify this; often leaving it to implicit mechanisms. Perhaps at this stage, the processes to manage this component, presenting an exciting opportunity to observe how knowledge is treated.

Some areas of hypothesis testing include how processes are considered in the knowledge manipulation or articulation area, primarily aimed at improving the efficiency (and effectiveness) of ministries optimising the spending functions of the agencies tasked with ensuring cost optimisation.

Observation indicate that the SZI initiative was focused on implementing information and communication technology systems, as evidenced by their partnership with Huawei for implementing these technologies for e-Government, e-Commerce, and IT talent (Huwaei, 2019). This involved rolling out infrastructure, ensuring proper interaction with government services involving financial transactions and collections, as well as training of personnel to interact with the institute.

For this research, the SZI offered a combination of aspects from Case 1 and Case 2, accessible through collaboration. With its wide mandate under the Office of the President in Zambia, SZI provided an ideal arrangement for the research to go proceed

more easily and with more flexibility. The arrangement allowed the research to access aspects contained in the planned framework and hypothesis.

Fortunately, the SZI was open to allowing the testing of hypotheses for this research. As a gateway to all things electronic and processing in the civil service, it provides an ideal platform to study how knowledge is managed in this regard. Therefore, it was suitable to proceed with research in this regard, enabling the establishment of a framework to ensure the study followed the set methodology.

4.6 Framework Considerations for Research.

A framework for the proposed hypothesis serves as a basis from which several models are derived. These models adhere to the firm plan established by the framework provisions. They include graphing, tabulations, and other formulations that future programmatic implementations can and will incorporate.

From literature it is evident that the underpinnings of this research could be both qualitative and quantitative. In terms of quantitative conceptualisation, the most significant component is the time factor, along with the considerations dependent on the implementation focus. These considerations can be seen as a function of time, whether they are from a qualitative or quantitative perspective.

The researcher designed the framework to examine three aspects to test the hypothesis: triggers or the beginnings of the knowledge acquisition and its obsolescence; the process under which conditions for the timing and relevance are determined; and the outputs from any given system.

While triggers may be seen as inputs into a system, a closer look reveals that they constitute their own process, which serves to initiate other formulations and implementations. The following sections and figures will discuss some theoretical considerations and framework design for hypothesis testing. These include perspectives, construct, rationale, and test setup.

The researcher views knowledge acquisition as a continuum; which is why obsolescence is such an insidious incident. Hard technology largely determines the obsolescence of acquired knowledge because it works intimately with this technology. In this context, hard technology refers to automated aids such as hardware or programmed algorithms.

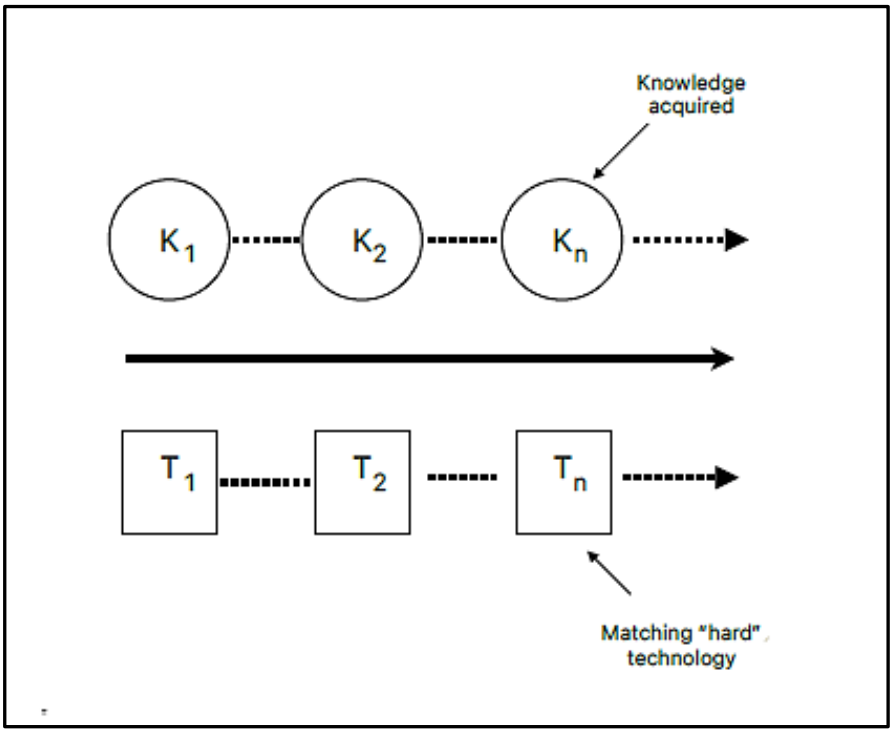


Figure 26 – Modelled view of knowledge acquired with related "hard" Technology

In this **Figure 26**, the series of **K** represents knowledge acquired moving along a continuum with related technology. In this case, the knowledge (**K**) is intimately related to the technology (**T**). In most cases, when the technology **T** is retired, the knowledge **K** is also retired. It is the linked obsolescence that may or may not determine whether the knowledge is obsolete independent of the technology. The researcher defined these "hard" technologies, T as *contentions*. Generically, a contention is something advanced or maintained in the face of possible argument or disagreeable circumstances ("contention", nd). However, it also implies a deployment that persists despite what is occurring on the ground. It is this latter definition that the researcher built on to describe the attendant components such as technology and innovation among others in the wake of knowledge acquisition. They are contentions because they augment the behaviour of an artefact while the knowledge is being

acquired. These contentions, examined further in this chapter, include other interventions that affect the core of a knowledge characteristic.

A very good starting point worth spending some time on is the connotation of **K** and **T** in terms of their chronology. When a knowledge acquisition process is initiated, the model around which this is to be implemented would be determined and established even before the timings are known. This therefore means the fallout of delay and other factors surrounding bureaucracy – inevitably tied to delay – come in later after a few runs. A recommended run is after the initial first or second run of establishing the knowledge acquisition so that the obsolescence is already tied in at the onset. Preferred implementation must start with the initial "zero" or start point. Thereafter, as the process is underway, recordings of all these factors are made for eventual determination or assessment.

Most acquisitions are made in tandem with a technology. This is important to consider, concede, and mitigate in the evaluation. Perhaps, as the researcher would include, the technology is a component of the evaluation. This is an artefact in most cases that can be further broken down according to the design or determination of the knowledge acquisition. In consideration of technology, it is noteworthy to note that some acquisition are intimately and inextricably intertwined.

However, in the absence of hard technology, or in the event that this is separated and modelled, it can be seen that knowledge is shown as a continuum with contentions built in. Most of the time technology is just one of these contentions. A contention is defined as that input that imposes itself as either a catalyst, enhancement, or determiner of outcomes. Most of the time technology is a catalyst, but where an intimate linkage is made, it can easily determine an outcome and hence be a very present part of the knowledge acquisition itself. A modelled view of a continuum and how it masks obsolescence, especially in the presence of hard technology, is shown in the figure (**Figure 27**) below.

Dealing with the concept of a loop construct as a juncture helps to visualise the acquisition method as a series of loops wherein some contentions could be clarified in some cases or validated in others before arriving at a streamline of what is being

observed. In this case, as the determination of artefacts and their influence on the exercise of knowledge acquisition is taken into account, the attendant contentions could also be evaluated.

A discussion of *contentions* is also made without limiting the scope. The three main ones are modelled in **Figure 27** and characterised in the discussion that follows. Each contention is discussed and a general discussion given after these discussions. The contentions are in no priority order but for visual acuity. It can also be read from left to right with the discussion as well as in keeping with the directional arrows shown in the figure.

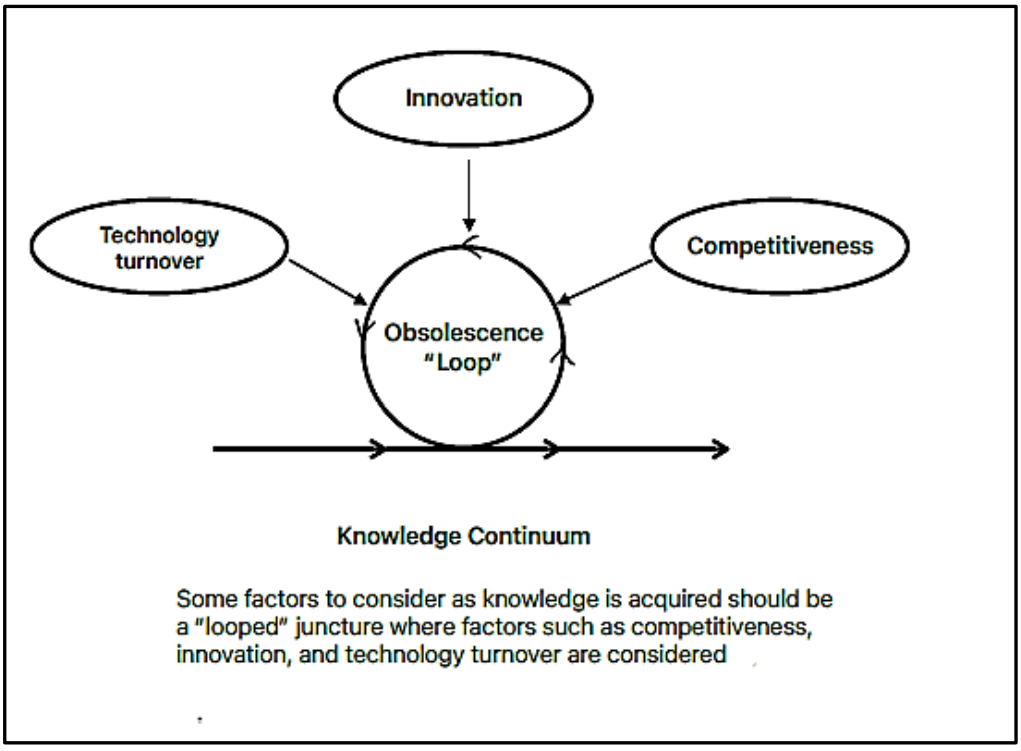


Figure 27 – Modelled view of how obsolescence can be observed

The three traditional contentions identified by the research are technology turnover, innovation, and competitiveness. Technology turnover is obviously tangible, innovation and competitiveness are intangible, except that depending on the artefact at issue or in focus, these may also be tangible.

A brief description and justification of the main contentions identified were considered in order to further set the premise for the hypothesis testing. This was also consistent with the deployment of the framework and any models that developed as a result.

The researcher allowed experts contributing to the hypothesis testing to consider some of these contentions as artefacts insofar as they were too intimately embedded in the artefact consideration they were dealing with. An instance of this could be a system designed with embedded electronics ordered specifically for a specific knowledge acquisition exercise which, without it, renders the entire establishment moot.

Technology itself is a catalyst for most of the implementations for knowledge acquisition processes. This traditionally includes computing resources such as micro processing and storage. This could also include software enhancements born out of algorithmic implementation, but also physical enhancements such as robotic or artificial intelligence in a rarefied fashion. The abstruse nature of technology, much less Information Technology, makes it imperative to understand how each component or catalyst of the knowledge acquisition process is being used, either as part of or as addition to the model in place. An example of this would be an agricultural process in place that has been customised for storage of grain from an environment of high humidity to that of lower humidity. Obviously, the gadgets that helped keep the storage optimal would have to be customised or redesigned to take into account the new realities. Algorithms will have to be redesigned, new filtration methods to keep the environment suitable replaced, and most likely entire plants for storage repurposed. What this means is that the rarefication of this would require very explicit specifications so as not to render the implementation an expensive and perhaps unusable exercise.

It is often assumed that in discussing information systems, we are also necessarily discussing technology. However, the researcher appreciates the position of technology as an enabler while the information system informs what needs to be done and what kind of information technology must or should be deployed at junctures where required.

Innovation in the knowledge economy is a buzzword. Anything innovative is immediately new and fleeting at once. When an idea is new, it will add noticeable character to anything. Innovating knowledge acquisition approaches is perhaps what creates the conception around obsolescence. If innovation can no longer be justified, it is time to rethink an entire process. A census sort algorithm that pre-evaluates the nature of data so that any of binary, bubble, or linear sort algorithms can be implemented based on initial 'hunch' of initial data screening would mean a huge amount of time saved in arriving at sorted data that also meets with the collector's intentions and timeframes. If, however, some hybrid data shows up and the algorithm fails to accurately discriminate which approach to use, the innovation will have failed. The model that initially collected a certain field of census data may have changed beyond the initial innovation. The innovation may have to undergo a rethink while keeping the data gathering *knowledge* intact in this case. The core model remains, the contention changes.

Competitiveness in most cases has a significance that takes benchmarks into account. Authorities from logistics to government business define competitiveness variously. Perhaps the generic sense the researcher focused on implies what is acceptable as a level benchmark and whether or not the current model can meet this level or surpass it. With metrics in place, it is easy to tell whether the competitiveness is at par or superior to what obtains. As a part of the knowledge acquisition it is worth considering that any significance that takes competitiveness into account also considers whether or not this component can be up-scaled or reassessed independent of the components or artefacts being utilised or if this inevitably affects the knowledge acquisition itself. Competitiveness in government systems usually become noticeable at Inter-governmental interfacing or when processing international collaborations. In this case, therefore, it is worth noting that government-to-government competitiveness is as fungible in nature as it is intangible. A government working with one set of visa processing aligned to an authority different from the majority of those surrounding their immediate region may require that either the surrounding interfaces notice the superiority of this one odd process, or the odd processing entity conforms. Again, the core knowledge acquisition may not necessarily require adjustment or note, but the contention may require some re-look or indeed authority, whatever the case may be.

Some factors that determine how knowledge is acquired include competitiveness (of where the knowledge is being used), innovation (of various artefacts related to the knowledge acquired), and technology turnover (as time and reality in the environment changes).

Generally, therefore, having considered these main contentions as defined, it could be noted that these can be separated in design and in scope, especially of a framework, from active artefacts.

There would be other factors besides the main ones outlined above. Human resources are always assumed; in the information systems modelling these are usually at the heart of any system as they constitute the users and manipulators of whatever the systems they are working with. It is therefore important to emphasise that the expert resource, user resource, and the manipulator resource are implicit throughout the discussion in this research.

Most often, the insidiousness of obsolescence is masked by advances in technological additions. In situations or scenarios where this is not apparent, the knowledge acquired gets stuck in time, considering that usually there is no option in what can be done to ensure that the knowledge being used is current or is not hanging on to obsolete factors. A proposed "interchange" is desirable; a loop during which the ideals of competitiveness, innovation, and technology can be observed. It is at such junctures that possible interventions can be considered. It is at such junctures that the researcher's framework can be considered and implemented. The figure above shows the intervention as modelled by the researcher.

In the figure (**Figure 27**), the researcher defines the **obsolescence loop** as the position or interval where the contentions are evaluated subsidiary to the artefacts under review or evaluation. This obsolescence loop is where the various processes of noting the behaviour of K and T discussed in the previous section comes in. Over time, it is worth figuring out whether either of the two overall conceptions is affected by any of the contentions involved. The researcher identified these three as the critical ones.

This then is a fine opportunity to broadly formulate this concept further. The next few sections considers some mathematical underpinnings that the researcher felt appropriately suited to discussing how these concepts could be modelled and futuristically aid in some fine-tuning of initial modelling and frameworks proposed in this research.

4.6.1 Perspectives for the Research.

The various perspectives of knowledge have been considered, from the various definitions and philosophical standpoints to the modern implementations and deployment of a knowledge management discipline. Also considered is the gleaned area of obsolete knowledge – most of it classical but invariably time-related.

In considering the research question a few considerations and hypothetical perspectives were formulated from the point of view of the researcher's search to better frame the research question. A few came up and will be viewed from some mathematical and philosophical standpoints. These invariably lead us to the construction of the framework on which the hypothesis test is based.

In consideration of the foundations of this research is the invariable foundation of how time factors into the acquisition and articulation of knowledge. The processing of information and activating it into knowledge (and latterly as wisdom) is best described as either a fractional accumulation or a disbanding of these fractional accumulations. Here the researcher considers each of these concepts.

4.6.1.1 Accumulating Knowledge as a continuum.

This research considers knowledge acquisition as both a continuum and a set of finite collections. The continuum is viewed as a more idealistic and realistic view of this accumulation, while the finite collections are the artefacts required for successful knowledge acquisition.

The concept of time in determining obsolescence is very critical in this research. Alongside this is the examination of the artefact's characteristics and how they

contribute to the overall goal of knowledge acquisition. An accumulated set of artefacts that does not surpass a certain threshold could help determine the "ageing" process of the knowledge. Setting the threshold could be based on various considerations. This is why a discrete approach may not be suitable for framing the framework. It is evident from the outset that mathematically describing this phenomenon will not involve a uniform design of these artefacts. Therefore, it is possible to independently consider the artefacts using different characteristics that can ultimately be resolved into a viable value for calculation. In discussing these two fundamental approaches, the integral and differential calculus approaches are generally considered. The concept of the area under a curve could be used to generically describe the process, where small accumulations of artefacts are made over time. While a specific equation is not the focus; the discussion revolves around the concept of considering an accumulation under a continuum of a time frame, which encapsulates the framework under review.

Describing a specific equation is not the goal of this research; however, discussing the concept will involve a general definition of an integral with a time series as appropriate.

Accumulation of anything takes a period of time, or more generically, an interval of time. Some of these accumulations will be non-consequential as with the use of models from traditional methods, while others will be monumental as in carefully crafted processes.

A good representation of the underlying features of knowledge can be viewed from the classical calculus model of the interval $\mathbf{\Delta t}$. Here, $\boldsymbol{t}$ represents traditional time, and $\Delta t_n - \Delta t_{n-1}$ denotes any time interval during which a function *f(x)* from ***n-1*** *to a maximum* ***n, starting from a finite time count such as 1 for n***. In this context, **x** represents the knowledge upon which the function, possessing the properties of the artefact under consider, is based within the given time interval.

This demonstrates that classical Calculus can be used to conceptualise knowledge acquisition as a simple integral function

$$\int f(x)\Delta t.$$

Indeed, this premise underlies a range of activities that may or may not be mathematically represented, but it illustrates a function of time and accumulation. Therefore, most knowledge can be encapsulated as an accumulation process. If we consider ***x*** is the knowledge being accumulated, and ***Δt*** as the time interval under consideration, we can express this as a sum of all the information artefacts over a period of time, thereby creating a knowledge base:

Knowledge acquired is approximately $\int_{tn-1}^{tn} f(Artifact)$ *over time* Δt *from a time* t_{n-1} *to a time* t_n

or, more succinctly:

$$\sum^{n} x_i \ \Delta t \qquad (4.1)$$

This formula represents the accumulation of knowledge over time, where x_i represents individual pieces of knowledge acquired during each time interval Δt.

Considering that we cannot accurately quantify the components contributing to the result or output we observe, we cannot formulate this as an exact equation. It should be more of an approximation or estimate. Quantification can be achieved by using weightings, confidence levels, or counts that are possibly identifiable in the resulting knowledge collective.

We can refine the conceptual formula by denoting ***f(Arteface)*** as ***f(A)*** where each **A** represents an artefact. This expression can incorporate any number of $\mathbf{A}_i[p_i]$, where each **p** represents a weight considered in determining the relevance of the artefact **A** at a given time ***t*** in the process of acquiring knowledge. This could be represented as:

$$f(A) = \sum_{i=1}^{n} A_i[p_i] \qquad (4.2),$$ or as an integral function:

$$K \approx \int_{tn-1}^{tn} f(Ai[pi]) \ \partial t \qquad (4.3)$$

Each $A_k[p_k]$ can be as detailed as necessary, but it should align with the timeframe in which it occurs, and adhere to the rules of the overall acquisition process K.

Let's consider our definition of a typical artefact **A** as an equation based on a number of accumulated characteristics **p**. We could think of a typical **A** as representing

$$\boldsymbol{A} = \frac{(\boldsymbol{p_{significance}} + \boldsymbol{p_{quality}} + \boldsymbol{p_{confidence}})}{\boldsymbol{t}} \qquad (4.4)$$

*Assume for instance that **significance** could refer to whether something is historically valuable or functionally useful; that **quality** could indicate whether an input requires intangibles such as confirmation or second-check; and **confidence** could signify whether something confers overall integrity to an artefact. All these considerations are made within a time interval **t**. More specifically, we understand **t** to be any calculated interval* $\boldsymbol{t_n - t_{n-1}}$

To have objective value, this set of characteristics can be regarded as being determined independently of defined influence, and that the **time** can be independently hand-counted to establish the factor that would make it worthwhile before calculating a threshold. A threshold in this case could easily be determined whether a knowledge acquisition goal is still necessary.

For this research, a hand count and consideration will be done based on a template that evaluates a qualitative/quantitative collection of characteristics based on the time it takes and a determination of a prime concept, such as lost significance over time, or symbolic characteristics of no relevance anymore, among others.

The hypothesis testing can be as simple as considering the worth of the accumulated artefact **A** relative to the time **t** it takes, or the importance of the artefact relative to the worth of its component characteristics **p.**

We know that Δt encapsulates the time intervals that we would be considering. In the equation and according to classical integration, it would incorporate smaller and smaller time slices depending on the relative definition of the time under consideration. In relative terms, therefore, a day would be smaller than a month, or a month smaller than a number of years collectively taken as a time period and so on. The significance

of this presentation is to bring about the staging of the framework on which we begin to look at first an assumed knowledge acquisition period and therefore how we can try to work with the differentiation of each of these accumulations.

Can we not use a finite summation function for this purpose? Why an integral approach instead of a clear summation? We could easily consider the summation

$$\sum f(x) \text{ or in this case } \sum_0^t Ai[pi]; \text{ according to equation (4.2)}$$

However, it is the considered view of this research that knowledge is more of a continuum than it is a set of discrete collections. The approach of a discrete summation does not effectively capture the time function, which is also at the core of evaluating the knowledge acquisition in the process of determining its obsolescence. Because we would like to consider each $\mathbf{A_k}$ as a set of weights that may vary from another $\mathbf{A_s}$ along the acquisition chain, it would not be ideal to use this approach to come up with the summation. A refined model within the context of coming up with the approximation can always be devised. The hypothesis testing further refines this concept.

Further development is easily considered to make a case for the distinction and refinement of these processes.

Section 4.2 discusses various ways of learning. One of the cardinal commonalities amongst the various ways is the idea that there should be independence of determination of concept, especially with regard to what works or doesn't. When we use approximation in this general formula, it is the researcher's goal to enable this to be determined independently or be written into the specific formula that is made while staying within the framework. So, perhaps, a numeric threshold of 0.5 or 50% could be enabled as an acceptable level for *current* knowledge whereas anything lower could trigger a relook and perhaps an archival or declaration of obsolete knowledge.

This framework comfortably accommodates the various ways or models of learning or acquiring knowledge.

4.6.1.2 Separating the Elements of Knowledge Artefacts.

A good start point is to iterate the idea of an artefact. In Knowledge Management, an artefact is appropriately anything that conveys meaning in terms of language or behavioural pattern in an autonomous system comprising knowledge activities. Hence, it is under this premise that the term is used throughout this Chapter. It implies characteristics of either a layout, or technique being used to acquire knowledge. Additionally, anything that comprises a component of the knowledge acquisition process is considered an artefact.

Jashapara's definition of an artefact extends it to material objects, technology as well as the hitherto defined language and layout definitions (Jashapara, 2011).

Conceptually, consider 4.6.1.2 as a clearer way to analyse artefacts. However, what would be the case if we look at knowledge acquired? Would it be possible to look at determining or defining relevance from this direction? A discussion would be well worth a clarification, and further testing could be feasible.

As noted in the previous section, it is this research's view that observing the output of a knowledge system could possibly identify some components that indicate the result of its effect. This is possibly observable by deducing the resulting goal from some narrative that describes its earlier build-up or indeed some component-matching.

While acknowledging that the accumulation of knowledge is a continuum, the challenge is how to consider the beginning of one artefact and the end of the other. This is where the prospect of considering obsolescence comes about.

With the consideration of the time interval, it is perhaps more interesting to visualise this as a differentiation based on the time interval established under the accumulation principle articulated above.

$\Delta t_n - \Delta t_{n-1}$ for any time interval during which a function *f(x)* takes place for any time interval from ***n-1*** *to any maximum* ***n providing we begin from a finite time count such as 1 for n***. In this case, we would consider **x** as knowledge on which the function,

representing the properties of the artefact we wish to consider in the time interval under consideration, will be based.

We would need to determine a total period and consider "walking back" to the constituent components that subsequently culminated in the result. Perhaps what is salient is to imagine that in this case, we determine the relevance of the entire output with assumptions on the majority of approximated – and visible – inputs resulting in the evaluation. This would preferably not be an accurate analysis of the components involved in the knowledge acquisition process.

Unlike in the accumulation of the continuum, in this way of looking at the artefacts, we are examining a breakdown of the individual parts within a time period so that we can understand the effect each of the artefacts *could* have on the knowledge goal itself. Hence, it would be reasonable to think of it as a differential approach, unlike an accumulation. In this case, we would be trying to extend our theoretical consideration as an approach to troubleshooting the result backwards; hence,

$$\Delta(Knowledge\ result) over\ the\ time\ period\ \Delta t$$

This viewpoint is a classical differential equation that will look at attempting to break up the different parts of a whole and again from a concretised result.

Hence, in this case, we can say that

$$K \approx \frac{\partial A}{\partial t} \qquad (4.5)$$

In this case, the formula would not be dealing with approximations from predefined inputs but approximations from a knowledge articulation already in practice, whose components can only, at best, be approximated. The research will look at this as a cursory consideration only to qualify the testing hypothesis from known artefacts as laid out in 4.6.1.1. Hence, each feature $\mathbf{A_n - A_{n-1}}$ is assumed as an approximation of what could have constituted the knowledge acquired. In this case, it may just be that the scrapping of an artefact is likely to be done wholesale without consideration of what constituted the qualitative or quantitative value of the component parts.

The rationale for attempting this framework is to ensure that current and future studies of this phenomenon qualify as something that can be modelled in a more generic way while at the same time preserving the concept of the underlying time dimension.

In thinking of this expression, we are mindful that we could be faced with a situation where a phenomenon requires us to consider either the entire knowledge system or components of it as obsolete – or conversely, qualify it as not obsolete in the final analysis.

4.6.2 Constructs for the Framework.

The framework being considered for this hypothesis testing is underpinned by discussions in 4.6.1.1 and 4.6.1.2.

The notional consideration that the artefacts make up the knowledge acquisition process itself makes this a realistic consideration to make. In what the research defines as the ***Triggering*** and ***Acquiring-stage*** points, the approach in 4.6.1.1 becomes relevant. In what the research defines as the ***Tested Output*** point, the approach in 4.6.1.2 becomes relevant. These will be the basis on which the hypothesis will be tested to a large extent. This comes with two main realisations.

The first realisation to consider is that there will be an artefact that is part of the makeup of a knowledge reality, which will be singular or a collection of different artefacts bringing about the knowledge acquired. Often times, over time, this either falls into irrelevance or nominal relevance. In this case, it is reasonable to assume that a re-evaluation can be done without necessarily disrupting the familiar acquisition process.

The second realisation is that an output of the knowledge acquisition process becomes interestingly glaring in the way that it brings about the satisfying result. Often times the entire output indicates from time to time that the activating artefacts upstream could just do with some refreshing. The challenge in this case is to figure out what the components to this output comprise. It would be a reasonable action to let this outcome become a parallel effort or more accurately dismantled to figure out what approximations can be made to make it better and drop those artefacts that prove obsolete.

In these two respective cases, hence, we could consider the continuum generalisation of an integration, and a differentiation function.

4.6.2.1 The Framework: Triggering and Acquiring.

The triggering and acquiring stages of knowledge acquisition involve examining the artefacts over a timeframe. The diagrammatic visualisation of this is given in the schematic below in **figure 28**.

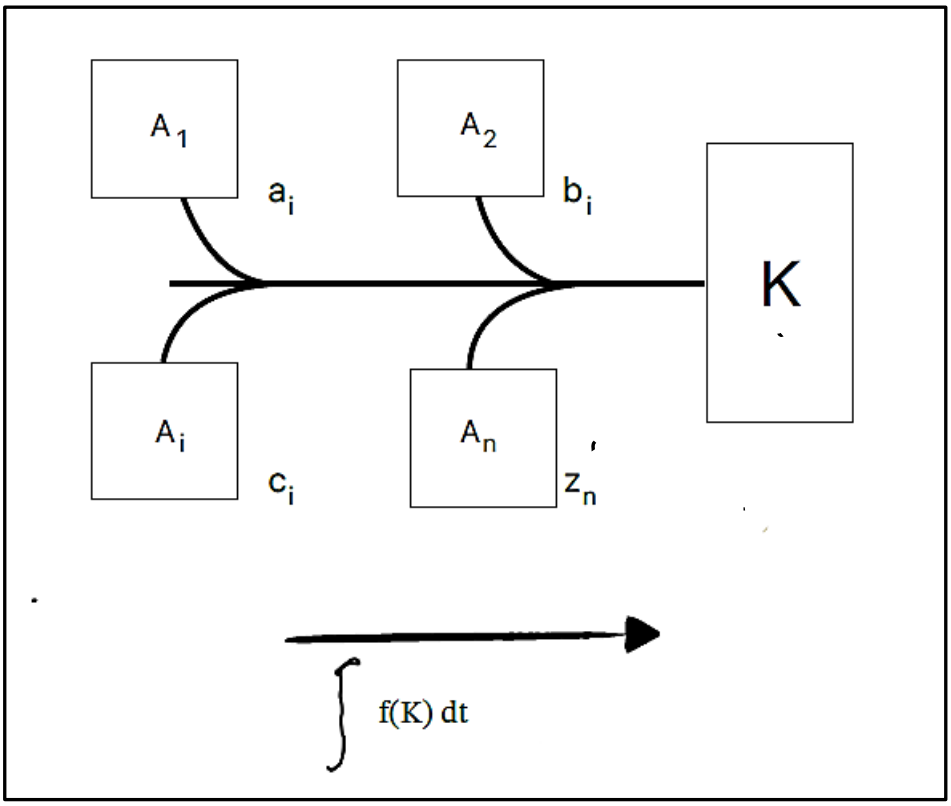


Figure 28 – Generic view of knowledge acquisition Framework

In this diagram shown as **figure 28** above, the knowledge acquired, K, is the result of various artefacts $\mathbf{A}_1$, $\mathbf{A}_2$, .., $\mathbf{A}_i$, $\mathbf{A}_{n-1}$, $\mathbf{A}_n$ so that each **A** is a function over a timescale ***t*** during which the acquisition components are being considered. Each **A** can be considered as having significance $\mathbf{p}_i$ for $\mathbf{A}_i$ so that each **p** can be quantified in terms of its relevance to artefact **A** in such a way that $\mathbf{A}_i[\mathbf{p}_1+\mathbf{p}_2+\ldots+\mathbf{p}_i]$. Each $\mathbf{p}_i$ may or may not be unique to any $\mathbf{A}_i$ depending on where during a time ***t*** this occurs. In fact, the differentiating factor of ***t*** and the attendant separate artefact relating to the overall acquisition K is what will set each of these apart.

To differentiate each series of properties of an artefact $\mathbf{A}_1$ having a series of weightings $\mathbf{a}_1+\mathbf{a}_2+\ldots+\mathbf{a}_i$, another series $\mathbf{b}_1, \mathbf{b}_2, \ldots \mathbf{b}_i$ as weightings for another artefact $\mathbf{A}_2$ bearing in mind that at any given time of examining the acquisition in a continuum, any $\mathbf{b}_i$ can be equal to any $\mathbf{a}_i$ but happening at a different point in the continuum, any b_i can be equal to any a_i happening at a different point in the continuum and probably in combination with other weightings $\mathbf{b}_k$ different from $\mathbf{a}_k$

Clearly, this also means that we could use different notation for each **A** to distinguish it from another artefact along a continuum where a knowledge acquisition is taking place. The diagram from **figure 28** can be refined as shown below in **figure 29**:

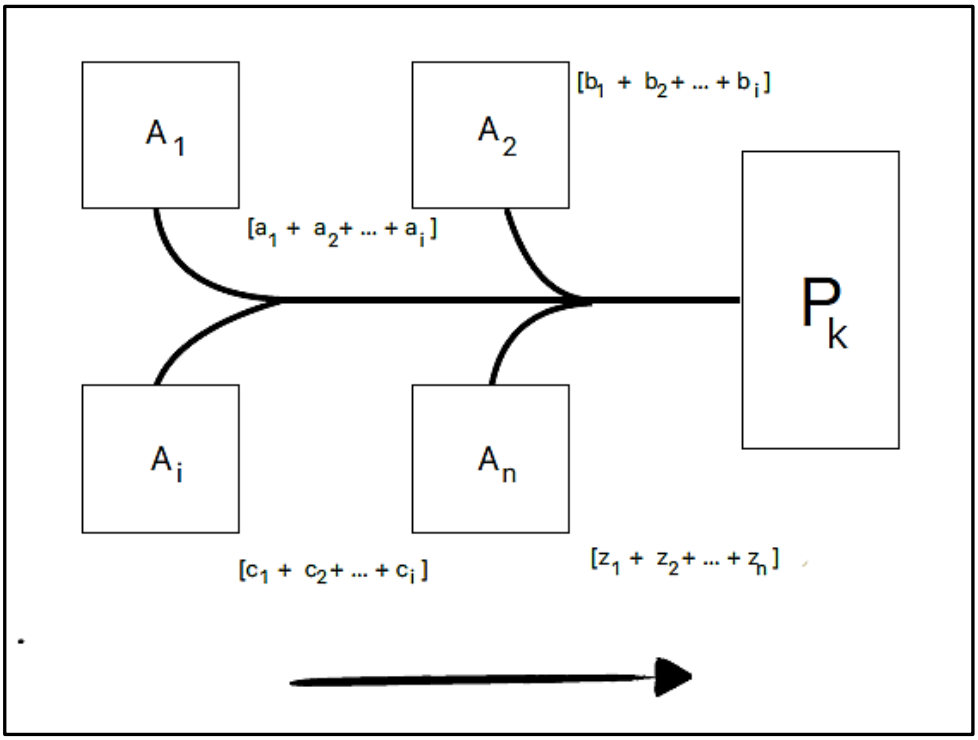


Figure 29 – Properties of the artefact during Knowledge Acquisition

With this, an accumulation of the relevance can be guided by the weightings on each a_i according to the significance given and the imperative given to a knowledge acquired, **K**.

Triggering can be as trivial as waiting for an approval to as essential as waiting for an essential component to be considered and designed or constructed. In most knowledge acquisition processes this will be seamless between the triggering and acquiring stages.

In other situations, the triggering sets the stage on whether or not knowledge acquisition proceeds. It is the intent of the research to consider these nuances as far as possible.

4.6.2.2 The Framework: Conceptual view of analysis from Output.

This part of the discussion will be considered only as a conceptual framework considered by discussions in 4.6.1.2.

In this instance, consider that an entire time period over which a knowledge acquisition has been performed is considered with little to merely approximation in terms of the timeframe. It is clear in this case that accuracy in terms of what constituted the acquisition artefacts are at best estimated. The diagram in **figure 30** below illustrates this.

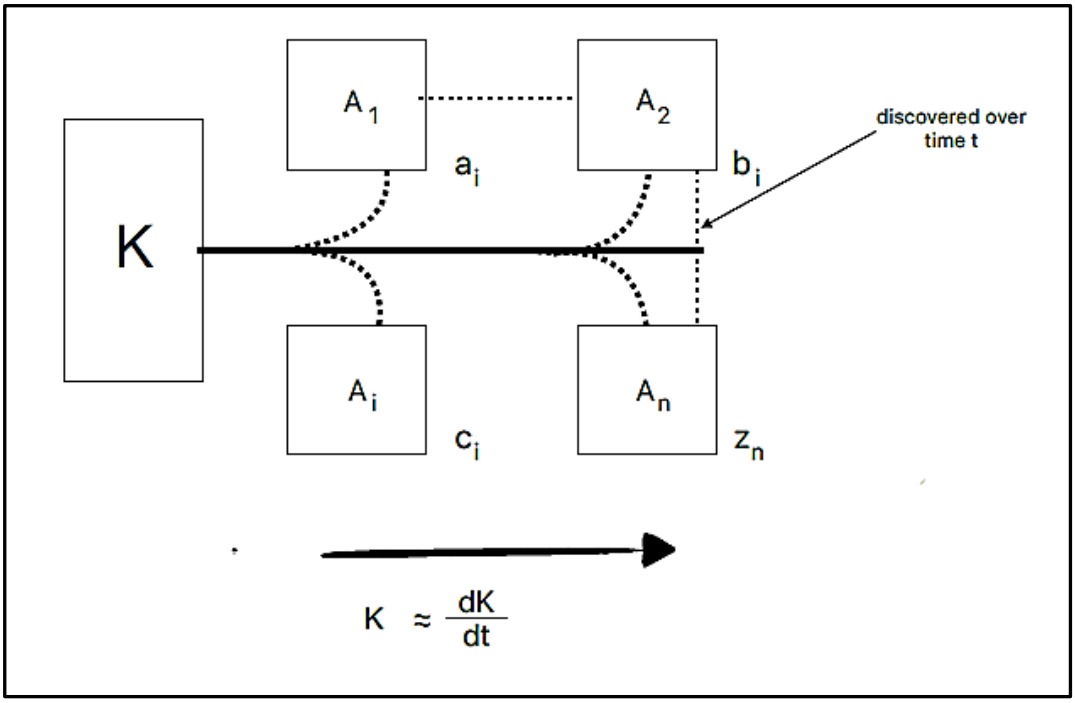


Figure 30 – Comparative view of framework from the point of artefacts derived from Knowledge Acquired

As noted, each $\mathbf{A_i}$ will be considered a derivative of the overall outcome and therefore may be done for qualitative purposes only. The major idea of considering this is to think of archived knowledge acquisition practices that would perhaps be so far

removed from when they were constituted that it is difficult to analyse their determination for obsolescence. Possible considerations here could be similar acquisitions whose artefact components can be used to approximate the acquisition under consideration.

4.6.2.3 The Framework: Overall Construct.

Essentially, the ***Triggering*** and ***Acquiring*** stages could be considered the same, except usually, the staging of the triggering in the researcher's conception and consideration is the stage at which effort, property and weightings have been expended in readiness to other provisions in the way of acquiring knowledge. What this then means is that at any given time, there will be effort expended during the triggering stage that would, among other things, contribute to the ultimate execution of any knowledge acquired in the end.

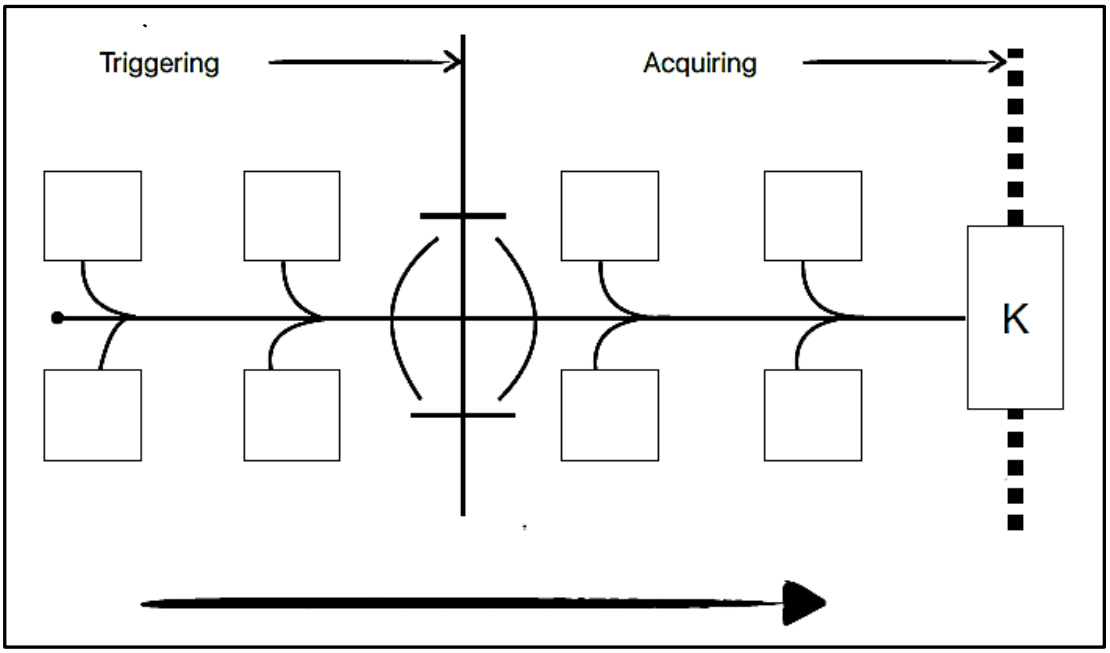


Figure 31 – The two Phases for Knowledge Acquisition

The diagram flow shown in the **figure 31** above will form the basis of the hypothesis testing and tries to answer both the relevance of artefacts in determining whether knowledge is obsolete as well as the timing function on which the choice of a calculus approach in mathematical definition is based.

The usefulness of this concept is to consider that at any time, the acquisition exercise can be subcategorised in order for the determination to be made on possible large-scale models. This way, while still considering whether an obsolescence can be called, smaller segments without necessarily resulting in a knowledge definition as acquired can be decided as if it were a discrete system.

4.6.3 The Testable Framework for This Research.

The testable framework that will be used for this research will primarily focus on 4.6.1.1. In this approach, three experimental characteristics of information are taken into account: significance, quality, and confidence. The researcher defined each of these respectively. A threshold asserts whether a determination carry could easily work with an arbitrary 100% or 1. What this means is that the components are given a percentage measure in the determination for the overall approximation. Because this is a rate, it is a good idea to stick with known determinants, such as 0 to 100, or 0 to 1.

In instances where this framework is specific to a variation of any calculation, it is easy to refine this threshold depending on what is being considered outside of the factors that are here conceptualised.

The following are specific categories taken into account by the framework. These categories give the guideline and model design basis for testing the hypothesis and confirming the proposed theories.

4.6.3.1 Significance.

Significance is defined as the level to which the artefact is indispensable to the process of knowledge acquisition. In this sense, normative aspirations such as how intensely necessary this is as well as what consensus there is to justify its current state. In hand-determining this, it could be safe to consider that a correlation between intensity and consensus could easily attract a threshold of about 0.5 if we determine that consensus is not an altogether firm determinant. For instance, a consensus to keep historical

characteristics because they tie to some hitherto outdated symbol may result in still keeping obsolete knowledge for its own sake. A lower threshold could even suffice.

Modelling significance is useful because it establishes a metric with which the conceptualisation of obsolescence is designed for determination. Included in this as part of the model would be how long an artefact subsists before the next one takes hold; what characteristic in terms of obligatory (or non-obligatory) importance; and what levels of tolerance the artefact enjoys in a particular knowledge acquisition process or exercise.

4.6.3.2 Quality.

Quality is defined as the state to which an artefact lives up to its essential nature – particularly of an inherent status. Although some aspects of quality are symbolic, most have a lot to do with transactional action. Does this aspect spur reasonable action to the information that results in meaningful knowledge acquisition goals? Quality in most disciplines is considered a non-negotiable concept requiring nothing less than a total adherence. If we considered a relative level of 0.9 to allow for symbolism at 0.1 it could safely be said that this overall characteristic could be a major determinant.

Matters of quality determination are numerous and mostly already established. It is instructive to note that a definition of quality in terms of scaling must be established and implemented so that the premise for evaluation is accurately followed. Because this is objective in nature, some groundwork may need to be established by the entity laying down obsolescence at the onset and then followed through with evaluations accordingly.

When a threshold is established; be it time interval or obligatory significance, a base can be established for new cycles of the same exercise. As time goes by, it is easy to consider the aspects agreed upon as part of the quality characteristic and evaluate whether it is overrun or overtaken and if a concession to declare it obsolete should be made.

It is essential to ensure that this is done as the knowledge acquisition implementation is being set up. Optionally, too, gathering the real time characteristics and then running a number of cycles to establish a threshold from an optimally efficient average would be appropriate.

4.6.3.3 Confidence.

Confidence in this research is premised on the state of belief that the artefact involved will hold up to its intended function in the knowledge acquisition process. Two subcomponents could be considered: *regulatory imperative* and *functional perspective.*

Regulatory imperative refers to when the knowledge acquisition process is overseen by a standard external to the organisation. A number of knowledge management functions have an intertwined relationship with aspects including set standards and international agreements, for example.

Functional perspective on the other hand, refers to the internal importance that helps ensure the artefact does not violate cultural acceptance within the organisation or its environment.

Determine the level of confidence in terms of its threshold can be approached differently for each subcomponent. Regulatory imperative is usually dictated externally and is non-negotiable, so it could be assigned a default value of 0.4. Functional perspective, being internal, is more flexible and could be assigned a default value of 0.6. The researcher's suggestion is to consider these percentages in determining the overall confidence level of the artefact.

4.6.3.4 Other Considerations.

As earlier noted, an artefact **A** can have any number of characteristics $\mathbf{a_i}$. It's important to recognise that the list provided for examination is not prescriptive. Each environment will have its own unique characteristics that are significant. Some of the

mentioned characteristics could be overridden by other considerations but should still be within the framework of determination. What is crucial is the establishment of thresholds and any tolerance levels that a particular knowledge acquisition process adopts or has been provided with. In setting up the hypothesis testing, this provision is a critical component of gathering the observed data.

4.6.4 Rationale for the Hypothesis testing.

The method suitable for this research is the observation approach, as established in the discussion of Chapter 3 and refined in Section 3.4.

Observation is ideal because the phenomena being studied are not subjectively decided and do not necessarily form raw data to be processed. The observations are determined and describe artefacts or characteristics in action.

A template is outlined to collect the phenomena and observe the weights attached to these suggested characteristics, guided mainly by the considerations in 4.6.3.

4.6.5 Setup of the Hypothesis Testing.

The framework being considered for this hypothesis testing is underpinned by discussions in 4.6.1.1 and 4.6.1.2.

The framework setup examines a main artefact affecting acquired knowledge and collects the factors that will participate in the knowledge acquisition process. These can be qualitative or quantitative. However, the important aspect is to ensure that both the qualitative and quantitative factors can be converted to a measurable consideration to best determine whether the knowledge acquired is obsolete or not.

Some of this consideration may be subjective; however, with agreement among the stakeholders of the acquired knowledge, and well-articulated within an enterprise, it can be determined how a measure or benchmark, such as those proposed in this research, can be put in place.

4.7 Summary.

This chapter outlines the core of the research; setting up a framework for hypothesis testing and testing fundamental questions proposed at the beginning of the study. The results, while intended to be exhaustive, still allow for further consideration.

The main conceptualisation of the research stemmed from the defining a typical artefact **A** with characteristics **p** covering both the qualitative and quantitative considerations of a knowledge acquisition structure or activity. This was summarised in the equation:

$$\boldsymbol{A} = \frac{(\boldsymbol{p}_{significance} + \boldsymbol{p}_{quality} + \boldsymbol{p}_{confidence})}{\boldsymbol{t}}$$

Any of these characteristics could be used for an artefact as demonstrated in the template that was used for hypothesis testing.

Together, these artefacts contribute to a knowledge acquisition, K, that can be examined as a whole or as a decomposition of its artefacts, A.

As noted in later discussions of Chapter 5 and Chapter 6, some characteristics were based on an 'expert feel' and could therefore easily be descriptive, while others were of a numerical measure and could be estimated on scale. This was considered as the expert bringing his or her tacit behaviour to the study as intended.

In order to conceptualise the framework, a mathematical approach was considered appropriate, as most of the interpretations were based on graphing and visualisation.

Generically, it was determined by the researcher that:

Knowledge acquired is approximately $\int_{tn-1}^{tn} f(Artifact)$ *over time* Δt *from a time* t_{n-1} *to a time* t_n

This is significant in describing what can be thought of as a starting point for designing testing models and functional, implementable solutions for the problem at hand.

The research also supposed that a conceptual look at observing a knowledge acquisition structure and figuring out its components, could be attempted. This was given as the differentiation of the knowledge acquired, K, decomposed into the various artefacts that an observer may not explicitly be aware of. This, for purposes of discussion, was not actively factored into the model examined in the following two chapters. This was summed generically as:

$$\Delta(Knowledge\ result) over\ the\ time\ period\ \Delta t$$

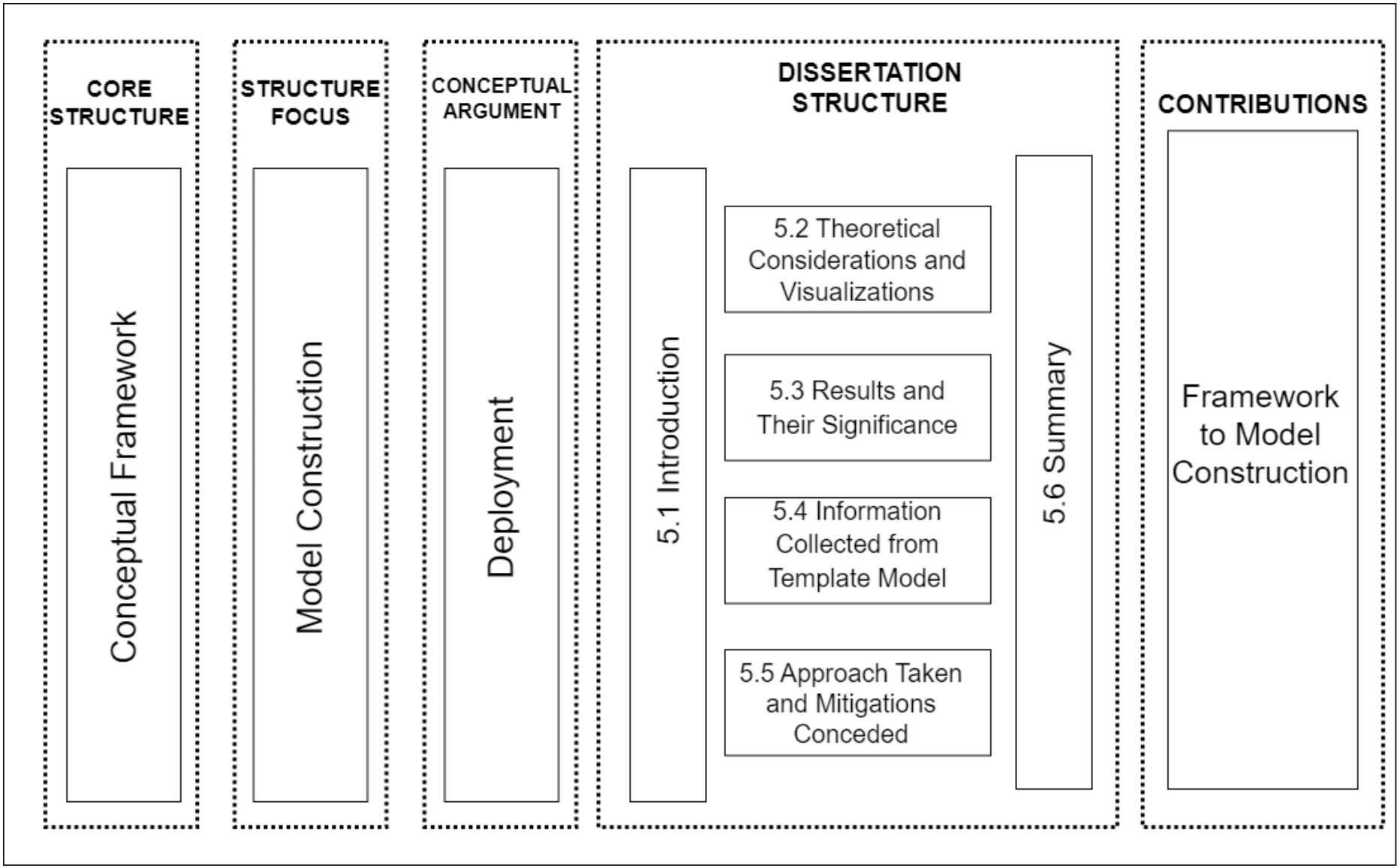
Important considerations were that a discrete summing could be made except when determining acquisition as a continuum; an integral was most suited. Generically determining the properties of an artefact meant that it could be possible to distil these characteristics into metrics that could then be interpreted into a determinant that would help determine whether the acquisition exercise was obsolete or not.

Also determined was the confidence for the determination of the "Yes/No" question. Other than leave it to a binary response, a range was devised to enable nuanced determinations, especially in situations where a threshold is left to individual experts to define. This way it would be easier for the different definitions to be considered and, where pertinent, agreed upon.

The satisfaction of this testing lent itself to fulfilling some of the hypothetical questions that set out for the research question.

CHAPTER FIVE HYPOTHESIS TESTING MODEL

Map 6 -- Hypothesis Testing Model



CHAPTER FIVE HYPOTHESIS TESTING MODEL

Layout:

5.1 Introduction

Based on the framework developed and advanced in Chapter 4, a working models was developed to test the hypotheses at hand. The spreadsheet method of presentation was chosen to lay out the various ways that these results could be manipulated, presented, and interpreted.

The preliminary significance of this study was immediately apparent. Without resorting to sophisticated methods or approaches, a group working on knowledge acquisition could immediately sense the relevance or lack thereof of what they were working on.

Throughout this study, one of the main implicit goals implicit was to seek simplified ways to interpret findings. The framework set up of in a mathematical language established a boundary within which future researchers could articulate and build upon. It aimed to establish a sound platform from which these ideas and definitions could be further developed.

Artefacts have a number of characteristics that may not be exhausted due to the nuanced nature of how and why they are used in different setups. The fact that artefacts

have several characteristics is in itself a consideration and one of the main focuses for building a framework to begin this process.

It is not unusual to get caught up in the comfortable routine of what works while allowing it to regress into a time-wasting exercise. This model gives knowledge workers an opportunity to evaluate, even at an automated pace, their efficiencies by weeding out those artefacts that no longer serve their intended purpose.

A few points to note are:

1. Knowledge obsolescence may not be solely driven by accelerators such as the enhancing technologies. These accelerators, termed contentions in this research, should be handled separately from the core knowledge system unless they are intricately related or built into it.

2. Obsolescence is influenced by various factors over time, as discussed in the previous chapter. These factors include viewpoints (*e.g., ceremonial, statutory*), timings and thresholds. Thresholds establish the facility within which determinants of obsolescence can be made.

3. Obsolescence aids planning how to proceed with knowledge acquisition more effectively. In the knowledge economy, efficiency and keeping up with trends are crucial. Managing all components in a knowledge system helps adapt to the rapidly changing global environment of knowledge acquisition.

The model was designed to address a number specific characteristics of each artefact without prescribing which artefacts to include, aiming to eliminate bias and subjectivity as much as possible. While subjectivity was allowed in expert decisions regarding thresholds and artefact usefulness, the overall approach encouraged objectivity, independent of the researcher's influence. The goal was to create a model demonstrating how continuous renewal of techniques and acquisition artefacts can benefit the knowledge economy. The model was intentionally generic, applicable across various scenarios beyond the specific civil service context of the research.

The data collection form was a spreadsheet workbook with three spreadsheets. The first, "Narrative", explained how experts should enter values and set limits. It included pre-set attributes from which respondents could select. The second, "Demo", provided a filled-out template for reference. It demonstrated that respondents could enter values exceeding the thresholds, illustrating the possibility of surpassing a 100% expectation in practice.

The third spreadsheet labelled "*Entry"*, was where the expert entered their information for submission to the researcher. This spreadsheet served as the vital research instrument for testing hypotheses and analysing the results.

Below are three tables, each representing one of the three spreadsheets used in the research instrument. The "Narrative" and "Demo" tables are partial displays, with the complete spreadsheets shown in Appendix I in the Appendix section.

Figure 32 is a spreadsheet that shows instructions and explanations for each template to be filled out.

Figure 33 shows a demonstrated entry to guide the instructions given in the narrative spreadsheet in figure 32.

Figure 34 is a blank spreadsheet that is filled out by the respondent/correspondent. This workbook was collected for each respondent in the research.

Section 5.1.1 to Section 5.1.8 explains each of the columns in a spreadsheet represented by **figure 34**.

This Sheet explains how you can fill out the Template.		
1	Ministry/ Unit	Name of Ministry or Civil Service Unit where this information is being recorded from. A Unit could be a unit that may not be in any particular ministry, such as a judicial unit related to a tribunal outside of a justice ministry's oversight.
2	Institution/ Department	Name of the department or institution where this information is being recorded. These can be used interchangeably especially where information need not be specific as to originating department.
3	Topical / Knowledge label	This refers to the area where knowledge is acquired/articulated. The object of interest or the process of interest can be used here. A general or even generic subject matter can also be used to give narrative to this entry.
4	Sub/Main	This refers to a descriptive narrative as a one-liner explaining a main source or activity related to the knowledge activity being referred to.
5	Artefact	The component of the overall knowledge process you are dealing with This could be a signature, a component (another process that must be fulfilled before this one) or an event that takes place before this takes off.
6	Duration	The time it takes to complete the artefact's fulfillment. Consistently make it either minutes or hours (or if these are very long processes, days; minutes and hours are more accurate)
7	Weighting	For now this is subjective; the amount of importance or relevance attached to this artefact This can be a count from 1 to 10 [1 least, 10 most] or a consistent value. It does not have to contribute to a percentage count of 100; it can be more or less. Establish a threshold.
8	Threshold	The level over which it begins to get indespensable, and below which it becomes dispensable.

Figure 32 – Spreadsheet showing Narrative of Template (This is a partial display; complete research instrument can be seen in the Appendix I)

Ministry/Unit:			**Heritage and Museums**						
Institution/Dept:			**National Archives of Antiquity**						
Topical/Knowledge Label:			***Museum piece induction***						
Sub/Main:	***Returned articles from law enforcement seizures abroad***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Authorized signature	48	0.4	0.6	Statutory	10	Yes	Y	Approval time too long
2	Screening	72	0.8	0.4	Other	2	Most Unlikely	N	Important for clarifying authenticity
3	Label	24	0.8	0.4	Statutory	1	No	N	
4	Ref to culture	720	0.5	0.5	Ceremonial	8	Likely	Y	If authentic display can go ahead!
5	Montage	48	0.8	0.4	Statutory	2	Most Unlikely	N	For display
6	Catalog	24	0.9	0.2	Statutory	2	Most Unlikely	N	Essential for recording of article
7	Disseminate	24	0.6	0.4	Treaty	1	No	N	Sharing with other heritage sites
8	Archive	24	0.8	0.2	Statutory	1	No	N	Must be recorded in national archives

Figure 33 – Spreadsheet showing the Demo of the Template

Ministry/Unit:										
Institution/Dept:										
Topical/Knowledge Label:										
Sub/Main:										
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**	**Sparkline**
1							No	N		
0							No	N		
0							No	N		
0							No	N		
0							No	N		
0							No	N		
0							No	N		

Figure 34 – Spreadsheet showing the Entry of the Template

5.1.1 What the Artefact signifies

The Artefact describes the position in the knowledge acquisition process itself. This is important for two cardinal reasons: first is that it brings the understanding of the expert intimately related to it; in the templates two experts described the same artefact in different ways. In some cases a two-step acquisition was considered as a single step by another. Secondly, it sets the stage for the other attributes that will be attached to this step or sub-process in the knowledge acquisition.

First off, the design itself:

5.1.2 What the Duration (Time Factor) signifies

The time factor is an important aspect of any knowledge acquisition process from two perspectives; the interval as well as the chronology.

The interval refers to how long each artefact persists in terms of the time it affects a process during the knowledge acquisition exercise. In this case, significance is purely a matter of magnitude. This could signal importance or, in relation to other characteristics, attention.

In terms of chronology, this shows the position that the artefact occupies in the entire scheme of the exercise. An adjustment in terms of when this should happen is subject to the design of a particular knowledge acquisition exercise or process. In respect to which an artefact is largely insignificant but occupies time, a number of actions could be triggered. If this is in terms of improving the process, it does not necessarily become an obsolescence matter; in the event that it does, dropping or modifying such an artefact would be the best course of action.

Furthermore, timing can also be considered as a passage of time in terms of awareness of what is going on around. If, for instance, a scenario has changed necessitating a change of methodology to aid time, then that could factor into the consideration for obsolescence. This, however, was not a focal point of this research.

What results in timing affecting an artefact becoming obsolete? In terms of timing, the framework gives two implicit concepts for representing this: graphing and observation. In terms of graphing, the default time-line graph against weight is the most obvious.

The time-line graph, with the weight on the *y*-axis, and time on the *x*-axis provides a typical representation of the different elements involved. Typically, this shows how the weight is distributing over time. The time function requires us to order chronology, hence the need for a strict timeline. However, for the purpose of observing which artefact to deal with, it may not matter how we order the timeline. A double, triple, or replicated graph on the weighting could help bring different aspects on the y-axis to fit in with the x-axis. This is an exercise that can be done in graphing either on a physical format or electronically with a graphing program.

The guiding proposition in the hypothesis testing is based on both the time factor and weighting based on the significance of the artefact. Knowledge quality can be determined with a time dimension, as is the case with most aspects of systems and sustenance of processes, knowledge acquisitions, as well as contentions like assisting technologies.

5.1.3 What Weighting signifies

Weighting anything in nature implies giving decisive significance, which can determine quality, distinction, or relevance. A starting point is agreeing on the premise as a unit for determining weight.

While a 50% mark is generally acceptable, the significance of an artefact is subjective and context-dependent.

In the previous Chapter, suggestive weights were proposed based significance. For example, symbolism may be weighted lower if emotional but not imperative value. Cultural aspects mean an outsider may not find something important, but their weight should be interpreted within the context of the society using it. Weighting should be determined within the group deciding obsolescence. Overlapping totals

should be avoided by considering realistic cumulative weights, allowing flexibility in setting weights for a particular knowledge acquisition exercise.

In recommending weighting it is important that weighting is determined within a group or organisation that is determining how they will begin to decide what is obsolete within the confines of what is being used with the artefact concerned.

5.1.4 What Threshold signifies

Threshold, in this research, determines the point at which an artefact's value is significant. Ideally, the threshold should cross the halfway point of a weighting to lend significance to the artefact's value. In testing the hypothesis, the weighting was considered the maximum strength of an artefact. Anything below the threshold could be used to calculate obsolescence vulnerability. Obsolescence vulnerability, defined as the difference between the threshold and the weighting, would be negative if subtracted from the weighting as set up in Section 5.1.3.

A threshold holding less than half the weighted input could mean the artefact is more likely to be considered for obsolescence. Comments or remark provide subjective or factual observations from the expertise handling the artefact. For example, "Mandatory" or "Required by law" means there are obstacles to declaring the artefact obsolete. Conversely, if the significance of the artefact does not require a high threshold, it can be considered sensitive and require more attention. In either case, obsolescence can be entertained based on competing factors.

Threshold is crucial for determining how a unit, department, or organisation plans for obsolescence. Combined with comments, it ensures any discrepancies entered by an expert are reconciled before deciding whether to include the artefact in obsolescence planning or remove it from the knowledge acquisition process.

5.1.5 What the Indication signifies

This discussion highlights the symbols and considerations made by the researcher, emphasising the need for an explanatory template. A Microsoft Excel spreadsheet was created to aid in collecting the necessary observations.

Artefacts used in collecting knowledge can be classified as **Sy**mbolic, **Ce**remonial, **St**atutory, and **Tr**eaty binding. Abbreviations like "Sy", "Ce", "St", and "Tr" can be adopted for efficiency (see Appendix I for details). Coding based on these symbols could facilitate manipulation. Here's a breakdown:

***Sy* or Symbolic**

Symbolic – This implies the artefact holds some significance, which may or may not hinder knowledge collection. Symbols can be powerful and serve as accountability signifiers, but they can also be merely placeholders without significant impact on functionality. In some cases, symbolic characteristics can delay efficiency.

What results to symbolic characteristics becoming obsolete? If, for instance, a ritual is respected without leading to the acquisition of knowledge, over time, its relevance may be questioned. Symbolism can be either irrelevant or functional, but it is often considered irrelevant.

***Ce* or Ceremonial**

Ceremonial aspects imply a form of respect or acknowledgement, often tied to authority. These demands can be cultural or traditional, subject to various interpretations. While less significant than symbolic elements, ceremonial aspects can also include audit requirements that prevent abuse by necessitating acknowledgement from multiple authorities before proceeding with a process.

What leads to the obsolescence of ceremonial characteristics? Over time, they can be replaced by concepts like automation, simplification, or limited-time functionality. Limited-time functionality refers to how quickly or slowly an

artefact contributes to the acquisition process, either slowing down or speeding up significantly.

_St_ or Statutory

Statutory – This denotes a requirement by law. Such requirements are often challenging to evaluate because they are considered unquestionable until they are no longer valid. Legislation establishes this characteristic, often aimed at maintaining order or ensuring compliance, with penalties for non-compliance.

What results in the statutory character becoming obsolete? Changes in legislation can have far-reaching implications, potentially triggering the obsolescence of an artefact and, in some cases, the entire knowledge acquisition process. These requirements remain unquestionable as long as legal authority demands their adherence. However, they become obsolete upon repeal or amendment of the legal provisions that necessitate them. For instance, a signature required by law, regardless of its functional relevance, must be adhered to. Considerations may arise regarding lobbying for changes to legal requirements to enhance efficiency and determine whether aspects rendering the acquisition process obsolete should be dropped.

_Tr_ or Treaty

Treaty – implies external characteristics of the artefact that come about as a result of mutually agreed components. Internationally agreed characteristics, for instance, imply that any adjustment or negotiation must result from regrouping and renegotiation. Whether or not this contributes to obsolescence depends on whether there is far reaching repercussion or not.

What results in treaty character becoming obsolete? The rationale for this is that it is possible to easily rate this artefact based on whether the significance of the symbol or ceremony, for instance, is getting in the way of acquiring this knowledge efficiently, or if, as a large component of the knowledge being gathered, it could be dispensed with without consequence to the overall outcome

of the knowledge being collected or acquired. If this is a significant time-basis for collecting knowledge, it could speed up a process or acquisition practice.

Remarks on these Attributes

The attributes are by no means instructive. The goal of this conceptualisation and as well to enhance academic engagement is to allow for inclusions while keeping the model and framework intact and encompassing. It may well be that there are other labels that could be used; however, these are identifiably the typical ones that are found in practice. They were considered after studying the general area of the knowledge acquisition process as well as by interacting with the experts in their respective fields, including some documentation that was availed to the researcher.

Other normative forms subsist, such as culture, ethics, and environmental. Different influences and bases will impact differently on how a knowledge acquisition and maintenance mode is achieved. The model offered up covers as extensively as possible these observations and considerations.

5.1.6 What the Dispensable signifies

The Dispensable column or characteristic is closely tied with the next two, namely Advisory and Ind. Disp. These respectively will conditionally give a recommendation based on what the dispensable column shows between 1 and 5 and after the value of 5. This characteristic is graduated in Bayesian fashion of growing recommendation from the negative to the positive, with 1 being a definite "No" in advisory. Similarly, the Disp. Ind. will show whether or not the recommendation for obsolescence plan consideration is a definite "Yes", or "No" or somewhere in between (such as "Unlikely", "More Unlikely", etc.).

The researcher's hypothesis at this stage aimed to assist the implementation of this planning exercise by giving useful suggestions based on how an artefact is viewed by the expert. This way, in the process of considering how useful the knowledge acquisition is, it is easier to have a guide or an invitation to consider

either the entire acquisition process or the particular artefact in the process of deciding whether it should be put up for consideration of obsolescence.

5.1.7 What the Remarks signify

The Remarks are essential for adding nuance or clarity to any of the choices made, especially regarding the Indication. 'Other' in the indication can various things, and it is crucial for the expert to provide clarity in the remarks. Additionally, any indication such as Statutory can be qualified, as it may be legal but also something equally compelling and mandatory for the knowledge acquisition process in question.

When deciding on a course of action for an artefact, a decision-maker can rely on the perception mind-set of the expert at the time of making the entry or viewing the artefact. It may be that, in the expert's view, the previously untouchable statutory status of an artefact should still prompt consideration for obsolescence planning, either in conjunction with the legal instrument that established it up or administratively internally, without necessarily violating the legal instrument.

5.1.8 Discriminating the Acquisition Process

The acquisition process involves considering how knowledge has been articulated over time and which artefacts are either outdated or surpassed by events. It logically follows that organizing our artefacts and their contributions to the knowledge acquisition process helps in deciding which parts or the entirety of the process need adjustment.

Observing the aging of acquired knowledge can be done by isolating major factors like attributes and time implications. An artefact that is both symbolic and insignificant, yet time-consuming, can be reviewed, revised, or removed through observation. Discrimination in this context involves reassessment, while expunging means eliminating it entirely.

5.2 Theoretical Considerations and Visualisations

The theoretical considerations of this dissertation focused on establishing a methodology for determining obsolescence consistently, with a key emphasis on a mathematical definition.

Using the area under a graph as an approach, the threshold was visualised to quickly identify artefacts above or below the threshold and understand why. The integral in the framework (in Chapter 4) provided a useful starting point, considering artefacts leading to knowledge acquisition are not uniform.

Additional considerations included how the information gathered could visually aid users in identifying what they were looking for.

Using a spreadsheet program like Microsoft Excel was deemed appropriate for its flexibility and ease of use, especially in government departments where resources may be limited.

The approach also aimed to pre-suppose some decisions without influencing respondents, ensuring that the hypothesis aims and objectivity were maintained. For instance, a “Yes” response was interpreted within a scale without overly prescribing responses, allowing for objectivity in the process.

5.3 Results and Their Significance

The results of the research highlighted interesting perspectives. To recap, the main questions from the Problem Statement were as follows:

1. What attributes of knowledge are key and important to identify between phases in planning for its collection?

1.1 Considered here were the artefacts and their respective roles in knowledge acquisition. Key characteristics such as significance and threshold were examined. These attributes introduced a new perspective on artefacts and their functions within the knowledge acquisition framework.

1.2 Respondents were allowed reasonable leeway in determining thresholds within guided limitations. This approach achieved two goals:

1.2.1 Different artefacts would have different levels, so thresholds would be based on the actual circumstances. The model suggested attributes designed to apply to different knowledge acquisition structures.

1.2.2 Thresholds were based on various considerations, some subjective and based on specific circumstances. Experts were expected to use different weightings, such as traditional percentages or ratios.

2. Why should an obsolescence strategy be used with acquisition of knowledge?

2.1 Strategies included subjective/objective evaluation of each artefact and attempts at weaning any obsolete components. Experts were expected to tacitly evaluate their work functions in the knowledge area without specific prescriptions.

2.2 The template incorporated suggested properties as a guide, not as strict instructions. Practitioners could best articulate the strategy to determine the quality of the knowledge.

3. How can cyclic obsolescence affect acquisition to impact currency of the knowledge acquired?

3.1 An evaluation model introduced a cyclic collection of artefacts' behaviour over time to evaluate the currency of knowledge acquired.

3.2 Cyclic obsolescence required multiple iterations to fully concede obsolescence. For this study, two experts independently evaluated the same knowledge acquisition

structure, accumulating evaluations over time into a cyclic feature.

4. Why is it important to consider the characteristics of information when contemplating planning for obsolescence with knowledge acquisition?

    4.1 Contentions, not a key point of hypothesis testing, were significant. They could easily interfere with knowledge acquisition. This study aimed to separate contentions from the core knowledge acquisition in its model design.

5.4. Information Collected from Template of Model

Information was collected using a template distributed to respondents within the Civil service (see Section 5.1). The design aimed to elicit objective submissions relevant to practitioners and the knowledge acquired.

The two major categories for collecting information were non-automated (or not computerised) and partially or fully automated (or fully computerised), respectively. This categorisation aimed to address the contentions discussed in Chapter 4. Here, contentions were considered as artefacts in terms of their relevance characteristics, with relevance referring to the evaluated values for the artefacts involved.

The overall hierarchical structure of the entire system would look like **Figure 35** below:

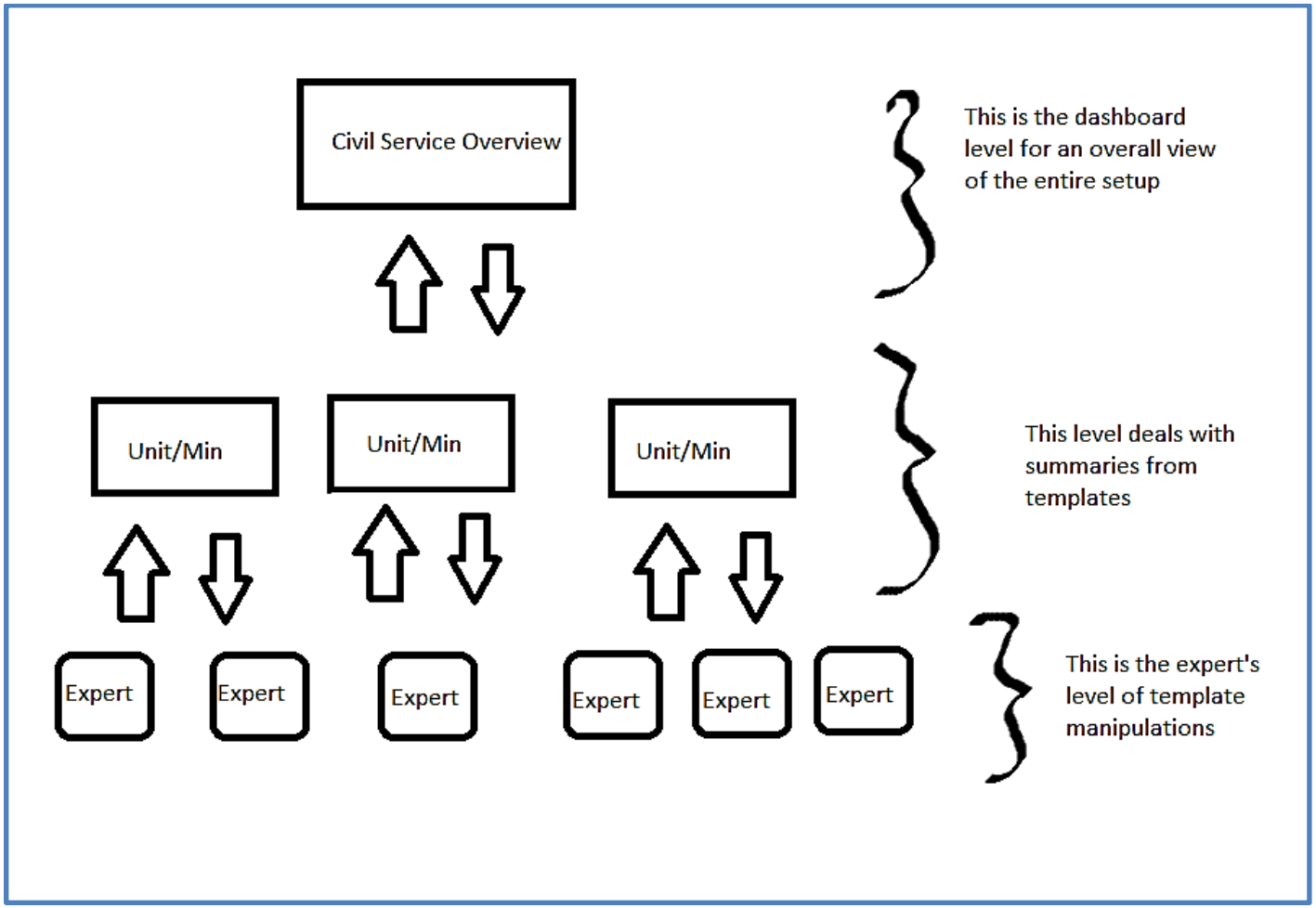


Figure 35 – Overview of flow of Templates from expert to dashboard at Civil Service Overview

The **Figure 35** above illustrates the implementation process detailed in Chapter 6. At the lowest level of the hierarchy, an expert observes and completes a template based on their specific knowledge function. These templates are aggregated into a summarised view at the unit or ministry level, where decisions can be recommended. At the highest level, a dashboard provides an overview to inform the central operations of the current status in each unit.

These levels and their outcomes are discussed in the next Chapter of this study.

5.5 Approach Taken and Mitigations Conceded

The approach to hypothesis testing was shaped by several factors.

Initially, a plan was made for small-cycle exercises over an extended, yet undetermined, period. However constraints arose, particularly regarding the cooperation of correspondents and collaborators. Despite numerous attempts with the Namibia Civil service, permission was not secured. Subsequently, efforts were redirected towards South Africa or Zambia, with Zambia being the first to respond positively.

This change cost a delay and required a significant redesign of the research methodology, particularly in how the template was structured. While the template itself remained unchanged, the planned cyclic approach was postponed, and an initial determination of the threshold was included.

Respondents were encouraged to be somewhat subjective, especially when determining the collection process independently. However, it was understood that experts would collectively negotiate these determinations to align with their unique operational areas. This flexibility was seen as a valuable addition to the research findings.

Moreover, the fact that respondents could determine the threshold indicated the feasibility of empowering as many users and operators as possible, provided they were engaged with any relevant artefacts.

One method to accommodate the diverse approaches of experts in the same field was to allow each to interpret their own artefacts. This approach had drawbacks, as it could lead to the exclusion or exaggeration of certain artefacts depending on perspective. However, this flexibility was intentional, aiming for a settled agreement through team collaboration and discussion, which was evident in the collected results. For this research, at least two collections were made for each knowledge acquisition point considered.

5.6 Summary

The hypothesis testing was established based on the mathematical framework outlined earlier. This framework, introduced in Chapter 4, served as the foundation for creating the working model used to test the hypotheses in this study.

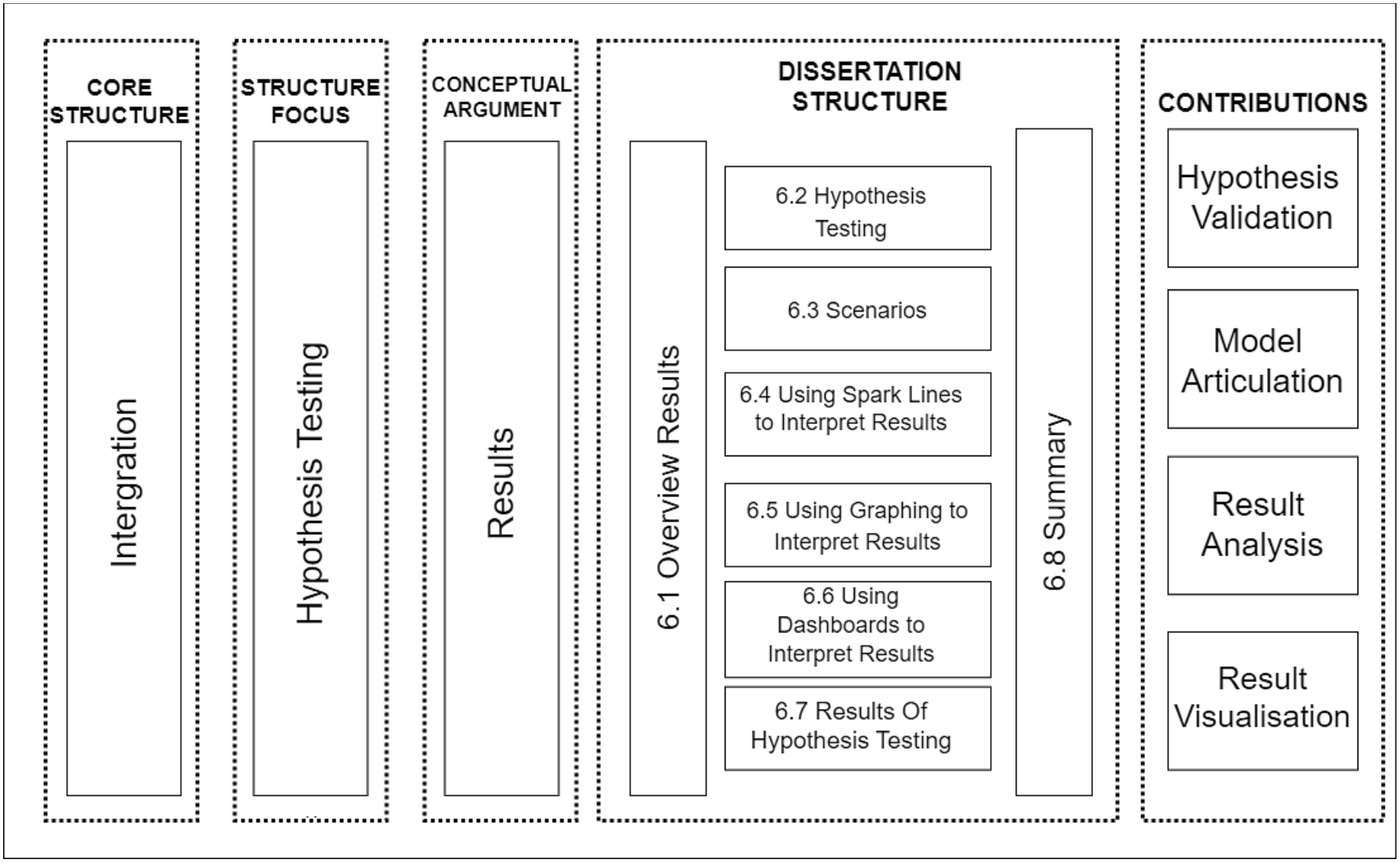
The model presented incorporates quantifiable metrics like time periods and weightings against threshold, alongside qualitative settings for “Yes” and “No”. A scaled conceptualisation of “Yes” and “No” was also introduced to enable quantification. This customisable model allows users and experts to define measurable levels according to their specific needs and the requirements of their knowledge acquisition process.

To a certain extent, the determination of the threshold was allowed to be subjective, based on the expert’s judgment regarding its relevance to their knowledge base and insight. Different scales were used by various experts, as evident in the analysis of the results. Recommendations, such as aligning timelines and weights, were provided based on these findings.

The results, detailed in Chapter 6, offer an interpretation of various aspects of knowledge analysis and how to determine the obsolescence of the exercise and its factors

CHAPTER SIX DISCUSSION OF RESULTS

Map 7 -- Discussion of Results



CHAPTER SIX DISCUSSION OF RESULTS

Layout:

6.1. Overview of Results

Various findings were presented after collecting the template entries from correspondents (and respondents) for this research.

Specifically, a target of 230 different experts was aimed for, out of whom 85 responses were successfully collected. The 85 responses were obtained from 117 attempts, some of which were deemed unusable.

The details for the template were outlined in Section 5.1 and the model was advanced in Chapter 5.

The template submission process had certain expectations regarding the volume of templates to be submitted and the actual numbers received, including usable and unusable templates. The following table shows the distribution of templates versus the templates returned.

It is evident from the list that some templates were neither acknowledged nor returned. Considering the targeted Ministries, it is apparent that there may have been apprehensions regarding the nature of the data collection. The researcher anticipated this possibility and was not surprised. The distribution aimed to cover a maximum of 5 knowledge activities per entity, involving two independently working experts in each case. Some of the returned templates contained entries that were deemed 'adulterated' or unusable. Nineteen entries were incomprehensible and were therefore not useful for the research. Additionally, 13 entries were rendered incomplete and incoherent,

respectively, as they did not follow the instructions given in the narrative or demo that accompanied each template (refer to Appendix II). These entries were still useful for analysis, unlike the 19 that were unusable. All the unused templates can be viewed in Appendix V. Below are examples of templates in each category discussed. Each category is shown in two scenarios. The captions explain what each of these tables represent.

Ministry/Unit:			**Transport and Communication**						
Institution/Dept:			**Motor Vehicle Registration**						
Topical/Knowledge Label:			***Registering a vehicle***						
Sub/Main:	***New vehicle***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Receive ZRA docx						No	N	
2	Register vehicle						No	N	
3	Approve chassis number						No	N	
4	Approve engine number						No	N	
5	Return vehicle to owner						No	N	

Table 8 – Example of Incomplete Template – Scenario 1.

Institution/Dept:	**Maintenance**								
Topical/Knowledge Label:	***Load shedding impact***								
Sub/Main:	***Load shedding***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Determine coverage		100	100	Statutory		No	N	Must know before implementation
2	Divide areas of coverage		80	100	Statutory		No	N	Management catchment
3	Setup notification rota		100	50			No	N	Management catchment
4	Notify affected areas		100		Statutory		No	N	Always
5	Determine new situatoin						No	N	
6	Adjust to new situation		50	50			No	N	
7	Inform affected areas		10	100			No	N	

Table 9 – Example of Incomplete Template - Scenario 2

Institution/Dept:	**Protocol Arrangement**								
Topical/Knowledge Label:	***Receiving dignitary***								
Sub/Main:	***Receiving dignitary***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Get notification				Statutory		No	N	
2	Decide on who it is				Statutory		No	N	
3	Receive who it is				Statutory		No	N	
4	Arrange for transportation				Statutory		No	N	
5	Write out agenda				Statutory		No	N	
6	Arrange meeting				Statutory		No	N	

Table 10 – Example of Incoherent Template (in most cases also incomplete) – Scenario 1

Institution/Dept:	**Job Complaints**								
Topical/Knowledge Label:	***Labor Commissioner duty***								
Sub/Main:	***Labour complaint***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Reception	1	1	1	Statutory		No	N	
2	Lodge in complain	2	2	2	Statutory		No	N	
3	Take to commission Head	3	3	3	Statutory		No	N	
4	Locate complain	4	4	4	Statutory		No	N	
5	Take back to owner	5	5	5	Statutory		No	N	
6	Respond on complain	6	6	6	Statutory		No	N	

Table 11 – Example of Incoherent Template (in most cases also incomplete) – Scenario 2

Ministry/Unit:			**Lands**						
Institution/Dept:									
Topical/Knowledge Label:									
Sub/Main:									
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Create	0	50	50	Statutory	1	No	N	This must be done
0		1	100	50	Treaty	1	No	N	This must be done
0		10	50	50	Ceremonial	1	No	N	This must be done
0		10	50	50	Other	1	No	N	This must be done
0		10	100	50	Statutory	1	No	N	This must be done

Table 12 – Example of Incomprehensible Template – Scenario 1

Ministry/Unit:			**Information**						
Institution/Dept:			**General**						
Topical/Knowledge Label:			***General***						
Sub/Main:	***General***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Setup	10	1	1	Statutory	1	No	N	
2	Execution	10	1	1	Statutory	1	No	N	
3	Observation	10	1	0.8	Statutory	1	No	N	
4	Recommenation	10	1	0.5	Statutory	1	No	N	
5	Wrap up	10	1	0.5	Statutory	1	No	N	

Table 13 – Example of Incomprehensible Template – Scenario 2

Table 7 and Table 8 show examples of an incomplete template. Incomplete templates were filled out with the intention of providing details but fell short requirements. Most incomplete templates had a logical flow and were understandable but lacked complete entry for each record of the artefact. These were set aside. The other two categories were for templates that were either incoherent (as shown in **Table 9 and Table 10**) or incomprehensible (as shown in **Table 11 and Table 12**). There appeared to be a thin line demarcating these three categories.

In most cases, it can be observed that most incoherent and incomprehensible templates were also incomplete. What set the incoherent apart from incomplete was that there was some effort to complete the template but a lack of focus on what was required was evident. What set the incomprehensible apart was mainly a lack of description, inconsistent weights and thresholds, and unclear remarks. Also, there was no consistency in terms of flow of numbering or description of artefacts. Some completed templates were either incoherent or incomprehensible.

It is worth noting that the header details were not mandatory and did not constitute incompleteness if minor entries such as sub labelling was not done. However, details such as Ministry and department were important for context. The researcher requested more clarity in some cases but most unusable submissions did not provide feedback when requested for clarification.

A total of 85 usable templates were received, which the researcher deemed sufficient for hypothesis testing. This makes up about 27% of the received templates, which usable proportion of the anticipated response. The **Table 13** below summarises this:

Anticipated	Received	Usable	Unusable	%-age unusable (of 117)	%-age usable (of 117)
230	117	85	32	27.35	72.65

Table 14 – Summary of received templates and percentages usable and unusable

Also of note is that Ministries are created at the discretion of governing parties. Some ministries may no longer exist depending on the government's decisions. Despite this, the obtained templates and information remain valid and useful regardless of any defunct entities included in constituting the assessments. The **Table 14** below shows

the ministries sampled by the researcher. Index and Ministry codes are supplied by the researcher and are not the official representations. This codification was incorporated so that those that were unlabelled templates could be renamed to fit the researcher's categorisation.

It is worth noting that ministries with zero artefacts turned in may be strategic, attracting concern or special attention. Despite repeated requests, no response was received within the six-month timeframe.

As the collected information was deemed adequate, no follow-up requests were necessary.

The next **Table 15** below shows the list of ministries projected and the actual collections at the end of the collection period. No interaction with the respondents was done to avoid bias, and no two individuals in the same function were informed of the other. Some submissions appeared collaborated as they had nearly identical entries suggesting possible collaboration

Index	Ministry Code	Projected	Returned	Unused	Used
Min001	MoA	10	4	0	4
Min002	MoC	10	4	0	4
Min003	MoD	6	0	0	0
Min004	MoF	10	2	2	0
Min005	MoFA	4	1	1	0
Min006	MoG	10	4	1	3
Min007	MoGE	10	6	2	4
Min008	MoH	10	8	0	8
Min009	MoHE	10	8	0	8
Min010	MoHA	10	8	0	8
Min011	MoI	10	6	2	4
Min012	MoJ	10	2	2	0
Min013	MoLSS	10	6	2	4
Min014	MoLNR	10	6	2	4
Min015	MoCD	10	4	0	4
Min016	MoLG	10	4	0	4
Min017	MoMMD	10	4	2	2
Min018	MoNGRA	10	8	4	4
Mon019	OVP	4	0	0	0
Min020	ProvM	10	0	0	0
Min021	MoYSA	10	8	4	4
Min022	MoE	10	8	2	6
Min023	MoT	8	6	2	4
Min024	MoTC	8	6	2	4
Min025	MoWS	10	4	2	2
	Totals:	**230**	**117**	**32**	**85**

Table 15 – List of distributed (Projected) and Received (Returned) Templates

Index	Ministry Code	Projected	Returned	Done	Incoherent	Incomplete	Incomprehensible	Balance	
Min001	MoA	10	4	done				4	
Min002	MoC	10	4	done				4	
Min003	MoD	6	0	done				0	
Min004	MoF	10	2	done	-2			0	
Min005	MoFA	4	1	done	-1			0	
Min006	MoG	10	4	done			-1	3	
Min007	MoGE	10	6	done		-2		4	
Min008	MoH	10	8	done				8	
Min009	MoHE	10	8	done				8	
Min010	MoHA	10	8	done				8	
Min011	MoI	10	6	done			-2	4	
Min012	MoJ	10	2	done			-2	0	
Min013	MoLSS	10	6	done	-2			4	
Min014	MoLNR	10	6	done			-2	4	
Min015	MoCD	10	4	done				4	
Min016	MoLG	10	4	done				4	
Min017	MoMMD	10	4	done			-2	2	
Min018	MoNGRA	10	8	done		-2	-2	4	
Mon019	OVP	4	0	done				0	
Min020	ProvM	10	0	done				0	
Min021	MoYSA	10	8	done			-4	4	
Min022	MoE	10	8	done		-2		6	
Min023	MoT	8	6	done			-2	4	
Min024	MoTC	8	6	done		-2		4	
Min025	MoWS	10	4	done			-2	2	
	Totals:	**230**	**117**		TTL Incoh.	TTL Incom.	TTL Incompre.	TTL Usable	AUDIT
					5	8	19	85	117
								TTL Unusable	

Table 16 – Accounting of template analysis for each Unit/Ministry

The 85 templates were summarised based on the entries made in each header, as shown below in **Table 16**.

Each expert is uniquely coded while being identified with the Ministry code assigned by the researcher. A pair was targeted for the hypothesis testing, with each pair consisting of an expert ‘A’ and ‘B’. This ensured independence in presenting various scenarios, such as a programming platform or a database environment. The expert’s entries were presented as entered, with no alteration or correction for typos, which were minimal and did not affect readability.

The workbook is integrated and easy to correlate. A database with an application connectivity could add other features, and various implementations are achievable. The dashboard demonstrated the framework in a simplistic, numeric-based qualitative format for each ministry, along with a qualitative summary for each ministry on one page, allowing for the interaction with the entire civil service’s activity.

Microsoft Excel was used for this research to demonstrate the framework. Automating various aspects is achievable using a fully developed application or platform, including visualisation techniques. The essential components of this research was to carry out hypothesis testing, which was successfully done using the spreadsheet method.

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min001	Expat00101A	Agriculture Extension Services	Farmer Input Support Program FISP	Registration of Voucher	
Min001	Expat00101B	Agricultural Extension Servies	Farmer Input Support Program	Register and Supply of Voucher	
Min001	Expat00102A	Plant Quarantine and Pytosanitary	Crop Infestation	Counteracting infestation	
Min001	Expat00102B	Plant Quarantine and Pytosanitary	Crop Infestation	Counteracting measures	4
Min002	Expat00201A	Patent and Company Registration Authority	Registering a Company in Zambia	Steps for registering a company	
Min002	Expat00201B	Patent and Company Registration Authority PACRA	Registration of a Compan	Major steps required for registering a company	
Min002	Expat00202A	Consumer Protection Commission	Receipt of consumer complaint	Consumer Protection	
Min002	Expat00202B	Consumer Protection Commission	Consumer Protection Procedure	Consumer Protection	4
Min022	Expat02201B	Energy Regulation Board	Approval of Tariffs	Negotiating Tariffs	
Min022	Expat02202A	ZESCO	Processing Connection of Power	Power Connection	
Min022	Expat02202B	ZESCO	Processing Connection of Power	Power Connection	
Min022	Expat02203B	Maintenance	Load shedding	Load shedding	
Min022	Expat02204A	Faults	Fault Handling	n/a	
Min022	Expat02204B	ZESCO	Faults	Fault Handling	6
Min006	Expat00601A	OSC	GBV Reports	Gender Based Violence	
Min006	Expat00601B	One Stop Center (Hospital/Police)	Reporting GBV	GBV	
Min006	Expat00602A		Collecting GBV information	GBV	3
Min007	Expat00701A	High School	Examinations processing	Exams Marking	
Min007	Expat00702B	Woodwork	Gathering requirements	Requirements	
Min007	Expat00703A	Primary School	Monthly Assessment	Individual summary	
Min007	Expat00703B	Senior Primary School	Assessment of Capability		4
Min008	Expat00801A	Patient Registration - Referral Center	Registering Patient at Initial Contact	OutPatient/Admission	
Min008	Expat00801B	Patient Registration - Referral Center	Registering Patient at Initial Contact	OutPatient/Admission	
Min008	Expat00802A	Doctor Consultation	Lab Sample Request	OutPatient/Admission	
Min008	Expat00802B	Doctor Consulting Room	Consultation	OutPatient/Admission	
Min008	Expat00803A	Admission for Pain	Administration of Pain Medication	OutPatient/Admission	
Min008	Expat00803B	Admission	Administering Pain Medication	OutPatient/Admission	
Min008	Expat00804A	Public Health	Disease Control	Infectious Disease Outbreak	

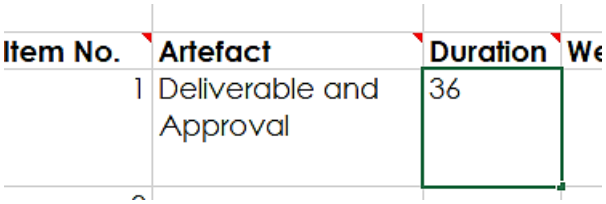
Table 17 – Partial list of Experts headers for each template

The complete list is available in the Appendix II. A unique count of these entries tallied with the 85 usable templates. Additionally, the other templates that were unusable are also available in the appendix.

6.2. Hypothesis Testing

The hypotheses tested stemmed from an initial problem established at the outset: determining how obsolescence can be used in knowledge acquisition. A framework was proposed, and a model was developed from this framework to test the hypotheses initially postulated.

The objective of this hypothesis testing was a paradox in itself. This means that while the researcher exercised utmost objectivity beyond the template provided, the correspondents were allowed to exercise as much subjectivity as they dared within the scope of their expertise and knowledge area. As much as this was considered subjective, the objectivity also came from any two experts viewing the same knowledge area and evaluating similar artefacts. In some cases, the results had a slight variance, but not so much that it was at total variance with any two experts. If consultations were made as these were being filled out, it is clear that these consultations did not significantly affect the overall result of each expert in this case. The two extracts from respondents shows this in the two figures (**Figure 36 and Figure 37**) below:



Item No.	Artefact	Duration	We
1	Deliverable and Approval	36	

Figure 36 – Deliverable and Approval expressed as one

In **Figure 36** above, the artefact *Deliverable and Approval* is treated as one with a total duration of 36 hours. Presumably, the expert in this case assumes that these two are inseparable. It is the researcher's view that where a conjunction (*and*) is used, it would be appropriate to separate the two and assign duration to each. The respondent in the caption shown below (**Figure 37**) does that for the same knowledge acquisition.

Item No.	Artefact	Duration	We
1	Dispatch	24	
2	Approved Signature	11	

Figure 37 – Deliverable and Approval expressed as separate artefacts

In the case of **figure 37**, the respondent separated the two respective artefacts, "Deliverable" and "Approval", referring to the Deliverable "*Dispatch*" in this instance. The respondent who separated artefacts also refers to approval as *"Approved Signature*".

The two experts shown in **figure 36** and **figure 37** view the same artefact differently. Upon closer inspection, however, the divergence in how these artefacts are viewed was not significantly different and could easily be identified. Also of note was that the duration for the two artefacts differed slightly by a variance of 1 hour. This is acceptable, considering the error would be less than 1% in each case.

Another interesting finding from the hypothesis testing was that in some cases, correspondents treated or named the same artefact slightly differently. However, in the description or characterisation, these artefacts proved to be the same. For example, "*Deliverable"* and "*Dispatch"* could be considered the same thing, implying the destination for approval (in "Deliverable") and from the source for approval in the latter.

A database expert or designer would consider concepts such as synonyms or homonyms in designing any storage system for such eventualities. The synonymous nature of "Deliverable" and "Dispatch" in this case indicates that the concept depends on the action or business rule that is being used, but the end result is basically the same.

It was also interesting to note that the number of artefacts for any two participants were not significantly different each other. In cases where one combined two artefacts as one, the other split them, but it was easy to differentiate between the two approaches.

The success of the hypothesis testing was defined further in the following sections.

6.3. Scenarios

The Civil Service of the Republic of Zambia, through the Smart Zambia Initiative, was engaged to facilitate testing by enlisting experts from various civil service units within its jurisdiction.

This initiative was successfully implemented by providing each expert with a template to encapsulate their knowledge bases.

The determination of a knowledge acquisition exercise was not specific; the template allowed each expert to enter their exercises in the form of artefacts and weights per artefact, as proposed in the model. The initial intent of the research was to run a cycle of at least two iterations for the hypothesis; however, due to limitations placed by time and accessibility plans earlier, this was reduced to experts giving their viewpoints based on a single interaction.

It was assumed that the experts were versed in their tasks and could therefore determine the efficacy of their area of operation.

It was evident that this was a useful way to consider the currency of knowledge acquired and used within the work environments of the participating experts. They acknowledged that they had not previously considered this method of assessing the currency of acquired knowledge, aside from some products linked to performance, monitoring, and evaluation. This was reflected in the remarks and comments provided in the supplied template.

Furthermore, the experts noted that even without a dashboard, they could envision how to approach the next cycle of their acquisition exercise and provide better advice on how to improve it.

6.4 Using Spark lines to Interpret Results

Sparklines, as described by Microsoft (Microsoft, 2022), provide a snapshot of related results, such as those of a record or a row. They present a visual interpretation of detailed information while maintaining the context of the bigger picture.

In this context, sparklines offer experts an immediate view of how the artefact under consideration is performing. This visual cue helps experts assess the artefact's behaviour and influence their decision to retain or discard it from the acquisition setup.

The significance of sparklines lies in their ability to allow decision makers to modify or extract specific artefacts without disrupting the entire knowledge acquisition process. They present a trend line, like a histogram, showing how an artefact behaves based on its assigned attributes, particularly the quantitative ones.

The partial table in **figure 38** illustrates that sparklines provide a consistent view regardless of the artefact's interpretation, aiding in decision-making about obsolescence. They also help experts justify their approach to artefact treatment and overall knowledge acquisition considerations, providing a clear explanation when queried from the cumulative dashboards.

Sparklines also assist in observing remarks made about an artefact, particularly those categorised under 'Other'. These remarks are essential qualitative contributions that experts were encouraged to provide. The majority of experts chose to comment on each entry, which was valuable in assessing the submitted templates.

For example, an artefact with a remarked 'This can be adjusted' under 'Other' could prompt a review of the signature requirement, potentially replacing it with a more efficient authorisation token.

Qualitative entries, such as remarks, are handled at the template level, allowing unit supervisors or peer evaluators to examine them and determine the artefact's viability.

The qualitative considerations, including remarks about an artefact's nature as 'Other', 'Symbolic', or 'Ceremonial', provide valuable insights for decision-making.

8	2	Arrange logistics	30	10	5	Other	5	Maybe	Y	Can be delegated

Figure 38 – Remark on a choice for 'Other' for an artefact

This example in **figure 38** illustrates that the expert believes this artefact can be handled outside of the knowledge structure without encumbering the knowledge structure or process.

9	Operations permitted	48	10	4	Symbolic	3	More unlikely	N	Not statutory requirement

Figure 39 –Remark based on a choice for 'Symbolic' for an artefact

In the example given above in **figure 39**, the artefact is considered symbolic because, according to the comment, it is ***Not statutory requirement***. This suggests that the artefact could be up for discussion, considering that perhaps its duration could be hindering the overall process of carrying out this function. In another symbolic expression by an expert shown in **figure 40**, the remark is that this artefact could be absorbed in an earlier one, as this is likely done in practice there.

2	Confirm farmer has 5 ha land	15	5	3	Symbolic	6	Possibly	Y	Usually done in artefact 1 by extension

Figure 40 – Remark based on a choice for 'Symbolic' for an artefact

The example in **figure 41** below shows the 'Ceremonial' choice and the accompanying comment.

3	Issue Voucher to Farmer	20	5	3	Ceremonial	5	Maybe	Y	Usually formality

Figure 41 – Remark based on a choice for 'Ceremonial' for an artefact

The expert in this illustrated case of **figure 41** considers that issuing a voucher to a farmer is a formality. Some processes are easily overtaken by new techniques or technology. It could be that a physical voucher is issued when, in fact, it has already been made available electronically to the recipient concerned.

The examples illustrate how useful the status of an artefact is in the decision-making process for declaring an artefact or structure obsolete.

Institution/Dept:	**Procurement**									
Topical/Knowledge Label:	***Acquiring items/approved orders***									
Sub/Main:	***N/A***									
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**	
1	Dispatch	24	8	5	Statutory	2	Most Unlikely	N	This must be done	
2	Approved Signature	11	5	4	Other	6	Possibly	Y	This can be adjusted	
3	Disbursement of Funds	48	5	6	Statutory	1	No	N	This must be done	
4	Audits	72	8	5	Statutory	1	No	N	This must be done	
5	Accountablity	48	6	5	Statutory	2	Most Unlikely	N	This is sometimes not done	
6	Project Reporting	120	9	5	Statutory	1	No	N	This must be done	

Table 18 – Artefacts with Trend-lines produced from sparklines (Excel 2010 and later)

Table 17 shows trend lines. These trend lines are produced from sparklines. The trend lines in the second row indicate a high instance of the dispensable recommendation. It is clear that this artefact can be dispensed with or adjusted to improve the knowledge acquisition process. Additional design presentation for sparklines help determine factors such as weighting, thresholds, and duration.

Notably, the thresholds for the first two artefacts were considered very high, suggesting they are indispensable. However, the sparkline for the *Approved Signature* indicates it can be adjusted without being dispensed with entirely. Although interviews were **not** conducted, it is deducted that the approved signature could be replaced by methods like digital signatures or two-factor authentication.

An interesting observation is that while the Accountability artefact (row 5, *Accountability*) was considered significant, remarks indicated that it was sometimes not done. Although this observation wasn't directly explored through interviews, examining the comments suggests a partial aspect to this artefact, which could influence future adjustments to its obsolescence status and how artefacts are accounted for.

The **table 18** below presents the same artefact collection from a different respondent. In this case, the first two artefacts are combined, leading to a slightly different sparkline presentation.

These differences highlight some 'tacit' behaviours implicit in the submissions. Ensuring that experts working on the same process did not know of each other was crucial in revealing these nuances. Despite mostly similar results, it was interesting to see how each expert had a nuanced perspective on conceding either a step or a description of a step in their knowledge acquisition progression.

Another notable point is the duration in identifiable acquisition steps. Interpreting the different durations also revealed tacit aspects of the experts involved. This intentional approach by the researcher ensured that, as objective as the goal was, there was also independence of expression by the expert based on their reality in

their work functions. This reality is crucial in understanding how different experts grow their work functions and how systems can be negotiated when dealing with obsolescence in a knowledge management system.

Institution/Dept:	**Procurement**								
Topical/Knowledge Label:	***Acquiring items/approved orders***								
Sub/Main:	***N/A***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Deliverable and Approval	36	9	5	Statutory	1	No	N	This must be done
2	Disbursed Funds	48	8	5	Statutory	1	No	N	This must be done
3	Audits	96	5	6	Statutory	1	No	N	This must be done
4	Accountability	48	8	5	Statutory	3	More unlikely	N	Some reports not done
5	Project Report	144	8	5	Statutory	1	No	N	This must be done

Table 19 – Trend-lines with Deliverable and Approval (from Excel 2010 and later)

In this instance, the sparklines shown in **Table 18** present a different outlook because there is no separation between the Deliverable (*Dispatch* in the previous table [**Table 17**]) and Approval (*Approved Signature* in the previous table [**Table 17**]). In this circumstance, the experts would have to be in synchronous discussion to determine which trend to adopt and how to then begin considering the ageing of the artefacts in question.

This expert submitting **Table 18** clearly indicates that artefact *Accountability* (row 4, *Accountability*) is sometimes not completed, pointing to reports that may be desirable but are not done, depending on undisclosed reasons. This suggests more clearly than the first expert (**Table 17**) that there is an accompanying reporting system linked to this acquisition position. It also implies that this remark could be weighed to determine if the reporting is significant enough to retain this aspect of the acquisition process, or if it can be considered obsolete and discarded. Additionally, while the first expert's advisory states ***"Most unlikely"***, the second expert's view indicates ***"More unlikely"***. The degree to which this is viewed may or may not be important. However, the fact that both consider ***unlikely*** in their assessments indicates that their viewpoints coincide, varying only in degree of superlative indicated by their choices.

As indicated earlier, in cases where there is a conjunction (an artefact that appears to have two sub-systems in one) it is advisable to separate the two artefacts. Therefore, in this case, the first table is preferred over the second.

6.5 Using Graphing to Interpret Results

Graphing the results was intuitive. As shown in the tables and figures discussed earlier in Section 6.4, the sparklines illustrate how to evaluate the result of artefacts and their characteristics instantaneously. Optionally, the timeline can be used to cluster a number of experts around the same artefact across a knowledge management system. For this research, the data to construct such a graph was deemed inefficient, and its absence was not considered a deficiency as other means

were already demonstrated. Over time, the template collection can be easily cast into graphs showing how each artefact ranks against a timeline.

Because the collection of the information required for this hypothesis testing was not defined in terms of finite collections or even content – aside from parameters to keep the test question in check – it is important that graphs are varied, and representative of the nuances that come out and expected in future trends.

An important characteristic of graphing in this testing is that the visual interpretation of how a graph tells the story of obsolescence is novel; it needs to show some aspects that would otherwise be overly analytical in its delivery. The dashboard section below shows a more analytical view of the artefacts collected in a summary way for each unit being viewed.

6.6 Using Dashboards to Interpret Results

Dashboards are crucial for quick decision-making by strategists. They provide a comprehensive view of the situation, allowing for both the big picture and detailed insights. In this study, dashboards were used to interpret the results obtained, highlighting nuanced differences between similar knowledge activities and assessing their significance.

One key feature of dashboards is their ability to consolidate multiple components into a single screen. The research aimed to create a dashboard that would enable a central authority or team to monitor their knowledge management acquisition status at a glance. This includes identifying areas that may require revision or overhaul based on predefined parameters and weightings specific to the entity being observed.

6.6.1 The Dashboard Template source

Dashboard sources are derived from the collected templates, which were structured so that each entry for a specific ministry and knowledge acquisition structure was presented in one spreadsheet (these are detailed in the attached appendixes).

To understand dashboards in this context, two scenarios were considered: First, disparate interpretations coexisting within the same environment, and, second, closely linked interpretations within the same environment.

In the first scenario shown, there were no two assessments of the same item that were closely related, despite working towards the same goal. This suggests independent work toward achieving goals, possibly due to a lack of structured processes and underutilisation of knowledge management. It is important for the responsible authority to implement a structured approach to knowledge management. It is also unclear which of the disparate routes is efficient until further study is conducted. For example, one respondent's template from the Ministry of Health noted a significant number of ***statutory*** entries in MoHA, while another recorded numerous ***other*** and ***symbolic*** entries with explanations of procedures that are sometimes not done, or dependent on patient care practices in MoHB. The tables below illustrate this template presentation. Additionally, these templates were obtained at the same referral centre but during different shifts of the individuals involved, resulting in significant deviation in the trend lines shown in the sparklines (Section 6.4).

The analysis of this divergence lies in the conceptualisation of the different artefacts by each respective expert; MOHA (**Table 19**) may not consider it significant to make the patient entry, perhaps because it is not their core active participating artefact. Similarly, MOHB (**Table 20**) may only consider those aspects with which they intimately work. This highlights the need for reconciliation, which is further addressed in the dashboard discussion.

When examining artefact chronologies, it is important to note that tacit perspectives by each expert could indicate either expediency (focusing only on pertinent aspects) or delegation (having matters not directly related done by someone else). In either case, this presents an opportunity to reconcile the knowledge acquisition structure among the experts involved, a focus of this research.

Institution/Dept:	**Patient Registration - Referral Center**								
Topical/Knowledge Label:	***Registering Patient at Initial Contact***								
Sub/Main:	***OutPatient/Admission***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Medical Presentation	15 mins	5	5	Statutory	1	No	N	This must be done
2	Register at Reception	10	5	5	Statutory	1	No	N	This must be done
3	Payment of fee	10	5	6	Statutory	1	No	N	This must be done
4	Obtain Book	10	5	5	Statutory	1	No	N	This must be done
5	Cleared for Medical Examination	5	5	5	Statutory	1	No	N	This must be done

Table 20 – MoHA showing artefact list different from MoHB

Institution/Dept:	**Patient Registration - Referral Center**								
Topical/Knowledge Label:	***Registering Patient at Initial Contact***								
Sub/Main:	***OutPatient/Admission***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Initial Patient Entry	20	5	5	Statutory	1	No	N	This must be done
2	Examined by Medical Officer	15	5	5	Other	1	No	N	This is sometimes skipped
3	Recommendation of diagnosis	10	5	6	Other	1	No	N	Not always done
4	Register as Inpatient	5	5	5	Statutory	1	No	N	This must be done
5	Payment of Fee	10	5	5	Statutory	1	No	N	This must be done
6	Obtain Book for recording diagnosis	5	5	8	Symbolic	1	No	N	Depends on diagnosis or exam
7	Refer to Medical Officer for further treatment	20	5	6	Symbolic	1	No	N	Not always done
8	Record Information in Book	20	5	5	Symbolic	1	No	N	Not always done

Table 21 – MoHB showing artefact list different from MoHA

The significance of this example in **Table 19** and **Table 20** lies in the need for a deviation analysis when presenting the dashboard, considering that these template entries were outliers that could not reliably conform to an existing knowledge structure. In later recommendations, it became clear that knowledge management and structures for managing these acquisition situations needed to be established in places where they were lacking, and individuals needed education on how to work with the resources under their purview. It is important to note that these two entries were outliers; however, the other six entries were not significantly different from each other in how they presented in their areas of analysis and knowledge management in acquiring knowledge. These six entries were from three different operational departments.

6.6.2 The Dashboard Presentation

The dashboard presented below as **Table 21** illustrates the interpretation of the Ministry of Health's entry, the two presentations shown in the templates above, along with other templates from the same ministry.

Following the framework, the analysis involves accumulations and comparisons, allowing practitioner to set the values against which they will model their analysis.

The approach is two-fold. Firstly, for immediate analysis, each knowledge acquisition activity involved at least two independently evaluating experts to ensure realistic and hypothetically true analysis. Secondly, there were instances where entries came from a single expert either because experts shared identical experiences, or one pair was unusable.

In general, the dashboard presentation below ***Expert-nX*** refers to the respondent responsible for filling out the assigned template, where ***n*** indicates a number corresponding to one or, in this case, two experts. The ***X*** indicates the letter assigned to an expert in the same knowledge acquisition structure. ***KM-n*** refers to the Knowledge Management acquisition characteristic under review for each expert entry, with ***n*** corresponding to the experts involved.

Therefore, in this specific case under discussion in **Table 21**, **Expert-1A** and **Expert-1B** would correspond to **KM-1** in the Duration Advisory, and Indication Advisory section of the dashboard as observed. This pattern applies throughout the dashboard. In the analysis, the **ceremonial** and **symbolic** aspects were considered to demonstrate the triggering of whether to pay attention to the knowledge acquisition.

Two points for 'CHECK' were considered in the dashboard. One indicated whether artefact lines or structures needed reconciling. Each acquisition function was shared between at least two experts independently. If there was a disparity at the analysis stage, for example between Expert 1A and Expert 1B, an advisory was made to check the disparity. CHECK-1 would correspond to EXPERT-1. The explicit numbering corresponds to the experts involved in each acquisition function.

In the corresponding advisory below the numbers, a textual advisory was provided for the principal overseeing or supervising the knowledge acquisition or management system. CHECK-1, CHECK-2 and so on was designated for the event that an artefact was declared either symbolic or ceremonial. **CHECK-1** would correspond to **EXPERT-1**. As earlier pointed out, Expert-1 references Expert-1A and Expert-1B because they are the two entries that are being considered for analysis as they work on the same knowledge acquisition structure. The explicit numbering correspond to the experts involved in each acquisition function. In the example, a count is made of the occurrence of each respective indication and flagged if it happens above zero. The framework developed earlier established dealing with the acquisition as a cumulative effort. In keeping with its implementation, the treatment of the knowledge management structure or acquisition function is being treated precisely in that manner.

Where no action is required, a simple 'OK' or accompanying textual advisory is given. For a single template submission (as in the second table 22 below), the advisory is to continue the implemented knowledge management system for more cycles of analysis to allow for comparative entries over time.

In the event of a single entry, it was replicated to use as a starting point. This highlights that even with a single expert, over time, the knowledge acquisition can be analysed

by comparing progress, with time being important to contextualise the determination of obsolescence and refine the acquisition process going forward.

The **table 21** below shows the dashboard analysing the two entries from the Ministry of Health, which have been under discussion.

		Artefact Lines	Variance	Duration Analysis KM-AQ	Duration Analysis Total				Weight Totals Threshold	Weight Totals Weight	Indication advisory					
CHECK	**Expert 1A**	5		KM-1	50	Expert 1	A	CHECK-1	25	26	KM-1	Symbolic	3	KM-2	Symbolic	1
	Expert 1B	8	**-3**		105		B		40	45		Ceremonial	0		Ceremonial	0
OK	**Expert 2A**	8		KM-2	188	Expert 2	A	CHECK-2	65	42						
	Expert 2B	8	**0**		184		B		50	46	KM-3	Symbolic	1	KM-4	Symbolic	0
OK	**Expert 3A**	7		KM-3	123	Expert 3	A	CHECK-3	68	44		Ceremonial	0		Ceremonial	0
	Expert 3B	7	**0**		125		B		63	36						
CHECK	**Expert 4A**	10		KM-4	410	Expert 4	A	CHECK-4	100	87						
	Expert 4B	9	**1**		386		B		45	40						

Indication	**CHECK**	**OK**	**CHECK**	**CHECK-1**	**CHECK-2**	**CHECK-3**	**CHECK-4**	KM-1	KM-2	KM-3	OK
	Check Artefact alignment	OK No Action Required	Experts' Duration needs alignment	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Review artefacts for change or drop	Review artefacts for change or drop	Review artefacts for change or drop	OK

OK	**CHECK**
OK No Action Required	Check Artefact alignment

Expert 1	Note any actions recommended
Expert 2	Note any actions recommended
Expert 3	Note any actions recommended
Expert 4	Note any actions recommended

Table 22 – Dashboard of Ministry of Health (MoH) Templates

Whereas **Table 21** deals with pairs of experts working on a knowledge acquisition structure, **Table 22** shows a situation where only one expert was shown to be working on the structure. This is due to various reasons, including that the pairing entry was unusable in the case of this study.

As can be noted, any artefact characteristic that meets conditions deeming it "current" had 'OK' annotated in the corresponding table of interpretation below the values. Where discrepancies were noted, a 'CHECK' advisory was indicated with a suggestion on what to pay attention to. Of note is the indication advisory, which was the first qualitative interpretation guide used besides the indicator for dispensability later in the overall summary for the entire ministry/unit summary covered. The overall summaries are discussed later in this Chapter.

In the **Table 22**, note the variance between any two experts dealing with the same knowledge acquisition. That indicates the need to reconcile the artefacts under consideration. At this stage, experts can be brought together to work with both the evaluation team and the knowledge management team to reconcile both the processes and the overall knowledge acquisition aspects of the unit under review. This also covered the duration which would reconcile the tacit behaviour of each expert and the explicit expectation of the artefact chronology under review. The weights were also analysed, in this case taking two significant points: ceremonial and symbolic. The interpretation here is that these two could easily be dealt with as to whether they were required or not. In the event they were not, the artefact chronology could be adjusted accordingly, and the knowledge acquisition improved or declared obsolete as the case would dictate.

The second scenario showed a somewhat homogenous set of templates. The spread was over three entries dealing with the same matter: dealing with national guidance matters with the Ministry of Religious Affairs and National Guidance. In this case, four experts were dealing with how they would go about advising authorities on matters for press release. Other templates obtained had entries respectively on general procedures for an event such as the national day of prayer and parliamentary presentations. There was not much deviation in this most likely owing to the fact that the ministry is a new one and most knowledge management structures were yet to be

put on a test drive. This was one of the more tightly set up structures noted. Worth noting was the point that the single submissions were a result of a pair that was incomplete, incoherent, or unusable. In this case, the entry was entered twice to show this fact. These templates are attached to this study as Appendix V.

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total				Weight Totals Threshold	Weight	Indication advisory					
OK	**Expert 2A**	5		KM-2	174	Expert 2	A	OK	50	36	KM-2	Symbolic	0	KM-3	Symbolic	0
	Expert 2A	5	**0**		174		B		50	36		Ceremonial	0		Ceremonial	0
CHECK	**Expert 3A**	6		KM-3	141	Expert 3	A	CHECK-3	60	52						
	Expert 3B	5	**1**		127		B		50	43	KM-4	Symbolic	0			
OK	**Expert 4A**	5		KM-4	187	Expert 4	A	OK	50	50		Ceremonial	0			
	Expert 4A	5	**0**		187		B		50	50						
Indication		**OK**	**CHECK**		**CHECK**		**OK**	**CHECK-3**	**OK**			OK	OK		OK	OK
		OK No Action Required	Check Artefact alignment		Experts' Duration needs alignment		OK	Use uniform Threshold and Weight for A & B	OK			OK	OK		OK	OK
		OK														
		OK No Action Required					**Expert 2**	There is no comparative Expert, or analysis is new								
							Expert 3	Note any actions recommended								
							Expert 4	There is no comparative Expert, or analysis is new								

Table 23 – Dashboard of the Ministry of National Guidance and Religious Affairs (MoNGRA)

The templates, along with aggregations and interpretations into dashboards, were all coded and summarised. The table below shows this. For purposes of discussion, the column header labels are shown in the **table 23** below.

Worth noting are columns labelled “Overview”, “Status”, and “Remark” in the dashboard display shown in **table 23**.

The Overview considers a one-word or simple-phrase advisory whether to take a close look at the acquisition under review (REVIEW), or whether to continue on with what is in place (CONTINUE). Since the entries are linked in accompanying spreadsheets, future entries and adjustments to the points being interrogated will dynamically change this status as the case may be. Also worth noting is that CONTINUE has two implications in its advisory. This can be noted in the column labelled “Status”. Status shows whether there is data from the templates. An indication to continue means that templates are yet to be gathered and populated under the unit under consideration. Column “Remark” gives a simple phrase to either continue the cycle – that is, gather more templates in the succeeding period – or to check remarks under a particular unit that is under consideration.

Structurally this table is an overview of the entire civil service under consideration. Any advisory is passed down the accounting officer responsible to take note and order necessary adjustments or considerations. This is illustrated in the figure below.

Columns labelled “Projected”, “Rejected”, “Unused”, and “Used” were added for research context. However, these can be used functionally in a real implementation to check for either compliance or accountability as the case may be. The research used it to account for what was issued and what was received (Columns “Projected” and “Rejected”). Also accounted for were templates that were unused for various reasons that appear in the following table, as well as those that were used (Columns “Unused” and “Used”). The following table shows an accounting of the specific instances that templates were unusable. Appendix V shows a complete listing of all unusable templates in flattened format.

In this research, the dashboard ties groups of indicators from templates to give an overview of the state of a knowledge acquisition. The directly numerical values were collated, while the qualitative values were tagged and then reflected on the dashboard.

Index	Ministry Code	Projected	Returned	Unused	Used	OVERVIEW	STATUS	REMARK
Min001	MoA	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min002	MoC	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min003	MoD	6	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min004	MoF	10	2	2	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min005	MoFA	4	1	1	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min006	MoG	10	4	1	3	CONTINUE	DATA	GO TO NEXT CYCLE
Min007	MoGE	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min008	MoH	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min009	MoHE	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min010	MoHA	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min011	MoI	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min012	MoJ	10	2	2	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min013	MoLSS	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min014	MoLNR	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min015	MoCD	10	4	0	4	CONTINUE	DATA	GO TO NEXT CYCLE
Min016	MoLG	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min017	MoMMD	10	4	2	2	CONTINUE	DATA	GO TO NEXT CYCLE
Min018	MoNGRA	10	8	4	4	REVIEW	DATA	CHECK REMARKS
Mon019	OVP	4	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min020	ProvM	10	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min021	MoYSA	10	8	4	4	REVIEW	DATA	CHECK REMARKS
Min022	MoE	10	8	2	6	REVIEW	DATA	CHECK REMARKS
Min023	MoT	8	6	2	4	REVIEW	DATA	CHECK REMARKS
Min024	MoTC	8	6	2	4	CONTINUE	DATA	GO TO NEXT CYCLE
Min025	MoWS	10	4	2	2	CONTINUE	DATA	GO TO NEXT CYCLE
	Totals:	**230**	**117**	**32**	**85**			

Table 24 – Summary of templates, overview, status and remarks

A few observations from the above **table 23** will put the results obtained into perspective. From the list of participating units and Ministries shown in the table, the submitting (DATA) were 19. Out of this number, 14 were advised to REVIEW, meaning that there were some artefacts, or knowledge structures in need of a rethink, evaluation, or possibly declaration of obsolescence. Only 5 were recommended for a CONTINUE. This meant either that the start point was not sufficient to be evaluated (as it was a start point or there was only one submission and none to compare with), or that there was yet to be sufficient cycles to observe.

This interesting turn of events shows that already, 73.67% (or rounding off, 74%) of Ministries or units' submissions required some attention in terms of determining the obsolescence or need to determine obsolescence in their knowledge structures. Only 26.32% (or rounding off, 26%) would have their cycles examined at a later stage of template collection.

This is significant as it immediately demonstrates the essential role that this implementation and study plays in helping entities manage their knowledge structures or functions in this way. **Table 24** below summarises this:

Total Ministries with Data Submitted	Total Ministries needing to REVIEW	Total Ministries recommended to CONTINUE	Percentage to REVIEW	Percentage to CONTINUE
19	14	5	74%	26%

Table 25 – Summary of recommendations to REVIEW or CONTINUE

6.7 Results of Hypothesis Test

The hypothetical considerations under considerations were as set out below. The testing that was done on each of them is discussed under each assumption.

1. ***Attributes of knowledge once identified, serve as critical factors in obsolescence planning.***

   Each artefact was considered in its basic contributing characteristics so that the overall contribution or lack thereof could be analysed more effectively. As seen in the templates and further analysis in terms of sparklines and dashboard, it is evident that these made the study and determination of obsolescence feasible and easier to construct. The attributes developed were considered under generic headings as discussed earlier in Chapter 5 Section 5.1.

2. ***The acquisition of knowledge must incorporate well-thought-out timing strategy, especially in the context of:***

   The function of time was considered important in knowledge acquisition and obsolescence planning. The framework was a function of the various aspects of the knowledge acquisition along with the duration within which each artefact was allowed to run. This clearly ensured the assumptions set out below:

   a. Competitiveness – In ensuring ***currency*** of the acquisition setup, it follows that competitive of any entity dealing with knowledge obsolescence planning is assured. The timeline within which any analysis was to be made was significant. It was clear that in this research a number of experts did not undertake a careful analysis of how they were variously working on the same knowledge acquisition structure and how they viewed or manipulated it. This could easily explain deficiencies and the apparent randomness of some acquisition perceptions and perspectives. Remarks from experts who expressed the need to either modify or do away with an artefact point to the desire for currency that would necessarily (perhaps not sufficiently) result in competitiveness of their knowledge structure. The Appendix II shows some of the comments especially as they pertain to

what experts viewed or considered as being ceremonial, symbolic, or other in certain cases.

b. Innovation – in dealing with knowledge acquisition, it is clear to see that once the knowledge acquisition structure is grasped and understood, innovations amongst experts are enabled. Clearly, any aspect that outpaced the other could be adopted and adjusted in ensuring that innovation was assured and in turn fed into competitiveness of the whole process; the concept of allowing an overview of each expert's perspective was with the intention of enabling the recommendation of more innovative ways of working through certain functions of the knowledge structure under review. In the outputs that present dashboard information, it can be observed that recommendations such as aligning time durations as well as weights points to the need to streamline how acquisition is done and ensure that experts are able to innovate. The tables illustrate this, along with full tables in the Appendix II.

c. Technology and systems turnover – earlier observable evidence showed that most discussions around obsolescence centred on the accompanying technology. In this research, the technology aspect was explicitly separated in dealing with the knowledge acquisition and obsolescence outlook. As can be seen this treatment has the potential of putting technology in perspective and perhaps slow down its turnover the whole knowledge management cycle of most systems.

3. ***The currency of acquired knowledge can be can be actively maintained and enhanced, recognising the central roles played by information systems and technologies.***

The implied advantage of currency is touched upon under the need for competitiveness. The currency of knowledge acquisition is a spinoff from this research and was intentionally meant to be a testable hypothesis as such. The fact that artefacts can be defined and analysed in order to determine obsolescence or the lack thereof indicates that maintaining knowledge artefacts in current state

is assured. It can be seen from the analysed templates that advisories designed into a template and presentations thereafter show that a knowledge management system can be kept current at reasonable intervals or junctures according to an entity's implementation of this framework and models.

4. ***Maintenance represents a vital feedback mechanism within the cycle, and it's imperative to emphasise the importance of addressing maintenance in the earlier phases of any cycle.***

Similar to hypothesis 3 above, maintenance feeds into the analysis of each artefact considered in this research. It can be observed that by setting benchmarks, weights, thresholds, and comparing durations, an artefact and consequently its entire knowledge management structure can be kept in good maintainable state. Challenging conceptualisations such as those of statutes were considered whereby in some templates, experts opined that despite the legal imperative, an artefact could be considered for turnover or change. This implies maintenance at some level and discarding at other others.

The overall dashboard monitoring other units within the civil service does work to bring about a maintenance cycle that can be consulted and resorted to at different levels right down to the template entry level. This means that a set interval (*time*) can be conceded during which a check can be made periodically.

6.8. Summary

This chapter analysed templates that were sent back from requests to the civil service. A projected total of 230 templates were sent out to almost all the major ministries and units available through the contact person. Of these, 117 were returned for analysis and collating.

Collating involved:

- Ensuring that the information received was meaningful; rendering some unusable but still retained. Some requests included confirming duration numbers, determining knowledge descriptors where applicable, and noting remarks made.

- 'Flattening' the collection such that individual templates could be presented on one spreadsheet per ministry or unit involved. This required coding each collection in a format that could easily be represented as a database. This way, the bulk was reduced. From individual collections of 117 templates, a single workbook complete with both input and analysed outputs was created. From this, several deductions were made according to the targeted hypotheses made earlier in the study.

- Attributes of an artefact ***could*** be used to successfully determine obsolescence.

- A timeframe could be considered in determining how an artefact was viewed; some remarks alluded to this, especially where symbolic and ceremonial indications were used. In some cases yet, as can be seen in attachments in the Appendix III, 'Other' was also conceded in remarks as alluding to time. For the purposes of the research, the symbolic and ceremonial indications were considered most significant.

- The spinoff of information systems and allied technologies could benefit from the treatment of knowledge obsolescence.

- In a cyclic fashion, knowledge artefacts could be given a maintenance treatment similar to other aspects in the articulation of knowledge management

systems and allied technologies. It must be emphasised here that technology obsolescence was not the main point of the study. Chapter 4 discusses some of the ideas that teased out the idea of technology and other allied aspects of knowledge and knowledge management.

There were discarded templates. The researcher found it prudent to discuss these templates and also include them as part of the appendices to this study – in this case, Appendix V. The researcher found it sound and appropriate to include these because they had been duly received back from the respondents and for reasons of contribution, the respondents were probably doing so in good faith and to the best of their ability. Additionally, these could spring stimulus for further research or discussion at a later, or future stage in the knowledge contribution cycle.

The consideration of the knowledge obsolescence study, the cumulative approach in analysing the collected templates was very useful. It supported the theoretical framework earlier advanced that a quantitative and qualitative look at the manner in which each artefact was viewed could be used to work on advisories as well as recommendations.

Quantitatively, an examination of fundamental aspects such as how many artefacts were involved in a knowledge structure as perceived by its experts could help align or make uniform, or indeed efficient, a knowledge function. Qualitatively, indications such as suggestions of whether an artefact was relevant or not could trigger an alignment based on how experts viewed a particular function. The concept of time rides overall. It is the idea against which most of the attributes could be pitted; namely that depending on how long a knowledge structure subsisted in the way it was used, an adjustment in time could help in the obsolescence planning of that structure.

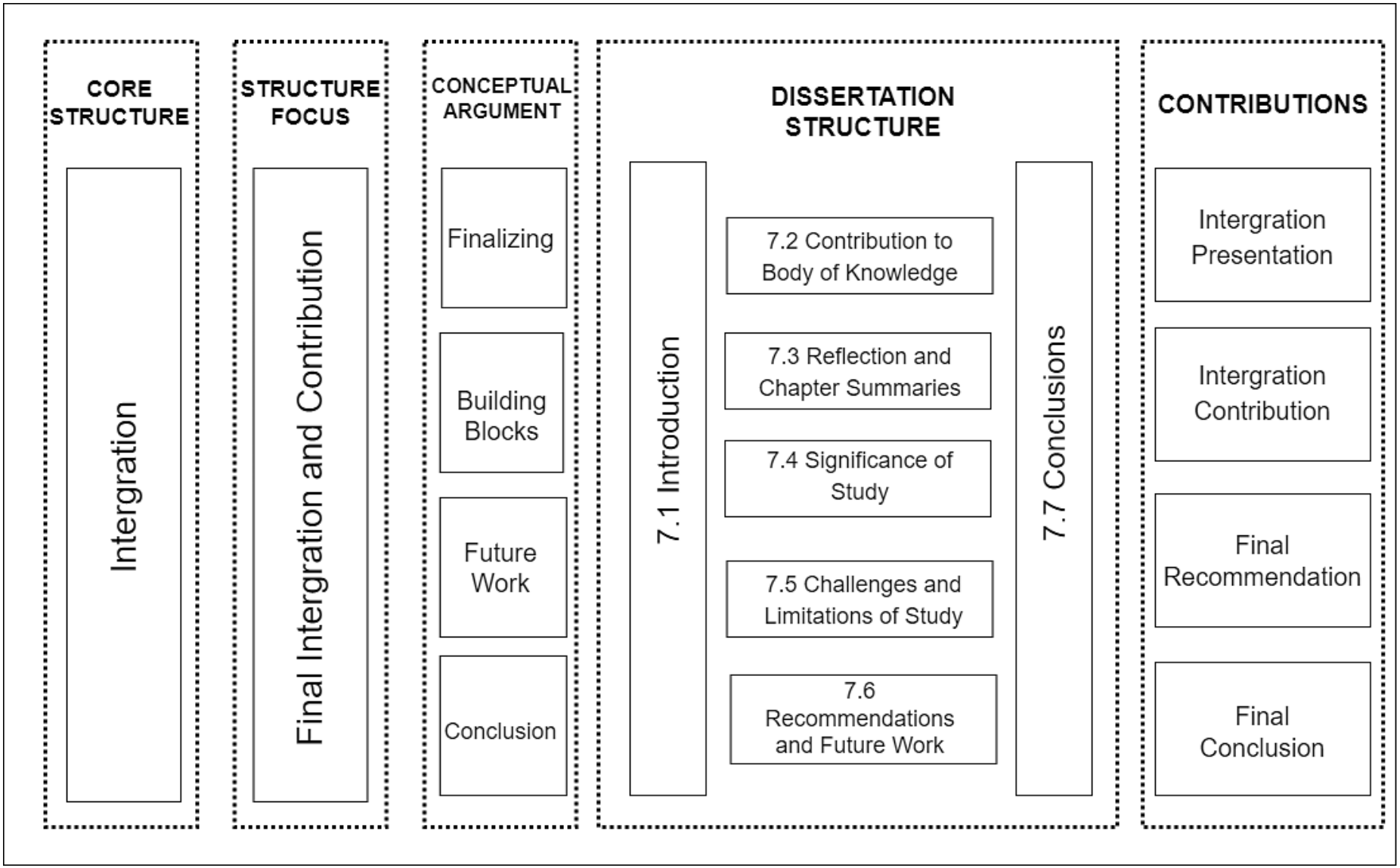
Unusable templates require special mention and they have been retained because they were received with the intention of providing the ‘paired’ viewpoint of each expert dealing with a knowledge structure. Overall, the effect of this was that the unpaired artefacts could not be used in comparative fashion as was intended. However, the usable artefacts were used as a starting point for onward collections that, in the interval decided by the overall civil service supervision, or the particular unit involved, could

then add more templates for future observation and analysis. The researcher had two options: (1) to try and analyse the unusable templates for relevant columns, and (2) to disregard the templates and declare them unusable.

The option was to disregard the templates and use the unpaired templates as starting points while still analysing each of the entries in order to give advisories. Partially, option (1) was still taken because the unusable templates were not discarded. They were retained for comment and future use for other academic and research purposes as would be found relevant going forward. In this sense, a repository with these templates was made available and the templates were retained.

CHAPTER SEVEN FURTHER WORK AND CONCLUSION

Map 8 -- Further Work and Conclusion



CHAPTER SEVEN FURTHER WORK AND CONCLUSION

Layout:

7.1. Introduction

In this chapter, the conclusion of the research is summarised. Key findings will be discussed in relation to the initial research questions. The value and contribution of these findings will also be examined and proposed. The study will address limitations and explore opportunities for further and future research.

This study aimed to contribute to the importance of considering obsolescence in knowledge acquisition. It was acknowledged that knowledge acquisition occurs whenever information is utilised, such as when procedures, manuals, and protocols are implemented. The research categorised these artefacts and analysed each of them on fundamental characteristics, which could then be used to establish the significance of obsolescence.

Another key finding was the variation in responses by experts working on the same knowledge structure. This highlighted the importance of planning for obsolescence and emphasised the need for experts to have similar, if not identical, perspectives on the fundamental artefacts they are dealing with.

7.2 Contribution to Body of Knowledge

This research aimed to contribute both to the academic body of knowledge as well as the practitioners' sector of specialty and specialisation. It outlined its contributions in two broad areas: the academic body of knowledge, and the practitioner's body of knowledge. The researcher aimed to impact three areas through this information system study: information systems (with a focus on knowledge management systems), information technology (with a focus on automation and application development), and applied mathematics (with a focus on basic integral and differential mathematics). These contributions were discussed in Chapters 4, 5, and 6 of this research, respectively. This study also opened avenues for future and further research, which will be discussed later in this chapter. For the purposes of this discussion, a practitioner is considered to be a professional who is actively engaged in a specific field of their calling or practice who also contributes to academic or industry literature that can be used and cited by others.

7.2.1 Academic Body of Knowledge

Academically, the theoretical framework outlined in Chapter 4 and the modelling established in Chapter 5 contribute to discussions in the fields of information systems, information technology, and applied mathematics. In the realm of information systems, this research explores uncharted territory in knowledge management systems, offering insights that can illuminate the advancement and evolution of information systems paradigms. Obsolescence as researched mostly points to attendant peripheral tools such as technological hardware and software. They rarely point to discussions based on core knowledge activities especially in areas that do not often use technology in a widespread manner. A systems approach such as has been demonstrated makes it easy to appreciate that an analysis can be done even in the absence of technological tools whose usage is usually an added enhancement. Regarding information technology, the various applications that operationalise the concept of obsolescence in knowledge acquisition, as discussed in the latter part of Section 7.4, are diverse and abundant. The model introduced in Chapter 5, along with its implementations and discussions in Chapter 6, further

support the idea of how information technology benefits from this research. The researcher's efforts to describe the framework using basic mathematical concepts, particularly in Section 4.6, demonstrates how the concept of knowledge acquisition and obsolescence planning can enrich an examination of the mathematical principles relevant to this research focus. Overall, this can improve the understanding of how this system can enhance efficiency and effectiveness.

7.2.2 Practitioners' Body of (Knowledge) Practice

Industry has innovations that point to their peculiar niche of operation or product and service engagement. Practitioners in industry are professionals who will not only exemplify the efficacy or efficiency of a product, or service, but also contribute to the literature in terms of what are referred to as white papers. A white paper would ordinarily be a report explaining a complex issue, presents research findings, or proposes a solution to a problem. Hence, this research aims to induce this engagement with industry, especially those that are actively involved in knowledge acquisition. Practitioners will ordinarily interact with academia, business, and government to inform their decision-making and influence policy or industry practices from time to time. Therefore, research of this nature is aimed at aiding in this area to enable new discoveries based on the result of this research. The practitioner application of this research's findings offers exciting prospects for deploying this model. The current use of a spreadsheet for hypothesis testing can be further enhanced with more sophisticated renderings. The research's partially automated spreadsheet, with minimal upgrades, can reflect real-time articulation of submitted templates and their expected results.

In terms of applications that can affect Information Technology tools and innovations, practitioners can harness the use of tools to enable them articulate further the use of knowledge acquisition models as demonstrated in this research. Beyond the spreadsheet, a fully-fledged application is possible. The spreadsheet can serve as a database of tables for template entries, and an application can be

developed using Open database connectivity (ODBC) to query and present the results in various formats.

Alternatively, this implementation can be used to create a data warehousing concept, which would retain historical renditions of various aspects of a knowledge structure with the support of the database implementation.

The potential applications of this model are endless and significantly enhance the practice, efficiency, and effectiveness of civil service systems across the African continent and globally.

7.3. Reflection and Chapter Summaries

This research elucidates several significant considerations and reflections, presented in two broad sections: Reflecting on the Chapter summaries and how they aligned with the research objectives, as well as the significance of the study undertaken from the outset and the realisations gained as a result of conducting this study.

7.3.1 Relating to Research Questions and Objectives

This research aimed to assert the importance of obsolescence planning in the course of knowledge acquisition. It looked at the civil service structures and drew all its research activity from templates of information given from there.

The main question to be answered by this research was

“**Why is obsolescence an important and positive factor in knowledge acquisition?”**

The overriding objective for this research was to demonstrate the significance of obsolescence in the context of knowledge acquisition.

The summarised answer to this question is that obsolescence is an important and positive factor in knowledge acquisition because it fosters an understanding of how information systems improves the various knowledge

structures, processes, and time-based functions. Chapter 1 introduced the importance of embarking on this research, outlining the basis for posing the question that has been stated. The title "Introduction" is generic and serves as an overview, touching upon several aspects including the significance and rationale for undertaking this research. It also laid the groundwork for stimulating the research by highlighting specific factors that had inspired it from the beginning. Two countries were examined in this research. Initially, the focus was on one country but due to limitations that will be discussed later, the second country became a more viable target for data collection and ultimately contributed to the completion of this research. The main objective was to demonstrate that obsolescence is an important and positive factor in the process of knowledge acquisition. This leads to keeping knowledge structures current, particularly in areas where continuous improvement is crucial. The focus of this research is the civil service, a sector that is known for its lethargy, inefficiency, and bureaucracy.

The study examined the origins of knowledge from both the etiological and etymological perspective. It presented arguments based on centuries-old definitions to provide context for the concept under investigation. While modern definitions were also discussed, the focus was on establishing the foundation for the research, including the problem statement, hypothesis, and the tools used for analysis.

In answering this question, an understanding and construct of attributes for identifying components of knowledge were established. It was noted that discussions around obsolescence typically focused on peripheral ideas like technological obsolescence, organizational structural changes, and system requirements. The researcher found a lack of literature addressing the attributes contributing to the behaviour of a knowledge acquisition structure or process, which could render the artefact or structure itself obsolete.

In this context, the investigation of knowledge obsolescence in acquisition planning was emphasised and pursued. The research aimed to answer this question, and it was found that obsolescence in knowledge acquisition is indeed

important. The templates collected from respondents not only answered the question but also highlighted some interesting areas for future pursuit, which will be discussed further in this chapter.

The primary attribute underlying the research was the timeframe during which an artefact remains relevant. This formed the basis for creating a theoretical framework to address this aspect. Additionally, the research laid the groundwork for developing attributes that could best suit an organisation, unit, or entity as it establishes its knowledge acquisition paradigms. This approach allows for the consideration of implementing a new rule applicable in both practitioner environments as well as academic instruction.

This question was supported by several sub-questions, which helped answer the main question and established several assertions that the research found useful in contributing to the body of knowledge.

1. What attributes of knowledge are key and important to identify between phases in planning for its collection?

The main attribute identified in this research time. Other attributes, such as significance, quality, and measure of relevance, were also developed during the research instrument's development and deployment. Some of these attributes included threshold, weighting, and scaling the 'Yes'/'No' response beyond the binary. These attributes were important in answering the main question of this research. Chapter 2 focused on the literature surrounding the general concept of knowledge, its definition, and articulation. The literature also explored some concepts of obsolescence, indicating a gap in the treatment of obsolescence as proposed by the research, which confirmed the need for further investigation.

Objective 1 to resolving this problem was: To establish attributes that will be used to address obsolescence.

Chapter 2 delved into the concept of knowledge from fundamental and philosophical perspectives. It discussed different perspectives and perceptions

of knowledge, highlighting knowledge management systems as comprising information in action. Understanding information and its characteristics is essential for addressing the research question. The researcher noted that human intellectual capital utilises knowledge to advance society. The concept of time and how knowledge evolves over time was a key consideration. The chapter also presented models of knowledge to illustrate the evolution of knowledge processes and knowledge management. Section 2.4 underscored this by examining some models.

2. Why should an obsolescence strategy be used with acquisition of knowledge?

From literature in Chapter 2, and the methodology established in Chapter 3, it is evident that most knowledge management systems rely on obsolescence of peripheral support systems, such as technologies and procedures, before considering the obsolescence of the knowledge structure itself. This practice is often consequential, as there is typically no real examination of the relevance of the knowledge structure independent of what is rendering it unusable. An example of this can be seen in orbiting space probes, which are launched several years before they begin functioning according to their design and purpose, often performing beyond their expected life spans. This scenario was also a motivating in this research. For instance, the Voyager probes launched by NASA ((Jet Propulsion Laboratory, 2023) in the late 1970s continue to operate with their original hardware, despite many accompanying systems and hardware being retired or declared obsolete. The Voyager probes have continued to function with systems upgrades and retirements, demonstrating efficient obsolescence planning over their 40-plus years in space.

Objective 2 of this question was: To determine the timeline within which a specification of obsolescence will subsist.

Chapter 2 explored various aspects of how knowledge is acquired, including different learning strategies. The significance of time in relation to knowledge

artefacts and information resources was particularly emphasised, highlighting how time affects different aspects of activity.

The framework designed in Chapter 4 addressed the attributes necessary for practitioners to manage knowledge obsolescence over time. Some of the models discussed in Chapter 4, such as knowledge learning frameworks, provided definitions that informed the design framework. This approach aligned well with the goal of innovating knowledge management systems to remain relevant and up-to-date, or to be replaced. The framework also identified other factors influencing knowledge acquisition, often outlasting the knowledge itself, leading to the knowledge becoming obsolete even when it was still useful, due to changes in accompanying system components.

3. How can cyclic obsolescence affect acquisition to impact currency of the knowledge acquired?

The framework developed for this research examines the cumulative effects of different artefacts on a knowledge structure or system. The research gathering phase also considered the importance of revisiting to the knowledge acquisition under review over time. This approach makes it possible to keep obsolescence planning in focus with each subsequent examination of a knowledge acquisition structure or an overall management system.

Objective 3 for this question was: To demonstrate currency of information contributing to knowledge acquisition.

Chapter 3 established the methodology to drive the research process and derive the desired results. Most methodologies under discussion were deemed unsuitable, either being too subjective or not aligned with the aspect of knowledge acquisition. Initially, raw data collection was considered. However, upon reflection, it became evident that what was being collected was information, not data, as the data process had already been completed. Therefore, a template was designed to gather the necessary analysis and results for the research aims.

Chapter 5 designed the model used to determine the currency of knowledge by examining the various artefacts as information sources with their attributes. This model collected an expert's experience as they worked through their job function or knowledge aspects. By combining the duration of a particular artefact with aspects such as what significance and whether information in action was necessary, the model assessed the knowledge's currency.

4. Why is it important to consider the characteristics of information when contemplating planning for obsolescence with knowledge acquisition?

Two factors were considered in examining this question. First, experts working an acquisition structure operate as independently as they perceive their work and knowledge management system. Second, their perceptions are shared with those responsible for stewarding the overall system. This approach benefits the understanding of how a knowledge structure has evolved and how each expert integrates their approaches and adjustments into the overall picture of the knowledge management system.

Objective 4 to this question was: To establish a maintenance recommendation based on the analysis of the knowledge acquisition and attributes so established.

In Chapter 6, the research presented the results of the hypothesis testing based on the model designed in Chapter 5. This model was created to analyse the hypotheses formulated at the beginning of the research. Implementing this model allowed for a cyclic use of the collected data. Some returned templates lacked a pair, which was not considered an error but rather an opportunity to use them as a starting point for new collections that could be matched against the usable templates.

Two articles were produced to reflect on the research study, focusing on the hypothetical statements from the beginning of the research. The first study examined the impact of information attributes on the knowledge acquisition process. It emphasised the importance of closely analysing an acquisition

process to determine the necessary improvements or adjustments. This study contributed to understanding how the treatment of knowledge is influenced by the attributes of contributing information.

The second study closely examined the framework developed for the research and the subsequent model used for testing the hypotheses. The research incorporated mathematical concepts to better explain these ideas. It established a continuum of knowledge acquisition to explain how knowledge acquisition can be effectively managed and how the obsolescence approach can be integrated.

7.4 Significance of Study

The general significance of this study lies in highlighting the importance of obsolescence planning in knowledge acquisition. It contributes significantly in two broad categories: theoretical and practical. These categories are discussed in the following sections:

7.4.1 Theoretical Significance of Study

As a theoretical implication/contribution, the research developed a framework applicable to various aspects of the study. Chapter 4 detailed the establishment of a theoretical framework suitable for building a model for this research.

A fundamental concept was the breakdown of an artefact into its attributes for examination or modeling. This approach involved deriving a mathematical concept that combines different aspects (initially qualitatively) to guide the treatment of the knowledge structure. The framework also considered the qualitative aspects, acknowledging that they could be transformed into measurable factors where applicable. The overarching idea was to expand on three characteristics – significance, quality, and confidence – in interpreting any resulting model. This concept was presented as the summation of attributes within a knowledge structure, which comprises artefacts, A. Each artefact carries its associated characteristics, p, capable

of holding any assigned characteristic. This discussion is summarized in the equation below:

$$\boldsymbol{A} = \frac{(\boldsymbol{p}_{\boldsymbol{significance}} + \boldsymbol{p}_{\boldsymbol{quality}} + \boldsymbol{p}_{\boldsymbol{confidence}})}{\boldsymbol{t}}$$

Where $\boldsymbol{t}$ is the concept of time.

The resulting model treated time as the duration during which other aspects of the artefacts persisted and could be measured against based on the unit or organisation's chosen parameters. This contributes to the body of knowledge by providing a conceptualisation, from a mathematical perspective, of processing knowledge acquisition. The untested derivative differential equation offers a solid basis to explore the consequences of dismantling or unpacking a knowledge acquisition without understanding its components. Additionally, the derived concept is visually presented, illustrating how the research perceives the overall knowledge acquisition process and how it can be utilised to analyse and assess various components and attributes crucial for determining obsolescence.

This theory contributes to existing theory in several ways, particularly in the areas of Knowledge Management, IT integration, and decision-support systems. Most theories are limited in their scope.

Nonaka and Takeuchi (Nonaka & Takeuchi, 1995) focus on knowledge conversion (tacit <-> explicit) but lacks structured methods for the acquisition, updating and integration of knowledge in bureaucratic settings such as the civil service.

Wiig proposed the Knowledge Management Cycle (Wiig, 1993) emphasising knowledge structuring but yet not addressing knowledge obsolescence or IT-driven retention.

Davenport and Prusak's KM Framework (Davenport & Prusak, 1998) describes knowledge as a strategic asset but still does not specify how public institutions can systematise its acquisition.

This theory therefore contributes in the following significant ways:

1. Integration of structured templates and observation-based acquisition, which makes the process repeatable and scalable in the public sector.

2. Introduces obsolescence planning into Knowledge Management theory, ensuring timely knowledge updates.
3. Uses IT for automation, making retrieval much faster; with a futuristic projection on the use of modern tools that are artificial-intelligence-led.
4. Links knowledge directly to decision-making, hence bridging the gap between storage and policy impacts.

7.4.2 Practical Significance of Study

Practically, the research established a model for use. Chapter 5 discusses the construction of this model, which articulates the knowledge acquisition process and determines knowledge obsolescence. Initially, a spreadsheet approach was used, but other tools could be used, such as a database approach for more sophisticated, real-time implementation. While specific application platforms were not the focus, hypothesis testing could still be successfully done with the simpler tools like Microsoft Excel. The model was used to test the hypotheses formulated in Chapter 1 problem formulation.

Chapter 6's results and discussion demonstrate the practical implementations and implications of the study. This highlights that while the study has been tested as hypothesised, it still has much to offer to the field of Knowledge Management and Information Systems.

7.5 Challenges and Limitations of Study

It is unusual for a study of this magnitude to proceed without encountering limitations and challenges. This research was no exception. Several limitations were evident. This section will discuss the challenges and limitations that the researcher faced in undertaking this work, categorising them under two headings: Challenges, and Limitations.

It must be noted that although some templates were deemed unusable, they were not discarded from the data collection bank. They have been retained for further study and potential clarification in the future.

Most challenges presented opportunities for resilience in this research, leading to innovation in some cases, such as in the analysis of single submissions. These challenges were incorporated into the model design, as discussed in the chapter addressing these situations in Section 6.6. Additionally, some submissions, such as those regarding duration, were still able to test the hypotheses through the designed model, much to the researcher's pleasant surprise. This was partly because, in some instances, the research result was an accumulation at the dashboard level, as well as a discussion of the behaviour of a sparkline at the individual record entry of a particular expert. This inadvertently confirmed the carefully considered framework and the working model that resulted from it (Section 4.6, and Chapter 5)

The order of the challenges and limitations discussed below are not prioritised. The numbering is for clarity only.

7.5.1 Challenges of the Study

A number of challenges were faced by the researcher and some contributed to the limitations discussed in the next section. These challenges are discussed in this section.

Challenge #1 – Accessing sources

The most significant challenge faced in the course of conducting this research was accessing the sources required to successfully complete it. Initially, the targeted civil service sector was one country where the researcher felt confident he had lived enough and established good contacts. However, as the requests for engagement and collaboration went unanswered, the researcher lost a lot of ground and confidence to carry out the research. It was only after reaching out to the researcher's country of origin that the research was able to get off the ground and proceed. This also cost the research a lot of time; in the order of a year and some months, delaying progress towards the completion of the study.

An explanation for this challenge in accessing the initial target civil service sources was a lack of trust. It was generally perceived that the research could easily touch on

sensitive sectors or aspects, leading to a general unwillingness to divulge the requested sources needed for the research.

In the researcher's country of origin there were still some challenges faced:

(a) Some sections that were targeted either ignored the templates submitted for information or simply refused to cooperate in giving back completed templates.

(b) In some cases, templates coming from these perceived sensitive sectors were incomplete or filled out in such a way that they were unusable.

(c) The researcher observed that in an effort to remain as anonymous as possible, the templates returned from such areas were deemed unusable or incoherent at best.

The researcher persisted in ensuring that alternate sources for his research were established aside from the original target country, and the research could eventually get off the ground.

Challenge #2 – Single point of contact

This research targeted the civil service, encountering the bureaucracy of receiving completed templates in a timely manner. The researcher was not directly engaged with the collaborators or respondents, resulting in a distance from the actual respondents and hindering progress in filling out the distributed templates.

The single point of coordination, though appreciated by the researcher, meant that the coordinator, in addition to their normal work schedule, had to ensure the collection and checking of the research templates. This limited the time available for seeking feedback on the respondent's submissions or understanding why some templates were incomplete or did not conform to the instructions. To address this, the research considered the incomplete and unusable templates, incorporating them into the discussion of the results obtained.

The researcher was able to minimally coordinate some priority submissions that required minimal clarification, reducing the time needed for the coordinating contact to provide assistance.

Challenge #3 – Delay in template collection

This challenge faced by the researcher was primarily a result of the initial delay in collecting templates, which impacted the overall time frame of the research. It was challenging to make up for this lost time without compromising the quality of the study. Fortunately, the researcher was granted extensions, which helped mitigate the delay and allowed for the completion of the study.

Additionally, personal setbacks, such as the loss of family members, presented significant challenges in proceeding with the research. The support of the supervisor and faculty staff played a crucial role in motivating the researcher to continue despite these difficulties.

Time was a critical factor due to the delays in sourcing templates and other personal setbacks. However, the researcher was able to allocate reasonable time, as agreed with the contact, to collect as many submissions as possible.

Challenge #4 – Arriving at final methodology formulation

This challenge faced by the researcher involved the final formulation of the methodology to be used. Initially, a questionnaire was considered for data collection, which is typical of such studies. However, upon further analysis of the research objectives and the nature of the subject area, it was realised that this was not merely a data collection exercise, but rather an interrogation of the knowledge management area. Therefore, the focus shifted to collecting information that was already actively available in the public sector. This led to a re-evaluation of the methodology to be used. Since this approach involved part survey and part observation, the researcher had to adopt a new approach, significantly altering the initial idea of how the research would be conducted.

Fortunately, the core thrust and aims of the research were not compromised or significantly altered. However, this change contributed to delays in obtaining necessary approvals from the Ethics committee.

Dealing with this challenge was challenging, as it was essential to comply with important requirements that were non-negotiable due to the institution's legal and ethical obligations for conducting research. The researcher had to be clear and articulate in their communication, considering the lack of face-to-face or real-time discussion with the committee. The shift from a questionnaire to a template added to the delay in obtaining approval from the Ethics Committee.

7.5.2 Limitations of the Study

There were a few limitations of the study that presented a containment of the study in a few ways. These limitations are discussed in this section.

Limitation #1 – Single source for feedback gathering

The researcher was limited to a single source of getting feedback, meaning that every initial submission of a completed template provided little to no opportunity for a second chance.

The result of this was that, although still significantly useful, it led to a compounded limitation: fewer templates were returned than expected. As discussed in Section 6.1, about half of the distributed templates were returned. This meant that the research sample began to shrink even before the researcher could begin to separate those submissions that were unusable from the ones that could be productively used. The limitation presented here was that there was little chance in some cases to analyse a pair, as in these special circumstances one part of a pair expected was not available.

This limitation was overcome by the design of the analysing tool. Received templates that were not paired were treated as uncontested and therefore expectant of a new cycle for comparison.

Limitation #2 – Time for engagement

This limitation of the study was a result of the time needed to engage the cyclic nature of the study. Although this was easily deduced with the sources obtained, it limited the satisfaction of the research to engage especially the maintenance phase of the objective 4 of the research.

The limitation was addressed by ensuring that the entries made were anonymised between any two experts looking at the same knowledge acquisition exercise. This ensured that the hypothesis tool could still analyse these initial submissions similar to a long-term assessment.

Limitation #3 – Obstacles in accessing the Civil Service

This limitation was as a result of the nature of the Civil Service in most countries, mostly in the African setup. Most sectors were not engaged enough to permit the researcher to conduct his collection of the sources needed for the research.

(a) This limited the research to those areas that were willing to cooperate.

(b) Additionally, even those areas that were engaged and ready to work with the researcher were placed under some restrictions that, in some cases, resulted in the researcher not receiving any feedback or return of templates at all.

Engaging a liaison person to coordinate the collection and entry of the templates overcame most of this limitation. The research was able to gather enough templates to use in the analysis and hypothesis testing phase of the research.

Limitation #4 – No direct contact with respondents/experts

This limitation faced by the researcher was a lack of direct contact with the experts dealing with the distributed templates in their line of work.

(a) Because of the nature of access, which was through one point of authority, the researcher could not interrogate some of the entries further. Some rationalisations were made through the central point of contact, but this cost a

lot of time because in some cases, the respondents were unwilling to give any further information or clarification on the templates they had filled out.

(b) Other respondents simply could not recall some of the reasons they entered certain fields or columns in the templates for which clarity was sought. Most of such templates were declared unusable by the researcher. By encouraging short entries in the remarks section, it was feasible to deduce meanings and relate them to other artefact attributes submitted alongside.

7.6 Recommendations and Future Work

Not all research will find a gap and fill it completely; while one gap is addressed new opportunities open up, revealing potentially gaps in themselves. This research found some in the process. This section is set up in two headings: one deals with the gaps that arose during the research, and the second deals with recommendations for future work.

By directly addressing these gaps, the theoretical framework offers a more adaptable, and context-aware approach to knowledge management in the civil service that is also comprehensive. Not only does it improve knowledge acquisition, but it also ensures long-term relevance and accessibility through the integration of obsolescence planning and IT.

The gaps discussed are those that emerged after the fact, not ones that were present at the outset. The gap that the study endeavoured to address has been adequately handled by the researcher. The aftermath of the study, including the limitations and challenges among others, gave rise to a whole set of interesting areas that can be presented for future or further work.

7.6.1 Gaps addressed

The gap addressed was that of considering obsolescence in knowledge acquisition planning, which the researcher deemed adequately examined, tested, and proved. The challenges and limitations discussed earlier present new and interesting areas for further explored after this research or as separate study topics by other researchers. Some of these gaps are discussed below.

1. **Contentions**: The research defined contentions as aspects of the knowledge acquisition process that are not central to it. Typical contentions included technology turnover, and competitiveness. A deeper examination of how justified turnover of such contentions are could provide valuable insights.

2. **Constructed attributes**: The research identified attributes from the framework in place to ascertain hypotheses. While time was a major attribute, other fundamental attributes of information could be interrogated to understand their role in formulating obsolescence planning. Drilling into attributes like relevance, availability, and timeliness could reveal linkages with accuracy, completeness, and reliability, opening up a new area for exploration.

3. **In vivo experimentation:** The tools for this research were built from the ground up, presenting a limitation in observing knowledge acquisition over a longer period.

   Framework Contribution: With a developed model now in place, more collections can be made to appreciate the role of obsolescence planning in the knowledge management system environment.

4. **Effects of the disciplines:** Aside from knowledge management, other disciplines such as information technology and mathematical modeling could benefit from this study.

   Framework Contribution: Exploring how these disciplines contribute to knowledge acquisition and obsolescence planning is an area worth considering.

5. **Methodology and application development**: The researcher deployed analysis exclusively using a spreadsheet application, without delving into application or software development.

   Framework Contribution: As observed in Section 7.4.2, it was not the intention of the researcher to get into these details; future analysis could benefit from other approaches, including database linkages and data warehousing.

7.6.2 Gaps addressed through the theoretical framework

In addressing gaps initially identified in designing the research, a number of gaps were also addressed as a result. Although not an exhaustive list, these are some of the gaps that were addressed by this framework.

1. **Lack of a systematic approach to Knowledge Acquisition**
   Previous studies focus more on storage and transfer as evidenced in the search and literature. There is a lack of method for continuous knowledge acquisition.
   Framework Contribution: The framework contributes a structured template-based approach that ensures consistent and strategic knowledge acquisition across the civil service (departments and sections.
2. **Absence of Obsolescence Planning in KM Models**
   Most models assume that once knowledge I stored, it will remain there indefinitely, without the need for periodic updates and obsolescence tracking.
   Framework Contribution: This research contributed an integrated obsolescence planning that incorporated knowledge lifecycle assessment in order to identify and update outdated information.
3. **Lack of Zambian Civil Service specific solutions**
   Existing research shows that most knowledge management frameworks are designed for corporate or Western public sectors with adaptations that are difficult to adapt to the African setting.
   Framework Contribution This model is customised to fit the Zambian civil service structure, addressing local challenges such as resource constraints, policy, and bureaucracy gaps, respectively.

4. **Inefficient use of IT in Knowledge Acquisition and retention**
   Most government departments and entities rely on manual documentation with limited IT-driven or enabled automation for knowledge acquisition and retention.
   Framework Contribution: This framework proposes the use of IT-enabled knowledge systems that can be further extended with the assistance of new tools such as Artificial Intelligence, cloud storage, and other digital repositories to ensure its sustainability.

7.6.3 Recommendation for Future Work

Some of the gaps identified in the previous section offer opportunities for future work in this area, as well as in allied disciplines. These gaps during the research process can serve as potential topics for future researchers to delve into. This study will consider these opportunities for future work.

1. Separating core knowledge acquisition from the attendant contentions offers an excellent opportunity for further research. Future research could explore how tangible technology influences or interacts with knowledge when facing obsolescence. This could include examining how experts view different artefacts and their relevance, leading to a declaration of obsolescence.

2. The research constructed attributes for hypothesis testing and results discussion, in line with the research objectives. This presents an opportunity to extend and construct new attributes for future research. Future studies can use this flexibility to include additional attributes for different knowledge acquisition exercises, contributing to the *currency* of knowledge acquisition.

3. The framework construction in this research looked at adding attributes to an accumulation, discussing scenarios and a theoretical differential equation-based approach. This offers an opportunity for future research into knowledge with unknown attributes. Additionally, simulating attributes using a designed application could be explored, benefiting fields like artificial intelligence.

4. The interplay between knowledge and information and communication technologies (ICTs) is a rich area for future research. Exploring how ICTs interact with knowledge to extend currency or expedite obsolescence, beyond tangible technologies, could yield valuable insights.

5. While this research used a spreadsheet for hypothesis testing, other methods and applications are possible. Future research could explore various ways to manipulate knowledge acquisition and actions, such as developing simulations and database-linked applications, extending the results and identifying new gaps.

6. Data independence is crucial in application development, especially concerning databases. Future research should ensure that collected templates are independent of the spreadsheet used for analysis, allowing for further development without disrupting the underlying dataset.

7. This research discusses the role of Information Systems, Information Technology, and Applied Mathematics in Knowledge Management. These areas could greatly benefit from further study based on this research, exploring new avenues and refining existing concepts.

7.7. Conclusion

The opportunity to offer solutions that impact a body of knowledge is a privilege for any researcher. There are disciplines that are focused on intense, single points of discussion, and there are others that are interdisciplinary. Information systems is one such that examines the interactions among various subjects. It is common to find systems designed for automation, like in a bakery or a civil service, borrowing from areas such as information technology (also known as information and communications technology).

The civil service sector in most countries is an area where digitalisation is rapidly advancing. However, this sector remains predominantly system-based and not

technology-driven. Consequently, it is often easy to confuse the technologies enabling these systems with the actual systems in place to operate various units, departments, and directorates.

When this study was undertaken, one of the concerns was the fate of knowledge accumulation within these various units, departments, and directorates. Knowledge Management Systems are relatively new in most civil service sectors, especially in African countries. The countries on which this study was based began promoting the advantages of a knowledge economy in the early 2000s. Therefore, it is appropriate to inquire into the various ways in which this knowledge economy could be best utilised. One crucial area that this research found worth adding to the body of knowledge was obsolete knowledge and the importance of conceptualising it and creating frameworks to enhance efficiency and effectiveness.

The study of how to manage obsolescence in knowledge acquisition is a significant contribution to ensuring that, despite the use of allied technologies and procedures, the importance of current knowledge is not overlooked. By advocating for a continuous evaluation of these structures to identify and address obsolescence, this research helps steer knowledge management systems in the right direction, especially in their deployment in African countries and other sectors of the global community.

The intention of this study is to leverage expertise to gain a strong foothold in the future of the knowledge economy, the digital platform, and beyond into areas yet to be integrated into this paradigm. As this study concludes, the researcher is confident that the contribution to this discussion and debate is significant and will have an impact on further research and study in this area and related fields.

As this study concludes, it is gratifying for the researcher to note that the intended goal has been achieved, the aims and objectives fulfilled, and a modest contribution to the body of knowledge in information systems has been made.

Bibliography/References

"contention". (nd, nd nd). *Merriam-Webster Online Dictionary*, Online. Retrieved November 29, 2021, from Merriam-Webster Online Dictionary: https://www.merriam-webster.com/dictionary/contention

Agarwal, R., Raj, E., Franco, A., & Sarkar, M. (2002, January). Knowledge Transfer Through Congenital Learning: Spin-out Generation, Growth and Survival. Illinois, USA: Universit of Illinois at Urbana.

Ahituv, N., & Neumann, S. (1982). *Information Systems for Management.* Dubuque, Iowa, USA: Wm. C. Brown.

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Resarch Issues. *MIS Quarterly, Vol. 25, No. 1*, 107-136.

Argyris, C., & Schön, D. (1974). *Theory in Practice: Increasing Professional Effectiveness.* San Francisco: Jossey-Bass.

Argyris, C., & Schön, D. (1978). *Organizational learning: A theory of action perspective.* Reading, MA: Addison-Wesley.

Aristotle, & Lawson-Tancred, H. (1998). *The Metaphysics.* London: Penguin Books.

Baker, R. J. (2008). *Mind Over Matter: Why Intellectual Capital Is The Chief Source Of Wealth.* Hoboken, NJ: Wiley & Sons.

Bandura, A. (1965). Influence of models' reinforcement contingencies on the acquisition of initiative responses. *Journal of Personality and Social Psychology, 1*(6), 589.

Bank, T. W. (2020). *Accelerating Digital Transformation in Zambia: Digital Economy Diagnostic Report.* World Bank Group. Washington DC: The World Bank Group.

Barkema, H., & Vermeulen, F. (1998). International Expansion Through Start-up or Acquisition: A Learning Perspective. *Academy of Management Journal, 41*(1), 7-26.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17(1)*, 99-120.

Bettis, R. A., & Prahad, C. K. (1995). The Dominant Logic: Retrospective and Extension. *Strategic Management Journal, 16*(1), 5-14.

Bolarinwa, O. A., Salaudeen, A. G., & Tanimola Makanjuola, A. (2012). Overview of Knowledge Management Applications in Healthcare Delivery in Developing Countries. *Academic Research International, 3*(3), 38-45.

Brelade, S., & Harman, C. (2003). *A Practical Guide To Knowledge Management (Specially Commissioned Report).* London: Thorogood.

Brinkley, I. (2006). *Defining the Knowledge Economy.* London, United Kingdom: The Work Foundation.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. (1956). *A Study of Thinking.* New York: Wiley.

Bryman, A. (1989). *Research Methods and Organisation Studies.* London: Unwin Hyman.

Buchanan, D., Boddy, D., & McAlman, J. (1988). Getting in, getting on, getting out and getting back. In A. Byrman, *Doing Research in Organizations* (pp. 53-67). London: Routledge.

Burch, J. G., & Grudnitski, G. (1989). *Information Systems: Theory and Practice.* New York, NY, USA: John Wiley & Sons, Inc. Retrieved May 30, 2023

Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and Organizational Analysis.* London: Heinemann.

Carlsson, S. A., & El Sawy, O. A. (1996). Gaining Competitive Advantage Through Shared Knowledge Creation: IN Search of a New Design Theory for STrategic Information Systems. *Proceedings of the Fourth European Conference on Information Systems* (pp. 1067-1075). Lisbon: J. Dias Coelho, T. Helassi, W. Konig, H. Krcmar, R. O'Callaghan, M. Saaksjarvi (eds).

Chitumbo, E. M., & Kanyengo, C. W. (2017). Knowledge Management Culture among Library Cataloguers: the University of Zambia Library Experience. *Library Philosophy and Practice (e-journal)*, 1-16.

Ciampi, F. (2008). *The Knowledge Creation Potential of Management Consulting.* Amsterdam: IOS Press.

Coghlan, D., & Brannick, T. (2005). *Doing Action Research in Your Own Organization, 2nd Edition.* London: Sage.

Collis, J., & Hussey, R. (2003). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students.* Basingstoke: Palgrave Macmillan.

Cresswell, J. W. (2014). *Research Design Qualitative, Quantitative, and Mixed Methods* (4th Edition ed.). Lincoln, USA: SAGE Publications Inc.

Cushing, T. (2013, December 13). *Too Much Free Time: Lawsuit Claims Accidental Google Search Led to Years of Government Investigation and Harassment*. Retrieved March 25, 2015, from Techdirt: https://www.techdirt.com/articles/20131210/07555625519/lawsuit-claims-accidental-google-search-led-to-years-government-investigation-harrassment.shtml

Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know.* Boston, MA, USA: Harvard Business School Press.

Descartes, R. (1996). *Meditations.* (J. Cottingham, Ed.) Cambridge, MA: Cambridge University Press.

Dewey, J. (1933). *How We Think and Psychology.* Heath.

Drucker, P. (1993). *The Post-Capitalist Society.* New York, United States of America: Harper Collins.

Earl, M. (2001, Summer). Knowledge Management Strategies: Toward a Taxonomy. *Journal of Management Information System, Vol. 18, No. 1*, 215 - 233. Retrieved March 2015, from JSTOR.

Easterby-Smith, M. (1997). Disciplines of organizational learning: Contributions and critiques. *Human Relations, 50*(9), 1085-1113.

Easterby-Smith, M., Thorpe, R., Jackson, P., & Lowe, A. (2008). *Management Research (3rd Edition).* London: Sage.

Edwards, J. S., & Kidd, J. B. (2003). Knowledge Management Sans Frontiere. *The Journal of the Operational Research Society, Vol. 54, No. 2 (Special Issue)*, 130-139.

Etzioni, A. (1964). *Modern Organizations.* Englewood Cliffs, NJ: Prentice-Hall.

Fiol, M. C., & Lyles, M. A. (1985). Organizational Learning. *Academy of Management Review, 10*(5), 803-813.

Gill, J., & Johnson, P. (2000). *Research Methods for Managers* (3rd Edition ed.). London, United Kingdom: Sage.

Gioia, D., & Pitre, E. (1990). Multi-paradigm perspectives on theory of building,. *Academy of Management Review, 15*(4), 584-602.

Gioia, T., & Hirschheim, R. (2000). The paradigm is dead, the paradigm is dead ... long live the paradigm: The legacy of Burrell and Morgan. *The International Journal of Management Science, 28*, 249-268.

Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory.* Chicago, IL: Aldine.

Google. (2016, June 5). *Remove Information from Google*. Retrieved June 5, 2016, from Google Search Console Help: https://support.google.com/webmasters/answer/6332384?hl=en

Gorelick, C., & Monsou, B. T. (125-139). For performance through Learning, Knowledge Management is THE critical practice. *The Learning Organization Vol. 12 No.2*, Emerald Group Publishing Ltd.

Goulding, C. (2002). *Grounded Theory: A Practical Guide for Management, Business and Market Researchers.* London: Sage.

Granstrand, O., & Sjölander, S. (1990, June). The Acquisition of Technology and Small Firms By Large Firms. *Journal of Economic Behavior and Organization, 13*(3), 367-386.

Gregory, P. M. (1947, July). A Theory of Purposeful Obsolescence. *Southern Economic Journal, 14*(1), 24-45.

Guthrie, E. R. (1935). *Psychology of Learning.* New York: Harper & Row.

Håkansson, H. (1990, September). Technological Collaboration in Industrial Networks. *European Management Journal, 8*(3), 371-379.

Hakim, C. (2000). *Research Design: Successful Designs for Social and Economic Research (2nd Edition).* London: Routledge.

Hasah, H., & Crawford, K. (2003). Codifying or enabling: the challenge of knowledge management systems. *The Journal of the Operational Research Society, Vol. 54, No. 2 (Special Issue)*, 184-193.

Hegel, F. W. (1997). *On Art, Religion, and the History of Philosophy.* (G. J. Gray, Ed.) Cambridge, MA: Hackett Publishing Co.

Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organizational Science, 2*, 88-115.

Hume, D. (2000). *A Treatise of Human Nature.* (D. F. Norton, & M. J. Norton, Eds.) Oxford: Oxford University Press.

Huwaei. (2019, June 10). *New ICT Helps Build Smart Zambia*. Retrieved February 10, 2020, from e.huawei.com: https://e.huawei.com/topic/leading-new-ict-ua/smart-zambia-case.html

Iilonga, S. (2015). Information and Knowledge Policy Framework to Enhance the Effectiveness of Namibia's Fourth National Development Plan (NDP4).

IFLA-WLIC 2015 (pp. 1 - 10). Cape Town: International Federation of Library Associations.

Ingraham, P., & Baum, J. A. (1997). Opportunity and Constraint: Organizations' learning from the operating and competitive experience of industries. *Strategic Management Journal*, 75 - 98.

Jashapara, A. (2011). *Knowledge Management, An Integrated Approach.* Essex: Prentice Hall.

Jet Propulsion Laboratory, C. I. (2023, 05 07). *Fact Sheet*. Retrieved from Voyager Frequently Asked Questions Fact-sheet: https://voyager.jpl.nasa.gov/frequently-asked-questions/fact-sheet/

Kant, I. (1999). *Critque of Pure Reason.* (A. W. Professor Paul Guyer, Ed.) Cambridge, MA: Cambridge University Press.

Killing, P. J. (1978, June). Diversification Through Licensing. *R & D Management Journal, 8*(3), 159-163.

Kolb, D. A. (2015). *Experiential Learning: Experience as a source of Learning and Development.* Upper Saddle River, New Jersey: Pearson Education, Inc.

Krathwohl, D. R. (2004). *Methods of Educational and Social Science Research, An Integrated Approach.* Long Grove, IL: Waveland Press.

Lederer, A. L., & Raghu, N. (1990). Making Strategic Information Sysems Happen. *The Executive, Vol. 4, No. 3*, 76-83.

Lehner, F., & Maier, R. K. (2000). How Can Organizational Memory Theories Contribute to Organizational Memory Systems? *Information Systems Frontiers, 2*(3/4), 277 - 298.

Locke, J. (1998). *An Essay Concerning Human Understanding.* Herts: Wordsworth Edition Ltd.

Lyles, M. A. (1994, December). The Impact of Organizational Learning on Joint Venture Formations. *International Business Review, 3*(4), 459-467.

MacQueen, R. J. (1998). Four Views of Knowledge and Knowledge Management. *Proceedings of the Fourth Americas Conference on Information Systems* (pp. 609-611). E. Hoadley and I. Benbasat (eds).

Margherio, L. (1998, July 1). *Economics & Statistics Administration.* Retrieved March 21, 2015, from Economics & Statistics Administration: http://www.esa.doc.gov/reports/emerging-digital-economy

Marope, M. T. (2005, February 2). *Namibia Human Capital and Knowledge Development for Economic Growth with Equity.* Johannesburg: The World Bank - Africa Region.

Martin de Holan, P., & Phillips, N. (2005). Organizational Forgetting. *The Blackwell Handbook of Organizatonal Learning and Knowledge Management*, 393-409.

Mchombu, K. J. (2014). The Role of Information and Knowledge in Poverty Eradication in Africa: a case study of Namibia. *IFLA 2014 Lyon* (pp. 1 - 13). Lyon: Interntional Federation of Library Associations.

Microsoft. (2022). *www.microsoft.com*. Retrieved from Use Sparklines to show data trends: https://support.microsoft.com/en-gb/office/use-sparklines-to-show-data-trends-1474e169-008c-4783-926b-5c60e620f5ca

Miettinen, R., & Peisa, S. (2005). Integrating Learning and the study of change in working life: The Alternative enterprise model. In Y. Engeström, J. Lompschher, & G. Rükriem, *Putting Activity Theory to Work: Contributions from Developmental Work Research* (pp. 201-224). Berlin: Lehmanns Media.

Mohanty, S. K. (2003). Review: Designing Knowledge Management Architecture. *Indian Journal of Industrial Realtions, Vol. 38, No. 3*, 390-393.

Morris, T., & Wood, S. (1991). Testing the survey method: continuity and change in British Industrial relations. *Work Employment and Society, Vol 5, No. 2*, 259 - 282.

Msiska, R. (2016). *Government Gazette* (Vol. LII). Lusaka: GRZ. Retrieved May 25, 2021

Nakale, M. (2004, June 04). *The Namibian*. Retrieved April 10, 2016, from www.namibian.com.na: http://www.namibian.com.na/index.php?id=6105&page=archive-read

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-creation Company: How Japanese companies create the dynamics of innovation.* New York, NY: Oxford Universiy Press.

NPC, N. N. (2017, May 31). *National Planning Commission.* Retrieved June 28, 2020, from NDP5 MAIN DOCUMENT_FINAL 2017_31 May.pdf: https://www.npc.gov.na/?wpfb_dl=294

Office of the Prime Minister, GRN. (2014). *e-Government Strategic Action Plan for the Public Service of Namibia.* Government of the Republic of Namibia, Office of the Prime Minister. Windhoek: GRN.

Piaget, J. (1952). *Origins of Intelligence in Children.* (M. Cook, Ed.) New York: International Universities Press, Inc.

Plato. (1992). *Theaetetus.* (B. Williams, L. M. J., & M. Burnyeat, Eds.) Cambridge, MA: Hackett Publishing Co.

PMRC, P. M. (2018, April 6). *Smart Zambia and the benefits of e-payslips.* Retrieved January 16, 2020, from pmrczambia.com: https://pmrczambia.com/smart-zambia-and-the-benefits-of-e-payslips-blog/

Polanyi, M. (1966). *The Tacit Dimension.* London, UK: Routledge & Kegan Paul.

Polanyi, M. (1985). *Personal Knowledge.* Chicago, IL: University of Chicago Press.

Polanyi, M., & Prosch, H. (1975). "Personal Knowledge". In M. Polanyi, & H. Prosch, *Meaning* (pp. 22-45). Chicago, IL: University of Chicago Press.

Ponzi, L., & Koenig, M. E. (2002). Knowledge management: Another Management fad? *Information Research 8(1)*, 145.

Popper, K. R. (1963). *Conjectures and Refutations: The Growth of Scientific Knowledge.* New York: Routledge and Kegan Paul.

Remenyi, D., Williams, B., Money, A., & Swartz, E. (1998). *Doing Research in Business and Management: An INtroduction to Process and Method.* London, United Kingdom: Sage.

Robson, C. (2002). *Real World Research 2nd Edition.* Oxford: Blackwell.

Ronen, T., & Pasher, E. (2011). *Complete Guide to Knowledge Management A Strategic Plan to Leverage Your Company's Intellectual Capital.* Hoboken, NJ: Wiley & Sons.

Saunders, M., Philip, L., & Thornhill, A. (2009). *Research Methods for Business Students* (5th Edition ed.). Essex, United Kingdom: Prentice Hall.

Schubert, P., & Lincke, D.-M. (1998). A Global Knowledge Medium as a Virtual Community: The NetAcademy Concept. *Proceedings of the Fourth Americas Conference on Information Systems* (pp. 618-620). Baltimore, MD: E. Hoadley and I. Benbasat (eds).

Schulz, M. (2001). The uncertain relevance of newness: Organizational learning and knowledge flows. *Academy of Management Journal*, 448 - 469.

Senn, J. A. (1982). *Information Systems in Management* (2nd ed.). Belmont, CA: Wadsworth. Retrieved May 30, 2023

Shipton, H., & DeFillippi, R. (2011). Psychological Perspectives in Organizational Learning: A Four-Quadrant Approach. In M. Easterby-Smith, M. A. Lyle, M. Easterby-Smith, & A. M. Lyle (Eds.), *Handbook of Organizational Learning and Knowledge Management.* West Sussex: Wiley.

Sikaonga, S., & Tembo, S. (2020). E-Government Readiness in the Civil Service: A Case of Zambian Ministries. *International Journal of Information Science*, 15-28.

Skinner, B. F. (1938). *The Behavior of Organisms: An Experimental Analysis.* New York: Appleton-Century Crofts.

Starbuck, W. H. (1996). Unlearning Ineffective or Obsolete Technologies. *International Journal of Technology Management, 11*, 725-737.

Swanson, B. E. (Winter, 1985-86). A Note on Information Attributes. *Journal of Information Systems*, 87-91.

Taggart, W. J. (1980). *Information Systems.* Boston, Massachusetts, USA: Allyn and Bacon.

Tashakkori, A., & Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches.* Thousand Oaks, California, United States of America: Sage.

Thompson, D., & al. (2003). *Illustrated Oxford Dictionary.* London: Dorlink Kindersley Ltd.

Thorndike, E. L. (1921). *Psychology of Learning.* Columbia University .

Toffler, A., & Toffler, H. (2003). *Revolutionary Wealth.* New York: Alfred A. Knopf.

Tsang, E. W., & Zahra, S. A. (2008). Organizational Unlearning. *Human Relations, 61*(10), 1435-1462.

Tuomi, I. (1999). *Corporate Knowledge: Theory and Practice of Intelligent Organization.* Helsinki: Mataxis.

Tuomi, I. (1999). Data is More Than Knowledge: Implications of the Reversed Hierarchy for Knowledge Management and Organizational Memory. *32nd Hawaii International Conference on Systems Sciences* (pp. 103-117). Los Alamitos: IEEE Computer Society Press.

Walsh, J. P., & Ungson, G. R. (1991). Organizational Memory. *Academy of Management Review, 16*(1), 57 - 91.

Watson, R. T. (1998). *Data Management, Databases and Organizations* (2nd Edition ed.). New York: John Wiley & Sons, Inc.

Weerasuriya, G. T., & Wijayanayake, W. (2014). An Evaluation of Factors Affecting Information Systems Obsolescence. *Journal of Emerging Trends in Computing and Information Siences*, 158-164.

Wiig, K. M. (1993). *Knowledge Management Foundations.* Arlington, Texas, USA: Schema Press.

Wilson, T. D. (2002). The nonsense of "knoweldge management". *Information Research, 8(1)*, 144.

Yildiz, H., & Fey, C. (2010). Compatibility and Unlearning in Knowledge Transfer in Mergers and Acquisitions. *Scandinavian Journal of Management, 6*(3), 448-456.

Yin, R. K. (2003). *Case Study Research: Design and Method (3rd Edition).* London: Sage.

Zack, M. H. (1998). An Architecture for Managing Explicated Knowledge. *Sloan Management Review.*

Zeckman, A. (2014, July 18). *Search Engine Watch*. Retrieved March 24, 2015, from Search Engine Watch: http://searchenginewatch.com/sew/news/2356194/hidden-from-google-news-forgotten-search-results

ZNPC, Z. N. (2018, April 9). *SDG Philanthropy Platfom Zambia.* Retrieved June 28, 2020, from 7 NATIONAL DEVELOPMENT PLAN 2017-2021: https://www.sdgphilanthropy.org/The-7th-National-Development-Plan-of-Zambia

APPENDIX I

Research Instrument used

Note This was the workbook distributed to experts for their entry and feedback to the researcher. Note that the Narrative is presented here in two pages to show the exhaustive information narrative to the expert that is not shown in the partial figure in the research document.

Narrative (for filling out the template)

This Sheet explains how you can fill out the Template.		
1	Ministry/	Name of Ministry or Civil Service Unit where this information is being recorded from.
	Unit	A Unit could be a unit that may not be in any particular ministry, such as a judicial unit
		related to a tribunal outside of a justice ministry's oversight.
2	Institution/	Name of the department or institution where this information is being recorded.
	Department	These can be used interchangeably especially where information need not be
		specific as to originating department.
3	Topical /	This refers to the area where knowledge is acquired/articulated. The object of interest or the
	Knowledge	process of interest can be used here. A general or even generic subject matter can also be used
	label	to give narrative to this entry.
4	Sub/Main	This refers to a descriptive narrative as a one-liner explaining a main source or activity related to
		the knowledge activity being referred to.
5	Artefact	The component of the overall knowledge process you are dealing with
		This could be a signature, a component (another process that must be fulfilled before this one)
		or an event that takes place before this takes off.
6	Duration	The time it takes to complete the artefact's fulfillment. Consistently make it either minutes
		or hours (or if these are very long processes, days; minutes and hours are more accurate)

AI-2

Demo (of a filled out template)

Ministry/Unit:			**Heritage and Museums**						
Institution/Dept:			**National Archives of Antiquity**						
Topical/Knowledge Label:			***Museum piece induction***						
Sub/Main:	***Returned articles from law enforcement seizures abroad***								
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**
1	Authorized signature	48	0.4	0.6	Statutory	10	Yes	Y	Approval time too long
2	Screening	72	0.8	0.4	Other	2	Most Unlikely	N	Important for clarifying authenticity
3	Label	24	0.8	0.4	Statutory	1	No	N	
4	Ref to culture	720	0.5	0.5	Ceremonial	8	Likely	Y	If authentic display can go ahead!
5	Montage	48	0.8	0.4	Statutory	2	Most Unlikely	N	For display

Blank (Template for Entry)

Ministry/Unit:										
Institution/Dept:										
Topical/Knowledge Label:										
Sub/Main:										
Item No.	**Artefact**	**Duration**	**Weighting**	**Threshold**	**Indication**	**Dispensable**	**Advisory**	**Ind. Disp**	**Remarks**	**Sparkline**
1							No	N		
0							No	N		
0							No	N		
0							No	N		
0							No	N		

APPENDIX II

Usable templates received and 'Flattened'

Note **Templates are said to be 'flattened' because individual templates have been collected into a single spreadsheet within the workbook. Initial collection was single workbooks containing a single entry.**

Each template was collected under a spreadsheet for a Ministry/Unit and given a serial such as **Expat00101A**. Each entry by **Expat00101A** from the template is saved as a line with the label. Also, the Ministry code is used to identify the expert's Ministry of operation. In the first column, as an instance, **Min001** identifies all experts under this Ministry who submitted templates.

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min001	Expat00101A	Confirm Farmer credentials	15	10	4	Statutory	1	No	N	This is always done
Min001	Expat00101A	Farmer land 5 ha at most	10	10	5	Symbolic	7	Perhaps	Y	Done by Coop mostly
Min001	Expat00101A	Voucher issue	15	10	6	Ceremonial	8	Likely	Y	Usually Coop fronts issuance
Min001	Expat00101A	Voucher authentication	10	10	5	Statutory	6	Possibly	Y	Sources of input restricted
Min001	Expat00101A	Voucher Audit	10	6	5	Symbolic	7	Perhaps	Y	Done by other Unit
Min001	Expat00101A	Purchase of Output	10	8	6	Symbolic	8	Likely	Y	Sometimes not all produce is bought
Min001	Expat00101B	Confirm Farmer belongs to coop	10	5	4	Statutory	1	No	N	Must be done
Min001	Expat00101B	Confirm farmer has 5 ha land	15	5	3	Symbolic	6	Possibly	Y	Usually done in artefact 1 by extension
Min001	Expat00101B	Issue Voucher to Farmer	20	5	3	Ceremonial	5	Maybe	Y	Usually formality
Min001	Expat00101B	Audit of Voucher	15	5	2	Symbolic	5	Maybe	Y	Usually not done uniformly
Min001	Expat00101B	Purchase of Produce	5	5	2	Symbolic	5	Maybe	Y	This is done by FRA
Min001	Expat00102A	Receive reports of infestation	14	5	5	Statutory	2	Most Unlikely	N	Helps determine disaster or not
Min001	Expat00102A	Study type of infestation	14	5	5	Statutory	1	No	N	Maybe different over an area

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min001	Expat00102A	Deploy experts	5	5	5	Statutory	2	Most Unlikely	N	On the ground expertise essential
Min001	Expat00102A	Sample infestation on the ground	7	5	5	Statutory	2	Most Unlikely	N	Reagents depend on findings
Min001	Expat00102A	Recommend measures	7	5	5	Statutory	1	No	N	Helps centrally determined measure
Min001	Expat00102A	Disseminate solution	14	5	5	Statutory	1	No	N	Usually centrally done
Min001	Expat00102A	Audit aftermath	14	5	5	Symbolic	3	More unlikely	N	Some places not done; sampling carried out
Min001	Expat00102B	Report of infestation	7	10	9	Statutory	1	No	N	Reports must cover appreciable area
Min001	Expat00102B	Study and advise	14	10	5	Statutory	1	No	N	Coverage is key; usually provinces in season
Min001	Expat00102B	Send out agric expertise	5	10	5	Statutory	2	Most Unlikely	N	Expertise must be on ground
Min001	Expat00102B	On the ground determinations	7	10	8	Statutory	1	No	N	Essential to approach
Min001	Expat00102B	Recommend solution	7	10	9	Statutory	2	Most Unlikely	N	Helps select suitable solution
Min001	Expat00102B	Roll out solution from center	14	10	6	Statutory	1	No	N	Usually done from central government
Min001	Expat00102B	Check on progress	14	10	10	Symbolic	4	Unlikely	N	Usually self-reporting is done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min002	Expat00201A	Fill out of Form 3; Name clearance	24	10	8	Statutory	3	More unlikely	N	Could take shorter
Min002	Expat00201A	Search done to determine composition	24	10	5	Symbolic	6	Possibly	Y	Resident Exec Dir, Co. Sec and undischarged bankruptcy
Min002	Expat00201A	Articles of Assoc. deposited	24	10	9	Statutory	2	Most Unlikely	N	Articles of association a must
Min002	Expat00201A	Share Capital Certificate	24	10	9	Statutory	1	No	N	Upon payment; can be done online
Min002	Expat00201A	Compliance Declaration	24	10	9	Statutory	1	No	N	Upon payment; can be done online
Min002	Expat00201A	Payment of Certificate of Incorporation	24	10	10	Statutory	1	No	N	Upon payment; can be done online
Min002	Expat00201A	Registration Certificate issued	24	10	10	Statutory	1	No	N	
Min002	Expat00201A	Company begins operations	48	10	6	Other	2	Most Unlikely	N	Doesn't have to be immediate
Min002	Expat00201B	Form 3 for name clearing	24	10	9	Statutory	1	No	N	This must be done
Min002	Expat00201B	Company composition determination	24	10	8	Statutory	1	No	N	Requirements for composition fulfilment
Min002	Expat00201B	Receipt of Articles of Association	24	10	10	Statutory	1	No	N	Must be done
Min002	Expat00201B	Receipt of Share Capital Certificate	24	10	10	Statutory	1	No	N	Must be done
Min002	Expat00201B	Receipt of Compliance Declaration	24	10	10	Statutory	1	No	N	Must be done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min002	Expat00201B	ZRA Tax Registration	48	10	10	Statutory	1	No	N	Done with ZRA BUT PACRA requirement
Min002	Expat00201B	Payment of Certificate of Incorporation	24	10	10	Statutory	1	No	N	Must be done
Min002	Expat00201B	Issue of Certificate of Registration	24	10	10	Statutory	1	No	N	Must be done
Min002	Expat00201B	Operations permitted	48	10	4	Symbolic	3	More unlikely	N	Not statutory requirement
Min002	Expat00202A	Consumer details and complaint	24	10	9	Statutory	2	Most Unlikely	N	Online version available and quicker
Min002	Expat00202A	Complaint investigation	48	10	8	Other	6	Possibly	Y	Only if it merits
Min002	Expat00202A	Instruments with Standards Bureau launched	48	10	8	Statutory	1	No	N	Only if it merits
Min002	Expat00202A	Target outlet/group notified	48	10	4	Other	7	Perhaps	Y	Litigation advisory
Min002	Expat00202A	Litigation process	48	10	4	Other		No	N	Not CPC's jurisdiction; only advisory
Min002	Expat00202B	Receive consumer complaint	48	10	10	Statutory	1	No	N	Can be immediate if online
Min002	Expat00202B	Bureau of Standards determinations	48	10	6	Other	5	Maybe	Y	Done if warrants investigation
Min002	Expat00202B	Notification of intent to affected party	48	10	4	Statutory	1	No	N	Can lead to litigation

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min002	Expat00202B	Consumer advised to litigate	48	10	5	Other	2	Most Unlikely	N	If litigation is warranted

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min006	Expat00601A	Interview survivor on icident	2	100	100	Statutory	1	No	N	Must
Min006	Expat00601A	Get full physical exam of survivor	8	100	100	Statutory	1	No	N	Must
Min006	Expat00601A	Get Laboratory exam results	24	100	100	Statutory	1	No	N	Must / essential in sexual assault cases
Min006	Expat00601A	Record/capture injuries	8	100	50	Statutory	1	No	N	Must / depends on visibility
Min006	Expat00601A	Trauma counseling	72	100	50	Statutory	1	No	N	Depends on situation
Min006	Expat00601A	Determine Legal Aid requirements	72	100	50	Statutory	1	No	N	Depends on situation
Min006	Expat00601B	Interview survivor	24	10	10	Statutory	2	Most Unlikely	N	Obtainable from Police
Min006	Expat00601B	Medical exam on survivor	24	10	10	Statutory	2	Most Unlikely	N	Obtained from hospital
Min006	Expat00601B	Laboratory results	48	10	10	Statutory	1	No	N	Obtained from hospital
Min006	Expat00601B	Record visible injuries	8	10	5	Statutory	1	No	N	Depends on case
Min006	Expat00601B	Arrange for counseling	72	10	10	Statutory	1	No	N	Where trauma has occurred
Min006	Expat00601B	Options for Legal Aid	72	10	6	Statutory	1	No	N	If representation in court is required
Min006	Expat00602A	Receive hospital reports	8	10	10	Other	1	No	N	Police and Hospitals
Min006	Expat00602A	Determine severity	24	10	8	Other	2	Most Unlikely	N	Based on need and counseling
Min006	Expat00602A	Coordinate with shelters	48	10	5	Other	2	Most Unlikely	N	Shelters run mostly by NGOs

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min006	Expat00602A	Coordinate Legal Aid	72	10	5	Other	1	No	N	Necessary for severe cases
Min006	Expat00602A	Monitor situations with other ministries	72	10	10	Other	2	Most Unlikely	N	Can take longer

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min007	Expat00701A	Receive Candidate paper at Center	14	100	100	Statutory	1	No	N	Required at Center
Min007	Expat00701A	Audit paper for correct entries	2	100	100	Other	1	No	N	Required at Center
Min007	Expat00701A	Mark paper	1	100	100	Other	1	No	N	Required at Center
Min007	Expat00701A	Submit for second marker	1	100	100	Statutory	1	No	N	Required at Center
Min007	Expat00701A	Confirm Mark and award grade	1	100	100	Statutory	1	No	N	Required at Center
Min007	Expat00701A	Submit for reporting	1	100	100	Symbolic	1	No	N	Required at Center
Min007	Expat00702B	Receive syllabus	14	100	100	Statutory	1	No	N	School requirement
Min007	Expat00702B	Examine teaching requirements	1	100	100	Statutory	1	No	N	School requirement
Min007	Expat00702B	List requirements for purchase	3	100	90	Statutory	1	No	N	School requirement
Min007	Expat00702B	Submit to Head of department	2	100	100	Statutory	1	No	N	School requirement
Min007	Expat00702B	Audit / justify material required	2	100	100	Statutory	1	No	N	School requirement
Min007	Expat00702B	Receive material for woodwork	21	100	100	Symbolic	1	No	N	School requirement
Min007	Expat00702B	Confirm practical lessons	2	100	100	Symbolic	1	No	N	School requirement
Min007	Expat00703A	Create Task Map	4	100	100	Statutory	1	No	N	Important for pupil progression

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min007	Expat00703A	Call pupil for assessment	1	100	50	Other	5	Maybe	Y	Some pupils are exceptional
Min007	Expat00703A	Record results of assessment	1	100	80	Statutory	2	Most Unlikely	N	Important for pupil progression
Min007	Expat00703A	Calculate pupil's proficiency	2	100	100	Statutory	2	Most Unlikely	N	Important for pupil progression
Min007	Expat00703A	Rank pupil by set criteria	1	100	100	Statutory	1	No	N	Important for pupil progression
Min007	Expat00703A	Work on improvements accordingly	2	100	100	Statutory	1	No	N	Important for pupil progression
Min007	Expat00703B	Get level from Task Map	2	100	100	Statutory	1	No	N	Important
Min007	Expat00703B	Assess pupil	1	100	100	Statutory	1	No	N	Important
Min007	Expat00703B	Calculate proficiency	1	100	100	Statutory	1	No	N	Important
Min007	Expat00703B	Produce ranking	1	100	100	Statutory	1	No	N	Important
Min007	Expat00703B	Preview remedies	1	100	100	Statutory	1	No	N	Important

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min008	Expat00801A	Medical Presentation	15	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801A	Register at Reception	10	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801A	Payment of fee	10	5	6	Statutory	1	No	N	This must be done
Min008	Expat00801A	Obtain Book	10	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801A	Cleared for Medical Examination	5	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801B	Initial Patient Entry	20	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801B	Examined by Medical Officer	15	5	5	Other	1	No	N	This is sometimes skipped
Min008	Expat00801B	Recommendation of diagnosis	10	5	6	Other	1	No	N	Not always done
Min008	Expat00801B	Register as Inpatient	5	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801B	Payment of Fee	10	5	5	Statutory	1	No	N	This must be done
Min008	Expat00801B	Obtain Book for recording diagnosis	5	5	8	Symbolic	1	No	N	Depends on diagnosis or exam
Min008	Expat00801B	Refer to Medical Officer for further treatment	20	5	6	Symbolic	1	No	N	Not always done
Min008	Expat00801B	Record Information in Book	20	5	5	Symbolic	1	No	N	Not always done
Min008	Expat00802A	Initial Patient presentation	30	10	5	Statutory	1	No	N	This must be done
Min008	Expat00802A	Physical Exam of patient	20	10	5	Statutory	1	No	N	Helps determine course of treatment
Min008	Expat00802A	Request for lab samples	10	5	6	Other	4	Unlikely	N	Depends on outcome of exam
Min008	Expat00802A	Allow lab to run tests	48	5	5	Statutory	1	No	N	This must be done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min008	Expat00802A	Present results from lab	20	10	5	Statutory	1	No	N	This must be done
Min008	Expat00802A	Confirm and prescribe	20	10	5	Statutory	3	More unlikely	N	Depends on diagnosis or exam
Min008	Expat00802A	Give patient information/advisory	20	5	6	Symbolic	5	Maybe	Y	For benefit of patient
Min008	Expat00802A	Update patient information	20	10	5	Statutory	1	No	N	Important for future medicals
Min008	Expat00802B	Patient Interview	20	10	8	Other	6	Possibly	Y	Some patients may not respond; observation is done
Min008	Expat00802B	Examine for indications	15	5	5	Statutory	2	Most Unlikely	N	This must be done
Min008	Expat00802B	Request for tests	5	5	6	Statutory	4	Unlikely	N	Not always done
Min008	Expat00802B	Lab test run on requested checklist	24	10	5	Statutory	3	More unlikely	N	This must be done once requested
Min008	Expat00802B	Return results to doctor by patient/lab	20	5	5	Other	5	Maybe	Y	Some patients do not follow on/deceased
Min008	Expat00802B	Diagnosis confirmation based on results	60	5	6	Statutory	1	No	N	This must be done based on results
Min008	Expat00802B	Prescribe treatment	20	5	6	Statutory	1	No	N	Not always done depending on outcome
Min008	Expat00802B	Record history	20	5	5	Statutory	1	No	N	Important for patient history

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min008	Expat00803A	Assess Patient for pain severity	20	10	4	Statutory	1	No	N	This must be done
Min008	Expat00803A	Check for allergies history	15	8	5	Other	6	Possibly	Y	If history is available this is skipped
Min008	Expat00803A	Determine class of drug for pain	10	10	6	Statutory	1	No	N	Pain medication inhospital must not be outpatient
Min008	Expat00803A	Prescribe inpatient medication	10	10	5	Statutory	1	No	N	Classified medication only inpatient
Min008	Expat00803A	Observe treatment	24	10	10	Statutory	1	No	N	This must be done
Min008	Expat00803A	Check effectiveness	24	10	8	Statutory	1	No	N	Depends on diagnosis or exam
Min008	Expat00803A	Discontinue medication	20	10	6	Other	5	Maybe	Y	Depends on severity
Min008	Expat00803B	Determine level of pain	30	10	5	Statutory	1	No	N	This must be done
Min008	Expat00803B	Admit patient for pain medication	10	5	2	Other	1	No	N	Can be dispensed if not needed
Min008	Expat00803B	Check medical history	15	10	5	Other	1	No	N	Not always done
Min008	Expat00803B	Administer pain medication	10	10	5	Statutory	1	No	N	This must be done
Min008	Expat00803B	Observe treatment	24	10	5	Other	4	Unlikely	N	Can be done as outpatient later
Min008	Expat00803B	Discontinue upon assessment	24	10	8	Statutory	1	No	N	Depends on diagnosis or exam

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min008	Expat00803B	Refer to Medical Officer for further treatment	12	8	6	Symbolic	1	No	N	Not always done
Min008	Expat00804A	Determine infection in more than two people	48	10	10	Statutory	1	No	N	Shorter for highly infectious pathogens
Min008	Expat00804A	Determine Area of Outbreak	24	10	8	Statutory	1	No	N	Aids resource management
Min008	Expat00804A	Advise Minister to declare outbreak	2	10	10	Statutory	1	No	N	Helps contain area legally
Min008	Expat00804A	Observe vigilance over area	48	10	6	Statutory	1	No	N	Important for containment or deployment
Min008	Expat00804A	Contain area	24	10	10	Statutory	1	No	N	Ensure no spread beyond area of infection
Min008	Expat00804A	Send expertise to determine solutions	72	10	5	Other	2	Most Unlikely	N	Depends on extent of outbreak
Min008	Expat00804A	Deploy curative measures	48	10	10	Statutory	2	Most Unlikely	N	Must be made regardless of extent
Min008	Expat00804A	Observe improvements	72	10	10	Statutory	2	Most Unlikely	N	Part of monitoring and observation
Min008	Expat00804A	Declare Outbreak over	24	10	8	Statutory	2	Most Unlikely	N	If declared initially

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min008	Expat00804A	Decide whether endemic	48	10	10	Statutory	2	Most Unlikely	N	Must be made for future vigilance
Min008	Expat00804B	Must be two or more people	48	5	5	Statutory	1	No	N	Depends on severity
Min008	Expat00804B	Determine Outbreak extent	24	5	4	Statutory	1	No	N	Helps containment measures
Min008	Expat00804B	Ministerial statement	2	5	5	Statutory	1	No	N	Legal requirement
Min008	Expat00804B	Vigilance surveillance	72	5	4	Statutory	1	No	N	Containment measures
Min008	Expat00804B	Contain area and restrict movement	24	5	5	Statutory	1	No	N	Spread prevention
Min008	Expat00804B	Deploy expertise	48	5	3	Treaty	3	More unlikely	N	Helps information building and treatment
Min008	Expat00804B	Dispense cure	72	5	5	Statutory	2	Most Unlikely	N	Dispensed immediately on determination
Min008	Expat00804B	Observe	72	5	5	Statutory	2	Most Unlikely	N	Builds information database
Min008	Expat00804B	Outbreak declared over	24	5	4	Statutory	2	Most Unlikely	N	For declared outbreaks

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min009	Expat00901A	Gather Student Requirements for Application	42	10	10	Statutory	1	No	N	Must be done; usually this is lead time
Min009	Expat00901A	Contact verification of loan level	14	10	8	Symbolic	3	More unlikely	N	Clear if institution is involved
Min009	Expat00901A	Vulnerability level award determination	14	10	5	Ceremonial	6	Possibly	Y	Sometimes difficult to verify
Min009	Expat00901A	Student Loan Agreement	28	10	10	Statutory	2	Most Unlikely	N	Must be done by law
Min009	Expat00901A	Loan disbursement	7	10	10	Statutory	5	Maybe	Y	Can be delayed
Min009	Expat00901A	Student Progress Reports	26	10	4	Symbolic	9	Highly likely	Y	Sometimes not enforced
Min009	Expat00901B	Receive Student Credentials	52	5	5	Statutory	1	No	N	Required as agreed
Min009	Expat00901B	Determine Student vulnerability level	14	5	3	Statutory	5	Maybe	Y	Can be done better outside of institutions
Min009	Expat00901B	Determine level of loan (100%, 75%, 50%, 25%)	14	5	2	Symbolic	6	Possibly	Y	Not always clear
Min009	Expat00901B	Award Student Loan	7	5	3	Statutory	1	No	N	When merited this is done
Min009	Expat00901B	Sign Repayment Agreement with Student	14	5	4	Statutory	2	Most Unlikely	N	Required as agreed
Min009	Expat00901B	Disburse Funding	7	5	3	Statutory	2	Most Unlikely	N	Required as agreed

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min009	Expat00901B	Monitor Student Progress	52	5	1	Ceremonial	10	Yes	Y	Not always followed
Min009	Expat00902A	Receive Applications	42	10	10	Statutory	1	No	N	Some are international
Min009	Expat00902A	Checklist requirements/vet	4	10	6	Statutory	1	No	N	Can be done over shorter period
Min009	Expat00902A	Discriminant for top candidates	2	10	5	Other	2	Most Unlikely	N	Depends on qualifying number
Min009	Expat00902A	Match Award to number available	1	10	10	Statutory	1	No	N	Must be done as required
Min009	Expat00902A	Award Scholarship	1	10	10	Statutory	1	No	N	Must be done as required
Min009	Expat00902A	Inform Awardees	2	10	10	Statutory	5	Maybe	Y	Students can check online
Min009	Expat00902A	Process Scholarship Operation	2	10	5	Other	5	Maybe	Y	Depends on award
Min009	Expat00902B	Receive and check applications	42	10	9	Statutory	1	No	N	Agreements dictate
Min009	Expat00902B	Determine deserving candidates	4	10	8	Statutory	1	No	N	Checklists are used
Min009	Expat00902B	Award according to number available	2	10	10	Statutory	1	No	N	Requirements depend on number available
Min009	Expat00902B	Inform scholarship recipient	1	10	10	Statutory	5	Maybe	Y	Self-check can be easier
Min009	Expat00902B	Assist recipient in process	2	10	4	Other	5	Maybe	Y	Can be self-check
Min009	Expat00903A	Institution Notification of Exams	12	10	10	Statutory	1	No	N	Done at beginning of examining year

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min009	Expat00903A	Registration of Examination	12	10	10	Statutory	1	No	N	As required by ECZ
Min009	Expat00903A	Receiving of verified results	4	10	10	Statutory	1	No	N	Required by law
Min009	Expat00903A	Auditing of verified results	4	10	8	Other	5	Maybe	Y	Depends on institutional setup
Min009	Expat00903A	Systems Administrator Data Entry	4	10	10	Statutory	1	No	N	Data capture mandatory
Min009	Expat00903A	Transcript Processing	6	10	10	Statutory	2	Most Unlikely	N	For Data preservation
Min009	Expat00903A	Results Administration	6	10	10	Other	5	Maybe	Y	Some institutions self-administer
Min009	Expat00903A	Registration of Certificates	6	10	10	Statutory	3	More unlikely	N	For future national legal verification
Min009	Expat00903B	Registration of Examination	12	10	10	Statutory	1	No	N	Required by law
Min009	Expat00903B	Examination Center Registration	12	10	10	Statutory	1	No	N	Required by law
Min009	Expat00903B	Audit of received results	6	10	8	Other	1	No	N	In collaboration with institution exam department
Min009	Expat00903B	Data Entry at ECZ	4	10	10	Statutory	1	No	N	Data preservation regulations
Min009	Expat00903B	Transcript and Certificates	6	10	10	Statutory	1	No	N	Required by law
Min009	Expat00903B	Registration of Certificates	6	10	10	Statutory	1	No	N	Required by law
Min009	Expat00904A	Request for Examination Draft Papers	30	10	10	Statutory	1	No	N	Required for initial assessment

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min009	Expat00904A	Notification of Moderator	30	10	8	Statutory	5	Maybe	Y	Sometimes shorter if moderator is internal
Min009	Expat00904A	Final Examination Papers	14	10	10	Statutory	1	No	N	Must be done
Min009	Expat00904A	Examinations take place	14	10	10	Statutory	1	No	N	Must be done
Min009	Expat00904A	Notify Moderator/2nd Examiner	30	10	10	Statutory	1	No	N	Must be done
Min009	Expat00904A	Release of results after Senate	30	10	10	Statutory	1	No	N	Must be done
Min009	Expat00904A	2nd Opportunity Examinations	14	10	6	Other	4	Unlikely	N	Affected courses only
Min009	Expat00904A	Release of results after Senate	14	10	10	Statutory	4	Unlikely	N	Affected courses only
Min009	Expat00904B	Draft Examination Papers	30	10	10	Statutory	1	No	N	Required by regulation
Min009	Expat00904B	Notify Moderator/Second Examiner	30	10	6	Statutory	6	Possibly	Y	Depends on nature of examination
Min009	Expat00904B	Final Question Papers received	14	10	10	Statutory	1	No	N	Required by regulation
Min009	Expat00904B	Administration of Examination	14	10	10	Statutory	1	No	N	Required by regulation
Min009	Expat00904B	Notification of Second Examiner	30	10	10	Statutory	1	No	N	Required by regulation
Min009	Expat00904B	Notification of Results	30	10	10	Statutory	2	Most Unlikely	N	Required by regulation
Min009	Expat00904B	Second Opportunity Exams	14	10	5	Other	4	Unlikely	N	Not done for all courses

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min009	Expat00904B	Notification of Second Opportunity Results	14	10	10	Statutory	4	Unlikely	N	Not for all courses

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Min010	Expat01001A	Forms submission	8	10	10	Statutory	1	No	N	Mandatory if passport must be obtained
Min010	Expat01001A	Reception checks all documentation	20	10	5	Other	6	Possibly	Y	This is done in foreign missions too
Min010	Expat01001A	Submission Audit (for veracity)	24	10	10	Statutory	1	No	N	Important for authenticity
Min010	Expat01001A	Interview of Applicant	24	10	4	Other	7	Perhaps	Y	Forms from abroad do not go through this process
Min010	Expat01001A	Passport issuance process	24	10	10	Statutory	1	No	N	Mandatory
Min010	Expat01001A	Signing of Issued Passport	24	10	10	Statutory	1	No	N	Mandatory
Min010	Expat01001A	Issuance to Passport holder	24	10	10	Statutory	1	No	N	Mandatory
Min010	Expat01001B	Receipt of forms and documents	60	10	10	Statutory	1	No	N	This is mandatory
Min010	Expat01001B	Verification of submission	120	10	6	Other	5	Maybe	Y	This is done at foreign missions too
Min010	Expat01001B	Audit of entries in submissions	120	10	8	Statutory	2	Most Unlikely	N	Ensures veracity before processing
Min010	Expat01001B	Submission to Passport issuance	48	10	10	Statutory	1	No	N	Process of issuing passport
Min010	Expat01001B	Passport Books for signature (Chief Passport Officer)	24	10	10	Statutory	1	No	N	All passports must be signed this way

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Min010	Expat01001B	Issuance of passport to holder	72	10	10	Statutory	1	No	N	End process of passport chain
Min010	Expat01002A	Notify culprit of offense/cite CAP Law	60	10	10	Statutory	1	No	N	According to law
Min010	Expat01002A	Write ticket of offense/advise admission of guilt	15	10	5	Other	2	Most Unlikely	N	Supervisor can allow mitigating for culprit
Min010	Expat01002A	Receive payment for offense	48	10	8	Other	2	Most Unlikely	N	Culprit can mitigate payment amounts
Min010	Expat01002A	Process Court (payment/appearance)	48	10	10	Statutory	1	No	N	According to law
Min010	Expat01002A	Register offense (or sentencing)	24	10	10	Statutory	1	No	N	According to law
Min010	Expat01002A	License endorsement as required	60	10	5	Other	3	More unlikely	N	Depends on how serious offense is
Min010	Expat01002B	Identify traffic offense	30	10	10	Statutory	1	No	N	This is required by law
Min010	Expat01002B	Inform culprit of offense with evidence	10	10	5	Statutory	1	No	N	Culprit can mitigate at discretion of supervisor
Min010	Expat01002B	Write ticket with instruction of payment	15	10	6	Other	3	More unlikely	N	Spot fines can apply
Min010	Expat01002B	Receive admission of guilt payment	48	10	5	Statutory	2	Most Unlikely	N	This is required by law

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min010	Expat01002B	Process court entry (paid/unpaid)	48	10	10	Statutory	1	No	N	This is required by law
Min010	Expat01002B	Remedy offense (including sentencing)	24	10	8	Statutory	1	No	N	This is required by law
Min010	Expat01002B	Endorse license for serious offense	60	10	4	Other	2	Most Unlikely	N	Depends on severity of offense
Min010	Expat01002B	Monitor culprit	48	10	3	Other	5	Maybe	Y	Can depend on severity and endorsement
Min010	Expat01003A	Collect documents from applicant and guardian	10	10	10	Statutory	1	No	N	Law requirement
Min010	Expat01003A	Verify submissions	10	10	10	Statutory	1	No	N	Law requirement
Min010	Expat01003A	Applicant interview for approval	20	10	5	Other	6	Possibly	Y	Guardian/Parent can assist
Min010	Expat01003A	Applicant photo session	5	10	10	Statutory	5	Maybe	Y	Can use better system for obtaining photo
Min010	Expat01003A	Typing of NRC front and back/affix photo	20	10	10	Statutory	2	Most Unlikely	N	Done on typewriter
Min010	Expat01003A	Applicant sign NRC before lamination	5	10	10	Statutory	1	No	N	Law requirement
Min010	Expat01003A	NRC issued/Citizenship confirmed	5	10	10	Statutory	1	No	N	Law requirement
Min010	Expat01003B	Accept documentation from applicant	15	10	10	Statutory	1	No	N	Mandatory

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min010	Expat01003B	Refer applicant to interview	15	10	6	Statutory	5	Maybe	Y	Can be accompanied
Min010	Expat01003B	Obtain Photo of applicant	10	10	10	Statutory	6	Possibly	Y	New ways can be found/online capture
Min010	Expat01003B	Typing of NRC/placement of photo	15	10	10	Statutory	4	Unlikely	N	Very manual. Can be computerised
Min010	Expat01003B	Signing of NRC by applicant	5	10	10	Statutory	4	Unlikely	N	Can be computerised
Min010	Expat01003B	Lamination of NRC	5	10	10	Statutory	1	No	N	Mandatory
Min010	Expat01003B	NRC Issue and Citizenship confirmation	5	10	10	Statutory	1	No	N	Mandatory
Min010	Expat01004A	Receive application	24	10	10	Statutory	3	More unlikely	N	Some clashes with freedom to assembly
Min010	Expat01004A	Scope area to provide security	48	10	5	Statutory	1	No	N	Ensure safety of demonstrators and public
Min010	Expat01004A	Assess merit	24	10	5	Statutory	1	No	N	If not in public interest cancel
Min010	Expat01004A	Process application	24	10	4	Other	5	Maybe	Y	If not merit cancel
Min010	Expat01004A	Provide security	24	10	4	Other	5	Maybe	Y	If not merit cancel
Min010	Expat01004B	Receive application from demonstrators	24	10	8	Statutory	2	Most Unlikely	N	Required for logistics

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Min010	Expat01004B	Advise on route and provision security	24	10	8	Other	5	Maybe	Y	No need if not in public interest
Min010	Expat01004B	Respond to applicants	24	10	10	Statutory	1	No	N	Required
Min010	Expat01004B	Provide route security/control	48	10	10	Statutory	1	No	N	Required for security

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min011	Expat01101A	Receive consumer complaint	1	10	10	Statutory	1	No	N	Starting point and mandatory
Min011	Expat01101A	Request feedback from source	14	10	10	Statutory	1	No	N	Right to reply / evaluated for pertinence
Min011	Expat01101A	Resolution of complaint	14	10	10	Statutory	1	No	N	Satisfaction to complainant
Min011	Expat01101A	Inform source of resolution	14	10	10	Statutory	1	No	N	Mandatory
Min011	Expat01101A	Litigation in place	14	10	5	Other	3	More unlikely	N	Not necessary if resolved prior
Min011	Expat01101A	Court decision	28	10	5	Other	3	More unlikely	N	Not necessary if resolved prior
Min011	Expat01101B	Complaint received	2	10	10	Statutory	1	No	N	Mandatory: within 30 days
Min011	Expat01101B	Forward complaint to radio/tv/publication	14	10	10	Statutory	1	No	N	Mandatory: allow response/resolution
Min011	Expat01101B	Work out solution to satisfactory level	14	10	10	Statutory	1	No	N	Mandatory: if OK no need to proceed
Min011	Expat01101B	Allow defendant to agree / disagree	14	10	5	Other	6	Possibly	Y	May not be necessary
Min011	Expat01101B	Send to court process	14	10	5	Other	6	Possibly	Y	May not be necessary
Min011	Expat01101B	Implement court decision	28	10	5	Other	6	Possibly	Y	May not be necessary

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min011	Expat01103A	Receuve application for evaluation	1	10	10	Statutory	1	No	N	Statutory
Min011	Expat01103A	Make recommendations to IBA board	2	10	10	Statutory	1	No	N	Statutory
Min011	Expat01103A	Communicate approval/ disapproval	3	10	5	Other	5	Maybe	Y	Depends on circumstances
Min011	Expat01103A	Inspect licensee	14	10	5	Other	5	Maybe	Y	Depends on whether approval was given
Min011	Expat01103B	Accept application from licensee	24	100	90	Statutory	2	Most Unlikely	N	Mandatory
Min011	Expat01103B	Evaluate application for committee	48	100	90	Statutory	2	Most Unlikely	N	Mandatory
Min011	Expat01103B	Recommend to IBA Board	24	100	100	Statutory	1	No	N	Mandatory
Min011	Expat01103B	Receive IBA Board recommendations	48	100	100	Statutory	1	No	N	Mandatory
Min011	Expat01103B	Communicate to licensee	72	100	50	Other	5	Maybe	Y	Depends on approval status
Min011	Expat01103B	Arrange for inspection after licensee sets up	72	100	50	Other	5	Maybe	Y	Depends on approval status

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min013	Expat01301A	Initiate site identification	7	10	10	Statutory	1	No	N	Legal mandate
Min013	Expat01301A	Gather logistics for site inspection	2	10	10	Statutory	1	No	N	Legal mandate
Min013	Expat01301A	Notify principals	7	10	4	Other	5	Maybe	Y	Some visits are unannounced
Min013	Expat01301A	Schedule site inspection	14	10	4	Other	5	Maybe	Y	Advance notificaiton may be necessary
Min013	Expat01301A	Carry out inspection	1	10	10	Statutory	1	No	N	Legal mandate
Min013	Expat01301A	Verify OHS checklist	1	10	10	Statutory	1	No	N	Varies from industry to industyr
Min013	Expat01301A	Produce report	7	10	10	Statutory	1	No	N	Shared with site
Min013	Expat01301B	Identify site to visit	7	10	10	Statutory	2	Most Unlikely	N	Sometimes tippoff
Min013	Expat01301B	Arrange for visit	2	10	10	Statutory	1	No	N	According to law
Min013	Expat01301B	Liaise with company	5	10	5	Other	6	Possibly	Y	Not always necessary
Min013	Expat01301B	Inspect company	1	10	10	Statutory	1	No	N	According to law
Min013	Expat01301B	Produce report	7	10	10	Statutory	1	No	N	According to law
Min013	Expat01301B	Share report with company	7	10	5	Other	6	Possibly	Y	Depends on nature of inspection
Min013	Expat01302A	Receive complaint	1	10	10	Statutory	1	No	N	Legally binding
Min013	Expat01302A	Consult with complainant	5	10	5	Statutory	1	No	N	Legally binding
Min013	Expat01302A	Assess complaint	5	10	10	Statutory	1	No	N	Legally binding

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min013	Expat01302A	Engage employer	2	10	5	Other	1	No	N	Depends on nature
Min013	Expat01302A	Recommend action	5	10	5	Other	1	No	N	Depends on nature
Min013	Expat01302B	Receive nature of dismissal	1	10	10	Statutory	1	No	N	Laws of Zambia
Min013	Expat01302B	Advise complainant	5	10	6	Statutory	1	No	N	Laws of Zambia
Min013	Expat01302B	Assess complaint extent	2	10	10	Statutory	1	No	N	Laws of Zambia
Min013	Expat01302B	Inform employer of action to be taken if any	1	10	5	Other	1	No	N	May not be necessary
Min013	Expat01302B	Recommend action to complainant	5	10	4	Other	1	No	N	May not be necessary

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min014	Expat01401A	Receive applications from prospective owner	24	10	10	Statutory	1	No	N	Must
Min014	Expat01401A	Interview of prospective land owner	24	10	8	Statutory	1	No	N	Must
Min014	Expat01401A	Approve successful candidates	24	10	6	Statutory	1	No	N	Depends on successful status
Min014	Expat01401A	Invite successful candidate to pay	48	10	5	Other	5	Maybe	Y	Can be done with letter of offer
Min014	Expat01401A	Issue letter of offer to candidate	48	10	5	Other	5	Maybe	Y	Can be done with payment
Min014	Expat01401A	Candidate advised to process with Commissioner	48	10	10	Statutory	1	No	N	Must
Min014	Expat01402B	Get authorization for original physical document	120	100	100	Statutory	1	No	N	Legal requirement
Min014	Expat01402B	Endorse document in register	60	100	100	Statutory	1	No	N	Legal requirement
Min014	Expat01402B	Run digital copy	15	100	100	Statutory	1	No	N	Legal requirement
Min014	Expat01402B	Serialization of copy	30	100	100	Statutory	1	No	N	Legal requirement
Min014	Expat01402B	Audit serial on original physical copy	15	100	40	Other	8	Likely	Y	Can be done with serializing
Min014	Expat01402B	Store digital copy on database	5	100	100	Other	2	Most Unlikely	N	Part of digital process
Min014	Expat01402B	File physical copy in cabinet/archive	20	100	90	Statutory	1	No	N	Legal requirement

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min014	Expat01403A	Get application from designate land owner	24	10	10	Statutory	1	No	N	Required
Min014	Expat01403A	Get endorsed site plan (Agric. Surveyor)	72	10	6	Statutory	1	No	N	Required
Min014	Expat01403A	Council minutes and issue of offer letter	72	10	10	Statutory	1	No	N	Required
Min014	Expat01403A	Audit survey by appointed surveyor	72	10	10	Statutory	1	No	N	Confirm land is vacant
Min014	Expat01403A	Treaty and plot allocation	24	10	10	Statutory	1	No	N	Classification of plot
Min014	Expat01403A	Reevaluate new survey and payment	48	10	10	Statutory	1	No	N	Required
Min014	Expat01403A	Issue of Title	24	10	10	Statutory	1	No	N	Required
Min014	Expat01403B	Receive endorsed forms	24	10	10	Statutory	2	Most Unlikely	N	Must have clerk, chief and applicant
Min014	Expat01403B	Receive site plan	24	10	5	Statutory	1	No	N	Can be submitted with application
Min014	Expat01403B	Draft letter of offer after minute entry at council meet	48	10	10	Statutory	1	No	N	Formalize conversion
Min014	Expat01403B	New surveyed site plan	24	10	10	Statutory	1	No	N	Vacancy of land confirmed
Min014	Expat01403B	Issue treaty for plot number allocation	72	10	10	Statutory	1	No	N	Mandated by parties
Min014	Expat01403B	Final survey and payment amount reevaluated	48	10	10	Statutory	1	No	N	Mandated by parties

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min014	Expat01403B	Title issued	24	10	10	Statutory	1	No	N	By law

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Min015	Expat01501A	Assess qualifying household	30	100	100	Statutory	1	No	N	Required by law
Min015	Expat01501A	Register qualifying household	30	100	100	Statutory	1	No	N	Required by law
Min015	Expat01501A	Audit and verify registered household	45	100	100	Statutory	1	No	N	Required by law
Min015	Expat01501A	Consolidate information on household	7	100	80	Other	2	Most Unlikely	N	Can be done at registration
Min015	Expat01501A	Register information on MIS	7	100	100	Statutory	1	No	N	For payment purposes
Min015	Expat01501A	Carry out transparency audit with community	2	100	50	Other	2	Most Unlikely	N	Community participation
Min015	Expat01501A	Assign entitlements to qualifying household	1	100	100	Statutory	1	No	N	Required by law
Min015	Expat01501B	Prescreen household	30	100	100	Statutory	1	No	N	Ministry requirement
Min015	Expat01501B	Register qualified household	30	100	100	Statutory	1	No	N	Ministry requirement
Min015	Expat01501B	Verify area of household	21	100	80	Statutory	1	No	N	Ministry requirement
Min015	Expat01501B	Confirm information gathered	14	100	100	Statutory	1	No	N	Ministry requirement
Min015	Expat01501B	MIS registration for SCT	7	100	100	Statutory	1	No	N	Ministry requirement
Min015	Expat01501B	Community meeting for confirmation	3	100	100	Statutory	1	No	N	Ministry requirement

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Min015	Expat01501B	Entitlements assigned	1	100	100	Statutory	1	No	N	Ministry requirement
Min015	Expat01502A	Receive and verify adopter	7	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502A	Identification of adoptee	14	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502A	Place adoptee with adopter for live-in	60	100	100	Statutory	1	No	N	30 days for Zambians
Min015	Expat01502A	Approve/ disapprove adoption	7	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502A	Place adoptee for permanent live-in	7	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502B	Receive application	7	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502B	Vet and identify adoptee	14	100	100	Statutory	1	No	N	Legal requirement
Min015	Expat01502B	Approve for pre-adoption interval	30	100	80	Statutory	2	Most Unlikely	N	Sometimes can be monitored/approved
Min015	Expat01502B	Approve for adoption	14	100	100	Statutory	1	No	N	Finalizing adoption
Min015	Expat01502B	Placement into permanent adoption	7	100	100	Statutory	1	No	N	Finalizing adoption

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Min016	Expat01601A	Dispatch	24	8	5	Statutory	2	Most Unlikely	N	This must be done
Min016	Expat01601A	Approved Signature	11	5	4	Other	6	Possibly	Y	This can be adjusted
Min016	Expat01601A	Disbursement of funds	48	5	6	Statutory	1	No	N	This must be done
Min016	Expat01601A	Audits	72	8	5	Statutory	1	No	N	This must be done
Min016	Expat01601A	Accountability	48	6	5	Statutory	2	Most Unlikely	N	This is sometimes not done
Min016	Expat01601A	Project Reporting	120	9	5	Statutory	1	No	N	This must be done
Min016	Expat01601B	Deliverable and Approval	36	9	5	Statutory	1	No	N	This must be done
Min016	Expat01601B	Disbursed Funds	48	8	5	Statutory	1	No	N	This must be done
Min016	Expat01601B	Audits	96	5	6	Statutory	1	No	N	Some reports not done
Min016	Expat01601B	Accountability	48	8	5	Statutory	3	More Unlikely	N	This must be done
Min016	Expat01601B	Project Report	144	8	5	Statutory	1	No	N	
Min016	Expat01602A	Deliverable and Approval	36	9	5	Statutory	1	No	N	This must be done
Min016	Expat01602A	Disbursed Funds	48	8	5	Statutory	1	No	N	This must be done
Min016	Expat01602A	Audits	96	5	6	Statutory	1	No	N	This must be done
Min016	Expat01602A	Accountability	48	8	5	Statutory	3	More unlikely	N	Some reports not done
Min016	Expat01602A	Project Report	144	8	5	Statutory	1	No	N	This must be done
Min016	Expat01602B	Deliverable and Approval	36	9	5	Statutory	1	No	N	This must be done
Min016	Expat01602B	Disbursed Funds	48	8	5	Statutory	1	No	N	This must be done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min016	Expat01602B	Audits	96	5	6	Statutory	1	No	N	This must be done
Min016	Expat01602B	Accountability	48	8	5	Statutory	3	More unlikely	N	Some reports not done
Min016	Expat01602B	Project Report	144	8	5	Statutory	1	No	N	This must be done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min017	Expat01701A	Receive application form	1	10	10	Statutory	1	No	N	Mines Act
Min017	Expat01701A	Receive application payment	2	10	10	Statutory	1	No	N	Mines Act
Min017	Expat01701A	Verify area	40	10	10	Statutory	1	No	N	Estimated duration; can be more or less
Min017	Expat01701A	Delimitation of area	20	10	10	Statutory	1	No	N	Estimated duration; can be more or less
Min017	Expat01701A	Offer letter to applicant	14	10	10	Statutory	1	No	N	Estimated duration; can be more or less
Min017	Expat01701A	Receive payment for mining area	1	10	10	Statutory	1	No	N	Estimated duration; can be more or less
Min017	Expat01701A	Issue license	14	10	10	Statutory	1	No	N	Estimated duration; can be more or less
Min017	Expat01701B	Receive and review application	1	100	100	Statutory	1	No	N	Legal requirement
Min017	Expat01701B	Receive proof of payment	1	100	100	Statutory	1	No	N	Legal requirement
Min017	Expat01701B	Verify area	74	100	100	Statutory	1	No	N	Within 74-day period
Min017	Expat01701B	Delinieate mining area	74	100	100	Statutory	1	No	N	Within 74-day period

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min017	Expat01701B	Prepare Offer Letter	74	100	100	Statutory	1	No	N	Within 74-day period
Min017	Expat01701B	Verify area payment	1	100	100	Statutory	1	No	N	Legal requirement
Min017	Expat01701B	Issue Mining license	14	100	100	Statutory	1	No	N	Legal requirement

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min018	Expat01802A	Examine report brought to attention	24	10	10	Statutory	1	No	N	Required
Min018	Expat01802A	Notify PS on effects	48	10	8	Statutory	3	More unlikely	N	Only when necessary
Min018	Expat01802A	Outline speech / press release	30	10	6	Statutory	3	More unlikely	N	Only when necessary
Min018	Expat01802A	Issue statement	24	10	6	Statutory	2	Most Unlikely	N	Only when necessary
Min018	Expat01802A	Prepare ministerial speech	48	10	6	Statutory	2	Most Unlikely	N	Only when necessary
Min018	Expat01803A	Notify registered churches	14	10	10	Statutory	1	No	N	Established
Min018	Expat01803A	Arrange venues and logistics	30	10	6	Other	5	Maybe	Y	This is also decentralized
Min018	Expat01803A	Arrange security for venue	30	10	10	Statutory	1	No	N	According to law and procedure
Min018	Expat01803A	Register participation	30	10	10	Statutory	1	No	N	According to law and procedure
Min018	Expat01803A	Notify guests of honor	30	10	10	Statutory	1	No	N	According to law and procedure
Min018	Expat01803A	Feedback after function	7	10	6	Other	5	Maybe	Y	Not always done
Min018	Expat01803B	Notify church body	7	10	10	Statutory	1	No	N	Legal
Min018	Expat01803B	Arrange logistics	30	10	5	Other	5	Maybe	Y	Can be delegated
Min018	Expat01803B	Notify security for venue	30	10	10	Statutory	1	No	N	Legal

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min018	Expat01803B	Obtain information on guests of honor	30	10	10	Statutory	1	No	N	Legal
Min018	Expat01803B	Feedback	30	10	8	Other	5	Maybe	Y	Not mandatory
Min018	Expat01804A	Examine reports and submission	30	10	10	Statutory	1	No	N	Must be legal
Min018	Expat01804A	Checklist for vetting to next stage	30	10	10	Statutory	1	No	N	Must be legal
Min018	Expat01804A	Make recommendations	60	10	10	Statutory	1	No	N	Must be legal
Min018	Expat01804A	Refer body to register / not register	60	10	10	Statutory	1	No	N	Must be legal
Min018	Expat01804A	Allow appeal	7	10	10	Statutory	1	No	N	Must be legal

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min021	Expat02101A	Accept proposals from youth groups	3	10	10	Statutory	1	No	N	Requirement by law
Min021	Expat02101A	Table proposals with committee	6	10	10	Statutory	1	No	N	Requirement by law
Min021	Expat02101A	Shortlist successful bids	6	10	6	Statutory	1	No	N	Requirement by law
Min021	Expat02101A	Invite applicants for interviews	3	10	4	Other	1	No	N	Some groups do not need interview
Min021	Expat02101A	Align successful applicants	1	10	10	Statutory	1	No	N	Requirement by law
Min021	Expat02101A	Notify successful applicants	3	10	10	Statutory	1	No	N	Requirement by law
Min021	Expat02101A	Recommend to Provincial Committee	2	10	10	Statutory	1	No	N	Further processing and funding
Min021	Expat02101B	Receive applications from business for youth	2	10	10	Statutory	1	No	N	Required
Min021	Expat02101B	Screen applications that qualify	4	10	10	Statutory	1	No	N	Required
Min021	Expat02101B	Draw up shortlist of successful applicants	6	10	8	Statutory	1	No	N	Required
Min021	Expat02101B	Interview applicants	2	10	5	Other	5	Maybe	Y	Some not interviewed
Min021	Expat02101B	Confirm successful applicants	3	10	5	Other	5	Maybe	Y	Could be skipped
Min021	Expat02101B	Forward list to provincial office	1	10	10	Statutory	1	No	N	Required
Min021	Expat02103A	Check agreement with wresterls	20	10	10	Statutory	1	No	N	Statutory

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min021	Expat02103A	Verify amounts agreed for wresters	15	10	10	Statutory	1	No	N	Statutory
Min021	Expat02103A	Verify guarantee for participating	15	10	10	Statutory	1	No	N	Statutory
Min021	Expat02103A	Register officials for tournamet	10	10	10	Statutory	1	No	N	Statutory
Min021	Expat02103A	Poster production satisfactory	5	10	10	Statutory	1	No	N	Statutory
Min021	Expat02103A	Physical fitness confirmation certified	5	10	10	Statutory	1	No	N	Statutory
Min021	Expat02103A	Grant license for tournamet	20	10	10	Statutory	1	No	N	Statutory
Min021	Expat02104B	Verify required documents	15	10	10	Statutory	1	No	N	Statutory
Min021	Expat02104B	Allow application form submission	30	10	10	Statutory	1	No	N	Statutory
Min021	Expat02104B	Forward application for Registrar audit	60	10	10	Statutory	1	No	N	Statutory
Min021	Expat02104B	Inspection of applicable venues and provisions	120	10	8	Statutory	1	No	N	Statutory: Different days
Min021	Expat02104B	Issue of provisional certificate pending recommendations	120	10	5	Statutory	1	No	N	Depends on whether extra work needed
Min021	Expat02104B	Certificate issued	10	10	10	Statutory	1	No	N	Statutory: Different days

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min022	Expat02201B	Receive Proposition from Energy company	24	100	100	Statutory	1	No	N	Regulatory requirement
Min022	Expat02201B	Evaluate proposition	48	100	80	Statutory	1	No	N	Regulatory requirement
Min022	Expat02201B	Get stakeholder Input	48	100	50	Other	5	Maybe	Y	Sometimes not done depending on nature
Min022	Expat02201B	Give feedback to Energy company	24	100	100	Statutory	2	Most Unlikely	N	Regulatory requirement
Min022	Expat02201B	Recommend Tariff change/no change	24	100	100	Statutory	1	No	N	Regulatory requirement
Min022	Expat02201B	Monitor implementation/ recommendation	48	100	100	Statutory	1	No	N	Regulatory requirement
Min022	Expat02202A	Receive Application from user	14	10	10	Statutory	1	No	N	Required
Min022	Expat02202A	Verify correctness	1	10	10	Statutory	1	No	N	Required
Min022	Expat02202A	Scope connection area	7	10	6	Statutory	1	No	N	Depends on workload
Min022	Expat02202A	Issue Quotation to Client	7	10	10	Statutory	1	No	N	Required
Min022	Expat02202A	Receive Payment from Client	7	10	10	Statutory	1	No	N	Required
Min022	Expat02202A	Make connection to grid	14	10	10	Statutory	1	No	N	Required
Min022	Expat02202A	Handover of connected premises	1	10	10	Statutory	1	No	N	Required
Min022	Expat02202B	Receive Application	14	10	10	Statutory	1	No	N	As required
Min022	Expat02202B	Survey connection area	7	10	10	Statutory	1	No	N	As required

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min022	Expat02202B	Make Quotation to client	7	10	10	Statutory	1	No	N	As required
Min022	Expat02202B	Verify Client payment	7	10	10	Statutory	1	No	N	As required
Min022	Expat02202B	Make connection	14	10	10	Statutory	1	No	N	As required
Min022	Expat02202B	Handover to client	1	10	10	Statutory	1	No	N	As required
Min022	Expat02203B	Determine coverage of loadshedding	14	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Zone areas for loadshedding	14	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Set up levels	14	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Notify affected areas with level	2	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Determine developments	2	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Adjust according to new development	2	100	100	Statutory	1	No	N	Required
Min022	Expat02203B	Notify areas with new level	2	100	100	Statutory	1	No	N	Required
Min022	Expat02204A	Receive fault report	60	10	10	Statutory	1	No	N	Can be done online
Min022	Expat02204A	Assign fault number	15	10	10	Statutory	1	No	N	Automated in most cases
Min022	Expat02204A	Identify fault area	30	10	10	Statutory	1	No	N	Automated in most cases
Min022	Expat02204A	Send Technicians to fault area	120	10	5	Other	5	Maybe	Y	Depends on fault
Min022	Expat02204A	Log corrective action	20	10	10	Statutory	1	No	N	Required
Min022	Expat02204A	Respond to complainant	60	10	10	Statutory	1	No	N	Can be done online
Min022	Expat02204A	Get feedback	60	10	5	Other	5	Maybe	Y	Not always done
Min022	Expat02204B	Get fault report from client	60	10	10	Statutory	1	No	N	Must be done
Min022	Expat02204B	Log fault and assign number	30	10	10	Statutory	1	No	N	Must be done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min022	Expat02204B	Locate area of fault report	30	10	10	Statutory	1	No	N	Must be done
Min022	Expat02204B	Roll out corrective measures	60	10	10	Statutory	1	No	N	Can take longer depending on fault
Min022	Expat02204B	Fill out log for solution	15	10	10	Statutory	1	No	N	Must be done
Min022	Expat02204B	Get/give feedback	60	10	5	Other	6	Possibly	Y	Not always done

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min023	Expat02301A	Premises inspection and approval	60	10	10	Statutory	1	No	N	May require physical inspection
Min023	Expat02301A	ZRA tax clearance	15	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	Investment license (ZDA/PACRA)	10	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	List of drivers and PSV licensing copies	25	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	Comprehensive Insurance evidence	20	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	Public liability documentation	10	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	Fitness and white books	20	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301A	Verify banking details	15	10	10	Statutory	1	No	N	Mandatory step
Min023	Expat02301B	Verification of premises	20	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Tax clearance documentation	15	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Verification of Investment License	10	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Drivers' PSV evidence	15	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Insurance cover (comprehensive)	25	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Public liability and certificate of fitness	5	10	10	Statutory	1	No	N	Requirement
Min023	Expat02301B	Evidence of white book for vehicles	10	10	6	Statutory	1	No	N	Can be done at fitness verification
Min023	Expat02301B	Bank account verification	10	10	10	Statutory	1	No	N	Requirement

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min023	Expat02303A	Process application from organization	1	10	10	Statutory	1	No	N	Required by law
Min023	Expat02303A	Plan grading logistics	2	10	10	Statutory	1	No	N	Required by law
Min023	Expat02303A	Dispatch Inspection team	1	10	10	Statutory	1	No	N	Required by law
Min023	Expat02303A	Carry out inspection	14	10	10	Statutory	1	No	N	Can be shorter
Min023	Expat02303A	Report and recommend	5	10	10	Statutory	1	No	N	Required by law
Min023	Expat02303A	Star Award	3	10	10	Statutory	1	No	N	May require discussion
Min023	Expat02303A	Inform organization	2	10	10	Statutory	1	No	N	Required by law
Min023	Expat02303B	Receive application from establishment	1	10	10	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Approve grading plan	2	10	6	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Allocate Inspector for grading	1	10	5	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Grade establishment from checklist	14	10	10	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Write report and justification	5	10	10	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Table discussion	5	10	5	Other	5	Maybe	Y	Sometimes dispensed
Min023	Expat02303B	Award Star	2	10	10	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Inform establishment	2	10	10	Statutory	1	No	N	Act 13, 2015
Min023	Expat02303B	Authorize category	2	10	5	Statutory	1	No	N	Act 13, 2015, formality

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min024	Expat02402A	Accept documentation	1	100	100	Statutory	1	No	N	ZRA, Customs documentations
Min024	Expat02402A	Allocate appointment slot	2	100	100	Statutory	1	No	N	Depends on availability
Min024	Expat02402A	Proof of Interpol examination of vehicle	1	100	60	Statutory	1	No	N	Can be done in advance
Min024	Expat02402A	Physical Exam	1	100	100	Statutory	1	No	N	Must be done
Min024	Expat02402A	Cleared for number plate printing	1	100	100	Statutory	1	No	N	Must be done
Min024	Expat02402B	Documentation verification	1	10	10	Statutory	1	No	N	Must
Min024	Expat02402B	Appointmnet for physical exam	2	10	8	Statutory	2	Most Unlikely	N	Can be shorter
Min024	Expat02402B	Interpol exam audit	1	10	5	Statutory	2	Most Unlikely	N	Usually done at entry with ZRA process
Min024	Expat02402B	Physical Examination	1	10	10	Statutory	1	No	N	Must
Min024	Expat02402B	Authorized to affix number plate	1	10	10	Statutory	1	No	N	Must
Min024	Expat02403A	Confirm certificate of incorporation	15	10	10	Statutory	1	No	N	Can use NRC
Min024	Expat02403A	Confirm tax clearance	15	10	10	Statutory	1	No	N	Cannot proceed without this
Min024	Expat02403A	Confirm Investment license	15	10	10	Statutory	1	No	N	Cannot proceed without this

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min024	Expat02403A	Confirm vehicle inventory	60	10	8	Statutory	2	Most Unlikely	N	Cannot proceed without this
Min024	Expat02403A	List of drivers	30	10	8	Statutory	3	More unlikely	N	Cannot proceed without this
Min024	Expat02403A	All fees paid	15	10	10	Statutory	1	No	N	Cannot proceed without this
Min024	Expat02403A	Issue certificate	15	10	10	Statutory	1	No	N	Cannot proceed without this
Min024	Expat02403B	Accept incorporation certificate	20	10	10	Statutory	1	No	N	Mandatory
Min024	Expat02403B	ZRA tax certificate evidence	15	10	10	Statutory	1	No	N	Mandatory
Min024	Expat02403B	Investment license evidence	10	10	10	Statutory	1	No	N	Mandatory
Min024	Expat02403B	Vehicle List presentation	30	10	5	Statutory	1	No	N	Time can be shorter
Min024	Expat02403B	Drivers List presentation	25	10	5	Statutory	1	No	N	Time can be shorter
Min024	Expat02403B	Confirm fees required are paid	15	10	10	Statutory	1	No	N	Mandatory
Min024	Expat02403B	Issue Certificate to applicant	10	10	10	Statutory	1	No	N	Mandatory

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min025	Expat02501B	Set up Terms of Reference	24	10	10	Statutory	1	No	N	Must be done
Min025	Expat02501B	Evaluate terms of reference at committee	15	10	10	Statutory	1	No	N	Must be done
Min025	Expat02501B	Set up forms for bidding	8	10	6	Statutory	1	No	N	Must be done
Min025	Expat02501B	Cost tendering process for applicants	5	10	5	Statutory	1	No	N	Must be done
Min025	Expat02501B	Set up period of bidding	10	10	10	Statutory	1	No	N	Must be done
Min025	Expat02501B	Issue tender	5	10	8	Statutory	1	No	N	Must be done
Min025	Expat02501B	Receive and process Tender	20	10	6	Statutory	1	No	N	Must be done
Min025	Expat02501B	Public brief of tender	20	10	10	Statutory	1	No	N	Must be done
Min025	Expat02501B	Award of tender		10	10	Statutory	1	No	N	Must be done
Min025	Expat02502B	Check schedule for maintenance	2	10	60	Statutory	3	More unlikely	N	Not always done
Min025	Expat02502B	List logistics for maintenance	5	10	10	Statutory	1	No	N	Statutory
Min025	Expat02502B	Adjust logistics according to budget	2	10	5	Statutory	1	No	N	Statutory
Min025	Expat02502B	Execute maintenance	28	10	10	Statutory	1	No	N	Statutory
Min025	Expat02502B	Log maintenance work done	7	10	10	Statutory	1	No	N	Statutory
Min025	Expat02502B	Update meinatnace schedule list	2	10	10	Statutory	1	No	N	Statutory

APPENDIX III

Analysis of Templates with Advisories

Analysis of each Ministry's templates is presented here.

Min001

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total
CHECK	**Expert 1A**	6		KM-1	70
	Expert 1B	5	**1**		65
OK	**Expert 2A**	7		KM-2	75
	Expert 2B	7	**0**		68

		Threshold	Weight
Expert 1	A	54	31
	B	25	14
Expert 2	A	35	35
	B	70	52

CHECK-1
CHECK-2

Indication advisory

KM-1	Symbolic	6	KM-2	Symbolic	1
	Ceremonial	2		Ceremonial	0

Indication	**CHECK**	**OK**	**CHECK**
	Check Artefact alignment	OK No Action Required	Experts' Duration needs alignment

CHECK-1	**CHECK-2**
Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B

KM-1	KM-2
Review artefacts for change or drop	Review artefacts for change or drop

Expert 1 Note any actions recommended
Expert 2 Note any actions recommended

AIII-2

Min002

		Artefact Lines	Variance	Duration Analysis KM-AQ	Duration Analysis Total
CHECK	**Expert 1A**	8		KM-1	216
	Expert 1B	9	**-1**		264
CHECK	**Expert 2A**	5		KM-2	216
	Expert 2B	4	**1**		192

			Weight Totals Threshold	Weight Totals Weight
Expert 1	A	CHECK-1	80	66
	B		90	81
Expert 2	A	CHECK-2	50	33
	B		40	25

Indication advisory					
KM-1	Symbolic	2	KM-2	Symbolic	0
	Ceremonial	0		Ceremonial	0

Indication	**CHECK**	**CHECK**	**CHECK**
	Check Artefact alignment	Check Artefact alignment	Experts' Duration needs alignment

CHECK-1	**CHECK-2**
Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B

KM-1	OK
Review artefacts for change or drop	OK

Expert 1 Note any actions recommended

Expert 2 Note any actions recommended

								Min006										
		Artefact	Variance	**Duration Analysis**						**Weight Totals**			**Indication advisory**					
		Lines		**KM-AQ**	**Total**					**Threshold**	**Weight**							
OK	**Expert 1A**	6		KM-1	186		Expert 1	A	CHECK-1	600	450		KM-1	Symbolic	0	KM-2	Symbolic	0
	Expert 1B	6	**0**		248			B		60	51			Ceremonial	0		Ceremonial	0
OK	**Expert 2A**	5		KM-2	224		Expert 2	A	OK	50	38							
	Expert 2A	5	**0**		224			B		50	38							
Indication		**OK**	**OK**		**CHECK**			**CHECK-1**	**OK**					OK	OK			
		OK No Action Required	OK No Action Required		Experts' Duration needs alignment			Use uniform Threshold and Weight for A & B	OK					OK	OK			
								Expert 1	Note any actions recommended									
								Expert 2	There is no comparative Expert, or analysis is new									

Min007

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total				Weight Totals Threshold	Weight	Indication advisory					
OK	**Expert 1A**	6		KM-1	20	Expert 1	A	OK	600	600	KM-1	Symbolic	1	KM-2	Symbolic	2
	Expert 1A	6	**0**		20		B		600	600		Ceremonial	0		Ceremonial	0
OK	**Expert 2B**	7		KM-2	45	Expert 2	A	OK	700	690						
	Expert 2B	7	**0**		45		B		700	690	KM-3	Symbolic	0			
CHECK	**Expert 3A**	6		KM-3	11	Expert 3	A	CHECK-3	600	530		Ceremonial	0			
	Expert 3B	5	**1**		6		B		500	500						

Indication	**OK**	**OK**		**OK**		**OK**	**OK**	**CHECK-3**		KM-1	KM-2		OK	OK
	OK No Action Required	OK No Action Required		OK		OK	OK	Use uniform Threshold and Weight for A & B		Review artefacts for change or drop	Review artefacts for change or drop		OK	OK

CHECK
Check Artefact alignment

Expert 1	There is no comparative Expert, or analysis is new
Expert 2	There is no comparative Expert, or analysis is new
Expert 3	Note any actions recommended

Min008

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total
CHECK	**Expert 1A**	5		KM-1	50
	Expert 1B	8	**-3**		105
OK	**Expert 2A**	8		KM-2	188
	Expert 2B	8	**0**		184
OK	**Expert 3A**	7		KM-3	123
	Expert 3B	7	**0**		125
CHECK	**Expert 4A**	10		KM-4	410
	Expert 4B	9	**1**		386

		Weight Totals Threshold	Weight
Expert 1	A	25	26
	B	40	45
Expert 2	A	65	42
	B	50	46
Expert 3	A	68	44
	B	63	36
Expert 4	A	100	87
	B	45	40

Indication advisory					
KM-1	Symbolic	3	KM-2	Symbolic	1
	Ceremonial	0		Ceremonial	0
KM-3	Symbolic	1	KM-4	Symbolic	0
	Ceremonial	0		Ceremonial	0

Indication	**CHECK**	**OK**	**CHECK**
	Check Artefact alignment	OK No Action Required	Experts' Duration needs alignment

CHECK-1	**CHECK-2**	**CHECK-3**	**CHECK-4**
Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B

KM-1	KM-2	KM-3	OK
Review artefacts for change or drop	Review artefacts for change or drop	Review artefacts for change or drop	OK

OK	**CHECK**
OK No Action Required	Check Artefact alignment

Expert 1	Note any actions recommended
Expert 2	Note any actions recommended
Expert 3	Note any actions recommended
Expert 4	Note any actions recommended

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total
CHECK	**Expert 1A**	6		KM-1	131
	Expert 1B	7	**-1**		160
CHECK	**Expert 2A**	7		KM-2	54
	Expert 2B	5	**2**		51
CHECK	**Expert 3A**	8		KM-3	54
	Expert 3B	6	**2**		46
OK	**Expert 4A**	8		KM-4	176
	Expert 4B	8	**0**		176

Indication		**CHECK**	**CHECK**		**CHECK**
		Check Artefact alignment	Check Artefact alignment		Experts' Duration needs alignment

CHECK	**OK**
Check Artefact alignment	OK No Action Required

Min009

			Threshold	Weight
Expert 1	A	CHECK-1	60	47
	B		35	21
Expert 2	A	CHECK-2	70	56
	B		50	41
Expert 3	A	CHECK-3	80	78
	B		60	58
Expert 4	A	OK	80	74
	B		80	71

CHECK-1	**CHECK-2**	**CHECK-3**	**OK**
Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	OK

Expert 1 Note any actions recommended
Expert 2 Note any actions recommended
Expert 3 Note any actions recommended
Expert 4 Note any actions recommended

Indication advisory

KM-1	Symbolic	3	KM-2	Symbolic	0
	Ceremonial	2		Ceremonial	0
KM-3	Symbolic	0	KM-4	Symbolic	0
	Ceremonial	0		Ceremonial	0

KM-1	OK		OK	OK
Review artefacts for change or drop	OK		OK	OK

AIII-7

Min010

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total
CHECK	**Expert 1A**	7		KM-1	148
	Expert 1B	6	**1**		444
CHECK	**Expert 2A**	6		KM-2	255
	Expert 2B	8	**-2**		283
OK	**Expert 3A**	7		KM-3	75
	Expert 3B	7	**0**		70
CHECK	**Expert 4A**	5		KM-4	144
	Expert 4B	4	**1**		120

		Weight Totals Threshold	Weight
Expert 1	A	70	59
	B	60	54
Expert 2	A	60	48
	B	80	51
Expert 3	A	70	65
	B	70	66
Expert 4	A	50	28
	B	40	36

CHECK-1	70	59	
	60	54	
CHECK-2	60	48	
	80	51	
OK	70	65	
	70	66	
CHECK-4	50	28	
	40	36	

Indication advisory					
KM-1	Symbolic	0	KM-2	Symbolic	0
	Ceremonial	0		Ceremonial	0
KM-3	Symbolic	0	KM-4	Symbolic	0
	Ceremonial	0		Ceremonial	0

Indication																
		CHECK	**CHECK**		**CHECK**		**CHECK-1**	**CHECK-2**	**OK**	**CHECK-4**		OK	OK		OK	OK
		Check Artefact alignment	Check Artefact alignment		Experts' Duration needs alignment		Use uniform Threshold and Weight for A & B	Use uniform Threshold and Weight for A & B	OK	Use uniform Threshold and Weight for A & B		OK	OK		OK	OK
		OK	**CHECK**													
		OK No Action Required	Check Artefact alignment													

Expert 1	Note any actions recommended
Expert 2	Note any actions recommended
Expert 3	Note any actions recommended
Expert 4	Note any actions recommended

							Min011											
		Artefact	Variance	**Duration Analysis**					**Weight Totals**					**Indication advisory**				
		Lines		**KM-AQ**	**Total**				**Threshold**	**Weight**								
OK	**Expert 1A**	6		KM-1	85	Expert 1	A	OK	60	50		KM-1	Symbolic	0		KM-2	Symbolic	0
	Expert 1B	6	**0**		86		B		60	45			Ceremonial	0			Ceremonial	0
CHECK	**Expert 2A**	4		KM-2	20	Expert 2	A	CHECK-2	40	30								
	Expert 2B	6	**-2**		288		B		600	480								
Indication		**OK**	**CHECK**		**CHECK**				**OK**	**CHECK-2**			OK					OK
		OK No Action Required	Check Artefact alignment		Experts' Duration needs alignment				OK	Use uniform Threshold and Weight for A & B			OK					OK
							Expert 1	Note any actions recommended										
							Expert 2	Note any actions recommended										

								Min013											
		Artefact	Variance	**Duration Analysis**						**Weight Totals**			**Indication advisory**					
		Lines		**KM-AQ**	**Total**					**Threshold**	**Weight**								
CHECK	**Expert 1A**	7		KM-1	39		Expert 1	A	CHECK-1	70	58		KM-1	Symbolic	0	KM-2	Symbolic	0	
	Expert 1B	6	**1**		29			B		60	50			Ceremonial	0		Ceremonial	0	
OK	**Expert 2A**	5		KM-2	18		Expert 2	A	OK	50	35								
	Expert 2B	5	**0**		14			B		50	35								
Indication		**CHECK**	**OK**		**CHECK**					**CHECK-1**	**OK**		OK					OK	
		Check Artefact alignment	OK No Action Required		Experts' Duration needs alignment					Use uniform Threshold and Weight for A & B	OK		OK					OK	
								Expert 1	Note any actions recommended										
								Expert 2	Note any actions recommended										

Min014

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total				Weight Totals Threshold	Weight	Indication advisory					
OK	**Expert 1A**	6		KM-1	216	Expert 1	A	OK	60	44	KM-1	Symbolic	0	KM-2	Symbolic	0
	Expert 1A	6	**0**		216		B		60	44		Ceremonial	0		Ceremonial	0
OK	**Expert 2B**	7		KM-2	265	Expert 2	A	OK	700	630						
	Expert 2B	7	**0**		265		B		700	630	KM-3	Symbolic	0			
OK	**Expert 3A**	7		KM-3	336	Expert 3	A	OK	70	66		Ceremonial	0			
	Expert 3B	7	**0**		264		B		70	65						

Indication	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**			OK	OK		OK
	OK No Action Required	OK No Action Required	OK	OK	OK	OK			OK	OK		OK

OK
OK No Action Required

Expert 1 There is no comparative Expert, or analysis is new
Expert 2 There is no comparative Expert, or analysis is new
Expert 3 Note any actions recommended

								Min015											
		Artefact	Variance	**Duration Analysis**						**Weight Totals**					**Indication advisory**				
		Lines		**KM-AQ**	**Total**					**Threshold**	**Weight**								
OK	**Expert 1A**	7		KM-1	122		Expert 1	A	OK	700	630		KM-1	Symbolic	0	KM-2	Symbolic	0	
	Expert 1B	7	**0**		106			B		700	680			Ceremonial	0		Ceremonial	0	
OK	**Expert 2A**	5		KM-2	95		Expert 2	A	OK	500	500								
	Expert 2B	5	**0**		72			B		500	480								
Indication		**OK**	**OK**		**CHECK**					**OK**	**OK**			OK				OK	
		OK No Action Required	OK No Action Required		Experts' Duration needs alignment					OK	OK			OK				OK	
								Expert 1	Note any actions recommended										
								Expert 2	Note any actions recommended										

Min016

		Artefact Lines	Variance	Duration Analysis KM-AQ	Duration Analysis Total
CHECK	**Expert 1A**	6		KM-1	323
	Expert 1B	5	**1**		372
OK	**Expert 2A**	5		KM-2	372
	Expert 2B	5	**0**		372

		Weight Totals Threshold	Weight Totals Weight
Expert 1	A	41	30
	B	38	26
Expert 2	A	38	26
	B	38	26

CHECK-1			
OK			

Indication advisory				
KM-1	Symbolic	0	KM-2 Symbolic	0
	Ceremonial	0	Ceremonial	0

Indication	**CHECK**	**OK**	**CHECK**	**CHECK-1**	**OK**	OK	OK
	Check Artefact alignment	OK No Action Required	Experts' Duration needs alignment	Use uniform Threshold and Weight for A & B	OK	OK	OK

Expert 1 Note any actions recommended

Expert 2 Note any actions recommended

								Min017										
		Artefact	Variance	**Duration Analysis**						**Weight Totals**				**Indication advisory**				
		Lines		**KM-AQ**	**Total**					**Threshold**	**Weight**							
OK	**Expert 1A**	7		KM-1	92		Expert 1	A	CHECK-1	70	70		KM-1	Symbolic	0			
	Expert 1B	7	**0**		239			B		700	700			Ceremonial	0			
Indication		**OK**			**CHECK**					**CHECK-1**				OK				
		OK No Action Required			Experts' Duration needs alignment					Use uniform Threshold and Weight for A & B				OK				
								Expert 1	Note actions recommended									

Min018

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total				Weight Totals Threshold	Weight	Indication advisory					
OK	**Expert 2A**	5		KM-2	174	Expert 2	A	OK	50	36	KM-2	Symbolic	0	KM-3	Symbolic	0
	Expert 2A	5	**0**		174		B		50	36		Ceremonial	0		Ceremonial	0
CHECK	**Expert 3A**	6		KM-3	141	Expert 3	A	CHECK-3	60	52						
	Expert 3B	5	**1**		127		B		50	43	KM-4	Symbolic	0			
OK	**Expert 4A**	5		KM-4	187	Expert 4	A	OK	50	50		Ceremonial	0			
	Expert 4A	5	**0**		187		B		50	50						

Indication		**OK**	**CHECK**		**CHECK**		**OK**	**CHECK-3**	**OK**			OK	OK		OK	OK
		OK No Action Required	Check Artefact alignment		Experts' Duration needs alignment		OK	Use uniform Threshold and Weight for A & B	OK			OK	OK		OK	OK

OK
OK No Action Required

Expert 2 There is no comparative Expert, or analysis is new

Expert 3 Note any actions recommended

Expert 4 There is no comparative Expert, or analysis is new

Min021

		Artefact Lines	Variance	Duration Analysis KM-AQ	Total
CHECK	**Expert 1A**	7		KM-1	24
	Expert 1B	6	**1**		18
OK	**Expert 3A**	7		KM-3	90
	Expert 3A	7	**0**		90
OK	**Expert 4B**	6		KM-4	355
	Expert 4B	6	**0**		355

			Weight Totals Threshold	Weight
Expert 1	A	CHECK-1	70	60
	B		60	48
Expert 3	A	OK	70	70
	B		70	70
Expert 4	A	OK	60	53
	B		60	53

Indication advisory					
KM-1	Symbolic	0	KM-3	Symbolic	0
	Ceremonial	0		Ceremonial	0
KM-4	Symbolic	0			
	Ceremonial	0			

Indication	**CHECK**	**OK**	**CHECK**	**CHECK-1**	**OK**	**OK**	OK	OK	OK
	Check Artefact alignment	OK No Action Required	Experts' Duration needs alignment	Use uniform Threshold and Weight for A & B	OK	OK	OK	OK	OK

OK
OK No Action Required

Expert 1	Note any actions recommended
Expert 3	There is no comparative Expert, or analysis is new
Expert 4	There is no comparative Expert, or analysis is new

							Min022												
		Artefact	Variance	**Duration Analysis**					**Weight Totals**					**Indication advisory**					
		Lines		**KM-AQ**	**Total**				**Threshold**	**Weight**									
OK	**Expert 1B**	6		KM-1	216	Expert 1	A	OK	600	530		KM-1	Symbolic	0		KM-2	Symbolic	0	
	Expert 1B	6	**0**		216		B		600	530			Ceremonial	0			Ceremonial	0	
CHECK	**Expert 2A**	7		KM-2	51	Expert 2	A	CHECK-2	70	66									
	Expert 2B	6	**1**		50		B		60	60		KM-3	Symbolic	0		KM-4	Symbolic	0	
OK	**Expert 3B**	7		KM-3	50	Expert 3	A	OK	700	700			Ceremonial	0			Ceremonial	0	
	Expert 3B	7	**0**		50		B		700	700									
CHECK	**Expert 4A**	7		KM-4	365	Expert 4	A	CHECK-4	70	60									
	Expert 4B	6	**1**		255		B		60	55									
Indication		**OK**	**CHECK**		**CHECK**		**OK**	**CHECK-2**	**OK**	**CHECK-4**			OK	OK			OK	OK	
		OK No Action Required	Check Artefact alignment		Experts' Duration needs alignment		OK	Use uniform Threshold and Weight for A & B	OK	Use uniform Threshold and Weight for A & B			OK	OK			OK	OK	

OK	**CHECK**
OK No Action Required	Check Artefact alignment

Expert 1	There is no comparative Expert, or analysis is new
Expert 2	Note any actions recommended
Expert 3	There is no comparative Expert, or analysis is new
Expert 4	Note any actions recommended

							Min023											
		Artefact	Variance	**Duration Analysis**					**Weight Totals**					**Indication advisory**				
		Lines		**KM-AQ**	**Total**				**Threshold**	**Weight**								
OK	**Expert 1A**	8		KM-1	175	Expert 1	A	OK	80	80		KM-1	Symbolic	0	KM-2	Symbolic	0	
	Expert 1B	8	**0**		110		B		80	76			Ceremonial	0		Ceremonial	0	
CHECK	**Expert 2A**	7		KM-2	28	Expert 2	A	CHECK-2	70	70								
	Expert 2B	9	**-2**		34		B		90	71								
Indication		**OK**	**CHECK**		**CHECK**				**OK**	**CHECK-2**			OK				OK	
		OK No Action Required	Check Artefact alignment		Experts' Duration needs alignment				OK	Use uniform Threshold and Weight for A & B			OK				OK	
							Expert 1	Note any actions recommended										
							Expert 2	Note any actions recommended										

								Min024											
		Artefact	Variance	**Duration Analysis**							**Weight Totals**				**Indication advisory**				
		Lines		**KM-AQ**	**Total**						**Threshold**	**Weight**							
OK	**Expert 2A**	5		KM-2	6	Expert 2	A	CHECK-2			500	460		KM-2	Symbolic	0	KM-3	Symbolic	0
	Expert 2B	5	**0**		6		B				50	43			Ceremonial	0		Ceremonial	0
OK	**Expert 3A**	7		KM-3	165	Expert 3	A	OK			70	66							
	Expert 3B	7	**0**		125		B				70	60							
Indication		**OK**	**OK**		**CHECK**						**CHECK-2**	**OK**			OK				OK
		OK No Action Required	OK No Action Required		Experts' Duration needs alignment						Use uniform Threshold and Weight for A & B	OK			OK				OK
								Expert 2	Note any actions recommended										
								Expert 3	Note any actions recommended										

							Min025											
		Artefact	Variance	**Duration Analysis**					**Weight Totals**					**Indication advisory**				
		Lines		**KM-AQ**	**Total**				**Threshold**	**Weight**								
OK	**Expert 1B**	9		KM-1	107	Expert 1	A	CHECK-1	80	65		KM-1	Symbolic	0	KM-2	Symbolic	0
	Expert 1B	9	**0**		107		B		70	115			Ceremonial	0		Ceremonial	0
OK	**Expert 2B**	6		KM-2	46	Expert 2	A	OK	0	0								
	Expert 2B	6	**0**		46		B		0	0								
Indication		**OK**	**OK**		**OK**				**CHECK-1**	**OK**			OK				OK	
		OK No Action Required	OK No Action Required		OK				Use uniform Threshold and Weight for A & B	OK			OK				OK	
							Expert 1	There is no comparative Expert, or analysis is new										
							Expert 2	There is no comparative Expert, or analysis is new										

APPENDIX IV

Summaries of Overview Recommendations and Collections

Each Expert's entry as collected, noted as ***Expat00n0nA/B*** in each pairing where appropriate.

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min001	Expat00101A	Agriculture Extension Services	Farmer Input Support Program FISP	Registration of Voucher	
Min001	Expat00101B	Agricultural Extension Servies	Farmer Input Support Program	Register and Supply of Voucher	
Min001	Expat00102A	Plant Quarantine and Pytosanitary	Crop Infestation	Counteracting infestation	
Min001	Expat00102B	Plant Quarantine and Pytosanitary	Crop Infestation	Counteracting measures	4
Min002	Expat00201A	Patent and Company Registration Authority	Registering a Company in Zambia	Steps for registering a company	
Min002	Expat00201B	Patent and Company Registration Authority PACRA	Registration of a Compan	Major steps required for registering a company	
Min002	Expat00202A	Consumer Protection Commission	Receipt of consumer complaint	Consumer Protection	
Min002	Expat00202B	Consumer Protection Commission	Consumer Protection Procedure	Consumer Protection	4
Min022	Expat02201B	Energy Regulation Board	Approval of Tariffs	Negotiating Tariffs	
Min022	Expat02202A	ZESCO	Processing Connection of Power	Power Connection	
Min022	Expat02202B	ZESCO	Processing Connection of Power	Power Connection	
Min022	Expat02203B	Maintenance	Load shedding	Load shedding	
Min022	Expat02204A	Faults	Fault Handling	n/a	
Min022	Expat02204B	ZESCO	Faults	Fault Handling	6
Min006	Expat00601A	OSC	GBV Reports	Gender Based Violence	
Min006	Expat00601B	One Stop Center (Hospital/Police)	Reporting GBV	GBV	
Min006	Expat00602A		Collecting GBV information	GBV	3
Min007	Expat00701A	High School	Examinations processing	Exams Marking	

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min007	Expat00702B	Woodwork	Gathering requirements	Requirements	
Min007	Expat00703A	Primary School	Monthly Assessment	Individual summary	
Min007	Expat00703B	Senior Primary School	Assessment of Capability		4
Min008	Expat00801A	Patient Registration - Referral Center	Registering Patient at Initial Contact	OutPatient/Admission	
Min008	Expat00801B	Patient Registration - Referral Center	Registering Patient at Initial Contact	OutPatient/Admission	
Min008	Expat00802A	Doctor Consultation	Lab Sample Request	OutPatient/Admission	
Min008	Expat00802B	Doctor Consulting Room	Consultation	OutPatient/Admission	
Min008	Expat00803A	Admission for Pain	Administration of Pain Medication	OutPatient/Admission	
Min008	Expat00803B	Admission	Administering Pain Medication	OutPatient/Admission	
Min008	Expat00804A	Public Health	Disease Control	Infectious Disease Outbreak	
Min008	Expat00804B	Public Health	Disease Control	Infectious Disease Outbreak	8
Min009	Expat00901A	Bursaries Committee of Zambia	Student Loan	Granting Student Loan	
Min009	Expat00901B	Bursaries Committee of Zambia (behalf of MoHE)	Student Loan Base	Student Loan	
Min009	Expat00902A	Bursaries Committee of Zambia	Undergraduate Scholarship Grant	Scholarships Process	
Min009	Expat00902B	Bursaries Committee of Zambia	Scholarships Undergraduate	Processing Scholarships	
Min009	Expat00903A	Examination Council of Zambia (ECZ)	Marking Center Set up	Marking of Scripts for Examinations	
Min009	Expat00903B	Examination Council of Zambia	Marking Center Setting	Scripts Results to Examination Council	
Min009	Expat00904A	University of Zambia - Examinations	Examination Preparations	Examination Paper Management	
Min009	Expat00904B	University of Zambia - Examinations	Examination Administration	Question Paper Handling	8
Min010	Expat01001A	Passport Office	Passport KMS	Passport Issue	

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min010	Expat01001B	Passport Office	Passport Processing	Process of Passport Issue	
Min010	Expat01002A	Zambia Police Service	Traffic Offense	Ticketing of traffic offense	
Min010	Expat01002B	Zambia Police	Traffic Offence Ticket	Ticket Processing	
Min010	Expat01003A	National Registration Passport and Citizenship	National Registration Card	Citizenship: National Registration Card (NRC)	
Min010	Expat01003B	Immigration Department	Citizenship National Registration Card	Obtaining National Registration Card	
Min010	Expat01004A	Zambia Police Service	Permit to Assemble	Allowing Assembly/Protest	
Min010	Expat01004B	Zambia Police Service	Public Order procedure	Demonstration handling	8
Min011	Expat01101A	Independent Broadcasting Authority	Complaints on unethical reporting		
Min011	Expat01101B	IBA	Processing Complaints	Deciding to sanction a news source	
Min011	Expat01103A	Independent Broadcasting Authority	Obtaining broadcasting license	Licensing	
Min011	Expat01103B				4
Min013	Expat01301A	Occupational Health and Safety	Site Inspection	Inspection of Workplace	
Min013	Expat01301B	Occupational Health & Safety	Site Inspection	Verification of workplace safety	
Min013	Expat01302A	OHS	Labour complaint	Dismissal complaint	
Min013	Expat01302B	Occupational Health and Safety	Labour complaint	Unfair dismissal	4
Min014	Expat01401A	Chongwe Town Council	Obtaining Land	Interview process	
Min014	Expat01402B	Lands Registry	Digitilazing documentation	Digital production	
Min014	Expat01403A	Chongwe Town Council	Changing title from traditional land	Change of title	
Min014	Expat01403B	Chongwe Town Council	From traditional land to land title	Obtaining title for traditional land	4
Min015	Expat01501A	Social Welfare	Social Cash Transfer	Obtaining SCT	
Min015	Expat01501B	Social Welfare	Social Cash Transfer	Processing SCT	
Min015	Expat01502A	Social Welfare	Adoption	Adoption vetting	

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min015	Expat01502B	Social Welfare Department	Adopting a child	Adoption	4
Min016	Expat01601A	Procurement	Acquiring items/approved orders	N/A	
Min016	Expat01601B	Procurement	Acquiring items/approved orders	N/A	
Min016	Expat01602A	Procurement	Acquiring items/approved orders	N/A	
Min016	Expat01602B	Procurement	Acquiring items/approved orders	N/A	4
Min017	Expat01701A	Mines Development	Permit for mining		
Min017	Expat01701B	Mining Trading License	Mines Development	Mining and exploration	2
Min018	Expat01802A	Public Relations	Ministerial Statement	Preparing Statement	
Min018	Expat01803A		National Day of Prayer	Preparations	
Min018	Expat01803B		Prayer Day 18 October		
Min018	Expat01804A		Proposed oversight for registering religious body		4
Min021	Expat02101A	Youth Development department	Funding at district level (Lusaka)	Business venture for youth	
Min021	Expat02101B	Youth Development	Applying for funding	Business venture for youth	
Min021	Expat02103A	Sport Development	Screening of Boxing Tournament application	Requirements	
Min021	Expat02104B	National Arts Council	Registering Arts Association	Association registration	4
Min024	Expat02402A		Registering an imported motor vehicle	Manual Option	
Min024	Expat02402B		Registration of Imported Motor Vehicle	Manual Option	
Min024	Expat02403A		Road Service Licensing		
Min024	Expat02403B				4
Min023	Expat02301A	Tourism	Car Hire	Approving Setting up of car hire	
Min023	Expat02301B		Car Hire	Document vetting	
Min023	Expat02303A	Zambia Tourism Board	Accommodation Grading	Star awards	
Min023	Expat02303B	ZTB	Grading of Hotel/Lodge	Star allocation	4
Min025	Expat02501B		Preparing a Tender	Tendering for works	

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	
Min025	Expat02502B	Public Works Department	Maintenance of VIP house	Maintenance	2

List of Collated Templates

Index	Ministry Code	Projected	Returned	Done	Incoherent	Incomplete	Incomprehensible	Balance	
Min001	MoA	10	4	done				4	
Min002	MoC	10	4	done				4	
Min003	MoD	6	0	done				0	
Min004	MoF	10	2	done	-2			0	
Min005	MoFA	4	1	done	-1			0	
Min006	MoG	10	4	done			-1	3	
Min007	MoGE	10	6	done		-2		4	
Min008	MoH	10	8	done				8	
Min009	MoHE	10	8	done				8	
Min010	MoHA	10	8	done				8	
Min011	MoI	10	6	done			-2	4	
Min012	MoJ	10	2	done			-2	0	
Min013	MoLSS	10	6	done	-2			4	
Min014	MoLNR	10	6	done			-2	4	
Min015	MoCD	10	4	done				4	
Min016	MoLG	10	4	done				4	
Min017	MoMMD	10	4	done			-2	2	
Min018	MoNGRA	10	8	done		-2	-2	4	
Mon019	OVP	4	0	done				0	
Min020	ProvM	10	0	done				0	
Min021	MoYSA	10	8	done			-4	4	
Min022	MoE	10	8	done		-2		6	
Min023	MoT	8	6	done			-2	4	
Min024	MoTC	8	6	done		-2		4	

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main	Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main
Min025	MoWS	10	4	done			-2	2	
	Totals:	**230**	**117**		TTL Incoh.	TTL Incom.	TTL Incompre.	TTL Usable	AUDIT
					5	8	19	85	117
								TTL Unusable	

Summary of Recommendations for each Ministry/Unit

Index	Ministry Code	Projected	Returned	Unused	Used	OVERVIEW	STATUS	REMARK
Min001	MoA	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min002	MoC	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min003	MoD	6	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min004	MoF	10	2	2	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min005	MoFA	4	1	1	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min006	MoG	10	4	1	3	CONTINUE	DATA	GO TO NEXT CYCLE
Min007	MoGE	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min008	MoH	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min009	MoHE	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min010	MoHA	10	8	0	8	REVIEW	DATA	CHECK REMARKS
Min011	MoI	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min012	MoJ	10	2	2	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min013	MoLSS	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min014	MoLNR	10	6	2	4	REVIEW	DATA	CHECK REMARKS
Min015	MoCD	10	4	0	4	CONTINUE	DATA	GO TO NEXT CYCLE
Min016	MoLG	10	4	0	4	REVIEW	DATA	CHECK REMARKS
Min017	MoMMD	10	4	2	2	CONTINUE	DATA	GO TO NEXT CYCLE
Min018	MoNGRA	10	8	4	4	REVIEW	DATA	CHECK REMARKS
Mon019	OVP	4	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min020	ProvM	10	0	0	0	CONTINUE	NO DATA	GO TO NEXT CYCLE
Min021	MoYSA	10	8	4	4	REVIEW	DATA	CHECK REMARKS
Min022	MoE	10	8	2	6	REVIEW	DATA	CHECK REMARKS

Index	Ministry Code	Projected	Returned	Unused	Used	OVERVIEW	STATUS	REMARK
Min023	MoT	8	6	2	4	REVIEW	DATA	CHECK REMARKS
Min024	MoTC	8	6	2	4	CONTINUE	DATA	GO TO NEXT CYCLE
Min025	MoWS	10	4	2	2	CONTINUE	DATA	GO TO NEXT CYCLE
	Totals:	**230**	**117**	**32**	**85**			

APPENDIX V

Unused Templates (Flattened)

Incomplete, Incoherent, and Incomprehensible templates are presented here.

Note: Most incoherent and incomprehensible templates were also incomplete. The researcher noted that distinctions were clear amongst these:

- **Incomplete** made some logical sense albeit the entries were not fully entered;
- **Incoherent** had disjointed/unknown entries made. Some terms entered were comprehensible but did not fit in with the narrative or could not be linked to an activity;
- **Incomprehensible** had inexplicable terms and entries made.

Summary of Unusable Templates by Ministry

Index	Ministry Code	Done	Incoherent	Incomplete	Incomprehensible	Balance	
Min004	MoF	done	2			2	
Min005	MoFA	done	1			1	
Min006	MoG	done			1	1	
Min007	MoGE	done		2		2	
Min011	MoI	done			2	2	
Min012	MoJ	done			2	2	
Min013	MoLSS	done	2			2	
Min014	MoLNR	done			2	2	
Min017	MoMMD	done			2	2	
Min018	MoNGRA	done		2	2	4	
Min021	MoYSA	done			4	4	
Min022	MoE	done		2		2	
Min023	MoT	done			2	2	
Min024	MoTC	done		2		2	
Min025	MoWS	done			2	2	
			TTL Incoh.	TTL Incom.	TTL Incompre.	TTL Unusable	AUDIT
			5	8	19	32	32

KEY:	INCP - Incomplete INCH - Incoherent INCB - Incomprehensible

AV-2

Each Expert's entry as collected, noted as ***Expat00n0nA/B*** in each pairing where appropriate (Incomplete).

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main
Min022	Expat02201A	Approving Tariffs	ERB	Setup of tariffs
Min022	Expat02203A	Maintenance	Load shedding impact	Load shedding
Min007	Expat00701B			Marking
Min007	Expat00702A	Materials Department	Woodwork	
Min018	Expat01802B	Public Relations	Preparing Ministerial Statement	Ministerial Statement
Min018	Expat01804B			Guidelines for Religious Organization
Min024	Expat02401A	Motor Vehicle Registration	Registering a vehicle	New vehicle
Min024	Expat02401B	Motor Vehicle Authority	Registration of imported motor vehicle	Importation of motor vehicle

Templates Collected: Incomplete

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min007	Expat00701B	Get Paper from candidate		5	5		1	No	N	Required
Min007	Expat00701B	Evaluate correctness of entries		5	5		1	No	N	
Min007	Expat00701B	Mark Paper/award marks		5	6		1	No	N	
Min007	Expat00701B	Report Summaries		5	5		1	No	N	Required
Min007	Expat00701B	Submit results		5	5		1	No	N	Required
Min007	Expat00702A	Assess syllabus	24	100		Statutory		No	N	Beginning of term
Min007	Expat00702A	Get requirements for lab work		80		Statutory		No	N	Beginning of term
Min007	Expat00702A	Write out requisition	24	100				No	N	Beginning of term
Min007	Expat00702A	Submit to head of procurement/responsible teacher		100		Statutory		No	N	Beginning of term
Min007	Expat00702A	Justify purchase of material						No	N	
Min007	Expat00702A	Receive materials						No	N	
Min007	Expat00702A	Prepare Lab						No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min018	Expat01802B	Analyze report on issue	24	100	90	Statutory	1	No	N	
Min018	Expat01802B	Determine impact on public	48				2	Most Unlikely	N	
Min018	Expat01802B	Advise PS	60	80	60	Symbolic	1	No	N	
Min018	Expat01802B	Write outline of speech/report						No	N	
Min018	Expat01802B	Review seriousness						No	N	
Min018	Expat01802B	Issue press statement				Statutory	1	No	N	
Min018	Expat01802B	Prepare Minister's speech						No	N	
Min018	Expat01802B	Implement measures	100	100	100	Statutory	1	No	N	
Min018	Expat01804B	Receive input and reports						No	N	Very important
Min018	Expat01804B	Analyze requirements				Other		No	N	Inform people involved
Min018	Expat01804B	Recommend on group		100	90			No	N	
Min018	Expat01804B	Inform group				Other		No	N	Inform people involved
Min018	Expat01804B	Qualify/Disqualify		50				No	N	Inform people involved
Min018	Expat01804B	Recommend to registration authorities						No	N	Important
Min018	Expat01804B	Get feedback	10	5	4	Other		No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min022	Expat02201A	Get justification report from power utility		5	5	Statutory		No	N	Legal requirement
Min022	Expat02201A	Evaluate justification		5	10		1	No	N	Legal requirement
Min022	Expat02201A	Table dissent		5	6		2	Most Unlikely	N	
Min022	Expat02201A	Discuss impact		5	5	Treaty		No	N	Meeting with stakeholders
Min022	Expat02201A	Recommendations		5	5			No	N	Inform utility
Min022	Expat02201A	Implementation requirements				Ceremonial		No	N	
Min022	Expat02203A	Determine coverage		100	100	Statutory		No	N	Must know before implementation
Min022	Expat02203A	Divide areas of coverage		80	100	Statutory		No	N	Management catchment
Min022	Expat02203A	Setup notification rota		100	50			No	N	Management catchment
Min022	Expat02203A	Notify affected areas		100		Statutory		No	N	Always
Min022	Expat02203A	Determine new situatoin						No	N	
Min022	Expat02203A	Adjust to new situation		50	50			No	N	
Min022	Expat02203A	Inform affected areas		10	100			No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min024	Expat02401A	Receive ZRA docx						No	N	
Min024	Expat02401A	Register vehicle						No	N	
Min024	Expat02401A	Approve chassis number						No	N	
Min024	Expat02401A	Approve engine number						No	N	
Min024	Expat02401A	Return vehicle to owner						No	N	
Min024	Expat02401B	Register Motor vehicle						No	N	
Min024	Expat02401B	Determine chassis						No	N	
Min024	Expat02401B	Determine engine						No	N	
Min024	Expat02401B	Charge						No	N	

Expert's entry as collected, noted as ***Expat00n0nA/B*** in each pairing where appropriate (Incoherent).

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main
Min004	Expat00401A	Receipts	Receipts	Receipts
Min004	Expat00402A	Budget Office	Staek holder consulting	Budget
Min005	Expat00501A	Protocol Arrangement	Receiving dignitary	Receiving dignitary
Min013	Expat01301A	Job Complaints	Labor Commissioner duty	Labour complaint
Min013	Expat01301B	Labour Commission	Lodging Employment Complaint	Labor Matter

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min004	Expat00401A	Receive Payment for statute					1	No	N	
Min004	Expat00401A	Fill out Register of statute					1	No	N	
Min004	Expat00401A	Write out receipt					1	No	N	
Min004	Expat00401A	Verify with payee					1	No	N	
Min004	Expat00401A	Issue receipt					1	No	N	
Min004	Expat00401A	Register receipt in receipt listing					1	No	N	
Min004	Expat00401A	Prepare listing for auditing					1	No	N	
Min004	Expat00402A	Issue notice of consultation		100	100	Statutory		No	N	Legal
Min004	Expat00402A	Open staek holder meetings	50	50				No	N	
Min004	Expat00402A	Interviews	8	90				No	N	Can be submissions
Min004	Expat00402A	Views collected	1	1				No	N	
Min004	Expat00402A	Submit to officers	50	50		Treaty		No	N	Legal
Min004	Expat00402A	Review staek holder matters	10	8				No	N	
Min004	Expat00402A	Give feedback to staek holders	100	10		Ceremonial		No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min005	Expat00501A	Get notification				Statutory		No	N	
Min005	Expat00501A	Decide on who it is				Statutory		No	N	
Min005	Expat00501A	Receive who it is				Statutory		No	N	
Min005	Expat00501A	Arrange for transportation				Statutory		No	N	
Min005	Expat00501A	Write out agenda				Statutory		No	N	
Min005	Expat00501A	Arrange meeting				Statutory		No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min013	Expat01301A	Reception	1	1	1	Statutory		No	N	
Min013	Expat01301A	Lodge in complain	2	2	2	Statutory		No	N	
Min013	Expat01301A	Take to commission Head	3	3	3	Statutory		No	N	
Min013	Expat01301A	Locate complain	4	4	4	Statutory		No	N	
Min013	Expat01301A	Take back to owner	5	5	5	Statutory		No	N	
Min013	Expat01301A	Respond on complain	6	6	6	Statutory		No	N	
Min013	Expat01301B	Receive presentation of complainant	2	5	6			No	N	N/A
Min013	Expat01301B	Advise Labor Commisssioner	4	5	6			No	N	N/A
Min013	Expat01301B	Value complaint severity	3	3				No	N	N/A
Min013	Expat01301B	Decide on action to take		5	5			No	N	N/A
Min013	Expat01301B	Approach culprit		2				No	N	N/A
Min013	Expat01301B	Allow culprit to defend himself						No	N	N/A

Expert's entry as collected, noted as ***Expat00n0nA/B*** in each pairing where appropriate (Incomprehensible).

Index	Expat	Dept_Inst	Topic_Knowledge	Sub_Main
Min006	Expat00602B			
Min011	Expat01102A			Not sure
Min011	Expat01102B	General	General	General
Min012	Expat01202A	Courts		
Min012	Expat01202B	Courts		
Min014	Expat01401B			
Min014	Expat01402A			
Min017	Expat01702A	Mining	Licensing	
Min017	Expat01702B	Licensing		
Min018	Expat01801A			
Min018	Expat01801B			
Min023	Expat02301A			
Min023	Expat02302B	Transport Requests		
Min025	Expat02501A	Tenders		
Min025	Expat02502A			Returned articles from law enforcement seizures abroad
Min021	Expat02102A	Youth and Sport	General	General
Min021	Expat02102B			Events
Min021	Expat02103B	Youth and Sport		
Min021	Expat02104A	Patient Registration - Referral Center	Registering Patient at Initial Contact	OutPatient/Admission

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min006	Expat00602B				5	Statutory	1	No	N	n/a
Min006	Expat00602B				10	Other	1	No	N	n/a
Min006	Expat00602B				5	Other	1	No	N	n/a
Min006	Expat00602B				5	Statutory	1	No	N	n/a
Min006	Expat00602B				5	Statutory	1	No	N	n/a

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min011	Expat01101A	Objective	10	1	0.8	Statutory	1	No	N	
Min011	Expat01101A	Process	10	1	0.5	Statutory	1	No	N	
Min011	Expat01101A	Observation	10	1	0.6	Statutory	1	No	N	
Min011	Expat01101A	Outcome	10	1	1	Statutory	1	No	N	
Min011	Expat01101A	Recommendation	50	1	1	Statutory	1	No	N	
Min011	Expat01101B	Setup	10	1	1	Statutory	1	No	N	
Min011	Expat01101B	Execution	10	1	1	Statutory	1	No	N	
Min011	Expat01101B	Observation	10	1	0.8	Statutory	1	No	N	
Min011	Expat01101B	Recommenation	10	1	0.5	Statutory	1	No	N	
Min011	Expat01101B	Wrap up	10	1	0.5	Statutory	1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min012	Expat01201A						1	No	N	
Min012	Expat01201A						1	No	N	
Min012	Expat01201A						1	No	N	
Min012	Expat01201A						1	No	N	
Min012	Expat01201A						1	No	N	
Min012	Expat01201B		20				1	No	N	
Min012	Expat01201B		20				1	No	N	
Min012	Expat01201B		20				1	No	N	
Min012	Expat01201B		20				1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min014	Expat01401B	Create	0	50	50	Statutory	1	No	N	This must be done
Min014	Expat01401B		1	100	50	Treaty	1	No	N	This must be done
Min014	Expat01401B		10	50	50	Ceremonial	1	No	N	This must be done
Min014	Expat01401B		10	50	50	Other	1	No	N	This must be done
Min014	Expat01401B		10	100	50	Statutory	1	No	N	This must be done
Min014	Expat01402A	Step 1: Getting documents	30	100	100	Statutory	1	No	N	
Min014	Expat01402A	Step 2: Filling documents	60	100	100	Statutory	1	No	N	
Min014	Expat01402A	Step 3: Filing	60	50	100	Statutory	1	No	N	
Min014	Expat01402A	Step 4: Retrieving documents	60	100	100	Statutory	1	No	N	
Min014	Expat01402A	Step 5: Presenting	30	100	100	Statutory	1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min017	Expat01702A	Entry point	25	5	5	Statutory	1	No	N	
Min017	Expat01702A	Stage 2	15	5	5	Statutory	1	No	N	
Min017	Expat01702A	Stage 3	100	5	6	Statutory	1	No	N	
Min017	Expat01702A	Stage 4	25	5	5	Statutory	1	No	N	
Min017	Expat01702A	Stage 5	30	5	5	Statutory	1	No	N	
Min017	Expat01702B	Entry Stage	25	5	5	Statutory	1	No	N	
Min017	Expat01702B	2nd Stage	120	5	5	Statutory	1	No	N	
Min017	Expat01702B	3rd Stage	10	5	6	Statutory	1	No	N	
Min017	Expat01702B	4th Stage	10	5	5	Statutory	1	No	N	
Min017	Expat01702B	5th Stage	30	5	5	Statutory	1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min018	Expat01801A							No	N	
Min018	Expat01801A							No	N	
Min018	Expat01801A							No	N	
Min018	Expat01801A							No	N	
Min018	Expat01801A							No	N	
Min018	Expat01801A							No	N	
Min018	Expat01801B							No	N	
Min018	Expat01801B							No	N	
Min018	Expat01801B							No	N	
Min018	Expat01801B							No	N	
Min018	Expat01801B							No	N	
Min018	Expat01801B							No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min021	Expat02102A	Authorized signature	48	0.4	0.6	Statutory	10	Yes	Y	This must be done
Min021	Expat02102A	Screening	72	0.8	0.4	Other	2	Most Unlikely	N	This must be done
Min021	Expat02102A	Label	24	0.8	0.4	Statutory	1	No	N	This must be done
Min021	Expat02102A	Ref to culture	720	0.5	0.5	Ceremonial	8	Likely	Y	This must be done
Min021	Expat02102A	Montage	48	0.8	0.4	Statutory	2	Most Unlikely	N	This must be done
Min021	Expat02102A	Catalog	24	0.9	0.2	Statutory	2	Most Unlikely	N	
Min021	Expat02102A	Disseminate	24	0.6	0.4	Treaty	1	No	N	
Min021	Expat02102A	Archive	24	0.8	0.2	Statutory	1	No	N	
Min021	Expat02102A	Loan indicators	8	0.8	0.5	Other	1	No	N	
Min021	Expat02102B	Running event	15 mins	5	5	Statutory	1	No	N	This must be done
Min021	Expat02102B	Create event	10	5	5	Statutory	1	No	N	This must be done
Min021	Expat02102B	starting pont	10	5	6	Statutory	1	No	N	This must be done
Min021	Expat02102B	Finishing line	10	5	5	Statutory	1	No	N	This must be done
Min021	Expat02102B	Event aftermath	5	5	5	Statutory	1	No	N	This must be done
Min021	Expat02103B		15 mins	5	5	Statutory	1	No	N	
Min021	Expat02103B		10	5	5	Statutory	1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min021	Expat02103B		10	5	6	Statutory	1	No	N	
Min021	Expat02103B		10	5	5	Statutory	1	No	N	
Min021	Expat02103B		5	5	5	Statutory	1	No	N	
Min021	Expat02104A	Item 1	15 mins	5	5	Statutory	1	No	N	Adequate
Min021	Expat02104A	Item 2	10	5	100	Statutory	1	No	N	Average
Min021	Expat02104A	Item 3	10	5	6	Statutory	1	No	N	Normal
Min021	Expat02104A	Item 4	10	5	10	Statutory	1	No	N	Adequate
Min021	Expat02104A	Item 5	10	10	5	Statutory	1	No	N	Normal

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min023	Expat02303B		20	5	5	Statutory	1	No	N	Legal
Min023	Expat02303B		15	10	5	Statutory	1	No	N	Legal
Min023	Expat02303B		10	15	6	Ceremonial	1	No	N	Optional
Min023	Expat02303B		5	1	5	Ceremonial	1	No	N	Optional
Min023	Expat02303B		10	5	10	Ceremonial	1	No	N	Optional
Min023	Expat02303B		5	10	8	Statutory	1	No	N	Legal
Min023	Expat02303B		10	10	6	Other	1	No	N	Optional
Min023	Expat02303B		15	8	6	Other	1	No	N	Optional
Min023	Expat02302B	Ask for transport		5	5	Statutory	1	No	N	
Min023	Expat02302B	Get forms to fill in		5	5	Other	1	No	N	
Min023	Expat02302B	Get transport		5	6	Other	1	No	N	
Min023	Expat02302B	Drive		5	5	Statutory	1	No	N	
Min023	Expat02302B	Return transport		5	5	Statutory	1	No	N	
Min023	Expat02302B	Fill forms		5	8	Symbolic	1	No	N	
Min023	Expat02302B	Park transport		5	6	Symbolic	1	No	N	
				5	5	Symbolic	1	No	N	

Index	Submission	Artefact	Duration	Weighting	Threshold	Indication	Dispensable	Advisory	Ind. Disp	Remarks
Min025	Expat02501A	Step 1	1	100	100	Statutory	1	No	N	
Min025	Expat02501A	Step 2	5	100	80	Other	1	No	N	
Min025	Expat02501A	Step 3	10	50	50	Other	1	No	N	
Min025	Expat02501A	Step 4	5	80	55	Statutory	1	No	N	
Min025	Expat02501A	Step 5	10	100	50	Statutory	1	No	N	
Min025	Expat02501B	Initial point	15	5	5	Statutory	1	No	N	Necessary
Min025	Expat02501B	2nd point	5	5	5	Other	1	No	N	Important
Min025	Expat02501B	3rd point	15	5	6	Other	1	No	N	Not important
Min025	Expat02501B	4th piont	20	5	5	Statutory	1	No	N	Necessary
Min025	Expat02501B	5th stage	20	5	5	Statutory	1	No	N	Necessary
Min025	Expat02501B	6th point	30	5	8	Symbolic	1	No	N	Debatable