Chapter Two

Review of Literature
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REVIEW OF LITERATURE

"We can be knowledgeable with other men's knowledge, but we cannot be wise with other men's wisdom."

2.1 Introduction

Knowledge is essential in everyday work. Everyone knows how to carry out his work and this knowledge can be reused later in similar tasks by adopting this knowledge to new situations. The general purpose of this is to make knowledge usable for more than one individual, e.g. for an organization as a whole; that is, to share it. New knowledge-based views on organisations suggest that it is knowledge that holds organisations together [18]. Today, knowledge is increasingly considered the most important asset of organisations [19] and it is assumed that every experience is reusable [20]. This does not apply only to specific parts like programming code but also means that any knowledge can be reused by others. "Identifying, managing, and transferring knowledge and putting in place the best practices has worked for some companies, sometimes saving or earning them literally billions" [21].

Defining knowledge and related terms is a sign of complexity and a topic of different viewpoints. It can be said that knowledge is something that evolves in people's minds by a combination of data, information and experiences. There are two general categories of knowledge, which have to be differentiated: tacit (implicit) knowledge and
explicit knowledge. Tacit knowledge is the internal knowledge which is hard to describe (like e.g. how to ride a bike - everyone can do it, but hardly describe it), while explicit knowledge is codified knowledge, that is, knowledge written down (like e.g. a handbook).

Knowledge is generated only in people's minds [6]; also, it is very complex. It has to be, because human actions depend on a large number of parameters. It is the complexity that enables the adoption to different kind of situations. Similarly to a procedure in a programming language, which can solve a certain number of problems by using parameters to define a concrete problem, knowledge provides different reactions depending on the situation. In contrast to code, the parameters of knowledge are unfortunately hardly countable and definable. This makes it difficult to record or document knowledge in such a way that others can benefit from it. It is difficult but possible, however, to turn tacit knowledge into explicit knowledge. This kind of knowledge can be stored and transferred and be later turned into implicit knowledge by the receivers. However, such explicit knowledge never describes the original tacit knowledge as a whole, but instead assumes a common basis of understanding on which the transmission back to implicit knowledge is based.

Figure 2.1 describes the hierarchy in which data, information, knowledge and wisdom are related. It is plotted with understanding on the X-axis and context on the Y-axis. Many parameters are used in terms of converting the experience into novelty within the graph.
2.2 Knowledge

Knowledge is one of those content-free management words that has many meanings [22]. In fact the Macquarie Dictionary provides eight definitions of knowledge. The first says knowledge is 'acquaintance with facts, truths, or principles, from study or investigation.' Another says knowledge is the 'perception of fact and truth and being cognizant or aware of fact or circumstance.' The last definition says knowledge is the 'body of truths or facts accumulated by human beings in the course of time' [23]. From these definitions the deduction can be made that in order to have knowledge one must first have some facts.

The same dictionary provides three definitions of a fact. The first says a fact is something that 'has really happened or is the case.' The second says a fact is a 'truth known by actual experience or observation', and the last muddies the waters by saying a
The fact is 'something said to be true or supposed to have happened' [23]. The linking concept here is truth, but what is truth?

**Truth types**

The Prussia philosopher Immanuel Kant held that there were two types of truth – analytic truths and synthetic truths. Analytic truths are statements whose denial leads to a contradiction [24]. For example, the assertion that ‘all mothers are female’ is an analytic truth because all mothers can be defined as a female parent. To deny the statement that ‘all mothers are female’ results in the absurd assertion that not all female parents are female. This truth is derived simply by analyzing the subject term in the statement. According to Kant analytic truths are both necessarily true and universally true. By this he meant that the truth cannot be conceived in any other way, and that the truth has a law-like generality with no exceptions [24]. Analytic truths represent knowledge because they are undeniable facts.

On the other hand synthetic truths are statements that are true but can be denied without creating a contradiction [24]. For example the statement ‘most human mothers are over twelve years old’ is a synthetic truth because it contains two unrelated concepts – the concept of being over twelve years old, and the notion of being a human mother. The statement is known to be true on the basis of experience, and not simply by understanding the meanings of the words. It is not inconceivable for there to be a nine year old human mother, but from experience most people would agree this is most unusual. Indeed, if the statement were changed to ‘most human mothers are over nine years old’ it would remain a synthetic truth.
If on the other hand the statement was changed to 'all human mothers are over nine years old' a degree of fuzziness would be introduced to the argument. There is now an absolute statement that is understood to be generally true, and which many would believe to be true. So in what circumstances is the belief a truth, and when does a truth constitute knowledge? This is where the notion of 'true belief', and particularly 'justified true belief' and 'appropriately caused true belief', enters the debate.

**True beliefs**

Beliefs are something that an individual holds to be true. They are facts that are derived from either analytic or synthetic truths, or some other source such as an authoritative reference or person. The dictionary definition of knowledge says it consists of facts and truths. The preceding discussion just determined that a belief is something that is held to be true, in other words a belief is a truth; yet it is possible to hold a mistaken belief – that is someone can believe something to be true when in fact it is false. Clearly then a mistaken belief should not be considered to be knowledge. But what is the test to determine whether a belief is true or otherwise?

Philosophers test their arguments using a conditional equation where S is a person and p is a proposition. According to this philosophical approach belief becomes knowledge if, and only if, the following conditions are met:

- p is true, and
- S believes that p is true.
The first condition requires something to be true, and that someone cannot know that it is true if in fact it is false. In this sense the condition is absolute. The second condition requires that the person is actually aware of the proposition and believes it to be true. However clearly it is possible to have a mistaken belief; therefore the equation requires an additional statement. Philosophers who subscribe to the notion of justified true belief change the equation to:

\[
\text{p is true, and} \\
S \text{ believes that } \text{p is true, and} \\
S \text{ has adequate justification for believing that } \text{p is true.}
\]

The final condition requires justification for the belief [25]. But this still leaves a problem because the justification for the belief could be wrong resulting in the justified true belief being false and hence the failure to end up with knowledge. Such a situation might arise because the source of much of what is known is the written or spoken word, and these written or spoken words may be factually incorrect despite the belief that the source is authoritative. Some philosophers have tried to resolve the justified true belief problem by linking knowledge to causality. This changes the equation to:

\[
\text{p is true} \\
S \text{ believes that } \text{p is true, and} \\
\text{What } \text{p is about is causally connected in an appropriate way to } S\text{’s belief that } \text{p is true [25].}
\]
It means that to distinguish knowledge from beliefs and opinions the key is not justifcation, but rather the causal connections. At first blush this appears to solve the problem, but it does not account for situations where something is known but the ‘knowing’ is not caused by the thing. For example someone can know that 13 is a prime number, perhaps because they have been told this by an authoritative mathematician, or perhaps by using the prime number theorem to work it out for him. In both cases, however, it is not the number 13 itself that causes them to know it is a prime number[25].

The definitional conundrum

Clearly it is extraordinarily difficult to define what a true belief is, and provide a test that accounts for all possibilities. This deficiency makes the definition of truth incomplete, resulting in an inability to precisely define knowledge, and leaves a definitional conundrum. It is perhaps better, therefore, to look at what has been established.

The dictionary definition says that knowledge is ‘body of truths or facts accumulated by human beings in the course of time’, and that a fact is ‘something said to be true or supposed to have happened’ [23]. From this it can safely be determined that truth is a universally agreed component of knowledge. It is also understood that truth can be broken into analytic and synthetic truths with the former being an absolute fact, and the later being based on a true belief. What is unable to be defined is what a true belief is, and this leaves a conundrum – knowledge can be whatever one believes it to be! It should also be noted that it is not possible for a belief to exist as such independently of a sentient being, meaning that knowledge cannot exist outside of a human. This really
does pose a conundrum. David Snowden, the former director of IBM’s Global Services
Knowledge and Differentiation Business Unit, suggests solving this conundrum one
should first turn to the philosophical discipline of epistemology [26].

An epistemologist’s view of knowledge

Epistemology is concerned with the ‘theory of knowledge’, and has a history in
the Western world dating to the works of Plato and Aristotle. The word epistemology is
derived from the Greek words episteme, meaning knowledge, and logos, meaning
rational explanation [24]. Epistemology seeks to define a standard of evidence for the
justification of beliefs and an understanding of how something can be known [27], and
in this sense is a regulative discipline [28].

Traditional epistemology seeks to answer eight questions [25]. These are:

• What is knowledge?
• What kinds of knowledge are there?
• What are the sources of knowledge?
• What is the structure of the body of knowledge?
• What are the limits of what can be known?
• What are the mechanisms by which one gains knowledge?
• How is knowledge related to belief and justification? and
• How ought one to proceed in order to acquire knowledge?

Epistemology therefore offers the promise to solve part of the manager’s
conundrum to determine what the knowledge component in the various knowledge
management models actually is. If nothing else an epistemological examination of the firm should allow the manager to determine its belief basis, and therefore to develop a shared understanding of what knowledge means to the organization.

Epistemologists typically make a major distinction between empirical knowledge, and a priori knowledge. A priori knowledge is said to be gained by reason alone [25]. A priori knowledge consists of statements that are known to be true without consulting one’s experience and therefore comprises analytic truths [24]. On the other hand, empirical knowledge, or a posteriori knowledge, is usually thought of as being knowledge that is derivable from experience or the senses alone [25]. Empirical knowledge therefore does not contain analytic truths, but rather truths that have been derived from observation, experimentation, collecting evidence, and so on [24].

Some epistemologists also make a distinction between capacity knowledge, acquaintance knowledge, and propositional knowledge. Capacity knowledge is knowledge on how to do something [25]. It is both cognitive and actionable. An example of capacity knowledge is knowing how to swim or to use Microsoft® Word 2007. Acquaintance knowledge is knowing something by personal acquaintance in space and time [25]. For example, one can say that they know Tony, and that they know he is a lecturer at an University and a former naval officer. Propositional knowledge deals with true or false situations. For example, the statement ‘one plus one equals two’ is true, and the statement ‘one plus one equals three’ is false. The first statement is known to be true and the second to be false hence one has knowledge - in this example based on an analytic truth.
Based on the definitions outlined immediately above, epistemologists broadly fit into three schools. The first school is the Autopoietic School. This school's position is that knowledge belongs to individuals since information, which is mere data in context, needs to be interpreted according to the individual's internal mental model. This means that knowledge is extremely difficult if not impossible to transfer. The second school might be called the cognitivists. This school focuses on the collection and central dissemination of knowledge as the main knowledge development activity. In this school knowledge might be considered to be facts and is based on the philosopher's argument of 'justified true beliefs.' The last school is the connectivists who believe that knowledge can and does reside in the team, and in the interactions within the team, therefore communication and the flow of information is the focus of knowledge management.

2.3 Types of Knowledge

Even though there are various types of knowledge, only two types of knowledge have been predominant, namely, the tacit knowledge and the explicit knowledge. The other types of knowledge are closely related to either one of these knowledge typologies. Considering these typologies will drastically improve the basic understanding of what knowledge is and what are the various typologies related to knowledge.

Explicit knowledge can be articulated into formal language, including grammatical statements (words and numbers), mathematical expressions, specifications, manuals, etc. Explicit knowledge can be readily transmitted others. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases. Figure 2.2 provides the knowledge typology map.
Tacit knowledge is personal knowledge embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to articulate with formal language (hard, but not impossible). It contains subjective insights, intuitions, and hunches. Before tacit knowledge can be communicated, it must be converted into words, models, or numbers that can be understood. In addition, there are two dimensions to tacit knowledge:

- Technical Dimension (procedural): This encompasses the kind of informal and skills often captured in the term know-how. For example, a craftsperson develops a wealth of expertise after years of experience. But a craftsperson often has
difficulty articulating the technical or scientific principles of his or her craft. Highly subjective and personal insights, intuitions, hunches and inspirations derived from bodily experience fall into this dimension.

- **Cognitive Dimension:** This consists of beliefs, perceptions, ideals, values, emotions and mental models so ingrained in us that we take them for granted. Though they cannot be articulated very easily, this dimension of tacit knowledge shapes the way we perceive the world around us.

Nonaka & Takeuchi's model [6] of the four modes of knowledge creation or conversion that are derived from the two kinds of knowledge are listed in below as table2.1:

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<th>To tacit knowledge</th>
<th>To explicit knowledge</th>
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<tbody>
<tr>
<td>From tacit knowledge</td>
<td>Socialization</td>
<td>Externalization</td>
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<tr>
<td>From explicit knowledge</td>
<td>Internalization</td>
<td>Combination</td>
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**Table 2.1: Four Modes of Knowledge Creation**

- **Socialization:** from tacit to tacit — sharing experiences to create tacit knowledge, such as shared mental models and technical skills. This also includes observation, imitation, and practice. However, “experience” is the key, which his why the mere “transfer of information” often makes little sense to the receiver.

- **Internalization:** from explicit to tacit — Embodying explicit knowledge into tacit knowledge. Closely related to “learning by doing.” Normally, knowledge is verbalized or diagrammed into documents or oral stories.
who have been trying to understand how we acquire, store and manipulate knowledge through the human brain. Or with the management scientists, who have been looking at how the enterprise deals with this most valuable organizational asset. Or with the computer scientists, who are directly concerned with the design and implementation of real systems that produce and deliver knowledge from the bits and bytes stored in their data warehouses.

So while there is a growing acceptance that the management of knowledge, including its delivery, is one of the most compelling requirements of the enterprise; there is little common ground as to what community of professionals has the responsibility for its pursuit. And yet, it seems quite obvious that this is essentially a multi-disciplinary endeavor since we are all in this together.

3.2.1 The Components and Processes of Knowledge Management

We mentioned that knowledge management “was riding the disciplines of the moment” and mentioned electronic commerce, data warehousing and mining, document management, enterprise information portals (EIP), the Internet, collaborative technologies, customer relationship management and, supply chain management to typify the set. But we also mentioned earlier that knowledge management is not necessarily about technology. Yet it takes a fair amount of technology, especially information technology, a number of soft disciplines, and a significant measure of leadership to make knowledge management take within an organization.

Knowledge that is in people’s heads must be captured and made explicit, communities of practice have to be identified, and within them, “best practices” must
emerge. Resistance to change must be overcome in most cases and the enterprise must be willing to continuously learn from its experiences. And all this must be underpinned and supported by a robust business intelligence platform and a very solid IT infrastructure. Business intelligence primarily means data warehousing and data mining. An enterprise’s knowledge is delivered these days, mainly through an enterprise information portal (EIP). The web is the prime vehicle for all communications and sharing.

But there are many other methods or techniques which we must address as part of the knowledge management discipline. Some would appear to be anathema to IT practitioners since they are very “soft” by most IT standards. Yet they are certainly very important and need to be considered. For example, we should be able to understand the role of critical success factors, communities of practice and change management techniques. We must be able to identify and utilize as necessary, leadership techniques, best practices and storytelling. The role of the chief knowledge officer and his/her relationship with the chief information officer must be defined.

If we look at it from another angle, here’s what the process looks like. Information has to be acquired, new knowledge has to be invented and then it has to be incorporated into the universal knowledge stores in order to be shared. This implies that it must be organized, stored, transferred, shared, taught. As obviously knowledge resides primarily in someone’s head. All knowledge must be looked at first from the human perspective. It is the individual who starts out to learn (acquire information) through browsing, exploration, observation and research, often structured through channels like formal education. In today’s environment, learning is assisted through a number of tools
• **Externalization**: from tacit to explicit — the quintessential process of articulating tacit knowledge into explicit concepts through metaphors, analogies, concepts, hypothesis, or models. Note that when we conceptualize an image, we express its essence mostly in language.

• **Combination**: from explicit to explicit — A process of systemizing concepts into a knowledge system. Individuals exchange and combine knowledge through media, such as documents, meetings, and conversations. Information is reconfigured by such means as sorting, combining, and categorizing. Formal education and many training programs work this way.

Artifacts derived from knowledge creation are facts, concepts, processes, procedures, and principles. These, in turn, are used to help create knowledge in others.

### 2.4 Conclusion

Humans are an essential agent for knowledge, particularly if we adopt a justified true belief position. Indeed it is wise to remember that while computers can extract data from machines, and can even find patterns that humans may take forever to find, this is simply taking data and making it into information by giving it context — it is not creating knowledge. Whether the patterns are real and useful ultimately requires understanding of relations and causalities, and when to apply or discard a rule, something that so far can only be done by a human [29]. Lewis Hassell, a philosopher at Drexel University Philadelphia, summarizes this position nicely by saying that there is no knowledge outside of experience, so knowledge is always ‘embodied, and that experience is always the experience of some rational individual in society, therefore there is no such thing as disembodied knowledge’ [30].
All this means that explicit knowledge, as the knowledge practitioners define it, is quite simply data and information artefacts. In turn it leads to the conclusion that knowledge cannot be managed per se, but it can be enabled – this is Nonaka and Takeuchi’s proposition from the outset [6], [31] and is the underlying fact.