Developing a Model to Manage Knowledge Creation and Enterprise Innovation

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Abstract. In this paper the authors will demonstrate that knowledge creation is a learning process that is triggered by problems. The paper will further demonstrate that knowledge creation depends on knowledge resources to be available. Thirdly the paper will show that knowledge creation may lead to innovation. Fourthly a knowledge creation model was created. This model builds on methodologies from the fields of innovation and learning to create a template for measuring and viewing the knowledge creation capability in the organisation. The model proposes a framework that may assist managers and executives to make each work related problem an opportunity for learning and therefore knowledge creation. The model further aims to serve as a benchmark tool to analyse knowledge creation activities.

The enterprise under study functions in the high end market in the communications technology industry. The enterprise develops and produces communication solutions that are both innovative and specific to customer needs. The enterprise can be defined as a knowledge intensive enterprise that relies on its knowledge workers to define simple solutions to complex customer problems. The enterprise has seen huge growth in the past few years but this has presented some challenges.

Introduction

The paper will provide an overview of basic definitions that support this discussion of knowledge creation and innovation. The paper will then elaborate on the underlying principles that define the Knowledge Creation Model. The Knowledge Creation Model will then be explained in practical terms. Thereafter the authors will present the findings of the research.

Theoretical framework.

The following section aims to establish the theoretical framework by defining relevant terminology that will be used in the paper.

Knowledge Resources. Throughout the paper there will be references made to knowledge resources. Knowledge resources in the context of this discussion includes all of the following:

Table 1: Taylor's (2007:65-66) categories and subsets of knowledge combined with Anderson and Kratwohls (2001) knowledge domains.

How Learned	How Held	Knowledge Domain
Individual tacit knowledge		
Implicit	Implicit	Conceptual, Metacognitive
Explicit	Implicit	Conceptual, Metacognitive
Explicit	Explicit	Factual, Procedural
Collective or social implicit knowledge		
Mainly implicit but can be explicit	Implicit	Conceptual, Metacognitive, Procedural
Explicit and implicit	Implicit	Conceptual, Metacognitive, Procedural

Knowledge workers. Gurteen (2006:1) defines the knowledge worker as: 'Those people who have taken responsibility for their work lives. According to Du Toit and Steyn (2009:2) these workers continually strive to understand the world about them and modify their work practices and behaviours to better meet their personal and organisational objectives.

Davenport (2005:3) states that knowledge workers are responsible for sparking innovation and growth in an enterprise. They invent new products and services, design marketing programmes and create strategies. Any references in the paper to employees and workers – refer to knowledge workers as defined here.

Knowledge work. According to Reinhardt, Schmidt, Sloep and Drachsler (2011:150) the main feature differentiating knowledge work from other conventional work is that the basic task of knowledge work is thinking. They further say that although all types of jobs entail a mix of physical, social, and mental work, it is the perennial processing of non-routine problems that require non-linear and creative thinking that characterises knowledge work.

Data. Data is a set of discrete, objective facts about events… as structured records of transactions (Davenport and Prusack, 2013:5).

Information. Information… as message… in the (various) form of communication… to have an impact on judgment and behavior. Information is data that makes a difference (Davenport and Prusack, 2013:5).

Knowledge. Davenport and Prusack (2013:5) define knowledge as: "Knowledge is a fluid mix of framed experience, values, **contextual information**, expert insight, and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of the knowers. In organisations it often becomes embedded not only in documents or repositories, but also in organisational routines, practices and norms."

Organisational knowledge. Various authors such as Badaracco (1991) and Nonaka (1994) categorise organisational knowledge as being on a continuum between tacit or explicit knowledge.

Learning. The activity or process of gaining knowledge or skill by studying, practicing, being taught, or experiencing something (Merriam-Webster, 2015).

Organisational learning. The primary goal of organisational learning is to continuously develop new knowledge and manage the resulting organisational assets more efficiently and effectively (Pemberton & Stonehouse, 2000:186).

Tacit and Explicit knowledge. Deng (2008), defines tacit knowledge as a personal mental model and insight in the complexity of the environment and is usually characterised by personal beliefs, intuition or judgment, values, and experiences. Due to its nature, tacit knowledge is difficult to codify (or document) (Nonaka & Takeuchi, 1995). On the other hand, explicit knowledge can be articulated as patterns of rules for problem solving, and is usually susceptible to codification and replication.

Underlying principles

Innovation and Knowledge Creation. Firestone (2003:20) defines innovation as a knowledge process life cycle event that has been completed. The cycle begins with a problem that emerges, moves through knowledge creation processes, and ends in incorporation of knowledge structures (Du Toit, Van Staden and Steyn, 2011:89). Afuah (1998) refers to innovation as new knowledge incorporated in products, processes, and services.

Popaduik and Choo (2006:312) found when studying the relationship between knowledge creation and innovation that knowledge creation is focused on the generation and application of knowledge that leads to new capabilities for the firm. Innovation, on the other hand, is also concerned with how these new capabilities may be turned into products and services that have economic value in markets. They further state that knowledge about markets becomes a critical component of the innovation process and that it is this continuous interaction of technical knowledge and market knowledge that will define a firm's capacity to innovate and therefore to prosper in an increasingly competitive environment. Based on the previous definitions of innovation it is clear that the act of new knowledge creation is a pre-cursor to innovation.

The innovation process is essentially a learning process. Fenwick (2003) confirms that all learning in work is to some extent innovative in that it introduces change. Organisational learning is further typically described in change terms, as for example in the following definition:

… changes in organisational practices….that are mediated through individual learning or problem- solving processes (Ellström, 2001:422).

Seelig (2012:13) describes an innovation engine (see Figure 1) that consists mainly of an internal part that is made up of knowledge, imagination and attitude. The external factors are resources, habitat and culture. Seelig (2012:184) explained that the internal section of the engine was inspired by Bloom's original work in 1979 on learning (Bloom, 1979:50-70). He focused on what people know, what they do, and how they feel, which are generally known as knowledge, skills, and attitude. Seelig adapted Bloom's skills category to imagination, as imagination refers to the specific skills needed for creativity. Knowledge in this context is what an individual knows and learns (See Figure 1).

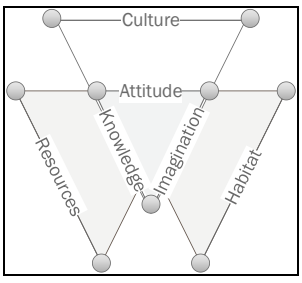

Figure 1: The innovation engine (Seelig, 2012: 13)

Knowledge is acquired in many ways. Every single bit of information that an individual internalises throughout his/her life will form the sum total of his/her knowledge base. Knowledge therefore establishes the foundation for innovation and/or knowledge creation.

Harnessing problems. Nonaka (1995:56) sees ongoing knowledge creation as the source of continuous innovation and continuous innovation as the source of sustained competitive advantage. "When organizations innovate, they do not simply process information, from the outside in, in order to solve existing problems and adapt to a changing environment. They actually create new knowledge and information, from the inside out, in order to redefine both problems and solutions and, in the process, to re-create their environment." From this statement follows that problems are central to continuous innovation. In other words problems presented by customers and markets may lead to innovation. Similarly the daily problems that knowledge workers experience may lead to innovative solutions and new knowledge or know how from within the enterprise. But problems must be solved in order to create something new.

The previous section on innovation and knowledge creation substantiated the fact that knowledge creation is a learning process. It is therefore proposed that the principles of Problem Based Learning might assist during this process. Problem Based Learning is a process that can be used when solving complex problems. Problem Based Learning has been successfully applied in learning institutions over the past few decades as demonstrated in the research of Gałęcki and Rębała (2014). Based on these findings these methods have been proven to successfully impact specifically in the fields of learning where higher order thinking skills is required and nurtured. Engineering environments in general are places where complex problems are being solved. The method of work has a strong link with the research approach.

Taking into consideration that innovative engineering firms are constantly working within these realms, it makes sense to propose that this model be used to drive knowledge creation in these work places.

This might especially be a valuable approach where an organisation is rapidly growing and new employees are required to up skill themselves on products and product knowledge.

Learning to Create. Nonaka and Takeuchi (1995:38) considered the mobilisation and conversion of tacit knowledge as the key to successful innovation. According to them innovation is the creation of new knowledge, but knowledge creation is not always innovative. Knowledge creation is further the end products of the learning process, as demonstrated by the theories from Bloom and later adapted by Anderson and Kratwohl (2002). This process demonstrates how learners may move through the different phases of learning to incorporate the higher cognitive orders of learning. The ability of a person to remember, understand, apply, analyse, evaluate and create (The learning process) is the sum total of that individual's knowledge creation ability (Anderson and Kratwohl, 2002:214).

Using the cognitive domains of the Bloom model, it is possible to guide workers by means of action verbs through the learning cycle. If this iterative approach of gradually moving higher into the cognitive domain is used it is possible that new knowledge will be created and therefore innovation may be the result. This learning process hinge on the accessibility to **data, information and knowledge, collectively named knowledge resources**. If these aspects are not available no new development can take place.

Knowledge Resources. Davenport and Prusack (2013:5) define knowledge as:

"a fluid mix of framed experience, values, **contextual information**, expert insight, and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of

the knowers. In organisations it often becomes embedded not only in documents or repositories, but also in organisational routines, practices and norms."

Anderson and Kratwohl (2001:214) revised Bloom's taxonomy to demonstrate the intersection between knowledge and the cognitive domain, where, they refined the model to include the knowledge domains that classifies four types of knowledge that learners may be expected to acquire or construct, namely:

- Factual (Refers to contextual information in the Davenport and Prusack definition)
- Conceptual (Refers to values in the Davenport and Prusack definition)
- Procedural (Refers to experience in the Davenport and Prusack definition)
- Metacognitive (Refers to expert insight and grounded intuition) in the Davenport and Prusack definition

These two views provide a comprehensive view of knowledge resources. All of the cognitive domains discussed in the following section, will continuously refer back to the knowledge domains during the learning process. The new knowledge created at the end of each learning phase will further contribute to the knowledge domain.

As discussed in the definitions section the field of knowledge management further classifies knowledge as either tacit or explicit knowledge.

Seelig (2012:186-187) explained that imagination is the catalyst required for creative combustion. She referred to psychology and neuroscience research that reinforces the hypothesis that the same parts of the brain are involved when an individual remembers and imagines, including evidence that an individual who don't have the ability to remember the past are unable to conjure up a vision of the future. Imagination is therefore fueled by **knowledge**. This implies that the bigger the well of knowledge the greater the possibility for fresh innovation.

The more knowledge individuals have, the more knowledge resources can be mobilised. Knowledge and access to knowledge resources are closely linked to one another and the one drives the other in an ever expanding wealth of more knowledge. Therefore the available knowledge resources influence the size of the knowledge base and allow knowledge workers to access more knowledge resources, which in turn will stimulate further knowledge creation.

Attitude. If knowledge exists and imagination is triggered by a fresh idea, attitude will determine if the idea becomes a feasible innovation. Seelig (2012:188) explained that attitude is the spark that jump-starts creativity. Attitude is a complex neurological process and the field of psychology has done various studies in this regard. Some attitudes are better suited to drive innovation processes as seen in the research by Moser, Schroder, Heeter, Moran and Lee (2011: 1484-1489). They found that individuals, who believe that intelligence develops through effort, normally see mistakes as opportunities to learn and improve. These individuals showed a stronger resilience to bounce back from mistakes whereas individuals that believe that intelligence is a given and mistakes reflect a lack of ability, recover from mistakes harder.

The "stages of learning model" as described by Buckler (1996:33) indicates that the 'Why' of learning is mainly a motivational aspect. According to Buckler motivation theory suggests that individuals will be intrinsically motivated to move through the learning process, and the strength of this motivation will vary from individual to individual. Buckler (1996:34) further states: "that individuals will be prevented from moving through the model by inbuilt attitudes, values, beliefs and responses, of which they are often not aware. These responses may be the direct result of conditioning, by the organisation, or "taught" learning systems in general."

According to Buckler (1996:34) the question **'I ought to know this**" or ignorance, appears to be the first level in learning for innovation. If one can admit that one ought to know about something the stimulus/motivation for innovative learning is in place.

According to Lanks (2011) failures prompt new path ways to investigate solutions. But undocumented failures become null and void. It is therefore important that the failures be carefully documented to ensure that the knowledge gained from these experiments becomes apparent. Lanks (2011) further mentions the importance defining failures need. Failing to succeed is a valuable culture to nurture in an enterprise that aims to be innovative by nature. It is important to decide in which manner failures are recognised as part of the successful innovation process. Similarly it is critical to define those failures that are not acceptable and should be limited as far as possible.

The Knowledge Creation Model

The Knowledge Creation (KC) model demonstrated in Figure 2 hinges on the following core principles: problems, skills, learning process, attitude and available knowledge and resources

This model was developed by combining the following models and theories:

- Seelig's Innovation Model (Seelig, 2012:13)
- Buckler's Stages of Learning Model (Buckler: 1996:33)
- Bloom's revised model (Anderson and Kratwohl, 2002:214)

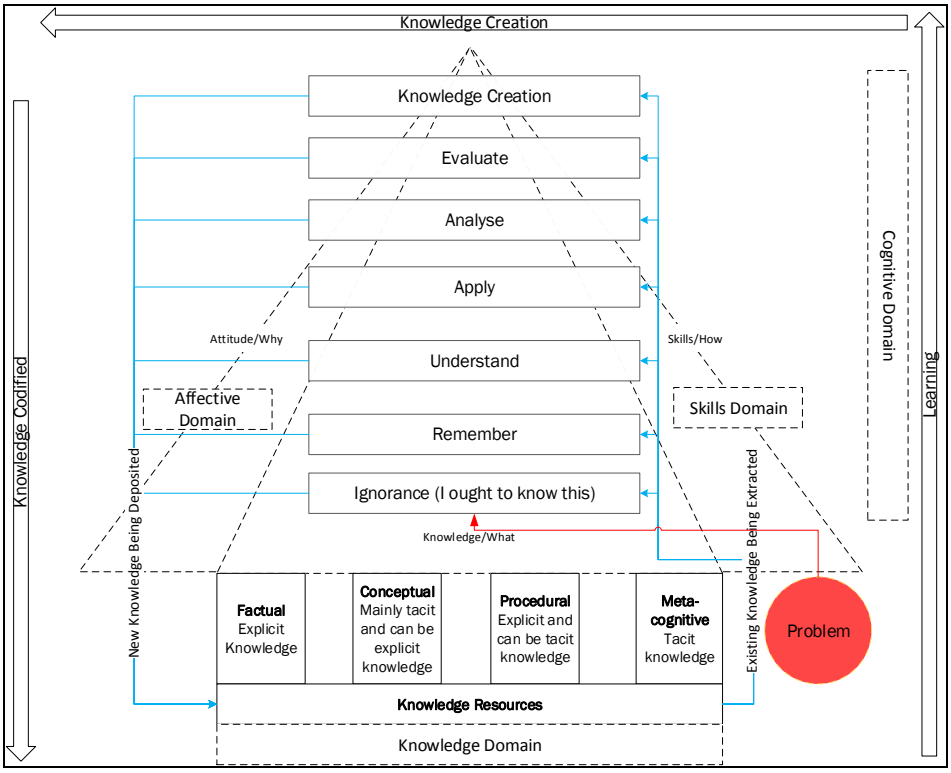

Figure 2: Learning for Knowledge Creation (KC)

The Problem. As mentioned previously, problems are the main drivers for innovation today. The model demonstrates in Figure 2 how the problem sometimes in the form of user requirements stimulate the ignition of a problem based learning process that might lead to new knowledge being created in order to solve a problem.

The Learning Domain. Knowledge creation depends on information to be available as well as the critical learning activities that should take place for knowledge to be created. A main stimulus for these activities to initiate are the acceptance of ignorance and the question that 'I

ought to know this'. To solve a problem using this methodology implies that the worker gradually moves through the various learning phases. Ensuring that all phases are covered sufficiently, is possible when outcomes are defined using the action verbs provided in the phases.

The Knowledge Domain. Knowledge resources act as critical enablers for the innovation process. The model demonstrates how the new knowledge created at the end of cycles will then contribute to the knowledge domain. Figure 2 further demonstrates that all aspects of the KC model hinge on the accessibility to data, information and knowledge, collectively named knowledge resources. If these aspects are not available no new learning can take place. Therefore to ensure continuous renewal in a specific environment the most important aspect will be the ability of individuals to access data, information and knowledge.

The Affective Domain. The affective domain is encapsulated in the attitude section of the model. Attitude is what drives the search for solutions. The Why question is important here.

The Skills Domain. In order to move through the learning process specific skills are required. Skills may exist for the domain that you are working in, or they may include specific skills that are geared towards knowledge creation. The OECD (2011) has identified the following soft-skills as required for innovation.

- Creativity (OECD, 2011: 34)
- Problem-solving (OECD, 2011:47)
- Critical thinking (OECD, 2011:33)
- Communication (OECD, 2011:34)
- Collaboration (OECD, 2011: 34, 53)
- Learnability (OECD, 2011: 34, 53)

By investing in these skills the enterprise will ensure that the requirements for an innovative workforce are in place. All of these skills are skills that can be enhanced through various learning programs and workplace initiatives.

Summary. By integrating the life-long learning aspects into the KC model and combining knowledge creation theory it becomes possible for individuals to contribute to new developments throughout their working life. Combining Seelig's (2012:13) innovation engine in this model enables innovation to be embedded in the knowledge creation process as well. The KC model above supports the theory of Torjman and Leviten-Reid (2003:16) that "knowledge is crucial to the development of organizational competencies and learning is the process through which organizations harness and apply knowledge".

Research methodology

The research methodology employed in this paper can be defined as an action research - case study combination with an interpretive approach. Argyris (1985: 4) described action research as: "Action science is an inquiry into how human beings design and implement action in relation to one another. Hence it is a science of practice." This is true of the approach envisaged for this paper as the main focus will be to critically analyse how subjects engage with the different domains of the KC model to enable knowledge creation and innovation. Data come largely from documentation, direct observation and participant input through questionnaires. The research instrument used was a questionnaire, based on the model created (KC).

The sample size was calculated at 20 % of the total population. The population was distributed through the various divisions of the enterprise. Therefore a 20% sample was selected from each division. The selection process was ad hoc and based on availability of research subjects. The aim of this research was to determine if the model and instrument can supply any meaningful results.

General Findings

The following section is based on discussions and interviews conducted with Management of the enterprise.

The enterprise under study defines innovation as the process of taking new concepts to market. Two main spheres for innovation exist within the enterprise (Figure 3). The innovation spheres are further stimulated by innovation triggers normally in the form of needs, opportunities and technology. The product side of the chart is directed by market trends and requirements and the project side are directed by existing customer needs and existing technology and products. Therefore both spheres are in the business of creating innovative solutions the only difference is the drivers. The two input spheres exert constant pressure on each other and this is indicated by the diagonal line in the Figure 3. The line represents a balancing act that ensures that the enterprise only sell what exists. Each of the spheres may contribute, support or enhance the other spheres of innovation in the enterprise.

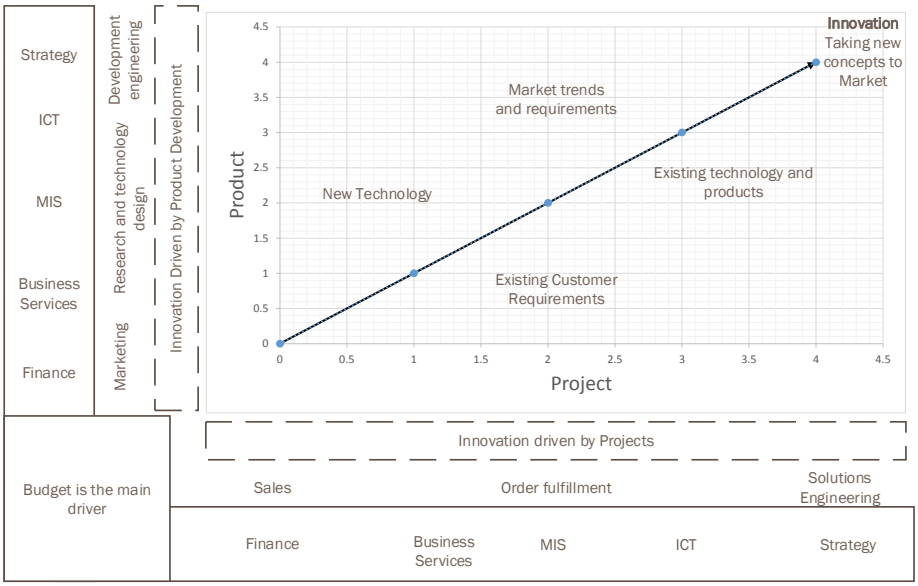

Figure 3: Innovation spheres of the enterprise under study (Input provided by the CEO of the Enterprise)

The enterprise under study clearly reflects the views on innovation as defined by Popaduik and Choo (2006:312) by developing products and services that have economic value in markets. The enterprise further acknowledges the role that knowledge about markets has in the innovation process. By embracing the continuous interaction of technical knowledge and market knowledge the enterprise is geared to prosper in an increasingly competitive environment.

The enterprise reflects the philosophy of Drucker (1989:25-30) to some extent "Because the purpose of business is to create a customer, the business enterprise has two – and only two – basic functions: marketing and innovation. Marketing and innovation produce results; all the rest are costs. Marketing is the distinguishing, unique function of the business." The enterprise differs from Drucker's philosophy in one aspect namely, the idea that everything else is viewed as costs. *The CEO of the enterprise refers to costs as incurred costs to offer essential customer advantage.* Figure 3 reflects this approach by indicating the value that all other functions provide in support of the product and project spheres.

Due to the exceptional growth of the enterprise and its deliverables the enterprise is currently in a challenging phase. Multiple new processes, products and knowledge workers have necessitated the restructuring of various existing structures.

Survey results

The survey was conducted at the premises of the enterprise. A questionnaire was handed out and the researcher was available for assistance. The questionnaire was designed to interpret the enterprise on the hand of the KC model. Though much was learned from this survey the scope of the paper does not allow us to discuss in detail all findings. The author will endeavor to make only those that are significant for this paper available here.

Demographics. The educational level of the sample group was extremely high. The results showed that 82% of the sample group holds a qualification from Bachelor's degree level and higher. It is interesting to note that 53% of the respondents holds a degree at Masters Level and 3.57% is at Doctorate level. The high education levels are indicative of a knowledge-intensive firm as defined by Deng (2008:174), as one whose major workforce comprises well-educated, skilled employees, and creates market value through effective application of knowledge to service provision for its clients (Swart & Kinnie, 2003; Prashantham & Berry, 2004). These results further indicates that the collective knowledge base of the enterprise is strong and diverse, a fact that is reflected in the successful growth of the company. The demographic results further showed that the majority of respondents (67%) are new in the company and have less than 5 years' experience with the company.

Skills domain. The skills domain of the KC model are the enablers that allow knowledge workers to leverage knowledge and learning processes. Reinhardt, Schmidt, Sloep and Drachsler (2011:150) states that the main feature differentiating knowledge work from other conventional work is that the basic task of knowledge work is thinking. They further say that although all types of jobs entail a mix of physical, social, and mental work, it is the perennial processing of non-routine problems that require non-linear and creative thinking that characterises knowledge work. In the OECD (2011:10) report it is mentioned that a broad range of skills contributes to innovation and "soft skills" may be increasingly important. The enterprise under study is a good example of a knowledge intensive company where knowledge workers are required to think creatively about customer problems in order to craft the correct solutions. The soft-skills that were included in the questionnaire is demonstrated in Table 2. In all but one category the respondents indicated that they see themselves at an intermediate level of the various highlighted skills. The enterprise may want to focus future learning endeavors to enhance these soft-skills to ensure that employees are well-equipped for the innovative and knowledge intensive work environment they find themselves in.

Table 2: Soft-skills levels

Skills	Advanced	Beginner	Intermediate
Collaboration	32.14%	7.14%	60.71%
Communication	35.71%	3.57%	60.71%
Creativity	25.00%	10.71%	64.29%
Critical Thinking	46.43%	3.57%	50.00%
Learnability	46.43%	0.00%	53.57%
Problem Solving	50.00%	0.00%	50.00%

Cognitive Domain. Results retrieved from the cognitive domain section of the questionnaire provides an in depth view of the typical actions that workers in the enterprise undertake on a daily basis. These results can be utilised on macro and micro level. The cognitive domain results have various application possibilities. Some of which will be demonstrated. On a macro scale strategic insights can be gathered when looking at the distribution of actions throughout the enterprise as shown in Figure 4. An immediate outlier is the more than 55% of respondents using the clarifying action to a great extent in order to understand. It is not clear why this amount of time is being spent to clarify – this might be indicative of a possible problem, or a specific phase in the enterprise. Another outlier is the 50% of respondents that are implementing to a very great extent.

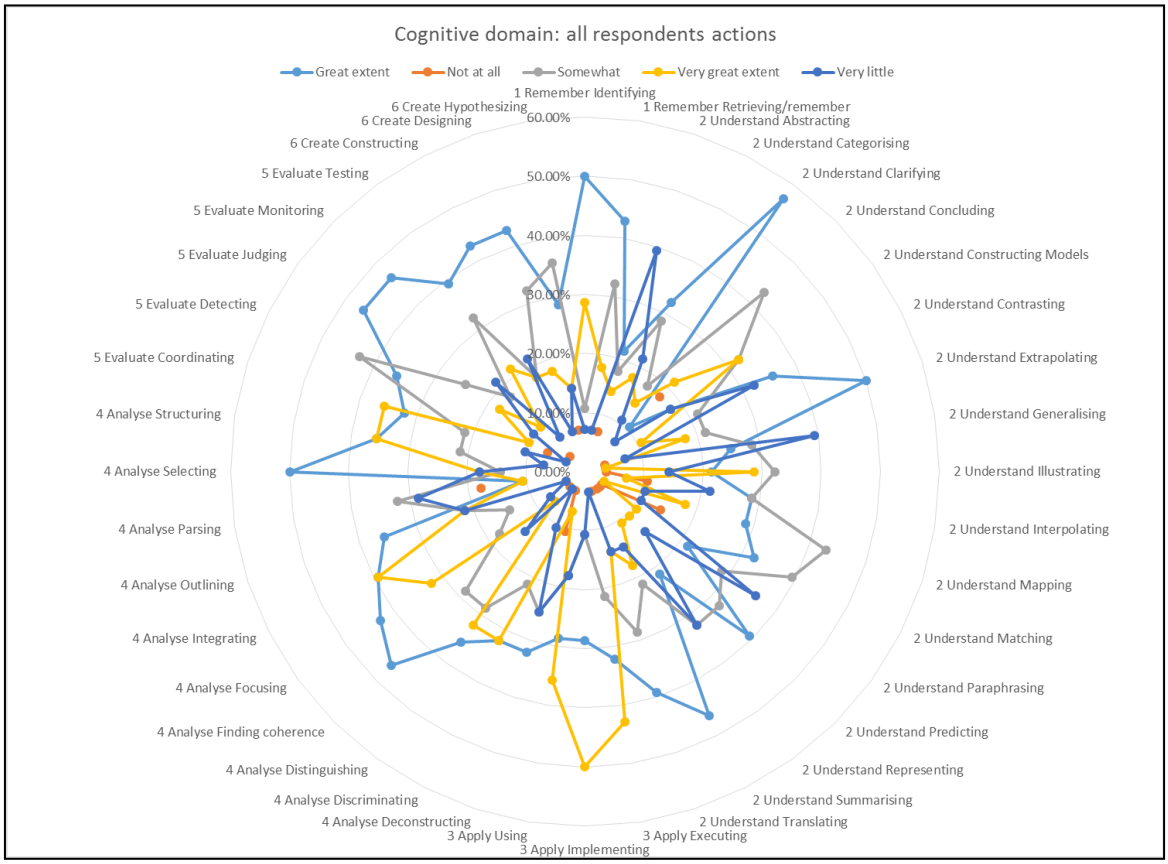

Figure 4: Cognitive domains of all respondents

To delve into the clarifying outlier we can for instance do a comparison between divisions to see where the actions are taking place.

Table 3: Clarifying action

Values	Business Services	Development Engineering	Finance	Marketing	Order fulfilment	Research and Technology Design	Sales	Solutions Engineering
Great extent	100.00%	61.54%	100.00%	100.00%	50.00%			50.00%
Somewhat		7.69%			25.00%		100.00%	50.00%
Very great extent		15.38%			25.00%	50.00%		
Very little		15.38%				50.00%		

Figure 5 demonstrates the Create phase and its application in all divisions. This is a valuable result for any enterprise that wishes to understand where creation activities are taking place and to what extent.

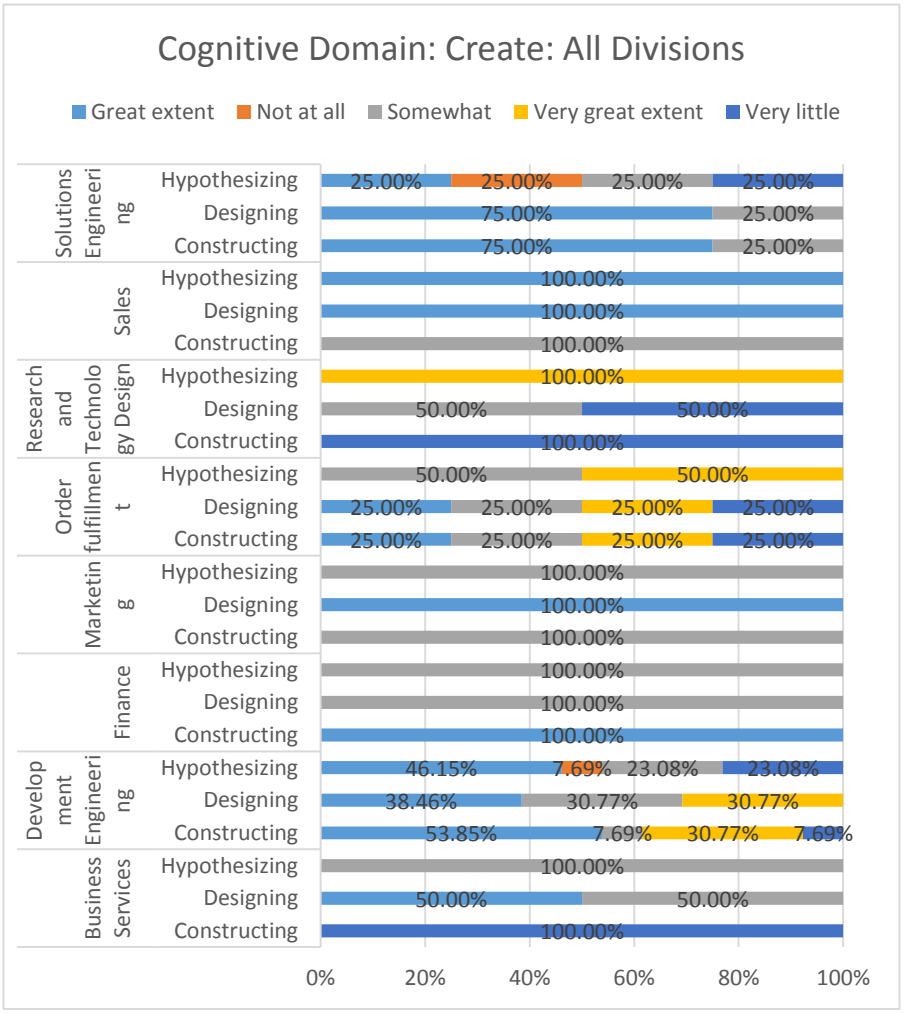

Figure 5: The Create phase in all divisions

Figure 6 demonstrates the value that the cognitive domain action verbs have on a micro level. Profiles of individuals can be drawn. These profiles can either be used to gain insight into the typical activities of this worker. There is a further potential that these actions can be linked with performance management processes.

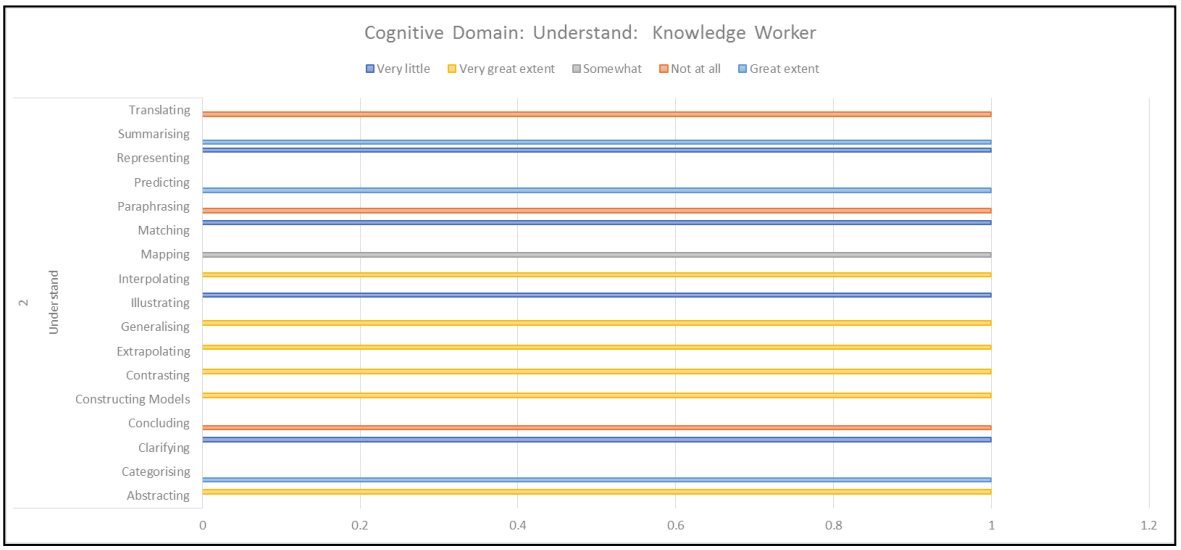

Figure 6: The Cognitive Domain of an Individual Respondent

The Affective Domain. The affective domain was addressed in the questionnaire by a series of questions that support the attitude for learning and knowledge creation. These were overwhelmingly positive showing that the attitude towards innovation and knowledge creation is positive.

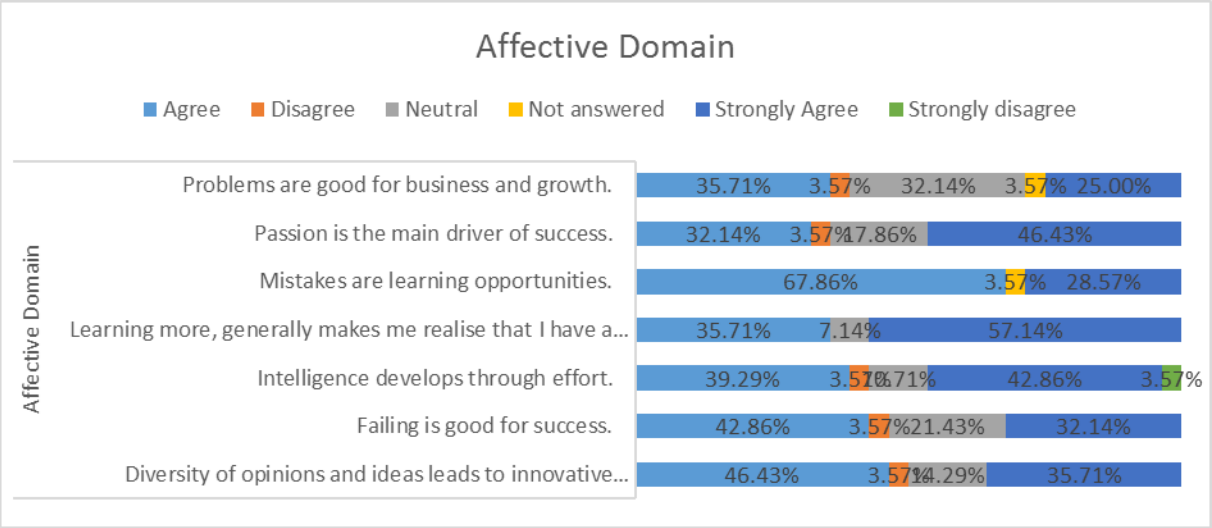

Figure 7: Affective Domain

The Knowledge Domain. This domain is represented in Figure 8 below. 92% of respondents confirmed that access to knowledge is critical for their jobs. Nearly 60% of respondents have experienced productivity problems due to being unable to access explicit knowledge. More than 70 % have experience some kind of productivity loss due to difficulty in accessing tacit knowledge. The majority of respondents indicated that tacit knowledge

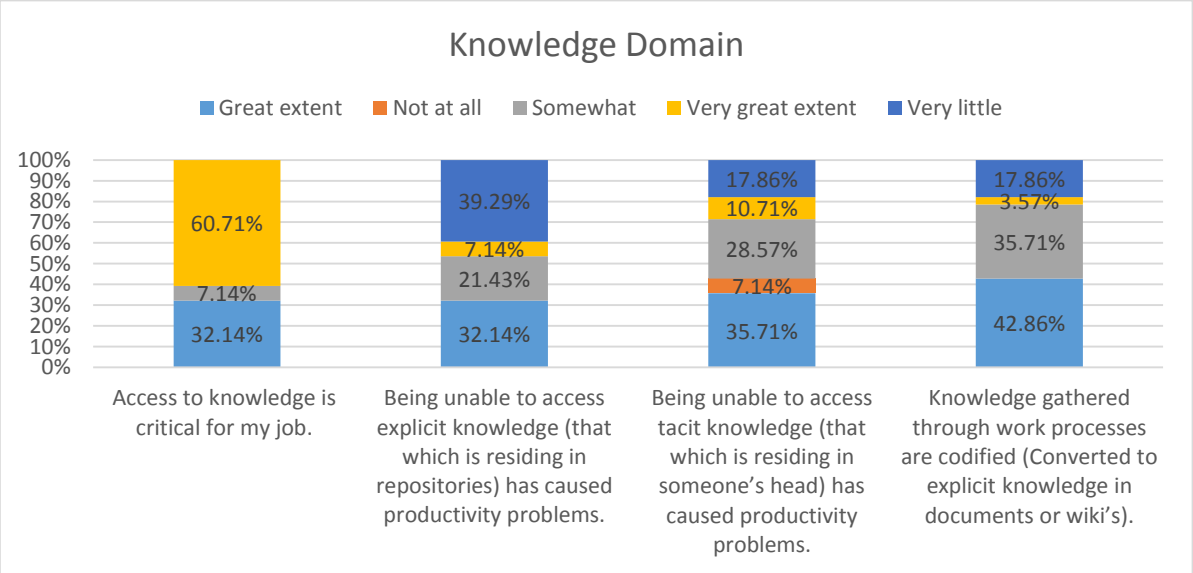

Figure 8: The Knowledge Domain

Conclusion

The literature review of applicable research conclusively showed that knowledge creation is a learning process that is triggered by problems. It was also shown that knowledge creation depends on knowledge resources to be available. The model demonstrates the fact that the knowledge domain forms the foundation for knowledge creation. Without knowledge no new

knowledge can be created. The survey results conclusively showed that lack of access to knowledge has led to productivity problems in the enterprise under study. These problems experienced by the knowledge workers of the enterprise will ultimately lead to lower productivity levels and as such may have a severe impact on the innovation capability of the enterprise.

The link between knowledge creation and innovation was established by Popaduik and Choo (2006:312). The enterprise adhere to this vision of knowledge creation and innovation in their definition of innovation as the process of taking new concepts to market.

The KC model has been applied by developing a research instrument with questions that support the various domains of the model. The survey results clearly indicate the value of the model and instrument.

The results from this survey merely provide insight into the current status of the enterprise. It is interesting to note that clarifying was identified as one of the most often used actions currently. Due to the volume of newness in the enterprise, it is possibly expected that more time will be spent on clarifying information, processes and knowledge. This is a further validation of the value of the KC model.

The model as such has not been applied in the enterprise. Applying the model will entail that managers action the various domains specifically. For example the skills domain can be enhanced by offering learning opportunities in the areas identified. The knowledge domain can be enhanced by embarking on a process to codify more tacit knowledge and to ensure that explicit knowledge is accessible. The cognitive domain may be used to create interventions at task level in the enterprise to drive specific outcomes. The instrument or survey can then be used at a later stage to verify the impact of the application on these domains.

The KC model provides an opportunity to managers of knowledge intensive enterprises to specifically intervene in the various domains that might impact on knowledge creation and therefore one can assume that innovation will follow as defined by Popaduik and Choo (2006:312).

Further research would include a bigger sample to get a clearer picture of the enterprise. Applying the model and then measuring again to see which interventions worked.

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Biography

Mrs. JG Ippel is a Training and Development Manager at a technology company. She has extensive experience in the fields of adult learning and specifically the eLearning domains. Her current profile sees her developing and delivering user content to users of complex systems. Her background includes fields as diverse as Library and Information Science and Archaeology. She then further specialised in Information Science and have a specific interest in the role of learning in the work place.

Prof ASA du Toit specialises in knowledge management and competitive intelligence and is an extra ordinary professor at the University of Pretoria. Before this she was head of the Department of Information and Knowledge Management at the University of Johannesburg. She published 85 papers in peer-reviewed journals and five chapters in books. She presented 37 papers at international conferences and 34 papers at South African conferences. She is a board member of the International Council for Knowledge Management, on the editorial board of six international journals and one South African journal. She received the SCIP Catalyst Award in 2014, is a member of the scientific committee of the Competitive Intelligence and Strategic Management Centre in Morocco, and was listed in the publication *2000 Outstanding Intellectuals of the 21st Century*, published by Melrose Press in 2003. Current research includes a book on South African knowledge management case studies and a book on South African competitive intelligence case studies.