The Development of a Conceptual Framework for Knowledge Sharing in Agile IT Projects

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Abstract

Organizations must adapt their resources to meet the challenges associated with changes in the work environment in order to remain competitive in the information era. Several research findings identify knowledge sharing as a means for an organisation to improve its competitiveness. Knowledge sharing can be defined in a variety of ways, but it essentially refers to the exchange of knowledge from an information giver to an information receiver. This is a purposeful activity that adds value to the client organisation, particularly in IT system that employs Agile methodology. For the scope of this paper, we are going to consider only Agile knowledge transfer in IT projects that occurs in two angles: business knowledge transfers from client to consultant; and IT technical knowledge transfers from consultant to client. However, when interdisciplinary teams are involved in Agile IT projects, the knowledge transfer mentioned before remains inefficient once the knowledge loss persists throughout the project life cycle. The conversion of conceptual knowledge, which only exists in the brains and minds of individuals, into explicit knowledge is essential for organisations to gain and maintain competitive advantages over its competitor. This study proposes an alternative conceptual framework to address conceptual knowledge transfer in IT projects that use Agile methodology.

Keywords: Agile, knowledge sharing, knowledge transfer, tacit knowledge management, conceptual knowledge, IT project, IT systems, project management.

1. Introduction

Today, companies must adapt their assets, both tangible and intangible, to be robust and agile to changing market conditions in order to survive and grow successfully (Sepashvili 2020). Firms need flexibility to take advantage of new opportunities and follow few rules in order to achieve set business objectives (Villaverde 2021). They need to be able to remain flexible while revising their strategy incrementally over time in response to acquired capabilities and experiences (Collis 2016). Firms need to have dynamic capabilities (DC) (Teece 2016; Franco et al. 2021; Zhao et al. 2021). Only with a proper knowledge sharing process, a firm can use its dynamic capabilities to improve its performances (Michailova & Zhan 2015; Cyfert et al. 2021). Several studies have already identified the characteristics of a firm dynamic capabilities and its relationship with a firm performance (Demigha and Kharabsheh 2019; Shih-Yi Chen Ching-Han 2012; McKee et al. 1989) and have started to address knowledge sharing as a fundamental process that enhances such capabilities (Demigha and Kharabsheh 2019; Zollo & Winter 2002; Lubit 2001). A company can only achieve innovation and improved performance by using a proper knowledge management process (Michailova & Zhan 2015; Cyfert et al. 2021). Industry has become increasingly reliant on technology and knowledge-based methods. The application of traditional software development techniques, including what is commonly known as waterfall development methodology is certainly best suited to systems that require staged or phased approaches. To move forward, the earlier stage must be fully completed before the next phase can commence.

Nowadays, the needs and goals of an IT project often change so rapidly that extensive documentation quickly becomes irrelevant, and it becomes a barrier to the project efforts (Huie et al. 2020). For example, the development of a software gets priority over comprehensive documentation which is fundamental for knowledge capture and that can be later utilized for knowledge transfer. Hence, knowledge is accessed and maintained primarily through experience rather than written documentation (Gheorghe et al. 2020). The modern software development paradigm, such as Agile is less focused on documentation and there is more direct knowledge transfer between the individuals involved in the project activities. This poses several key challenges

and risks for managing knowledge assets in an organisation, and it could eventually affect a firm's ability to be competitive and innovative (Huie et al. 2020). With an increasing number of organisations shifting away from waterfall-based models to Agile development methodologies, these companies are better positioned to leverage of the benefits of agile methodology which enables them to achieve their strategic goals and objectives (Koch & Schermuly 2021).

In Agile development methodologies, there is less documentation and more emphasis on experience and verbal communications (Alsaqqa et al. 2020). As a result, knowledge in the Agile framework has changed from being explicitly written and shared, to being "*conceptual*" (Rodrigo et al. 2021; Jordan 2020), that exists only in individual minds, and as such is unlikely to be expressed in words and easily can be lost (Rodrigo et al. 2021; Ersoy & Mahdy 2015). It is important to realize that explicit knowledge can be formally expressed and encoded, in some format that are readily transferable such as a book, electronic media, while *conceptual* knowledge is influenced by personal characteristics, such as faith, personal experiences or perspective (Cho et al. 2020). Organisations face challenges over "*conceptual*" knowledge management, such challenges present an opportunity for an organisation to develop unique core competencies based on knowledge and therefore achieve competitive advantage (Wilson & Campbell 2020). As a result, firms are making sharing knowledge a major part of their strategies, encouraging innovation, and sharing competencies among team members (Sardjono et al. 2020).

2. Innovation and Knowledge Management

2.1 Innovation

The term innovation means "the use of a new or significantly improved product (good or service), new marketing methods, or a new organisational method" (Fenişer at el 2019). In the scope of this research, we are only focusing on innovation based on the perspective of Tavassoli & Karlsson (2015) and Fenişer at el (2019), which categorize innovation into four classes that are namely, product innovations, process innovations, organizational innovations, and marketing innovations. Product innovation occurs when a new product or a new variation of an existing product is launched in the

market with the goal of satisfying a specific customers' needs. Process innovation involves the introduction of new production practices, as well as new commercial approaches to a good or service. A primary goal for process innovation is the reduction of the unit costs of the products produced. Organizational innovation entails changes in routines aimed at improving a company's efficiency, productivity, revenue growth, versatility, and creativity through the use of disembodied knowledge. Lastly, marketing innovation is associated with improvements of the mix of target markets including market segmentation, and in methods to serve these markets. It is only through reorganising and updating the existing strategy and organisational structure that a company can innovate. Further exploration of this relationship has been provided by Paavola (2021), who noted that dynamic capabilities are a precondition for innovation. The efficiency of a firm's innovation efforts hinges on both acquiring and sharing knowledge within a certain time boundary (Cheng et al. 2016). This leads to competitive advantage which enables an organisation to achieve their business goals.

2.3 Knowledge Management

To meet its competitors' needs, organisations must manage knowledge and intellectual capital as intangible assets (Sardjono et al. 2020). Knowledge Management is defined by Szczerbicki & Sanin (2020) as "the observation, investigation, and optimization of the knowledge economies of an organisation". Cho et al. (2020) and Rodrigo et al. (2021) separates knowledge into two types namely, empirical and conceptual knowledge. Empirical knowledge is the ability to effectively manifest, codify, access, and verbalize knowledge (Cho et al. 2020; Rodrigo at el. 2021). An organisation generally uses documents, procedures, or manuals to express its explicit knowledge. However, conceptual knowledge refers to knowledge that is accumulated in the mind of people and is therefore difficult to access or share (Jordan 2020; Rodrigo et al. 2021). According to Konno & Schillaci 2021, in organisations, knowledge is constructed through the continuous application of both empirical (explicit) and conceptual (tacit) knowledge conversion processes. It is necessary to convert tacit knowledge into explicit knowledge in order to be able to use it by other.

3. Agile Concept

Agile is an agnostic industrial methodology that ensures reliable, timely product iterations, which offer consumer's value by routine and incremental deliveries, with both improved functionality and consumer input (Alsaqqa et al. 2020). This strategy is an important differentiation from technology which frequently does not require or as certainly no longer match the customer's current specifications due to modifications over time (Schaeffer 2016). Although widely used in the software development industry, the mechanics described in the agile manifesto (Beck et al. 2001) can equally be applied to other industries (El Beggar 2021) and have in the recent years become a trusted and preferred method for an organisation to achieve competitive advantage (Agile Ascension 2021). The Agile methodology originated as a concept to overcome the weaknesses of conventional waterfall approach. The waterfall approach had significant disadvantages from the customer perspective with requirements often changing in the interim and there is an over emphasis on documentation at the beginning of the project (Lal 2018). This affects an organisation's ability to dynamically adapt to industry demands as they are influenced by internal and external forces (Diane Isabelle et al. 2020). However, the Agile approach does not have any technological or industrial restrictions, it simply establishes some simple customer-centered guidance on the construction of projects using Scrum or Kanban tools (Granulo and Tanovic 2019). All these implementations have the same commonality; an effort to develop collaboration by eliminating workflow constraints for efficiency with an emphasis on developing the required product (Gheorghe et al. 2020).

4. Related Work

Nonaka & Takeuchi (1996), in regard to knowledge, proposed the Socialisation, Externalisation, Combination, and Internalisation (SECI) model. In this model, socialisation refers to the process of assimilating new tacit knowledge into the existing base of tacit knowledge; Externalisation refers to the process of articulating tacit knowledge into explicit knowledge.

In this model, socialisation is the process of converting new tacit knowledge into the existing base of tacit knowledge; externalisation is the process of articulating tacit knowledge into explicit knowledge; The process of converting explicit knowledge into more complex and systemic sets of explicit knowledge is known as combination; and internalization is the transformation of explicit knowledge into tacit knowledge. Boh and Wong (2013) propose a framework of knowledge sharing mechanisms based on the knowledge management literature to reflect how knowledge is shared. Organizational practises that facilitate the sharing, integrating, interpreting, and applying of know-what, know-how, and know-why embedded in individuals and groups are referred to as knowledge sharing.

In addition, several tools have been developed to support the delivery of knowledge by the research community, which are primarily designed for application sharing such as e-mail, newsgroups, and instant messaging tools. These tools are used to facilitate communication and collaboration among team members to support tacit knowledge exchange (Delio & Paul 2021). By the use of Wiki technology, anyone can make, organize, and update any web page instantly using only a browser. With this technology, users can enter information in an unstructured format such as text and pictures supporting asynchronous collaboration (Medero & Albaladejo 2020).

5. Proposed Framework

The novel model proposed in this paper creates an alternative direction to address conceptual knowledge transfer in IT projects that use Agile methodology. Hence, it addresses the IT project gaps within the current project management approach with provisions of an environment conducive for knowledge sharing and transfer within an organizational context. This framework aims to capture and disseminate conceptual knowledge generated in IT projects that uses agile methodology, even if the team members may be either located or distributed. This framework is based on SECI model, but unlike the SECI model, this model addresses the interactions that occurs along four modes, that include: Assimilation, Experimentation, Attestation and Extemporisation in two dimensions Conceptual vs Empirical Knowledge and Formal

and Informal Knowledge Sharing (Figure 1).

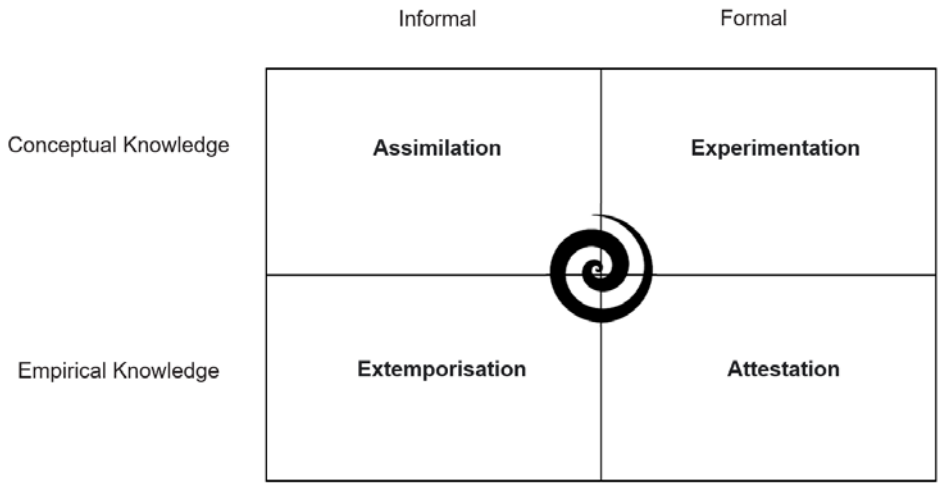

Figure 1 – Proposed Model.

5.1 Conceptual and Empirical Knowledge

Conceptual Knowledge is associated with an abstract or theoretical concept(s). It is typically used by intellectuals and philosophers to create new frameworks or reinterpret existing ones. (Cho et al. 2020; Rodrigo at el. 2021). Empirical Knowledge, on the other hand, is based on documentation of patterns, technology, applications, or experimentation-based that produces data as results. It could be a data-driven analysis or evaluating findings that can be validated through the creation of practical elements or experimentation. It is critical in this type of knowledge to first gather facts before actively producing the necessary information or application. (Jordan 2020; Rodrigo et al. 2021).

5.2 Formal and Informal Knowledge Sharing

Formal knowledge sharing is defined as the creation and dissemination of knowledge and information through formal institutionalised documentation. It is usually founded on professional knowledge, formal decisions, and official documents. (Mueller 2015; Bencsik et al. 2019). Andrea Bencsik and Timea Juhasz (2020) defined informal knowledge sharing as all kinds of knowledge that exist in addition to formalised knowledge. It refers to resources, services, and activities that are used to facilitate

knowledge sharing but are not necessarily designed for that purpose, according to the authors. Conversations and ideas exchanged at the coffee machine, dinners, lunches, and while commuting together to work or to a client can all be examples of informal knowledge sharing. (Quayle and Kelly 2019).

5.3 Knowledge Assimilation

Assimilation is a cognitive process that directs how we absorb new information and integrate it into our existing knowledge. (Introduction to Cognitive Development 2016). Assimilation occurs when you add new information to what you already know in order to internalise it as new knowledge. As a result, assimilation is a blending of previous knowledge with new knowledge. (Roberts et al. 2017). In this model Assimilation is represented by the act of informal sharing knowledge between people, such as storytelling and informal meetings that happen between employees in Agile interactions.

5.4 Knowledge Experimentation

The experiment is the core component of the scientific method, which is a systematic means of exploring the world around us (Auer et al. 2021). Experiments typically include controls, which are designed to minimize the effects of variables other than the single independent variable. This increases the reliability of the results, often through a comparison between control measurements and the other measurements. (Coutelieris 2018). Using those as a starting point, we can define Knowledge Experimentation as a test, trial, or preliminary procedure; an act or operation performed for the purpose of discovering something unknown or testing a principle.
In this paper, the assimilation process reflects planned sessions for people interaction during agile work, such as joint training and peer coaching.

5.5 Knowledge Attestation

Attestation is defined as "an official verification of something as true or authentic" by Merriam-Webster 2021. An attester is someone who verifies the authenticity or validity of something or someone which are frequently made in writing to certify the

statements. Attestation is the act of witnessing the signing of a formal document and then signing it to ensure that it was properly signed by those who are bound by its contents. (Suriano et al. 2020). This presented method uses Knowledge Attestation as a proof or evidence by which knowledge sharing is attested. It is focuses on person-to-document knowledge sharing which includes organisational repositories, and intranets.

5.6 Knowledge Extemporisation

Extemporisation is a term used in both musical and theatrical performances to describe when a musician is able to consciously use patterns and small elements of structure in their improvisation (Hussein 2017). The artist performs extemporisation to achieve musical spontaneity, brio, drive, and variety. (Harris 2015). Extemporisation, as defined by Everitt 2021, is the ability to speak or perform without prior preparation or thought. The Knowledge Extemporisation mode proposed here covers informal and ad hoc document exchanges in agile projects, reflecting people's preference for personal contacts for texts over electronic databases (Attestation).

5.7 Model Setup

The model starts with Assimilation (informal conceptual knowledge sharing) focuses on conceptual knowledge, it is represented by person-to-person knowledge sharing, such as storytelling and informal meetings that happen between employees in Agile interactions. Secondly, Experimentation (formal conceptual knowledge sharing) reflects arranged sessions for person-to-person interaction during the agile work, such as joint exercises, and communities of practice. The next part empirical knowledge is where the knowledge is captured and stored in documents and databases. Attestation (formal empirical knowledge sharing) focuses on person-to-document knowledge sharing which includes organisation repositories, and intranets. The last step it the Extemporisation (informal empirical knowledge sharing) covers informal and ad-hoc exchanges of documents in agile projects, reflecting a tendency for people to use personal contacts for documents rather than electronic databases (Attestation).

It is expected that all stakeholders will be able to benefit from the knowledge generated during this IT project. However, it is not a guarantee that other people will be able to find the information stored. Hence, the organisation's competitive advantage depends on its members' ability to access information from a structured data portal, to ensure that information can be retrieved successfully (Wilson & Campbell 2020). The members should be able to successfully retrieve the information from a structured data repository, to guarantee the long-term competitive advantage of the organisation (Wilson & Campbell 2020). It is recommended that the organisation implements their own query mechanism that can be helpful for easy retrieval of required data from our framework.

6. Conclusion and Limitations

This paper assumes that the importance of knowledge management in IT projects cannot be overstated. In particular, there was an effort to introduce a new framework that can suggest a new way of collect, share and distribute conceptual knowledge into a business organisation, consequently increase innovation. Moreover, the framework is aimed at supporting agile practices and to help organisations to share knowledge effectively. An important limitation of this research effort lies in the fact that the novel conceptual framework should be validated by several organisations that uses agile knowledge sharing practices into its operations. As part of the new framework, employees as well as groups of like-minded employees can collect and store conceptual knowledge and recognise it as a valuable asset for IT projects in today's competitive marketplaces. The second limitation it that this paper focused only on the Agile knowledge transfer in IT projects that occurs in two directions business knowledge transfers from client to consultant; and IT technical knowledge transfers from consultant to client. The Third limitation is that the innovation definition was based on the perspective of Tavassoli & Karlsson (2015) and Fenişer at el (2019), other types of agile knowledge transfer, innovation or other concepts such as Autopoiesis and Cognition or Enaction and Enactivism is beyond the scope of this study and is left for future research. This paper recommended a new framework to collect and store conceptual knowledge in IT projects using agile approach and the

evaluation of the overall method remains to be improved and supplemented during future research. Finally, this framework creates an alternative direction to address conceptual knowledge sharing in IT projects that use the Agile method, which can be also expanded by future researchers in more effective ways by adding an analysis of non-IT projects organisations.

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