A Look at Crowdsourcing through the Lens of the Dynamic Theory of Organizational Knowledge Creation

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Abstract

In today’s increasingly dynamic business setting innovation is known for being of importance and accomplishing a competitive advantage. The research on innovation has acknowledged the role of knowledge being the foundation of competitive advantage. Many companies imply that knowledge sharing is the reason for the competitive edge. In today’s business world it is gradually turning to become a knowledge environment. This paper addresses the impact of knowledge creation on crowdsourcing in terms of innovation. The objective of this study is to understand the importance of crowdsourcing and knowledge creation within innovation management. Innovation is the outcome from implementing structural knowledge. In this study we will seek to understand and recognize how crowdsourcing can be utilized to enhance the formation of structural knowledge. In our findings we acknowledge that crowdsourcing has a constructive influence on innovation. Knowledge sharing also has an effect on the level of innovation in organizations. The methodology will mainly be based on an interpretivist approach from our literary review. Our research findings from all the literature will primarily be of a qualitative approach. There is also a case study covered in this thesis describing using knowledge management with crowdsourcing as a way to promote innovation.

Keywords: Crowdsourcing, Innovation Management, Knowledge Creation, Knowledge Sharing
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We hope this paper will advance further knowledge of the crowdsourcing phenomena we chose to investigate.
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1. Introduction

1.1 Background

Profitable innovation management stresses that we acquire knowledge and utilize it as best as we can. To improve innovation and creativity transforming knowledge into innovation is needed. More needs to be done to find methods to promote the rate of global innovation. There are many implications to why realizing novel ideas is key for companies. In order to master competition and achieve business growth innovation is essential. Innovation can enable new prospects, enhance proficiencies and gain a competitive advantage. Literature evidence advocates that there is a strong correspondence among business performance and new products (Tidd & Bessant, 2013). Knowledge management can incite cultural variations and innovation by promoting the free stream of ideas and is therefore significant for companies (Quast, 2016-04-25). According to Tidd & Bessant (2013, p. 7) “Innovation is consistently found to be the most important characteristic associated with success”. Compared to those who do not innovate, innovative companies more commonly gain stronger growth figures and are more profitable. Elenkov & Manev (2009) differentiate between two modes of innovation: product-market innovation and organizational innovation. Product-market innovation is product strategy, new business environments and marketing platforms. Organizational innovation on the other hand is preparation platforms, development procedures and organizational arrangements.

Knowledge sharing is essential as it is the practical use for knowledge management. According to Elenkov & Manev (2009), displays of an innovative procedure are novel products or product enhancements. Czarnitzki & Kraft (2004) claims that the number of sales of new products is an economic indicator of innovation and of market achievement for a company. Sustained innovation is highly important and viewed as a competitive edge. Continuous innovation is the procedure of producing novel ideas (Elenkov & Manev, 2009, p.357). Organizations that utilize crowdsourcing techniques have an enhanced capability to learn and innovate. Through crowdsourcing organizations can accomplish better implementation and transform ideas into innovation (Xu, Ribeiro-Soriano & Gonzalez-Garcia 2015). There is a research gap in the existing literature, first there is not much research done in the field of crowdsourcing and there is also not much research done that connects knowledge sharing and crowdsourcing. The reason for this thesis is to fill that gap in the best possible way.

The remainder of this paper is organized as follows. Section 2 shows the literature review. Section 3 presents the theoretical framework for introducing key concepts of our research. The methodology is then presented in section 4. The case study is in section 5. Section 6 develops our research findings. Conclusion and discussion are reported in Section 7.

1.2 Research Question and Aim

The purpose of this study is to explore the relationship between Dynamic Theory of Organizational Knowledge and Crowdsourcing. We address this topic by using a literature review, theoretical framework and a case study. Our chosen case for analysis will be InnoCentive.
In our thesis project, we want to show the importance and effects of knowledge creation when applied to the crowdsourcing process. For this reason, we have developed the following research question: To what extent does the InnoCentive crowdsourcing platform fit within the crowdsourcing process as a sequence of knowledge conversion modes (Oliveira and Ramos, 2014)?

1.3 Delimitations

Our research will be using one theoretical framework in analyzing one case study in an attempt to connect the value of knowledge creation to crowdsourcing as a way to promote innovation on the internet. We wished we could do more in depth. We chose to focus only on Nonaka’s four modes of knowledge creation and did not focus on the Ba concept in our research.

We decided to base our thesis off of a literary review approach as a result of the lack of empirical data associated with the relatively new concept of crowdsourcing. As a result we will rely primarily on secondary data collection. We concluded that this approach was the best fit given the limited time to write our thesis.

As further motivation for this final thesis, we have both already written similar papers earlier in the Management of Technology Innovation and Creativity course (ME 2092) and the Technological and Industrial Change course (ME 2093).

Looking at delimitations, what about other theories? That is, theories that we discarded, can they have given us another result? It is difficult to know which theories to use and which ones not to employ. And other case studies? Did we pick the one that suited our thesis best? These things are impossible to know. However, by covering one particular case study that aligned with our topic we thought it displayed our thesis the best.

We chose to not looking into details on crowdsourcing as we thought it was not vital. We only touched knowledge management on the surface.

2. Literature Review

2.1 What is innovation?

The term innovation comes from the Latin innovate, meaning “to make something new” (Tidd & Bessant, 2013, p.19). One of the most common views presumes that innovation is a procedure of transferring opportunities into new ideas to be used in reality (Tidd & Bessant, 2013). Some definitions of innovation are as follows: “Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things” (Tidd & Bessant, 2013, p.19). Innovation “represents the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (Kadar, Moise & Colomba, 2014, p. 1084). Knowledge and globalization are what drives innovation (Kadar, Moise & Colomba, 2014). Innovation should not be confused with invention; innovation should work both technically and commercially. There is no certification of commercial success when being an inventor. Innovation is much more than only identifying new ideas; it is the procedure of turning ideas and knowledge into effective use and capturing value from them. Innovations emphasize the development and exploitation of new knowledge (Tidd & Bessant, 2013).
2.2 What is innovation management?

Innovation management is “focused on the systematic processes that organizations use to develop new and improved products, services and business processes. It involves development of creative ideas within the organization and the networked environment” (Kadar, Moise & Colomba, 2014, p. 1083). The knowledge gathered in new technologies and processes has resulted in growth and competitiveness. In order to create a favorable environment for innovation it is necessary to develop knowledge-based society that invests in research and education. The dynamic forces for innovation are new knowledge, globalization and changes in views (Kadar, Moise & Colomba, 2014).

The company’s development of new products, services and technologies represent modern innovation management. Innovation management enables organizations to develop and innovate their business model. In order to make key decisions used to create many ideas and investment opportunities, innovation management plays a significant function (http://innovation-management.org/).

2.3 How is innovation important?

Innovation is what stimulates variations in the business climate and also innovation approaches. Innovation approaches are about inspiring innovation among people and implementing and employing knowledge (Kadar, Moise & Colomba, 2014). Research findings shows, a strong connection between market performance and new products, which are function of innovation. New products result in attaining and maintaining market share and consequently can grow the profitability of the company. The capability to substitute old products with better versions is becoming more imperative. As the environment is constantly changing, product development is a vital capability. Changes in the environment can create both opportunities and limitations, and competitors might also bring in new products. The company therefore needs the ability to react quickly throughout product innovation. A powerful competitive advantage is to create something no one else can or do so in methods that are better than anyone else. Being able to provide something faster, more cheap, and with higher quality has likewise always been seen as a competitive advantage. As a company is able to further innovate it diminishes the risk of being left behind (Tidd & Bessant, 2013). According to Hausman and Johnston (2014) the role of innovation is connected to job creation and contributing to the overall economy.

2.4 Why is innovation important?

Hausman and Johnston (2014) argues that innovation is symbolized with profitability and economic strength. As the world is becoming increasingly competitive, companies must master innovation to stay competitive. Innovation matters, and not just simply for the single company but also for national economic growth. According to Tidd & Bessant (2013) almost all of the economic growth since the eighteenth century is because of innovation. Those companies that are innovative do not jeopardize their future and can instead gain market share and increasing profitability. As we saw in the introduction, innovative companies do more frequently attain stronger growth than those that do not innovate. New innovations can improve life, solve problems and enable better living standard. It is evident that much of their longevity of companies such as 3M, Siemens and Philips is due to having the ability to innovate on a persistent basis (Tidd & Bessant, 2013).
2.5 Where do innovations come from?

According to Tidd & Bessant (2013) ideas can come from unexpected and surprising things that provide new ways for innovation. It can also come from watching others, by benchmarking and imitating. Innovations can be created from inspiration or based on a problem that needs to be solved. Exploring an alternative future and opening up several possibilities can also create it (Tidd & Bessant, 2013). Innovation may occur from industry and market changes (Kadar, Moise & Colomba, 2014).

2.6 How knowledge can create innovation

As we have seen in the introduction, successful innovation management demands that we get hold of knowledge and use it as best as we can. The idea is that we put together components of knowledge and create architecture of an innovation. Tidd & Bessant (2013) argue that there are three innovation phases of knowledge routines, (1) Discovery, (2) Realization and (3) Nurturing. Discovery means active environmental scanning and examining the internal and external situation, experiment and R&D. Realization is how the organization can successfully develop the innovation by existing knowledge. Nurturing is the means by which efficacy of knowledge applications are measured and sustained over time (Tidd & Bessant, 2013).

2.7 Patents

Patents play an increasingly important role in innovation. All developed countries have some kind of intellectual property rights with the purpose to support innovation and investments in new technology. By having exclusive rights, a company can be allowed a limited monopoly for a certain period of time. Intellectual property can be exploited in the development and commercialization of innovations. Patents can be utilized to acknowledge and evaluate innovation both at the company or national level. The main advantage is that the company has exclusive commercial rights to use the invention and can protect it. However, patents do not indicate the economic performance or commercial potential of the innovation (Tidd & Bessant, 2013). On the contrary, Moser (2013) claims that historical data has stressed the role of patent laws in producing incentives to invent, encouraging innovation, and promoting economic growth. Patent counts have become the standard of measuring innovation. Hence, number of patents can be an indicator of innovation in a company, such as the strength of the patent portfolio (Tidd & Bessant, 2013). Worth noticing is that innovation often appears independently of patents as a consequence of knowledge sharing (Moser, 2013).

2.8 Knowledge Management

According to Lai, Hsu, Lin, Chen & Lin (2014, p. 735), “knowledge management significantly and positively influences innovation performance”. Developed in the 1990s, knowledge management has become a well-established discipline both in the business world and the academic field. Organizations implement knowledge management activities to enhance the efficiency of business processes, increase productivity and in finding novel resolutions. In technological settings, innovation can be the outcome of knowledge management efficiency (Donate & Pablo, 2015). According to the authors the principal reason for the existence of companies is creation, integration and exploitation of knowledge. Another important feature is the leadership, since leaders have a significant impact on the efficiency of knowledge management within their organization. Leaders can create an environment where individuals are encouraged to share their knowledge and cooperate within the organization (Donate & Pablo, 2015).
Knowledge creation means developing new knowledge or replacing old/existing knowledge in the organization's collection of tacit or explicit knowledge, which are explained below. In order not to forget the acquired knowledge, knowledge management activities should include structuring of organizational knowledge, which makes the company maintain an organizational memory. Knowledge is collected and stored in electronic databases, documented and codified in expert systems. Employees should be spirited to distribute knowledge. Knowledge management initiatives centers around resolving issues (Donate & Pablo, 2015).

Critical for knowledge management is the accessibility of knowledge databases. As we have seen, important for organizational success is the managing of intellectual resources. Attempts to share and use tacit and explicit knowledge are more significant when people are acknowledged and rewarded for their comprehending of the knowledge procedure. The key to success lies in having a supportive and stimulating environment that promotes knowledge sharing (Smith, 2001).

2.9 Knowledge Sharing

The term knowledge sharing “implies the giving and receiving of information framed within a context by the knowledge of the source” (Sharratt & Usoro, 2003, p. 188). Donate & Pablo (2015) argues that knowledge is a vital resource and when accomplished diligently enables the company to achieve value. In order to make the most professional usage of knowledge, organizations should implement knowledge management processes aiming to accomplish consciousness.

Effective knowledge management is an approach for improving the company’s innovation capability. Donato & Pablo (2015) argue that knowledge management initiatives commonly share a significant connection to innovation performance. Accordingly, there are several relations between R&D efforts to produce new ideas and create innovations. Research also suggests that there is an association between knowledge from employees and innovation. Central for accomplishing advantages based on innovation are knowledge management practices such as new knowledge and organizational learning. Knowledge creation is thus required for the organization to enhance its innovation performance. The authors claim further that knowledge transfer is a key feature for new product development. Moreover, the method a company uses in its existing knowledge through knowledge management initiatives will affect its innovation capability. As an example, formal and informal socialization activities influences knowledge sharing and product development results. According to the authors, a company’s innovation performance depends on the company’s ability of knowledge management transfer.

On the contrary, literature demonstrates that the connection between knowledge and innovation is somewhat unforeseen. Yet, the transformation of knowledge is interrelated to the innovation procedure, which results in new technological breakthroughs. Likewise, other research indicates that companies have the ability to attain progresses in the quality of products from the interface amongst knowledge storing and knowledge transformation procedures (Donate & Pablo, 2015). When companies develop personalization policies it represents that knowledge management networks are of significant value for knowledge sharing. Organizing data and collecting information is regarded as knowledge processes, and the impact on implementation is vital when people transform these procedures. When the development is connected to knowledge management transformation knowledge storing activities is probable to impact an organization’s result.
Hence, knowledge activities will significantly affect knowledge storing procedures and innovation routines. In order to structure and distribute knowledge many organizations employ intranets and databases (Donate & Pablo, 2015).

For knowledge sharing to work leadership is key. Knowledge leaders must involve and create incentives for knowledge conversion and distribution. In order to meet the company’s knowledge objectives leaders must encourage workers to learn and employ knowledge as best as they can. Hence, knowledge leadership is crucial to seize the prospects to innovate. Knowledge leaders must be flexible to promote innovation and directing others to the purposes of the organization. Idealistic management is needed for leaders to succeed with explicit and tacit knowledge. Innovation and management will share an unforeseen comparison. The company will implement knowledge management initiatives, which will have a constructive influence on innovation implementation. The goal for the knowledge leader is to motivate learning and members intellectually. It is vital to create the right environment where knowledge can flow and where knowledge sharing could arise original ideas and innovation. The probabilities of a company being innovative are increased when it has more knowledge (Donate & Pablo, 2015).

Knowledge is key for a company’s survival and advancements. It is evident that knowledge management is becoming increasingly important for a company’s success. Researchers claim that knowledge based resources is the foundation for achieving competitive advantage in today’s globalized world (Abou-Zeid, 2007). Voransachai (2008) stresses that innovative companies in general are good at developing their corporational assets.

It is important that companies manage their organizational knowledge, which is the most significant resource according to Voransachai (2008). The most competitive advantage of today’s companies is the knowledge creation that will enhance innovation. Innovating companies tends to have a higher market share, higher growth rates and higher profitability. According to Voransachai (2008), globalization has resulted in establishing knowledge as the strategic feature for companies to become competitive. As a consequence, many companies have become knowledge-based organizations. From a business perspective, innovation is seen as a new procedure contributing to company performance. Knowledge acquisition, sharing and creating influences positively innovation (Voransachai, 2008).

Rewrite: Managing knowledge involves five key components:

1. Generation and acquisition of novel knowledge.
2. Recognizing and accumulating existing knowledge.
3. Distributing and receiving knowledge.
4. Contributing knowledge in the organization.
5. Employing and establishing knowledge in processes, product and services.

(Table from Tidd & Bessant, 2013, p. 574)

Besides managing a learning process, knowledge management is about the development of effectively sharing organizational knowledge (Leung, 2014). Hence, knowledge management concerns how a company gains and manages knowledge (Inkpen & Dinur, 1998). Knowledge management is becoming increasingly important for companies and there are three major reasons for this:

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1) Enables decision-making competencies, 2) Promotes learning organizations by making learning a routine and 3) Stimulates cultural change and innovation (Quast, 2016-04-25). The purpose of knowledge management is to endorse creation and transfer of knowledge in organizations. More than before, codifying, storing and sharing knowledge has become more efficient because of the increase of networked computers. Knowledge has become a critical organizational resource (Hansen, Nohria & Tierney, 1999).

When considering knowledge management, there are two factors that comprise the theoretical framework: technical and people-oriented. The technical view is about producing organizations’ knowledge and the accumulation of non-explicit knowledge. The people-oriented factor is knowledge distribution (Leung 2014). Alavi and Leidner (2001) claims that knowledge management has three different reasons: 1) Make knowledge accessible 2) Inspire knowledge 3) Implement a knowledge structure.

2.10 Tacit and Explicit knowledge

Knowledge management concerns how to capture both tacit and explicit knowledge. Tacit knowledge is “personal, experiential, context-specific and hard to formalize and communicate” (Tidd & Bessant, 2013, p. 575). Smith (2001) explains tacit knowledge as not being expressed, as knowing more than one can openly describe. An example would be riding a bicycle. Tacit knowledge is of a subjective nature and cannot be covered in manuals or databases. This form of knowledge consists of perceptions and insights. Demonstrations, stories, observations and face-to-face contacts are methods of sharing tacit knowledge to others. It is in many cases easier to remember tacit than explicit knowledge. Unfortunately tacit knowledge is often undervalued and neglected in the workplace. This is a tremendous waste of intellectual capital. Tacit knowledge is best transferred in a free and open environment that encourages knowledge sharing. People-to-people techniques are used to personalize tacit knowledge.

Explicit knowledge is more clearly converted than tacit knowledge (Smith, 2001). Explicit knowledge can be “codified, that is expressed in numerical, textual or graphical terms, and therefore is more easily communicated” (Tidd & Bessant, 2013, p. 575). With simple availability explicit knowledge is accumulated in databases (Smith, 2001).

Companies must create environments to encourage knowledge sharing and use all forms of knowledge. It is becoming increasingly important to manage human intellect, resources and convert it to innovative products, services or processes. A person uses face-to-face methods to share tacit knowledge. Managerial success is dependent on the capability to manage tacit knowledge. Using tacit knowledge is key in maintaining skillful, innovative and productive employees. In order to utilize knowledge resources companies need to support gathering, transferring and sharing of knowledge. Tacit knowledge is critical in using the general quality of knowledge (Smith, 2001). Importantly Smith (2001) claims that knowledge-based work contains 99 percent of the work most people make, not true for factory workers or farmers. That is, the work people do is based on the knowledge needed for the particular job.

Comparable to corporate reputation and brand identity knowledge is becoming, as we have seen earlier, an increasingly significant resource. Being a highly personal resource, knowledge exemplifies the collective expertise of an organization. The value of knowledge plays a key role when it has an important purpose and focuses on a specific objective. Employees have valuable knowledge, skills and experiences that is essential for companies.
An effective strategy to manage knowledge is to translate data to information and eventually to knowledge. The challenge is to transfer knowledge into wisdom and experience. Tacit knowledge is associated with wisdom (Smith, 2001). Organizations such as IMB create databases of information and new knowledge that is easily shared and available, Knowledge management is an ongoing process and is distributed throughout organizational boundaries. Knowledge management is a procedure of acknowledging what knowledge a company already has and can create. Phases in this procedure contain how knowledge is captured, translated and exploited. Instead of starting over again, knowledge management exploits the company’s existing resources to enable people create best practices and learn from experience. Dealing with tangible intellectual resources such as patents and creating innovative corporate strategies are all areas of knowledge management. Codifying explicit knowledge is a method to utilize knowledge assets. In order to save time and efforts knowledge shall be reused. To succeed with translating and transferring tacit knowledge, some companies use personalization strategies. People-to-people knowledge is used to analytically evaluate business problems. The competitive strategy should be aligned with methods of codified and personalized knowledge Research shows that most companies do not succeed in managing explicit and tacit knowledge (Smith, 2001). Databases with knowledge and information must be well structured and easy to utilize by anyone. However, there are cases where companies are good using their databases for translating and sharing knowledge (Smith, 2001).

2.11 Knowledge creation

As a segment of structural knowledge we find knowledge creation. It is the ability of companies to implement and distribute knowledge. Regarding innovation, knowledge creation and transformation is essential to attain a competitive advantage. Knowledge creation has a constructive connection with innovation implementation. Nonaka’s Dynamic Theory of Organizational Knowledge Creation (SECI Model) (Nonaka, 1994) is outlined below. Here, Nonaka demonstrates the conversion and knowledge creation among tacit and explicit knowledge. Nonaka’s work is one of the most well known in the area of knowledge management (Glisby & Holden, 2003). There are four procedures for creating knowledge in organizations (Smith, 2001):

1. Socialization - tacit to tacit, by perceiving and seeking understandings during meetings (Smith, 2001). For socialization to work members should be keen to distribute and convert knowledge (Glisby & Holden, 2003). This form of generating knowledge is the practice to transferring tacit knowledge over common experiences and this is necessary since tacit knowledge is hard to articulate (Nonaka, Toyama & Konno, 2000).

2. Externalization - tacit to explicit, discovering methods to communicate tacit knowledge (Smith, 2001). For externalization to be realized group obligation is required. Here tacit knowledge is converted and made explicit (Nonaka, Toyama & Konno, 2000).

3. Combination - explicit to explicit, merging explicit knowledge into new explicit knowledge (Smith, 2001). In this process explicit knowledge is accumulated, combined and presented in a new form (Nonaka, Toyama & Konno, 2000).

4. Internalization - explicit to tacit, tacit knowledge converts internalized. This form is the mode of translating explicit knowledge to tacit knowledge (Nonaka, Toyama & Konno, 2000). For internationalization to work people must collaborate and be willing to distribute their knowledge resources. When this is realized this form for generating knowledge becomes a relatively simple conversion (Smith, 2001).
The creation of knowledge revolves around the forms of socialization, externalization, combination and internalization as seen in figure 1. Nonaka (1994, p. 14) claims, “organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge”. When people acquire knowledge the company must acknowledge and transfer that new knowledge (Nonaka, 1994). These four forms constitute a model of knowledge creation. There exists a mixed amount of diverse perceptions regarding if explicit knowledge can be translated into tacit knowledge. Particular views say it cannot, others argue that tacit knowledge can be converted conversely through the SECI model (Smith, 2001).

Glisby and Holden (2003) reason that this model should be utilized with cautiousness since it is a model of the Asian business environment. Moreover, it should be viewed objectively since it can be regarded subjective and grounded only on Japanese traditions and thus not relevant in other cultures. However, the theory should not be discarded, only employed cautiously and objectively (Glisby and Holden, 2003).

2.12 Crowdsourcing

In this paper we explore the role online crowdsourcing plays as part of the knowledge creation process. The term “crowdsourcing” (Howe, 2006) as we know it today has been around in one form or another i.e. there was an incentivized contest in 1714 by the British government to challenge a crowd in deriving a simplified method to calculate a ship’s navigational longitude. Also in 2011, the Icelandic government launched a crowd initiative seeking the support of developing a new constitution in 2011. Figure 1 illustrates a historical timeline of various forms of crowdsourcing.
Crowdsourcing originates from a combination of two words: “crowd” and “outsourcing” and the term was originally coined by a professor of journalism and contributing editor to Wired magazine, Jeff Howe, in 2006. In his macroblog entitled “Crowdsourcing” (http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html, Fourth Paragraph, Accessed: 28, April, 2016), Howe states the following definition:

“Simply defined, Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the wide network of potential laborers.”

Furthermore, since the original coining of Crowdsourcing, a typology of crowdsourcing types (as summarized below) has emerged according to Estelles-Arolas (2016, pp. 41-43). Estelles-Arolas and Gonzalez-Ladron-de-Guevara (2012b) propose five different crowd tasks and complemented by other crowdsourcing typology research carried out by Reichwald & Piller, (2006); Howe, (2008); Brabham, (2008); Kleeman et al., (2008); Geerts, (2009), and Burger-Helmchen & Penin, 2010). The five types are as follows:
1. **Crowdcasting**: This is a type where a crowdsourcing intermediary will solicit a crowd to help solve a problem or task in the form of a competition where a predetermined award is offered to a solver with the best solution.

2. **Crowdcollaboration**: An intermediary initiates a process and allows individuals within a crowd to share their knowledge in order to solve problems or create ideas collectively usually with no financial incentive involved. The task initiator or seeker removes themselves from the collaboration process. Within the this category are two subtypes:

   a. **Crowdstorming**: Involves online brainstorming sessions on a proposed idea where a crowd collaborates and votes.

   b. **Crowdsupport**: Where a seeker solicits the help of customers to solve problems for other customers absent any after-sales service.

3. **Crowdcontent**: Individuals of the crowd work independently to create or find content to problems or questions posed by the seeker. The outcomes of all the individuals will be combined and there is no competition involved. There are three subtypes to this category:

   a. **Crowdproduction**: The crowd is gathered to create content individually or collectively such as text-translation or image tagging.

   b. **Crowdsearching**: Crowd participants search content on the internet under defined goals set by a seeker.

   c. **Crowdanalyzing**: A crowd is gathered to search and analyze multimedia images or video set by a seeker.

4. **Crowdfunding**: A seeker solicits funding from a crowd for a product or services in return for financial or other rewards including equity and donation-based campaigns.

5. **Crowdopinion**: A seeker solicits opinions on a product, service or topic.

2.13 **Crowdsourcing on the Internet: Explicit and Implicit Collaboration**

Crowdsourcing is still a fairly new concept to explore. The popularity and usefulness of Crowdsourcing has grown particularly with the presence of the internet as a means of delivery. More research has taken place in other aspects of the concept such as the way Crowdsourcing system owners and participants collaborate and in what type of context. Doan, Ramakrishnan and Halevy (2011) take into account the “nature of collaboration” when deploying Crowdsourcing methods on the internet. Doan et al. state that collaboration can either be explicit or implicit in nature in terms of how users collaborate.

Explicit collaboration allows users to directly “evaluate, share, network, build artifacts and execute tasks” (Doan, et. al, 2011, p. 89) together directly on sites such as Wikipedia and Flickr. Users from the crowd are actively recruited to solve problems or execute tasks on a “standalone” site that is independent of other websites.

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Implicit collaboration involves problem solving or performing tasks as a side effect of interacting on existing “standalone” sites or piggybacking on another system. According to Doan et al. (2011) this type of collaborating on a standalone site requires the gathering of a crowd while piggybacking on another site does not. Examples of standalone sites include Internet Movie Data Base (IMDB) where users rate movies and can also access the ratings done by others. A good piggyback site example is accessing Amazon where users purchasing habits are tracked and used for buyer recommendations.

2.14 The relationship between innovation concepts and crowdsourcing

It is important to note that the link between crowdsourcing and innovation are synonymous. Crowdsourcing can take place in any one of these innovation concepts. Schenk and Guittard (2009) examine Crowdsourcing when comparing it to classic concepts such as to Open Innovation, User Innovation and Open Source Software.

1. Open Innovation

Open Innovation as a concept was originally developed by Henry Chesbrough in 2003. Schenk and Guittard (2009) note that Open Innovation and Crowdsourcing share the same paradigm in which knowledge is distributed and both have a positive impact on a firm's R & D processes. They draw out three differences though, 1) Open Innovation focus on innovation processes while Crowdsourcing does not, 2) Open Innovation focuses on the interaction between firms while Crowdsourcing is between a firm and a crowd and 3) Open Innovation deals with the selling and buying of knowledge and processes and not so much involved in the outsourcing for crowd input.

2. User Innovation

User Innovation is a concept primarily developed by Eric von Hipple in 1998. According to Schenk and Guittard (2009) the shared paradigm between User Innovation and Crowdsourcing is the focus of innovation shifts to the users who are external to the firm. The differences are listed as follows, 1) User Innovation is user driven while Crowdsourcing is firm driven, 2) Crowdsourcing is multi-faceted and not only dependent upon innovation issues, 3) User Innovation involves final development of products while Crowdsourcing is open to a wide variety of user participants.

3. Open Source

Crowdsourcing does have some similarities in terms of the participation involved with Open Source sharing but is not restricted to the sharing of software development and coding alone. According to Schenk and Guittard (2009, p. 12), “Open source is an application of the crowdsourcing production mode rather than a similar concept.” Unlike freely sharing and altering of source code on the internet, a In other words

3. Theoretical Framework

Online crowdsourcing intermediaries are mainly a vital part of the Open Innovation category. Lane (2010) concluded that open innovation combined with crowdsourcing can create competitive advantages in terms of new innovations and problem solutions.
Seltzer and Mahmoudi (2012) state that crowdsourcing is an open innovation process. For this reason, after consideration of the above concepts, we will take a more specific look at the relationship between knowledge creation and an open innovation-based online crowdsourcing platform i.e. InnoCentive as our chosen case for analysis.

3.1 Adapting the Nonaka SECI Model to evaluate crowdsourcing processes

Using the aforementioned Nonaka’s “Modes of Knowledge Creation” (1994), we examine an open innovation-based crowdsourcing platform by applying an adaptation of Nonaka’s original SECI model as our framework of analysis. In reviewing our case we use Oliveira and Ramos (2014), who have created a SECI model variant to analyze online based crowdsourcing processes. According to them, “... this work aims to better understand, from the firm’s perspective, how can Crowdsourcing be used in order to enhance the creation of organizational knowledge leading to innovation.” (p. 2)

Originally, Nonaka (1994) developed the initial SECI model into a four-part quadrant system of knowledge creation processes with tacit and explicit knowledge conversions along the periphery as mentioned earlier in detail in this paper. Refer back to Figure 1.

We then transition Nonaka's original SECI model to Oliveira and Ramos’s SECI version as a framework for analyzing a Crowdsourcing platform as a case. See Figure 2:
As we make the comparison we reiterate each of Nonaka’s SECI modes of knowledge creation and conversion, and then explain Oliveira and Ramos’s crowdsourcing versions with each section. Before we begin, it is important to point out that the crowdsourcing platform (crowdsourcer) serves as an “intermediary” between what Oliveira and Ramos (2014) call the “Seekers”, who are the clients (whether a firm or individual) and the “Solvers” who represents the crowd that serves the crowdsourcing platform.

In line with the SECI model, we then go around the quadrant in a clockwise fashion starting with Socialization (Problem Identification) and ending at the Internalization (Solution Learning) quadrant.

This clockwise movement is known as the “Ba” and defined by Nonaka and Konno (1998, p. 40) as “shared space that serves as a foundation for knowledge creation.” What is meant by “shared space” can be physical in terms of office space, virtual as in emailing or teleconferencing, or a combination of both.

For this research, we focus only on the four modes of organizational knowledge creation as the framework for analysis and do not focus on the Ba concept.

Figure 2. Crowdsourcing process as a sequence of knowledge conversion modes (Adapted from Nonaka & Konno (1998 p. 43))

Source: Oliveira, F. and Ramos, I. (2014, p. 4)
4. Methodology

In this section we discuss our methodology that will be used in our research. We will use Collis and Hussey (2014) as the primary source in structuring our methodology to explain the phenomena we have chosen to investigate.

4.1 Research Paradigm

Our chosen paradigm will mainly be based on an interpretivist approach from our literary review process of existing literature. In reaching our conclusions we will use an inductive and humanist reasoning process as we go through many different types of publications in our literature review. Our analysis from all the literature and by deploying the SECI frameworks Nonaka (1994) and Oliveira and Ramos (2014) in the case study will be primarily qualitative as well subjective in nature. As such, we will focus on a qualitative method of data collection based on existing phenomena versus actual quantitative data measurements.

4.2 Research Approach

In the process of enhancing our quest for knowledge in the chosen phenomena we will form our writings based off of an interpretivist style of literary review.

Our paper focuses on the field of knowledge management and how the concept relates to modern internet-based crowdsourcing, which embrace the concept of open innovation. We will collect knowledge from sources such as scientific journals, articles, books and web sites that will serve the purpose of our research question.

We will locate our various literary sources using Google Scholar database as the bulk of our citations. Further citations will also be used from additional sources such as the KTHB Primo system, the Scopus database and ResearchGate.

Google scholar is an available scholarly web search engine that contains journal articles, top authors, books and other scholarly papers. KTHB Primo system offers literature for free in many cases as well. Scopus and ResearchGate will be secondary sources for more literature collection.

Our research will be guided by the keywords of: Crowdsourcing, Innovation Management, Knowledge Creation and Knowledge Management.

We will use an existing SECI theoretical model and deploy an empirical inductive approach to evaluate an existing crowdsourcing platform as a case.

We will utilize an analytical and qualitative research approach based on case study methodology. We seek to enhance additional knowledge through deepening the in-depth research into existing phenomena. The case will be a crowdsourcing platform as the basis for the phenomena of observation. We will focus on crowdsourcing platforms that specialize on an Open Innovation approach and can be analyzed under the given Nonaka SECI model framework.
4.3 Sustainability and Ethics

“Innovation is often viewed as a major contribution to the degradation of the environment, through its association with increased economic growth and consumption” (Tidd & Bessant, 2013, p. 607). Nevertheless, innovation must promote sustainability and reasons for more ethical procedures (Tidd & Bessant, 2013). Also, innovation creates jobs, contributes to the overall economy and is a main field of study as it relates to Industrial Management.

In the world today sustainability is a big issue. Therefore, it is required to think in the long run and not compromise future generations livelihood and possibilities to fulfill their own needs. The principle for companies is to make good business decisions by considering the long-term interests of consumers and society. CSR (Corporate Social Responsibility) is becoming a major function in today’s globalized world and for responsibly businesses. CSR strategies support businesses to make a positive effect on the environment (Tidd & Bessant, 2013). Social entrepreneurship is another method for addressing ethical and sustainable issues.

5. Case Overview: InnoCentive

The origins of our case can be traced back to a U.S. based pharmaceuticals company called Eli Lilly and Company. The original idea was formed primarily by employee Alpheus Bingham in 1998 while serving as Vice President of e.Lilly, which was a business innovation unit specializing in open and networked organizational structures. One of the initiatives he launched from e.Lilly was InnoCentive (Bingham, A. and Spradlin, D., 2011, xix).

InnoCentive was established as a business unit in 2001 and later was spun off by Eli Lilly with venture funding in 2005, (https://www.innocentive.com/offering-overview/seeker-faqs, Accessed: 10 May, 2016). InnoCentive currently remains a privately held company. Clients include Eli Lilly, GSK, Roche and Thomson Reuters among a few.

As per their website, “InnoCentive is the open innovation and crowdsourcing pioneer that enables organizations to solve their key problems by connecting them to diverse sources of innovation including employees, customers, partners, and the world’s largest problem solving marketplace” (https://www.innocentive.com/offering-overview/seeker-faqs/, Accessed: 10 May, 2016).

InnoCentive as an organization which serves as an online crowdsourcing intermediary where seekers, who can be commercial enterprises, public sector agencies and nonprofit organizations are combined with solvers who comprise the crowd. Solvers can be in the form of employees, partners/customers or their global network of over 375 000 people. Innocentive offers prizet-based competitions as an incentive for crowd participation. Intellectual Property Rights (IPR) are strictly given paramount importance in confidentiality for the seekers (https://www.innocentive.com/offering-overview/seeker-faqs/, Accessed: 10 May, 2016).

From the seeker perspective, programs are available for both external initiatives and internal initiatives. InnoCentive offers the following programs (https://www.innocentive.com/offering-overview/, Accessed: 4 June, 2016):
1. Premium Challenge Programs (External): Offering where seekers can access a crowd network of over 375,000 people to solve problems.

2. Custom Challenge Programs (External): Offering where crowdsourcing initiatives can be customized to fit unique seeker needs in solving problems.

3. InnoCentive@Work (Internal): Offering where SaaS-based innovation management software is utilized for seekers to crowdsource solutions that are internal.

4. InnoCentive Idea Management (Internal): Offering where SaaS-based generation software is utilized for seekers to manage idea campaigns and suggestion box initiatives among employees.

All pricing information is not published and open to the public. Innocentive requires a brief website form to be completed and send for a Sales follow-up (https://www.innocentive.com/about-us/contact/sales/, Accessed 4 June, 2016) or contact can be made with given telephone numbers on their website. After sales agreements are established, seekers begin the process by posting a “Challenge” to the crowd.

From the solver perspective (https://www.innocentive.com/our-solvers/, Accessed, 5 June, 2016), they are required to register and are free to review initiatives or “Challenges” in the InnoCentive challenge center. Solvers of the crowd can view a “Challenge Bulletin” or follow InnoCentive via a Twitter feed. InnoCentive also provides a Project Room where upon registration and signing of a confidentiality agreement, solvers can view more precise seeker requirements, technical information, ask questions and submit solutions. Solvers are permitted to submit up to ten separate proposals to each Challenge. Solvers within the crowd can also form cross-collaborative teams and participate in Team Project Rooms (TPR).

For solvers the experience can be attractive and rewarding. Rinaldi (2015) states that in a period of 15 years, over 350,000 solvers have participated with over 40,000 solutions submitted in more than 2000 challenges. Over $40 million dollars have been awarded. Solvers are not just restricted to experts related to a challenge but anyone can get involved with a valid solution (Chan, 2013).

A method where InnoCentive protects intellectual property rights is by allowing only the seekers to view and make determinations to all solutions from the solvers. Seekers and solvers are also required to sign confidentiality agreements in advance. All seekers are known to InnoCentive but can be anonymous to the solvers.

In general, with the growth of internet in the past decade, social networking has been empowered making it much easier for InnoCentive to provide a vast network for problem solving at an accelerated pace beyond just internal networks of seeker firms (Spradlin, 2009).

5.1 Economic Impact of the InnoCentive Challenge program

In a case study conducted by Forrester Consulting on behalf of InnoCentive (Bishop, 2009), an anonymous seeker company was surveyed on the economic impact of using InnoCentive’s “Challenge” program by an external consulting agency. The challenge programs are either standard in form or can be individually customized for their seeker clients (https://www.innocentive.com/ar/challenge/browse, Accessed, 6 June, 2016). The purpose of the study is to demonstrate the value of using InnoCentive’s open innovation-based challenges to other potential seeker firms.
The study concluded with the following qualitative benefits from the sampled firm:

- Research costs are cut by working with the InnoCentive intermediary than if the firm did it all internally.

- The firm became more innovative in its own right and was better able to smooth out the transferability of IP rights.

- As a result of the challenge program the firm was able to easily identify an array of solutions offered by InnoCentive’s vast global network of solvers. A process made easier than doing it all internally.

Although the study stresses the difficulties of quantifying data they do indicate a 74% return on investment (ROI) in a three month payback period (break even point) for the sample firm. Based on a three year collection of data period between total costs, benefits and net savings.

It is important to note from the study’s disclosures section (p. 6), that Forrester Consulting maintains full editorial control and does not accept any external changes that contradict their original findings.

6. Research Findings

(Zhou & Li, 2012, p. 1091) argues that companies with “diverse knowledge domains are more likely to generate cutting-edge ideas and novel combinations of knowledge components”. A comprehensive knowledge foundation can enhance the company’s ability to implement innovations and acknowledge opportunities in the market.

Still, knowledge may arouse various ideas but it does not automatically cause evolving breakthroughs. Wide-ranging knowledge is central for innovation as it enables the efficient acknowledgment of novel ideas and denotes to complication of knowledge in crucial areas. Sometimes it occurs that companies create ideas but do not accomplish success in the realization segment, all this since they lack the essential competence to resolve complex problems. Knowledge sharing shall promote new ideas and companies must utilize knowledge incorporations to employ its knowledge possessions. Knowledge sharing is a procedure through which the company can add its comprehensive knowledge to generate ideas (Zhou & Li, 2012).

Xu, Ribeiro-Soriano and Gonzalez-Garcia (2015) stresses the usefulness of crowdsourcing in generating novel product ideas. Crowdsourcing endorses group work and supports knowledge sharing. Members’ knowledge needs to be included in procedures and benefit the establishment of learning competencies. These skills qualify companies to grow a permanent learning system, which distinguish the company from its rivals. Companies that produce crowdsourcing initiatives have an enhanced capability to understand and respond to dynamic market deviations. A definition of crowdsourcing is as follows: “the ability to gather large group of people around your brand and get them working to develop products and/or solutions” (Xu, Ribeiro-Soriano & Gonzalez-Garcia 2015, p. 1160). According to Xu, Ribeiro-Soriano & Gonzalez-Garcia (2015), crowdsourcing has a constructive influence on innovation, since the knowledge forms of tacit and explicit knowledge added can be employed to enhance procedures and design novel products. For many companies Internet has become the main processes of delivery and advertising network.
There are two distinguished forms of crowdsourcing: competitive and collaborative. For collaborative crowdsourcing a mutual solution is applied in a combined approach. In competitive crowdsourcing it is assembling and collaborating solutions. These forms are equally exclusive and by utilizing them companies can increase routines (Xu, Ribeiro-Soriano & Gonzalez-Garcia, 2015).

6.1 Findings when applying InnoCentive’s crowdsourcing processes through Oliveira and Ramos’ knowledge conversion modes

Using figure 2 as a reference, we will next apply Oliveira and Ramos’s SECI crowdsourcing version of the four knowledge conversion modes to our InnoCentive case study. Given there are assorted programs for both seekers and solvers we will remain focused only on the Crowdsourcer as an online platform that serves as an intermediary between seekers and solvers as the technique.

1. Problem Identification- Tacit to Tacit (Socialization):

The process with the Crowdsourcing intermediary begins with the initiating of an unofficial description of the problem in which the seeker wants to work on.

In the early stages, the problem description will create dialogue among the seekers and the crowdsourcer. Also the potential crowds and types of agreements are being formed through discussions. Eventually, the seeker’s problem will begin a codification process as it moves on to the next phase of transferring knowledge from tacit to explicit in the Problem Creation quadrant.

At InnoCentive, the socialization phase begins when a seeker and a solver makes initial contact with InnoCentive to find out about services, pricing and compensations (see: https://www.innocentive.com, Accessed: 6 June, 2016).
Solvers will click “I Want to be a Problem Solver” and register by choosing “Want to Partner with InnoCentive? (https://www.innocentive.com/about-us/contact/partnership-inquiries/, Accessed 6 June, 2016).

Seekers and solvers register which includes providing their emails and phone number in which InnoCentive will follow up and begin a dialogue process to establish a purpose.

2. Problem Creation- Tacit to Explicit (Externalization):

Oliveira and Ramos (2014) call this area of the quadrant the “Pre-challenge” phase. In this phase, the seekers begin to externalize and explicitly define their question or problem before it is passed on to the solvers who are provided by the Crowdsourcing intermediary.

In regards to InnoCentive, externalization takes place when a tacit problem or task is identified and an explicit written description is put together for seekers and solvers with the locus being on the Seeker using the Crowdsourcer as the intermediary between them. Written agreements are then subsequently signed to initiate the Problem Creation.
According to InnoCentive’s Terms of Use section (www.innocentive.com, 2016), Seekers will post on the Crowdsourcer’s website their problems or tasks known as “InnoCentive Challenge Statements” and they may include an award incentive to the Solvers. Through the crowdsourcing intermediary which Innocentive calls the “Challenge Center” (www.innocentive.com, 2016), the Solvers can accept the Seeker’s InnoCentive Challenge and offer what is a “Proposed Solution”.

3. Solution Creation- Explicit to Explicit (Combination):

This area of the quadrant is referred to as the “Challenge” phase by Oliveira and Ramos (2014). Written agreements are signed and processed between seekers and solvers. Written solutions begin to be offered to problem descriptions set by seekers with the crowd (solvers) serving as the locus. From the seeker’s perspective, a combination results when explicit knowledge is converted to new knowledge.

Combination at InnoCentive begins with the issuance of InnoCentive Challenge Statements. Solvers can locate various seeker challenges in the “Challenge Center” (https://www.innocentive.com/ar/challenge/browse, Accessed 6 June, 2016).

After registration, sales agreements signed and posting their challenge, seekers in return will be able to review all of the proposed solutions from the solvers, offer a possible reward payment and thus new knowledge has been created. (https://www.innocentive.com/offering-overview/seeker-faqs/, Accessed, 6 June, 2016).

4. Solution Learning- Explicit to Tacit (Internalization):

Oliveira and Ramos (2014) call this area of the quadrant “The Post Challenge” phase. A complete set of explicit instructions on a particular contest for example are then internalized through the crowdsourcing intermediary with the Seeker serving as the locus.

In this area the locus is on InnoCentive who will take the best proposed solution from the crowd and implement or internalize the new knowledge into a new innovation that will benefit them (https://www.innocentive.com/offering-overview/seeker-faqs/, Accessed 6 June, 2016).

7. Discussion and Conclusion

This paper contributes to the research on knowledge management, innovation and crowdsourcing in several ways. First, there is not much research done in the field of crowdsourcing. Second, it connects the concepts of knowledge sharing and crowdsourcing through Nonaka’s (1994) Dynamic Theory of Organizational Knowledge Creation (SECI model). Our findings also show that knowledge creation, sharing and crowdsourcing are key to innovation within companies. Crowdsourcing in particular supports the distribution of knowledge.

In regards to our case study of InnoCentive, we have demonstrated that it does have a clear fit when applying it to Oliveira and Ramos’ crowdsourcing process model. We conclude that Nonaka’s Dynamic Theory of Organizational Knowledge Creation (1994) does play a very significant role in explaining a crowdsourcing process and that it should be applied more often in the field of crowdsourced innovation.
We have also advanced our research a step further when compared to the work of Oliveira and Ramos by examining an actual crowdsourcing intermediary as a case study for analysis.

7.1 Limitations

Crowdsourcing is a relatively new phenomenon which has made it difficult to find good empirical data. Due to the lack of empirical information, we relied mainly on secondary data such as from InnoCentive’s own website and material from our literature review. We did receive some primary data from Innocentive but we had to rely mainly on secondary data sources.

A limitation was the availability of particular articles on the web, ones that we could not approach in the KTHB Primo system or via google scholar. Therefore, certain information and materials is not thoroughly covered as we wished.

Another limitation was the timeframe of the thesis in which we could have used more time to gather empirical data. There are many theories to use and it has been difficult in choosing relevant ones that fits our case. However, after diligent review we finally selected one that we believe will fit best for our thesis project.

The ability to find empirical findings on knowledge creation was another limitation we faced. The information we found was only of a theoretical nature and not much of empirical evidence.

We wish we have had more ample time to get in contact with InnoCentive and interview them more in depth. In the end we had to resort to the single Forrester Consulting study supplied to us.

7.2. Further research

In terms of further research, additional work would be needed to gather significant empirical data when exploring the relationship between knowledge creation and crowdsourcing. Along with knowledge creation and crowdsourcing, the concept of open innovation plays an important role and should be explored further. Also, we feel more empirical research needs to be accomplished on how knowledge creation and crowdsourcing plays a role in promoting innovation on the internet. We would like to see the Dynamic Theory of Organizational Knowledge Creation applied more in crowdsourcing research as many other crowdsourcing platforms exist in varied forms that could be used as potential case studies in this field.

Further research of Innocentive and in depth interviewing of people there could be something for future research. That way, we could present the case more thoroughly and detailed.

Other case studies that align with crowdsourcing and knowledge creation could also be of interest to develop and add to the extant literature.

More research on knowledge sharing and its role in the innovation process and for crowdsourcing is another potential future research.
8. References


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