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Integrating Knowledge Management and Innovation Management: Searching for a Synergy

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“Innovation without knowledge management is blind, Knowledge management without innovation is lame”- Modified from Albert Einstein’s famous aphorism

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Abstract

This is a literature-based paper. This article’s purposes are to demonstrate the connection between innovation and knowledge management and to provide a few innovation strategies by showing how knowledge management serves as the foundation for innovation. A stratified Random sampling technique is used. The relevant literature from 1996-2022 is analyzed. The literature was divided into seven strata (from 1996-2022). A content analysis was carried out and double-checked by a coder. Results show that knowledge management is indispensable for innovation, and together they may produce fruitful innovation techniques. There are several contributions made by this study. The study's findings might be helpful to managers and practitioners. This document provides managers with some key knowledge management theories from which innovation strategies may be developed within the company, nourishing knowledge management and realizing their synergistic effects. The study’s conclusions may aid firms in becoming more inventive. Future studies might investigate the concerns in any organization's context.

Keywords: Knowledge, Knowledge Management, Knowledge Transfer, Innovation, Innovation Management

INTRODUCTION

The most popular subjects in the academic and business worlds today are knowledge management and innovation. As management recognizes the significance of creativity, which facilitates the transfer of one kind of knowledge to the next, knowledge is becoming progressively more useful and the awareness of the existing connections between various system pieces results in new interpretations, which results in a new level of knowledge where a new perceived value is created, and this connection suggests that the advancement of knowledge is necessary for innovation (Carneiro, 2000). The first essential driver for knowledge management's involvement in innovation in today's business environment is to build, strengthen, and maintain competitive advantage through the application of knowledge and through collaborative practices (du Plessis, 2007). Innovations foundation is laid on knowledge management. Unfortunately, there is so little investigation in the existing literature. A critical investigation on the major literature of “knowledge management” and “innovation management” could reveal this gap. For example, Carneiro (2000) has suggested that

knowledge should be the integral part of innovation, but the author has not shown any relationship between these two variables. The famous SECI (Socialization, Externalization, Combination, Internalization) model of Knowledge Management formulated by Nonaka and Takeuchi (1995) could not address this issue. KM gurus (Jasimuddin, 2005; Spender, 1996; Blackler, 1995; Hasnain, 2016; Szulanski, 1996, 2000) have ignored the issue. Though du Plessis (2007) made an endeavor to show the role of KM drives in innovation. However, she has not shown the techniques for maximizing KM's value in innovation. This article aims: (i) to establish the relationship between innovation and knowledge management and (ii) to demonstrate how is innovation primarily founded on knowledge management. In order to do this, it would be helpful to analyze the concepts of knowledge management and innovation. An attempt is also being made to create a methodology for researching NPD (New Product Development) using knowledge management. In order to foster an environment where innovation is valued, this study proposes a few insightful theoretical and managerial implications of management support. The paper is organised as follows: Firstly, it starts with primary issues. Secondly, it begins by reviewing the body of research on knowledge management and innovation. The paper also demonstrates its methods. Thirdly, it illustrates the study's conclusions. The study features a discussion in the fourth section, and it finishes with recommendations for future studies.

LITERATURE REVIEW

For likewise knowledge itself is strong, as Sir Francis Bacon famously said, is a well-known proverb. is profound and outstanding statement on knowledge will continue to be popular for many years to come. The hard-earned knowledge of humans allowed human civilization to reach its pinnacle. In all honesty, it is humankind's greatest strength and most potent tool for conquering and exploring uncharted territory. Knowledge has illuminated the micro and macro habitats of the cosmos, from needle to rocket, from sea to sky, and from science to humanities.

The world has evolved into a knowledge game. In this cosmos, everything is interconnected with knowledge. Implementing knowledge contributes to closing gaps and bridging distances between the affluent and the poor, improving the quality of life for society's marginalized and downtrodden. Thus, poverty would eventually actually find a home in a museum , and our globe would transform into a society in which there would be no significant gaps in terms of social and economic inequality.

A thousand-year-old definition of knowing, which is a "justified true belief," is overturned by the formulation of Gettier's (1963) theory of knowledge. According to Gettier (1963), "justified true belief" needs include an additional component in order to be considered knowledge should take the following variables: justified, true, belief, context). Similar to Nonaka & Takeuchi (1995), they asserted that knowledge cannot be produced by a false belief that satisfies these three criteria. In their subsequent argument, they stated that knowing is personal conviction about the truth is justified through an active human effort (p.58). It should be mentioned that there is no widely accepted definition of knowledge due to how difficult it is to define (Hofer-Alfeis and Spek, 2002). However, This topic has been under discussion by philosophers for many centuries (Hislop, 2005). Knowledge is a framework and environment

for assessing and assimilating new experiences and information are provided by a fluid mixture of framed experience, values, contextual data, insider knowledge, and grounded intuition. It starts in the minds of the knowledgeable and is used there, and it frequently integrates itself into organisational routines, procedures, practises, and conventions in addition to documents or repository systems (Davenport and Prusak, 1998, p. 5).

Based on Polanyi's (1962, 1966) views, which were pioneers in the field of knowledge management, Nonaka and Takeuchi (1995) established the SECI model in the field of knowledge management. Humans are able to convey some of their brain's previously learned material since they are more capable of doing so than they are of telling it. Tacit knowledge, in the opinion of Polanyi, is the source of all knowledge.

Since knowledge is created by humans, it contains emotions and passion. Knowledge is both public and, to a considerable extent, personal. Every piece of knowledge is either tacit or based on more fundamental tacit knowledge that underpins explicit knowledge. According to Polanyi (1962, 1966), knowledge is essentially a social construct, a person's experience, something that is very tacit in nature, a process of knowing, and a way to learn new things. Tacit knowledge is the foundation of all sorts of knowledge.

Nonaka and Takeuchi's (1995) Modes of Knowledge Conversion (SECI Model) and Finding Innovation Techniques

Nonaka and Takeuchi (1995) define four methods of knowledge conversion: socialisation, externalisation, combination, and internalisation, or the SECI mode, in their widely cited classic book "The Knowledge Creating Company." These four modalities are demonstrated by the knowledge dialogue process, which also demonstrates how tacit knowledge transforms into explicit knowledge before hiding away as fresh tacit knowledge, much like a spiral or spinning motion inside the organization.

Socialization: The socialising period stage includes activities like observation, imitation, practice, experience, brainstorming, group sharing of an idea, and so on. The process of converting knowledge begins with this step. Before actors share knowledge, this is the stage of purpose. When the staff meets informally to organizational issues or challenges, for instance (tacit to tacit).

Externalization: Tacit knowledge is transformed into explicit knowledge by externalisation. (Nonaka & Takeuchi, 1995). It is the most important conversion method because at this level, knowledge assumes the form of real-world authenticity. For instance, during the morning briefing, workers could record some orders from their boss in a notebook (tacit to explicit).

Combination: This method of knowledge translation combines much explicit knowledge. For instance, social workers may create a new page in their notebooks based on a collection of instructions from the preceding few days or create a written project proposal based on previously written suggestions (explicit to explicit).

Internalization: Explicit knowledge is transformed into tacit knowledge. Documentation enables people to better absorb their experiences, enhancing their tacit knowledge. For instance, a project worker may read a previous project proposal and connect it to their previous experience (explicit to tacit).

Spender's (1996) Model on Classifications of Knowledge

Organizational knowledge may be divided into the four types of conscious, objectified, automatic, and collective based on its implicit or explicit characteristics, individual and social nature, and other factors.

Spender (1996) created the four categories of knowledge by classifying knowledge together with the two aspects of explicit-implicit and individual-social. The explicit information that a person has is known as conscious knowledge. Automatic knowledge is the term used to describe a person's implicit, or tacit, subconscious abilities or information. Collective knowledge is implicit, whereas objectified knowledge is the explicit, codified knowledge of a social system or organization. The most reliable and vital type of organisational knowledge is collective knowledge (Spender, 1996, p. 52).

Jasimuddin's (2005) Model on Classifications of Knowledge

Based on the roles of internal and external influences in organisations, Jasimuddin (2005) identified four forms of knowledge. He referred to it as "knowledge from sources." The knowledge of suppliers, rivals, and consumers is considered exogenous knowledge. Based on the tacitness and knowledge sources, four classifications are proposed here.

Tactic knowledge that is held in the hands and minds of employees is known as endogenous knowledge. Examples include abilities, knowledge, and experiences.

Endogenous-explicit knowledge may be codified inside an organization, for as when employees take notes during a meeting with their coworkers. Examples of this kind of knowledge include manuals and codes of practice.

Exogenous-tacit knowledge is not in the members of the organization's heads, nor is it codified. It is located outdoors. Examples include the knowledge of customers and suppliers.

Although expressed, exogenous-explicit knowledge is not present in the organization. It can be found in supplier manuals, rival patents, annual reports, and customer specifications. The framework suggests two aspects for organizational knowledge: kind (tacit-explicit) and source (endogenous-exogenous). Four knowledge categories are created when the dimensions are combined. It may be attempted to apply this concept to the context of an NGO. It is possible to refer to the experience, knowledge, and proficiency of NGO field staff and headquarters as endogenous or tacit knowledge. Following discussions and meetings, they create various guides and protocols (endogenous–explicit knowledge). The beneficiaries, funders, and other stakeholders in the case of NGOs continue to have access to outside knowledge (exogenous-tacit knowledge). Government manuals, supplier instructions, and donor guidelines are only a few examples of explicit knowledge that is available to everyone but non-governmental organizations (NGOs) yet is very useful for operations (exogenous-explicit knowledge).

Blackler's Model -Classification of Knowledge

There are five pictures of knowledge offered by Blackler (1995). He expanded on the notion of the five categories of knowledge in an organisation and furthered the concepts of Collins (1993). These were embrained, embodied, encultured, embedded and encoded.

He expanded on the notion of the five categories of knowledge in an organisation and furthered the concepts of Collins (1993). These were embrained, embodied, encultured, embedded and encoded.

Embrained knowledge is ingrained in employees' minds. It depends on their cognitive and mental ability.

Embodied knowledge is action- and context-oriented, challenging to transmit or share absent the knowledge holder's physical presence, and it may be partially apparent.

Shared understanding leads to *enculturated knowledge*. This is directly tied to the socialisation process, which is only accomplished through that procedure. Examples include group discussions, employee storytelling, interactions among communities of practise within an organisation, and more.

Knowledge that has been systematically practised is *embedded*. Embedded knowledge may be analysed in terms of systems, in the connections between, for instance, technology, roles, formal processes, and emergent routines.

Symbols, signs, and other means are used to express *encoded knowledge*. Examples include books, manuals, and rules of conduct.

Knowledge Management Process

Knowledge management is still a young field but is gaining popularity in both academic and non-academic circles, and it is also expanding quickly. A fundamental tenet of management philosophy, knowledge management has seen a sharp rise in popularity. Our surrounding management community has come to understand and embrace knowledge management, which is evolving into a brand-new realm of innovation. Organizations need to understand how crucial knowledge management is nowadays.

The phases of the knowledge management process are identified as, captured, stored, retrieved, and transferred by Jasimuddin, *et al.* (2006). Collection, storage, sharing, and connecting are phases in the process according to Zuckerman and Buell (1998). Heavin and Neville characterized the phases of the knowledge transmission process as creation, storage, distribution, and capture (2006). According to Gamble and Blackwell (2001), the processes in the knowledge management process include identifying, organising, transferring, and using.

Next, further detail is provided on the main steps in the knowledge management process, including creation, storage, transfer, and application.

Within organisations, new knowledge is very advantageous and adds to the body of current knowledge. It facilitates the creation of new goods and services as well as their modification and manufacturing. Organizations may better meet their own demands as well

as societal needs with the aid of new knowledge. In a market where the only certainty is uncertainty, knowledge is the only trustworthy source of long-term economic benefit. In an environment where markets change, technologies proliferate, competitors multiply, and products virtually overnight become obsolete, successful businesses are those that continuously generate new knowledge, disseminate it widely throughout the organisation, and quickly incorporate it in new technologies and products (Nonaka, 1991).

The relationship between tacit and explicit knowledge has resulted in the development of four unique forms of knowledge production. (Nonaka and Takeuchi, 1995), which were covered in the preceding sections. Since knowledge arises through social interactions, it may be easiest to comprehend how it is created by concentrating on individual interactions at the micro-level (Jakubik, 2008). Tacit knowledge, which serves as the foundation for explicit knowledge, is produced by social interaction, which is the source of all knowledge (Chua, 2002). It needs social contact between the participants before tacit knowledge may be produced. Additionally, it is clear that three of the four knowledge formation phases—socialization, externalisation, and combination—in the well-known SECI model (Nonaka and Takeuchi, 1995) include social interaction (Chua, 2002).

As specific components are required for social contact between players, it does not occur accidentally or spontaneously. It also doesn't appear overnight. It is important to highlight trust (Newell et al., 2002) as well as the internal and external interactions among stakeholders (Dawson, 2000). The duration of the relationships between the players is crucial in the creation of knowledge. For knowledge to be created, team members must engage across time (Nonaka and Takeuchi, 1995; Newell et al., 2002).

Additionally, as knowledge sourcing tactics, internal R and D, employing staff with particular expertise, skills, experience, or insights, acquiring knowledge-rich organisations, joint ventures, knowledge purchase, such as contract R and D, licencing, and knowledge scanning have been recognised (Sammons, 2005).

Where new knowledge is deposited and issued from, storage is like a bank. Proper storage reveals the most up-to-date portrayal of a company's knowledge stock. It provides the framework for all strategic decisions and can prevent errors and knowledge gaps. It is possible to relate knowledge storage to a warehouse that houses tangible goods. Physical items and organisational knowledge can be contrasted in the context of knowledge storage. The organisation can reuse this asset in the future with the aid of proper maintenance and preservation.

Reusing knowledge is always economical since it saves time, lowers communication costs, and gives businesses the chance to take on more projects (Hansen et al., 1999). This is because organisations, don't have to hire fresh consultants or specialists. Costs associated with administration and logistics may also be reduced.

Mu *et al.* (2008) claim that Successful knowledge transfer across several organisations improves relationships and builds trust. Such trust ensures that the knowledge recipients will continue to share their knowledge in future as well. The adoption of new knowledge into routines and culture may encourage organisational learning and innovations in new practices (Darr and Kurtzberg, 2000). Increased consumer satisfaction is a result of new knowledge (Goh, 2002). Knowledge sharing also minimises productivity losses (Argote

and Ingram, 2000) and improves organisational performance. Transfer of knowledge aids in increasing force (Hall, 2001) and it enhances the value of enterprises' current knowledge. (Hogberg and Edvinsson, 1998). Interorganizational knowledge transfer decisions are made based on anticipated costs and benefits (Appleyard, 1996).

Knowledge transfer aims to boost an organization's productivity and, as a result, its worth. If new knowledge does not result in a change in behaviour or the creation of a new concept that results in new behaviour, even transmission and absorption combined are of little value (Davenport and Prusak, 2000).

Knowledge Transfer Process and Szulanski's (2000) Model

Organizations try their best to encourage people to transfer knowledge (Jasimuddin & Saci, 2022). The knowledge transfer process involves internalization by the recipient and externalization by the provider, requiring transmission from both internal and external organizations (Liu and Liu, 2008). The knowledge supplier first assesses the requirements of the potential recipient. Prior to choosing a provider, a receiver verifies that the candidate has the specialized knowledge (Hall and Paradice, 2005) and abilities (Davy, 2006) required to address their concerns.

Initiation, implementation, ramp-up, and integration are the four steps of the transfer process—were shown in Szulanski's (2000) model of knowledge transfer.

Initiation, often known as the decision-making stage, is, in essence, the initial step in the transfer process. This step, which is also known as the planning stage, is when the transfer choices to transfer knowledge is made. The logistics and mobility of resources are organized during the implementation phase to provide a seamless transfer between the supplier and the recipient. Ramp-up is the stage when the transmitted knowledge is first applied by the recipient. After achieving good outcomes, knowledge is institutionalized in the last phase of integration.

There are several relevant procedures needed for successful knowledge transfer. For instance, educating members of the receiving organization, organizing social events, transferring experienced staff, or giving the recipient organization documentation, designs, or hardware that embodies knowledge. Effective techniques include personnel transfers, training initiatives, executive visits, the establishment of coordination offices, leadership pledges to learning, and network formation.

The mechanisms include offering opportunities for contact between members of different organizations as well as opportunities for recipient organization members to see specialists at work in the donor organization. There are more ways, such as moving experienced employees and giving the receiver documentation, designs, and descriptions of the organizational structure. Providing it to the receiving organization further promotes knowledge transfer since part of the donor's expertise may be embedded in its hardware, software, and products (Argote, 1999).

Mechanisms and Barriers to Knowledge Transfer

Mechanisms are the means by which knowledge is transferred from the transmitters to the receivers. Hasnain, *et al.* (2016) conducted empirical studies in the Bangladeshi NGO context. Face-to-face interactions, books, pamphlets, reading materials, workshops, seminars, staging plays, posters, signboards, and banners are all examples of knowledge transfer channels as identified by Hasnain, *et al.* (2016). They (p.48) further exalt in the NGO context that barriers to knowledge transfer include religious conservatism, clients' limited capacity for knowledge absorption due to education and literacy, pressure from political leaders and local elites, a lack of trust, a lack of training, duplication or overlap in NGO-activities, superstitions, stubbornness and language barriers, ambiguity in knowledge, etc.

Knowledge Hiding

Knowledge hiding is a curse (Islam, *et al.*, 2021) and have negative consequences for any organization (Jasimuddin & Saki, 2022). The act of intentionally trying to conceal or withhold information that others have requested is known as knowledge hiding (Connelly, 2012). Wu, *et al.* (2022) had their study on 216 employees in 47 groups of technology and R &D industries. They found that perceived over qualification is positively affecting knowledge hiding. Islam, *et al.* (2021) collected data from 735 employees working in the manufacturing and service sectors in Pakistan. They found that the workers under abused supervision withhold knowledge transfer in the workplace. Thus innovation is affected. Anand and Hassan (2019) reveal that personal-related factors (personality, emotional intelligence, evil intentions, revenge, seeking power, expecting something in return), co-workers' related factors (lack of trust, protecting a friend or teammates), organizational related factors (time pressure, protecting important information, knowledge complexity, job requirements) are the primary causes to knowledge hiding behavior. Additionally, they have recommended the following remedies for overcoming knowledge-hiding behaviour: enhancing core-self evaluation to overcome personal related issues, increasing employee awareness of one another's jobs to overcome work-related issues, offering opportunities for socialising outside of the workplace to address coworker related issues, 360-feedback on hiding acts to address organisational related issues, and fostering a positive work environment in organisations.

Jasimuddin & Saki (2022) put importance on creating a culture of innovation among the members of the top management.

Understanding the above issues and their remedies would help a smooth transfer of knowledge and thus innovation.

Innovation

People learned new concepts by trial and error, transformed them into new knowledge, and then utilized that knowledge to learn new concepts, identify further unknowns, and grow increasingly interested, and as a result, the process of exploration, learning, and invention never ends, thus the knowledge-experience cycle's results have sparked ongoing creativity and innovation (Gupta, 2014). Humans acquire knowledge and then they use that knowledge to create new things like procedures, processes, and tools.

Innovation-Defined

In the literature, innovation is defined in a wide variety of ways. The term “innovation” is derived from the Latin word *Novus*, which means new or unique. Newness and novelty are essential components of innovation as identified by Smith (2015). Further, Smith (2015, p. 4) continues by exhibiting the four forms of ‘newness’: Completely new products, new technology, new customers, new use, and new producer. According to du Plessis (2007), to promote new business results, improve internal business processes and organizational structures, and produce goods and services that are driven by the market, innovation is the invention of new knowledge and ideas. Both radical and gradual innovation are included in innovation. Rogers (2003) finds innovation as an idea, practice, or thing that a person or other adoption unit perceives as new.

Harkema (2003) defines innovation as “the process of acquiring, disseminating, and assimilating knowledge with the goal of producing new knowledge. Harkema (2003, p. 340), continues, innovation might be a brand-new technology, service, or product. Innovation therefore involves change, which can be either dramatic or gradual. (Harkema’s (2003) definition of innovation consists of the steps of the knowledge management process and the production of new knowledge with the elements of the knowledge management process. The approach of developing and contributing something new to an organization and human civilization through knowledge, concepts, and experiences may be treated as “innovation”, the author opines.

Innovation-taxonomies

Many researchers (Smith, 2015; Zia & Shafiq, 2017; Burkhart, 2014; to name a few) have classified innovation in different ways. Smith (2015) classified innovation as: Product innovation, service innovation, and process innovation. New tangible products are the result of innovation in the product market. Similarly, new service innovation is the development of the old version of a service. Process innovations that happen throughout the course of producing or providing services. Smith (2015) further divided innovation as: Radical innovation (the outcome of a significant technological advancement or technological application), incremental innovation (slight modification to the current goods, services, and procedures), modular innovation (it retains the configuration of an existing product's current system while incorporating new components with a distinctive design.) and architectural innovation (when new links are added, the system configuration changes, but the components and associated design principles remain the same). Zia & Shafiq (2017) classify innovation into product and Process. In terms of product and process, the classifications are comparable to Smith's (2015) classifications.

Burkhardt (2014) has classified innovation in a very comprehensive way. According to the author innovation may be classify into: (i) process innovation (ii) functional innovation (iii) design innovation (iv) product innovation (v) service innovation (vi) business model innovation (vii) co-creation innovation (viii) open innovation .

Process Innovation: Innovation in industrial processes is referred to as process innovation. Every business is involved in the deployment of new or enhanced production or delivery techniques, which may entail the use of new equipment, new ways to use current

machinery, new methods of production, new methods of customer service, or different software being used in the process. Examples, Six sigma, *Kaizan*, JIT.

Functional Innovation: In order to address the processes that underlie those functions and are in need of improvement, functional innovation entails first identifying the functional components of an issue or challenge. The problem is not seen separately, rather it is seen totally.

Design Innovation: Design innovation advises against creating products with several functionalities or features since they might create unfavorable opinions of the final product. It should be mentioned that electronic products that are overloaded with features cause unneeded problems. The design innovation focuses on simplicity.

Product Innovation: Product innovation is multidisciplinary, including several roles. It is carried out within the organizations in conjunction with the marketing and R & D Departments. Companies must gain competitive advantages. Manufacturing and logistics may be able to provide the necessary assistance to ensure a continuous supply of goods and raw materials.

Service Innovation: Innovation in services is not that different from innovation in products. Customers can frequently articulate their wants for service innovation, but there will always be chances to develop novel solutions that will have advantageous effects.

Business model innovation: Business model innovation focuses on continuously changing a company's value offer in order to enhance both incoming and outgoing value. Because it demonstrates the path, this may be the greatest approach to encourage greater stretch objectives for sales.

Co-creation innovation: Co-creation is a strategy for bringing innovative ideas, new partners, and external catalysts into a company in order to spur innovation. For instance, one party may possess capital while another possesses important technology and R&D capabilities. However, due to rising costs and shortened product life cycles, the latter party may discover that it is no longer viable to create an acceptable return on capital. It's possible that none of the parties possesses the skills necessary to create the service alone.

Open innovation: In order to improve the internal technological base of the company, lower R&D costs and time to market, and produce superior product, service, or process improvements, open innovation uses outside ideas and technologies. In addition, latent internal intellectual capital—unused intellectual property and technology—is made accessible to other businesses for licensing and usage (Burkhardt, 2014, p. 374).

Sources of Innovation

According to Drucker (1985), there are seven sources of innovation: (i) unexpected occurrences (ii) incongruities (iii) process needs (iv) industry and market changes (v) demographic changes (vi) changes in perceptions (vii) new knowledge.

Unexpected occurrences are the suddenly something new appears. For example, Röntgen was experimenting with a cathode ray tube, he could invent the X-ray accidentally (Mrittika, & Santosh, 2021). A mismatch or divergence between what something currently is and what it should be is how Drucker defined an *incongruity*, and from where innovation may develop. *Process needs* is to discover more effective methods for doing things.

(example: self-checkouts are saving time for the customers). *Industry and Market changes*, e.g. Changing from the usual in terms of customers' demand. Early adopters enjoy a few benefits. *Demographic change* is an important source of innovation. What are the TV programs children enjoy most? After, 20-years what programs, they would enjoy? Film industries should think early. *Changes in perceptions*, think about people's concept about eco-friendly products. Many people even did not know about "Eco-friendly". The production of environmentally friendly goods and services is a current concern for both businesses and customers. See how our perception has changed. Innovation comes from sources that cannot be ignored, such as technological and scientific knowledge. *New knowledge* can be used in all facets of the company.

Process of Innovation

Various authors (Silvia, *et al.*, 2016; McGowan & Di Resta, 2014) could identify number of steps of process of innovation. Silvia, *et al.* (2016, p.177) find the following steps. The steps are comprehensively covering all the steps in the process of innovation: (i) idea (or invention) of "something new (product, service or process (organizational or technological) (ii) development (production, "doing") of "something new"; (iii) commercialization (diffusion, "selling") of "something new". McGowan & Di Resta (2014, p. 428) develops the four phases of the process of innovation: (i) understand (Observing to comprehend the user needs and wants and the market) (ii) frame (gaining ideas and defining the problem) (iii) create (creating concepts that adhere to the frameworks) (iv) deliver (designing experiences around the concepts in order to test and give value).

Further, The research and development (R&D) department that is in charge of looking into, analysing, and supervising the process of coming up with new ideas is where the market pull model starts (Myers, & Marquis, 1969, cited in Silvia, *et al.*, 2016). The Push method sees the development, manufacture, and marketing of new technologies as taking place along a clearly defined timeline that begins with product development-related research activities and ends with the marketing stage (Silvia, *et al.*, 2016).

METHODOLOGY

In this paper, which is based on the literature, the benefits of tying knowledge management and innovation management together are explored. According to Saunder, Lewis, and Thornhill (2019), the sample framework is segmented into strata for the years (1995–2022) and the purposive sampling technique (stratified random sampling) was used based on literature published in the aforementioned years in the following ways:

Selected literature in Strata-1(1995-1998): Blackler (1995); Nonaka & Takeuchi (1995); Appleyard (1996); Spender (1996); Szulanski (1996); Davenport & Prusak (1998, 2000), Hogberg & Edvinsson (1998); Zuckerman & Buell (1998).

Selected literature in Strata-2 (1999-2002): Argote (1999); Hansen, *et al.* (1999); Szulanski (2000); Darr & Kurtzberg (2000); Dawson (2000); Argote & Ingram (2000);

Carneiro (2000); Hall (2001); Gamble & Blackwell (2001); Chua (2002); Goh (2002); Newell, et al. (2002).

Selected literature in Strata-3 (2003-2006): Harkema (2003); Rogers (2003); Sammons (2005); Hall & Paradice (2005); Hislop (2005); Jasimuddin (2005); Dorrch (2005); Jasimuddin (2006); Davy (2006); Heavin & Neville (2006).

Selected literature in Strata-4 (2007-2010): du Plessis (2007); Mu, Peng & Love (2008); Schulze & Hoegl (2008); Liu & Liu, 2008; Jakubik (2008); Pettikka & Virtanen (2009).

Selected literature in Strata-5 (2011-2014): Akram, et al. (2011); Arikka-Stenroo & Sandberg (2012); Thomson (2014); McGrowan & Di Resta (2014); Burkhat (2014); Greene (2014); Gupta (2014); Harrington & Voehl (2014).

Selected literature in Strata-6 (2015-2018): Hasnain (2015); Smith (2015); Silva, et al. (2016); Hasnain, et al. (2016); Zia & Shafiq (2017); Li Liu & Zhou (2018).

Selected literature in Strata-7 (2019-2022): Kim, et al. (2019); Flores-Torres, et al. (2021); Mrittika & Santosh (2021); Islam & Asad (2021); Hasnain (2022); Jasimuddin & Saci (2022); Anand, & Hassan (2019); Islam, et al. (2022), Khatoon, et al. (2021), Islam, et al.(2021), Lanke (2022); Anand, & Hassan (2019).

Here, the years 1995 to 2022 in the literature are consulted. Each stratum is made up of four years (1995-1998, 1999-2002, 2003-2006, 2007-2010, 2011-2014, 2015-2018; 2019-2022). No pertinent literature was found in 1997, 2004, 2013, or 2020. Literature concentrating on knowledge management and innovation management is intentionally chosen from each stratum, and a content analysis is carried out. The practice of content analysis technique is now widely used by academics, business researchers, and communicators (Neuendorf, 2002) as for the purpose of developing an expert system, content analysis is helpful in reading the text (Aacharya, 2022). A coding system was used to double-check the literature's contents. 97% of the author's coding is accurate with a colleague.

FINDINGS

The Indispensability of Knowledge Management for Innovation and Formulating Tools for Innovation

Innovation requires knowledge management, which is essential. Innovation is the creation of knowledge. Knowledge Management and innovation are interlinked. Knowledge is necessary for innovation. Therefore, organizations must identify knowledge competency and richness in order to bring innovation (Akram, *et al.*2011).

Innovation is Highly Dependent on Knowledge Management

du Plessis (2007) identified three primary drives for the use of knowledge management in the innovation process. Firstly, in order to innovate and gain a competitive edge, collaboration methods are essential. Since businesses may cooperate, gaining knowledge through cooperation is a straightforward method of innovation. Secondly,

simplicity. Simple and complex free innovation is made possible through knowledge management. Businesses that use knowledge for innovations more quickly are successful. Thirdly, integration of internal and external knowledge as well as its availability and accessibility to knowledge support innovation as identified by du Plessis (2007). du Plessis (2007) further highlighted the various functions of knowledge management to innovation, and the role of knowledge management in creating value for innovation: knowledge management helps in transfer and codification of tacit knowledge, the role of explicit knowledge to innovation, knowledge management helps collaboration (knowledge sharing communities), Management of various activities in the knowledge management life cycles plays a role in the innovation process, knowledge management helps to create conducive internal work culture, which helps innovation, knowledge management gives and access to both tacit and explicit knowledge for innovation, knowledge management may show the knowledge gaps in firm's knowledge base, thus it helps to calculate the deficit knowledge for innovation, knowledge management assists in developing abilities for innovation, knowledge management converts tacit to explicit and explicit to tacit as required for innovation etc. du Plessis (2007). Schulze and Hoegl (2008) link the uniqueness of the created product concepts to Nonaka and Takeuchi's (1995) four knowledge generation strategies of socializing, externalization, combination, and internalization. They find new product creation ideas are positively linked with socialization and internalization but innovative ideas has a negative relationship for externalization and combination. According to Darroch's (2005) findings on New Zealand firms, using knowledge management as a means of coordination, a company with a knowledge management competence will employ resources more effectively, which will lead to more innovation and improved performance. Innovation is closely related to the knowledge management process, such as acquisition, distribution, and responsiveness. Metaphorically, innovation and knowledge management may be compared with a building, where the foundation is knowledge Management and rest visible parts are innovation. So if we want to strengthen innovation, we need to strengthen the foundation (e.g. Knowledge management parts associated with innovation).

Developing Tools of Innovation from Knowledge Management

In actuality, both knowledge management and innovation help one other out. Knowledge management aids innovative tools to the greatest extent possible. Actually, knowledge management and innovation are related. Tacit knowledge focuses on the idea that "we can know more than we can tell" (Polanyi, 1966). There are significant ramifications to the statement. Based on Polanyi's concept, SECI and other knowledge management theories and models are developed. Tacit knowledge is the source of all kind of knowledge, and the foundation of innovation is based on tacit knowledge. Harrington and Voehl (2012, p. 182) could describe sixteen creativity tools. These tools may be the basis of innovation techniques. A few of them and their origins and connections with knowledge management are exhibited side by side below:

(i) Quick scorecard creativity test. This tool is rooted with a few knowledge management theories and models. The organizations must have a structure in place that will expedite the approval and implementation of a person's ideas. This necessitates a seamless transfer of the creative approach from an individual to a team and to all those who will be influenced.

Here idea is created by the individual and it is transferred to the team and finally to the top management for approval and implementation.

Connection with Knowledge Management: The technique starts with the tacit knowledge of the individual. The team prepares the proposal (tacit-explicit), and later the top management helps implement the project. The technique shows the conversion of tacit knowledge to explicit and shows various variables of SECI model. The individual releases the knowledge to the team in tacit form (socialization), the team prepares the proposal in written form, e.g. tacit to explicit knowledge (Externalization), finally the knowledge is implemented and integrated as the policy in the organization (Combination). Jasimuddin (2005) finds, it is first endogenous knowledge and later endogenous-explicit knowledge. This innovative technique is in line with Blackler's (1995) embrained and encultured knowledge. This technique also covers the one of steps of Szulanski's (2000) model of knowledge transfer process (e.g. integration). Knowledge transfer mechanism here is the conversation which is parallel to Hasnain, *et al.* (2016).

(ii) Kano Analysis: Harrington and Voehl (2012) could describe about Kano Analysis. They find threshold, performance, and excitement are the main types of attributes of product and services. Threshold attributes are the minimum qualities a product and service must for possess that customers search for. Performance attributes are the qualities of products from which the customers get enjoyment. Excitement attributes are the features of the products for which customers are delighted.

Connection with Knowledge Management:

The first step of Kano Analysis process is brainstorming, where tacit knowledge is converted and applied. This method is based on SECI model of Nonaka and Takeuchi (1995).

(iii) Nominal Group Technique: This kind of brainstorming is different. The facilitator offers each participant with a sheet of paper with a question addressed. The moderator requests an answer from each participant. The participants write the answers. The moderator collects the answered papers. The moderator writes down each idea on a flip chart. The concepts are not up for discussion. He promotes fresh concepts. The ideas are categorized by the facilitator, there is a vote, and the ideas are then prioritized.

Connection with Knowledge Management: Here, the moderator briefs the attendees in the beginning (tacit to tacit). The participants write their responses (tacit-explicit) on a paper. Based on the collected notes, the moderator makes notes on the flip chart (explicit-explicit). The concepts are categorized, and new concepts are discussed as a result (explicit-tacit). There are all of the factors SECI here. Discussion, pen, papers, and flip charts are the knowledge transfer mechanisms (Hasnain, *et al.*, 2016).

(iv) *Synectics*: Analogies (e.g. a comparison of two otherwise disparate things based on the similarity of a specific feature metaphorically) are used to create new ideas. It is a kind of generating fresh concepts by connecting them to the issue being addressed. For example, heart and water pump. *Connection with Knowledge Management:* This technique is based on tacit to tacit knowledge connection. It may be compared with the automatic knowledge of Spender (1996), embrained knowledge of Blacker (1995), and endogenous tacit knowledge of Jasimuddin (2005).

(v) Brainstorming: We might have a tonne of ideas after doing individual or group brainstorming. Analyzing those is the crucial phase. Numerous tools could be used for this. Brainstorming can produce fresh ideas or alternative solutions/innovation to issues when done correctly. *Connection with Knowledge Management:* It is based on SECI model of Nonaka and Takeuchi's (1995) socialization phase firstly, and later externalization phase.

(vi) Six thinking hats: Thompson (2014) finds, the "Six Thinking Hats" approach to problem-solving and decision-making has assisted organizations in thinking outside the box. It is a technique for teaching the brain to approach a topic from several angles and perspectives in order to encourage open-mindedness and creative thinking, involve everyone in the dialogue, and prevent talks from coming to an end because of defensive and offensive conduct.

Connection with Knowledge Management: This technique is playing with tacit knowledge of the individuals. It may be compared with the concept of Polanyi (1962, 1966) where he could identify first that tacit knowledge is the root of all knowledge. The SECI model's socialization is also the basis. From classification point of view, it is endogenous tacit knowledge as described by Jasimuddin (2005). We could also find here a flavor of barriers of knowledge transfer, and its removal as discussed by Hasnain, et al. (2016) in the context of NGOs.

(vii) Morphological Analysis: According to Harrington and Voel (2012, p. 231), it is an attribute listing technique. They advise creating a table with column titles for a product's and service's qualities. Fill in the columns with as many variations of the product as possible. This may be a brainstorming exercise. The table ought to include every variation that could exist for each attribute. Pick one entry from each column at this point. Either choose intriguing combos or proceed at random. You can make a new blend of components by combining each item from each column. This is a brand-new good, service, or tactic. Finally, assess and refine that combination to determine whether you can envision a lucrative market.

Connection with Knowledge Management: A close study finds, Drawing a table and writing on it is a conversion of tacit knowledge into explicit knowledge. Brainstorming is tacit to tacit knowledge. Then, fixing the combination of the components in the columns and evaluation may be tacit to tacit, or tacit to explicit. So this technique fits with SECI model of Nonaka & Takeuchi (1995).

(viii) Storyboarding: It gives new idea on a particular problem. Harrington and Voel (2012) cited the example of the project which is shut down. The issue is what the business should do with the workers involved in the shut down project. To conduct the technique, there is interaction between a group of people and the facilitator. The facilitator poses a series of queries, such as How can these people be motivated in a way that benefits the business and them personally? Then, each participant writes one of their ideas on a 5 x 8 card. The participants hear the cards once they have been collected and read out by the facilitator. Similar concepts are categorized and posted to the board. The facilitator probes further to generate fresh perspectives and creativity.

Connection with Knowledge Management: On lateral thinking and brainstorming, the technique is based. The technique is similar to SECI model as conversion from tacit in explicit and compilations of all explicit knowledge and again to tacit knowledge.

(ix) Force Field Analysis Diagram: Harrington and Voel (2012) find that the method serves as a visual aid for identifying and examining factors that either push back against or support change. By creating strategies to get past obstacles and making the most of the driving force, this technique promotes improvement. *Connection with Knowledge Management:* It is similar like knowledge transfer and its barriers and techniques of overcoming those as described by Hasnain, et al. (2016).

(x) Mind Mapping: Greene (2012) finds, Mind mapping combines the advantages of each hemisphere of the brain in a way that enables people to swiftly generate fresh, original ideas while also ensuring that they are helpful to the project's end aim. The rules for mind mapping were carefully designed to encourage participation from both sides of the brain throughout this process. *Connection with Knowledge Management:* The technique is parallel to the knowledge transfer taxonomies of Hasnain (2015). He classifies knowledge transfer as: internal transfer (when knowledge is transferred between the hemispheres inside the human brain), secondly, external transfer (when knowledge is released from the brain), and terminal transfer (when knowledge goes for application or action).

Towards a Methodology for Studying NPD (New Product Development) Process Using Knowledge Management

NPD serves as a formal guide, blueprint, a model or strategy for developing a new product project from conception to market introduction and beyond (Cooper, 1994). It is crucial to find out a general research agenda to demonstrate the roadmap of innovation through knowledge management. New Product Development (NPD) process is critical and it demands support from the other organs in the organization. According to the author, the NPD process necessitates following phases for innovation in line with the concepts of knowledge management and innovation: (i) Collection of new ideas/knowledge (ii) Research and Development (R&D) (iii) Procurement and production (iv) Commercialization and (v) Integration/organizational memory

(i) Collection of new ideas/knowledge: This is the first step in the chain of the innovation process. Joint Investigation Committee (JIC) consists of expert members from different areas in the organization that should scan the internal and external environments. These may also include the people in the organization and the competitors. This committee converts tacit and explicit knowledge and vice versa as necessary (the SECI model may be a useful tool). JIC should transfer all the knowledge (tacit and explicit) to R&D (mechanisms may be hard, or soft copies and personnel).

(ii)R&D: The crucial hub for innovation is R&D. Depending on the organization, it has different duties. It organizes the concepts and information that were transferred from the JIC. It collects, creates, saves, and disseminates information collected through JIC. The technical merits and technological viability of the proposed new ideas and information are critically examined, or added in R&D. R & D manages received explicit and tacit knowledge. If a problem (or problems) extends outside their purview,

they seek specialized advice from outside. R&D makes the essential preparations while taking sustainability into account. If the concepts put forth are approved, R & D advises the production department to create the prototypes. R & D also requests the finance to study the cost and associate expenditures.

(iii) Procurement and Production (PP): Upon receiving the request from R&D, Production prepares the prototypes as requested by R & D. If a positive response is given by the beneficiaries of the prototypes, and with the approval of R&D and the Board of Governors, necessary logistics and raw materials are procured. If necessary, PP modifies the prototypes with the consent of R & D. Now, PP manufactures the products in bulk quantity (SECI Model).

(iv) Commercialization: The process of creating a product concept, launching it successfully, and interacting with consumers is referred to as commercialization (Pellikka & Virtanen, 2009). Resources such as technical know-how, industry understanding, customer and market knowledge, the ability to discern how the product will function best, communication, distribution, and strong relationships with key stakeholders are all necessary for commercialization (Arikka-Stenroos, & Sandberg, 2012). Here knowledge transfer between various stakeholders are noticed. The marketing dept is mainly responsible for the commercialization of innovation-products and services.

(iv) Integration/organizational memory: Integrating something means adding it to the program, policy, or procedure. In order to preserve successful innovations, the organization may bank them for later use. The people who make up an organization are primarily its memory, claim Walsh and Ungson (1991). Therefore, it is essential to keep an experienced and professional team in the company. Additionally, They went on to identify the retention mechanisms in the organizations as being people, culture, change, structures, and ecology. When needed, previously used innovative techniques may be taken out of these bins in the future. Knowledge storage is a step in the knowledge management process. Additionally, there is a clear emphasis on explicit to explicit knowledge.

DISCUSSION AND CONCLUSION

Innovation and knowledge management are related and dependent on one another. The management gurus acknowledge the role that knowledge management plays in innovation. Innovation depends on the expansion of knowledge. The main motivation behind innovation management is to maintain competitive advantages through the use of knowledge and collaborative processes. Power is knowledge itself. Given the enormous contributions knowledge has made to human civilization, it might take over the planet. Justified true belief in a context as knowledge. The Nonaka and Takeuchi's (1995) SECI model, which consists of Socialisation (explicit to tacit), Externalisation (explicit to tacit),

Combination (explicit to explicit), and Internalisation (explicit to tacit), is one of the most popular models for knowledge management.

Apart from SECI model, there are many theories and models. Spender (1996) has classified knowledge based on explicit-implicit, individual-social, while Jasimuddin (2005) has divided knowledge on basis of tacitness and sources as Endogenous explicit knowledge, exogenous-tacit knowledge. Blackler (1995) finds knowledge as embezzled, embodied, encultured, embedded, and encoded. Regarding the stages of the knowledge management process, there are several points of view. The creation, storage, transfer, and application phases make up the core steps of the knowledge management process. Among these, knowledge transfer could become well-liked as a result of its significance within the organisation. The four steps of the knowledge transfer process are initiation, implementation, ramp-up, and integration. (Szulanski, 2000). There are many mechanisms of knowledge transfer. Face-to-face interactions, books, pamphlets, reading materials, workshops, seminars, staging plays, posters, signboards, and banners are all examples of knowledge transfer mechanisms. Knowledge transfer also encounters different barriers. Lack of knowledge absorptive capacity in recipients due to education and literacy, pressure from environments, lack of trust, lack of training, duplication of or overlapping in the NGO-activities, superstitions, stubbornness and language barriers, ambiguity in knowledge etc. are the barriers to knowledge transfer.

An invention of new technology, service, or product can be defined as an innovation. Innovation entails change, which can be either sudden or slow. It is the process of learning, disseminating, and assimilating of knowledge with the objective of developing new knowledge. Burkhardt (2014) finds process innovation, functional innovation, design innovation, product innovation, service innovation, business model innovation, co-creation innovation, and open innovation are just a few of the many categories under creativity. According to Drucker (1985), the key sources of innovation are unanticipated events, inconsistencies, process needs, industry and market changes, demographic changes, shifts in attitudes, and new information. The invention process has been segmented in many different ways by authors. However, the primary steps in the innovation process are concept generation, development, and commercialization. Innovation requires knowledge management, which is essential. Innovation and knowledge management can be metaphorically equated to an iceberg, with the surface portion representing innovation and the undersea portion representing knowledge management. Tools for innovation and creativity are deeply ingrained in knowledge management. For example, quick score card is connected with Nonaka & Takeuchi (1995), Jasimuddin (2005), Blackler (1995), Hasnain, *et al.* (2016) and Szulanski's (2000) models. Kono analysis is connected with SECI model and brainstorming. Nominal Group Technique is connected with SECI model and a few knowledge transfer mechanisms of Hasnain *et al.* (2016). Brainstorming is based on a few phases of SECI model. Syntectics is based on Spender (1996), Blackler (1995) and Jasimuddin (2005). Six thinking hats are based on the concepts of Polanyi (1962, 1966), Jasimuddin (2005) and Hasnain, *et al.* (2016). Morphological Analysis and storyboarding have a foundation on SECI model. Field Force Analysis has based on Hasnain, *et al.* (2016). Mind Mapping is connected with Hasnain (2015).

According to the concepts of knowledge management and innovation, the author suggests that the NPD process requires a few phases for innovation: (i) collection of new ideas and knowledge; (ii) research and development (R&D); (iii) procurement and production; (iv) commercialization; and (v) integration/organizational memory.

This paper reflects the usefulness and indispensability of knowledge management for any innovation, and thus adds value and fillers to the existing body of literature of KM and Innovation. There is no doubt that innovation should be greater if knowledge management strategies are robust.

This document provides managers with some key knowledge management theories from which innovation strategies may be developed within the company, nourishing knowledge management and realizing their synergistic effects. The study's findings may aid firms in becoming more inventive. As a result, both academics and the corporate sector could derive theoretical and practical benefits from this paper. This paper suffers from the limitation of literature based research. Future researchers are free to conduct empirical studies in any type of organizational setting.

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