

Developing a Theoretical Framework for Knowledge Acquisition

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Abstract

Eliciting knowledge is one of the most critical tasks that many organizations may face. Many organizations face problems when experts leave their job. This paper presents a framework for knowledge acquisition which will allow for a consistent method for capturing the knowledge of a particular enterprise, organization or human (domain) expert. This developed framework can be used for almost large organizations with a little adaptation related to job nature of the organizations. The goal of this paper is to present a framework in which a knowledge engineer can use to successfully capture, apply and validate knowledge. This framework can also be used for both types of knowledge (explicit and tacit). Moreover, applying this framework does not require a huge amount of effort or cost.

Keywords: Knowledge management, knowledge acquisition, tacit knowledge acquisition, explicit knowledge acquisition.

1. Introduction

In order to have a new knowledge economy and business, organizations are now facing major challenges due to external pressures as well as the nature of the workplace. Additionally, in past years, the world witness major turbulent time in the global economy. Many companies restructure themselves to manage human capital. This gives rises to the necessity of improvement of a strategic, comprehensive, holistic and adoption Knowledge Management (KM) to enhance human capital. It is evident that there is a strong competition among organizations and a sort of rapid change in the business environment and, therefore; the organizations start thinking of how to improve their human capital. In this regard, knowledge has become a key source for organizations to enhance the human capital which is of prime significance for organizations' performance.

KM is mainly viewed as one of the attractive options that can improve human capital. Consequently, many organizations lost sight of human capital to grow and compete with domestic and

global competitors. Thus, organizations try to achieve by managing Knowledge. As a result, KM has begun to be proactively introduced within the policy, strategy, and implementation processes of worldwide corporations, governments, and institutions [1]

Information and communication technologies (ICT) work as knowledge enabling tools for supporting and enhancing the performance of the KM practices. The improvement of ICT performance and the ease of the knowledge transfer are breaking down the time and distance barriers in knowledge dissemination [2]. ICT provides channels for storing, acquiring, transferring, exchanging, distributing, and reusing of knowledge faster and more conveniently both internally and externally. Additionally, Papoutsakis [3] describes that Information Technology (IT) may become the driving force behind the required business transformation. In order to take full advantage of the opportunities facilitated by IT, in particular when applied to KM, senior managers should manage IT to successfully combine it with the strategic objectives of their organizations. Therefore, Knowledge is the most primary asset for organizations today and KM has become one of the most moving research and growth fields to combine with the area of Information System (IS).

It is widely known that one of the most critical issues that most large organizations focus on is the capability of retrieving knowledge from expert minds and managing the Intellectual Capital. Managing Intellectual Capital is not restricted only to humans but it includes Structural Capital, and Relational Capital of an organization. But human capital is the most important one. As well, Mau [4] supposes that KM gives the means for organizations to leverage information and expertise to get better innovation, responsiveness, productivity and competitiveness. These assets, which give to the intellectual capital of an organization, contain databases, manuals, work reports, policies and procedures as well as other undocumented knowledge that sits in the heads of their employees.

Human capital includes knowledge embedded in human minds, skills, experiences and intuitions possessed by individuals. The knowledge which the organization operational system contains called Structural Capital. The organization's relationships with its partners, network of customers and stakeholders is called Social Capital [5].

KM helps organizations to stay competitive, to maximize the use of their knowledge into products and services, and emphasize the importance of employees as intellectual assets and suppliers of knowledge [5].

Knowledge discovery is to mine this valuable intellectual capital from documentation, database and mind of experts. Some tools and techniques like data mining and interviews are useful for knowledge discovery [6]. Also, KM is becoming an ever more persistent subject within the business community. Thus, KM purpose is to leverage an organization intellectual asset in sustaining competitive advantage [7].

Moreover, Human Capital, the most critical issues that most organizations focus on is the knowledge embedded by an individual. This knowledge can be differentiated between Explicit Knowledge and Tacit Knowledge. In addressing this issue, Nonaka [8] Presents two kinds of knowledge: explicit and tacit. Explicit knowledge can be expressed in words and numbers and shared in the form of scientific data. Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or share with others. Also, Markus [9] indicates that knowledge has two dimensions; the explicit and the tacit. Explicit knowledge that has been captured and articulated and has ideally been codified, that is, documented, structured and disseminated. Tacit knowledge resides in people's heads or muscle memory and may be destined to remain there. Another definition by Bechina [10] suggests two types of Knowledge; the Tacit and Explicit. Tacit knowledge is linked to personal perspectives, it is intangible and not easy to articulate, and explicit knowledge has a tangible dimension that can be easily captured, codified and communicated.

The problem in many organizations today, as we believe, is that explicit knowledge has been get a more interest than tacit knowledge since dealing with explicit knowledge is easier and more manageable than tacit knowledge. Managing and extracting tacit knowledge form organizations and human experts is not an easy task since this type of knowledge is not articulated [5,11].

The following sections are organized as follows: In section two, we review relevant literature; section three present characteristics of Knowledge acquisition, in section four, we propose the research framework; the last section presents our conclusion.

2. Literature Review

2.1. Knowledge Acquisition

KM has progressed from an emergent concept to an increasingly common function in business organizations. As evidence of its maturity as an area of academic study, a host of journals have been devoted to KM and intellectual capital management have been created [12]. In Addition, A prerequisite of implementation of KM is to understand and develop the infrastructure elements required to support the acquisition, management, and transfer of tacit and explicit organizational knowledge [7].

Furthermore, Stollberg [13] believes that Knowledge Acquisition is an activity which deals with finding and acquiring knowledge in knowledge-based resources. The firm should make conscious efforts to sense, search, and define relevant knowledge and its sources [14]. The importance of knowledge acquisition depends on organization culture and objectives. As well, Abdullah [15] thinks that the first step of KM is acquisition of knowledge in a collaboration environment , this step involve sequential steps that should be taken in order to make sure that the knowledge could be acquired from the right people, time and place.

Additionally, knowledge acquisition process makes the process of bringing the knowledge into an organization from external sources possible [16]. Therefore, one of the main issues in knowledge management is Knowledge acquisition (KA); Knowledge acquisition plays an important task in building knowledge based systems (KBS). On the other hand, evaluating different Knowledge acquisition techniques has been difficult because of the costs of extracting knowledge embedded inside human brains [17].

One of the most critical issues that knowledge engineers face during building a knowledge-based system is Knowledge acquisition. Since engineers must first determine where the knowledge exists inside the organizations, then how to acquire and capture this knowledge in a systematic way. The cost and presentation of retrieved knowledge depend on used method. Also if that knowledge used in building an application the cost and performance of this application will depend on the quality of the knowledge acquired. The approach to knowledge capture may take several forms.

2.2. Knowledge Acquisition Issues

Goh [18] gives a definition of KM as systematic leveraging of data, information, skills, expertise, and various forms of assets and capital to improve organizational innovation, responsiveness, productivity and competence. Also, Kautz and Mahnke [19] present KM framework to provide the consultants project work and individual development through making technological solution themes and guidelines that are available, helps to locate experts and projects. Additionally, Deng and Yu [20] say the knowledge selection is executed by the expert's members of knowledge management team to judge whether or not the captured knowledge is valuable to be stored in repository.

A prerequisite of implementation of KM is to understand and develop the infrastructure elements required to support the acquisition, management, and transfer of tacit and explicit organizational knowledge [7]. Three areas of importance help do this process; which are the emphasis on people, process and technology [7].

The following issues are the most important issues which must be dealt with when talking about knowledge acquisition; Firstly, knowledge is in the heads of experts. This means that if you want to extract this type of knowledge you need a method to contact expert minds and to extract its knowledge. Secondly, experts have large amounts of knowledge. Some of these types of knowledge can be extracted by several methods such as printed document, interview, and reported while others is

very difficult to extract. Thirdly, experts are not available all the time. Furthermore, Most of experts don't have time to waste in interviews or documentations.

3. Building an Approach for knowledge Acquisition

It is known that capturing explicit knowledge is easier than tacit knowledge since that tacit knowledge is embedded in human brains. It is the tacit knowledge that not at all gets quantified into a manual or other form. The real problem which resides within tacit knowledge is when someone leaves his position in an organization for any reason the knowledge in his or her mind leaves also. In order to capture this knowledge, knowledge acquisition techniques must be developed [21, 22].

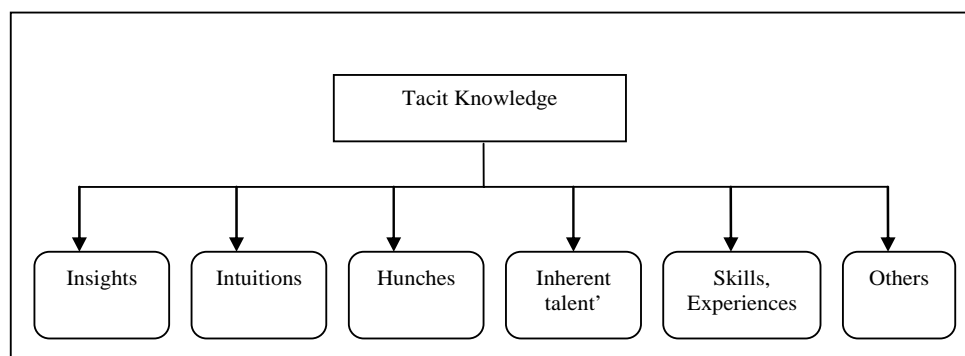
3.1. Characteristics of Tacit Knowledge Acquisition

Sunassee [23] explain that tacit knowledge is the form of knowledge that is subconsciously understood and applied, difficult to articulate, developed from direct experience and action and usually shared through very interactive conversation, storytelling and shared experience. Also, tacit knowledge is retained by people in their heads; it is the product of their minds' experiences and learning. It can be shared but in a less tangible form, tacit knowledge is more difficult to qualify [24].

Soltero et al., [25] considers that tacit knowledge can be defined as the knowledge that a person posses. Also he says that knowledge is embedded in the individual's experience and it has a personal quality, which makes it hard to formalize and communicate. Additionally, Belbaly [26] adds that tacit knowledge is not easily shared, and cannot be codified.

One of the main features of tacit knowledge is that it is may lead to improvements in employee approval and motivation when an organization "officially" recognizes and makes noticeable kinds of knowledge that individual workers claim to have [27]. Figure 1 indicates to the features and forms of the tacit knowledge.

Figure 1: Forms of Tacit Knowledge



It is not easy to elicit tacit knowledge since most people can't easily explain what they do, how they do, and what they have in a manner that can be understood by others. Because of the rule that skills, experiences, insights, Hunches and intuitions are usually learned through apprentice-style learning. As a result, interpretations of what the experts say and do are often defective and incomplete, sometimes based on rationalizations by the experts of what they think they are doing rather than what they are actually doing. Also a very important thing to note about tacit knowledge acquisition is that it is time consuming. Obviously, costs must be reduced, errors have to be eliminated and development time should be shortened [28, 29, 30, 31,32]. Approaches to solve these issues are proposed in this paper.

The main characteristic of the tacit knowledge approach is the fundamental belief that knowledge is basically personal in nature and is therefore difficult to extract from the heads of individuals to an explicit form [29].

In fact tacit knowledge, often implicitly, most of the time remains in the heads of individuals in the organization and when an expert leaves his job most of his knowledge is lost. Tacit knowledge can also be articulated by individuals even though some efforts and some forms of assistance may be required to help individuals articulate what they know [33].

The main advantage of tacit knowledge is that it may lead to improvements in the employee's satisfaction and motivation. Also, leaving tacit knowledge in its form may lead to protect firm's proprietary from diffusing to competing organizations. Additionally, if the organization guarantees that all expert staff will not leave the organization and the organization has a second level of standby experts it will be a huge benefit for the organization against competitors. As well if the organization has a formal and official method to handle tacit knowledge inside the organization and to keep it in a secure manner, it will be a great advantage. Finally, if the organization follows a strict policy which forces workers to work as a team not as individuals, then there will be always a staff of second level experts who work with the main experts, so knowledge will be transferred to several individuals.

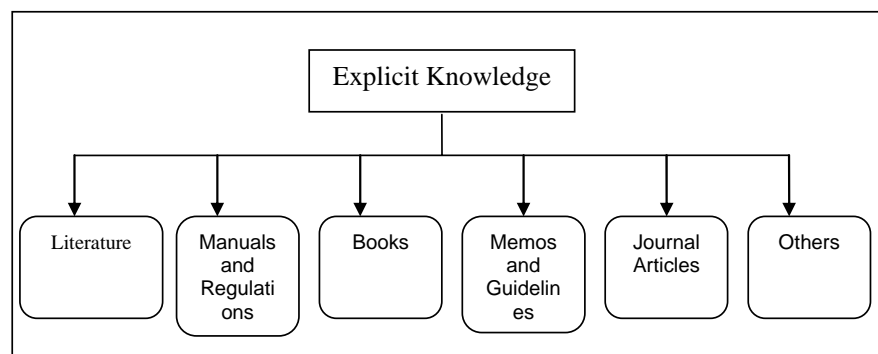
On other hand, the main disadvantages of articulating tacit knowledge is that making tacit knowledge in the form of explicit knowledge increases the risk that this knowledge may be moved to other opponent organizations, also this leads some staff individuals to claim to have knowledge that they don't actually have. Moreover, it would be expensive to move people in order to move knowledge in the organization. In addition, individuals may not have sufficient skills or motivations to articulate their useful knowledge. Beside that People vary seriously in the precision with which they can state their ideas, to adequately articulate their knowledge into useful knowledge assets. Additionally, if organizations have experts with different backgrounds, educations, beliefs and cultures, then it would be a difficult task to articulate their knowledge. Finally, since an individual can be at one place at a time, this will limit the reach and the speed of the organization in transferring an individual's knowledge.

3.2. Characteristics of Explicit Knowledge Acquisition

Sunassee [23] defines that explicit knowledge is easy to articulate, capture and distribute in different formats, because it is formal and systematic. Furthermore, explicit knowledge tends to be considered as anything that can be documented, archived or codified [24].

Soltero [25] explain that explicit knowledge refers to the knowledge that is transferable in a formal and systematic way, by means of a language, since it can be simply articulated and interchanged. Additionally, Belbaly [26] notes that explicit knowledge can be articulated, codified, and stored in certain media. The researchers have proposed and developed an approach of explicit knowledge, see figure2.

Figure 2: Forms of Explicit Knowledge



According to the above figure, the authors take into consideration several sources of explicit knowledge which will be briefly explained in the following paragraphs. Explicit knowledge has mainly the following sources (Literature, manuals and regulations, books, memos and guidelines, journal articles and other sources of knowledge)

Literature: One of the main sources of explicit knowledge is Literature. These documents are very popular types of knowledge which used mainly in education areas. These documents can also be helpful in defining and clarifying the terminology of the problem domain.

Manuals and Regulations: Manuals mainly exist in organization in printed regulations. Manuals are the best source for complementary information about the problem area for a knowledge based application. All regulation documentation must be made available to the knowledge engineers to ease the elicitation of the knowledge embedded inside these documents.

Published Books and Journal Articles: This type of knowledge is mostly the least useful form of documentation to the elicitation process. Since this type of knowledge is mainly known and does not contain the small details.

Reports, Memos and Guidelines: These types of documents (Reports, Memos and Guidelines) are generally not formatted and organized in a proper way. Such types of documents will require more explanations and clarifications to be understood and to easily extract useful embedded knowledge.

The main advantage of explicit knowledge, once knowledge is captured into any form, that it is easy to retrieve. Also, the knowledge will be available all time 24/7/365. Furthermore, knowledge will be available to all departments and people within the organization or outside the organization.

Moreover explicit knowledge can be discussed, tested, improved and enhanced. Explicit knowledge can be used to identify which type of knowledge is capable of making significant contributions to the organization knowledge base, and which are not. Explicit knowledge makes an organization current knowledge base more visible and useful. Also making the knowledge in the form of explicit knowledge allows the organization to discover deficiencies in its knowledge assets.

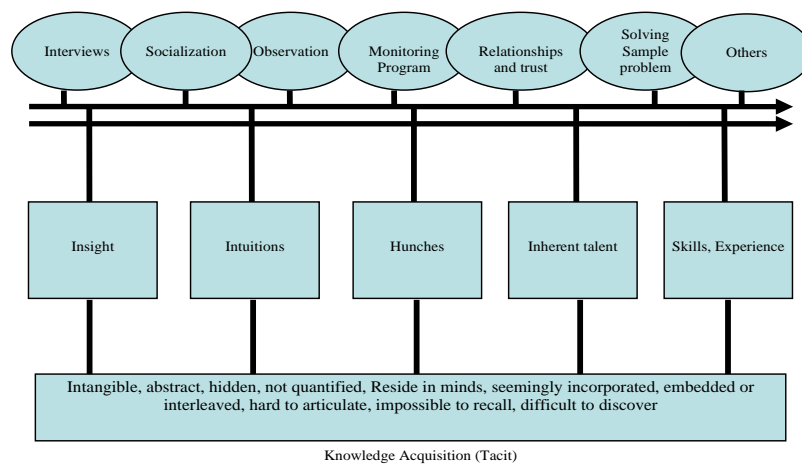
4. A Theoretical Proposed Framework for Knowledge Acquisition

In the following two sub sections the authors propose a theoretical framework for tacit and explicit knowledge acquisition.

4.1. A Theoretical Proposed Framework for Tacit Knowledge Acquisition

This section proposes a conceptual framework of tacit knowledge acquisition, see Figure 3.

Figure 3: Theoretical Proposed Framework for Tacit Knowledge Acquisition



Tacit knowledge acquisition such as insights, intuitions, hunches, inherent talent and skills, is difficult to extract from human minds. According to the fact that knowledge is in mind, it is widely known that traditional strategies are ineffective when they come to acquire an experts' tacit knowledge. In tacit knowledge, there are several methods which can be used to help elicit tacit knowledge in any organization. These methods can be used with an adaptation based on the type of organizations and based on experts' job. Since that tacit knowledge is highly intangible, abstract, out of sight, secret, and hidden, one can attribute its origin to be apparently incorporated, embedded, built in, included, and interleaved with certain innate and essential skills problem-solving skills.

One of the main methods of retrieving knowledge embedded inside human minds is socialization; socialization is the transferring and sharing of tacit knowledge between people. For example, a team discussion is an example of socialization. Socialization generally occurs between employees who have a common culture and understanding. Such a process often occurs in a very informal feeling and is, therefore, difficult to document and structure. Moreover, any effort to apply a process or structure to socialization can cause it to break down.

The methods which can be used to help elicit tacit knowledge are; encouraging expert people to train their staff by applying their knowledge and skills to solve novel or typical problems. Also, Observing and monitoring experts' behaviors form their staff when they are applying critical tasks.

Additionally, conducting regular meetings between experts and their staff to exchange experiences is highly recommended to record and document every action occurs during the meeting. As well, Allowing closed staff to deal with situations that are similar to real life situations which usually only solved by experts. This is important to let them practice solving novel problems by themselves.

Using monitoring programs to make an extensive discussion, when necessary, between experts and their staff after each critical task. This would be useful to help staff acquire new experiences based on using monitoring records. Finally, Identifying what each individual possess of specific kinds of knowledge in the organization.

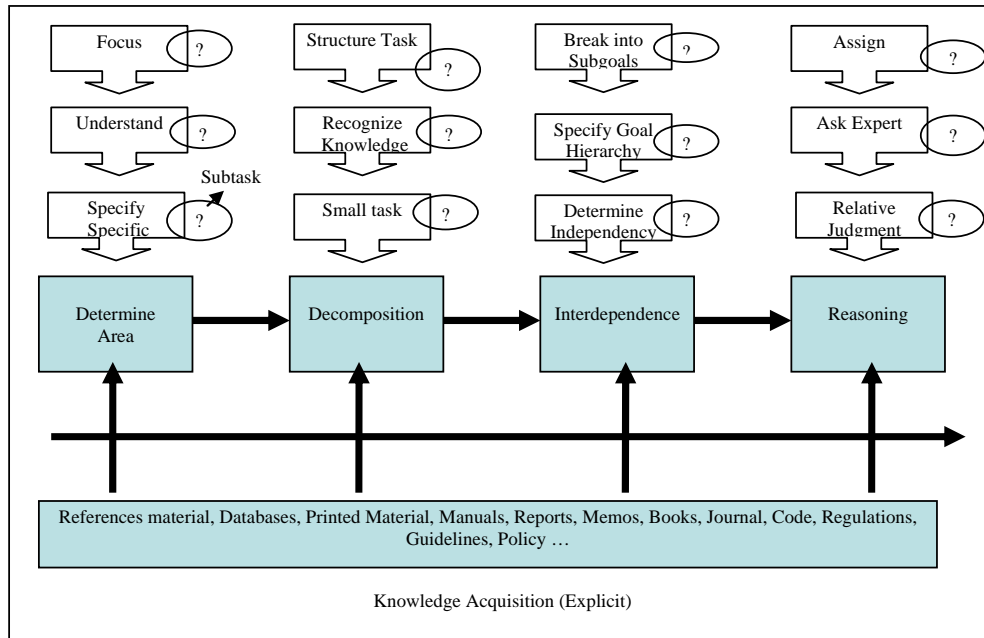
Knowledge acquisition is a complicated task. Acquiring explicit knowledge may be seemed to be simpler than tacit knowledge. This does not mean that explicit knowledge is easy to acquire and manage. But explicit knowledge almost has a formal form which makes it easy to deal with.

Requirements of knowledge acquisition are the following; firstly, experts must have a regular time out of their job for teaching and training others. This means that non expert people will have the necessary experience before experts leave job or retired. Secondly, when designing a process to capture knowledge, essential knowledge must be focused on not over all knowledge.

4.2. A Theoretical Proposed Framework for Explicit Knowledge Acquisition

Explicit knowledge acquisition is divided into four main tasks. These tasks can be adapted to any organization to acquire explicit knowledge in an efficient manner. Any framework must have the capability to decompose the knowledge acquisition task into manageable subtasks, which means that it can be easily managed and adapted. Therefore, this section proposes a theoretical proposed framework for explicit knowledge acquisition, see Figure 4, which is very flexible and have been built to be appropriate for most organization regardless their nature.

Figure 4: Theoretical Proposed Framework for Explicit Knowledge Acquisition



The main idea in the theoretical proposed framework is based on dividing any explicit knowledge area into four main manageable subareas, determining areas, decomposition, Interdependence and reasoning. Then with the help of specialists in the organization we can define each piece of useful knowledge in the organization and determine the correct way to extract it in a proper and simpler method. The '?' inside the frame work indicates to selecting a proper subtasks which will be appropriate for the organization based on it is nature.

4.2.1. Determining Domain Area

The first step in the explicit knowledge acquisition process is to know what domain area to focus on of your knowledge elicitation. Determining the domain area is a very important step, because when a domain area is qualified correctly then it is the suitable time to move on to the knowledge acquisition process for that domain.

4.2.2. Decomposing the Knowledge Acquisition Task

Solving any large problem requires dividing this problem into manageable sub tasks. This process of decomposing the knowledge acquisition task is critical to the success of the overall process of acquiring tacit knowledge. Dividing the domain area helps experts to build their knowledge base. Also, it is a necessary step to enable the experts to focus their attention on building an appropriate and reliable knowledge base system. Structuring the task of building a knowledge base system into a number of distinct sub steps will ease the task of experts in building a knowledge base gradually. Such breaking down the process of the knowledge acquisition task can help the experts to focus their attention on one aspect of expertise at a time.

4.2.3. Determining Interdependencies

After decomposing large tasks into manageable subtasks, it is necessary to determine Interdependencies. Interdependency occurs when two or more things depend on one another equally. Implementation the knowledge acquisition task depends on finding the interdependencies between different parts of knowledge. Also determining interdependencies will make it easy to identify the missing parts of knowledge, determining what parts of knowledge are related and what are not.

4.2.4. Qualitative Reasoning

Conflict rules cause different explanations. It is known that if there is a situation which is not clear to judge this will result in a different decision. So if there is a fuzzy task we should ask experts for an explicit, relative judgment between the active rules in that context.

5. Conclusion

The framework of this study demonstrates clearly that all the selected factors have a significant impact on acquiring tacit and explicit knowledge. The framework for acquiring explicit knowledge based on dividing any domain area into manageable subtasks which are determining areas, decomposition, Interdependence and reasoning. Then these subtasks will become the main focus of the knowledge acquiring process. And the most important thing is that the ability of adapting this framework by any organization to satisfy its own requirements. In Addition, The framework for acquiring tacit knowledge is also simple and could be used for most organizations. The framework shows that socialization is one of main features that help to acquire the tacit knowledge regardless the nature of the organization. The framework indicates to conduct regular meetings which could also be useful for some organizations to obtain tacit knowledge since they let staff meet the experts and get benefits from them directly. The framework invites to use monitoring programs which are useful in some critical situations that cannot be repeated such as performing a surgeon.

The authors tried to build a framework for acquiring explicit and tacit knowledge which can be used almost for most large organizations. This framework is simple, easy, and comprehensive. Hopefully, these frameworks will shed some light for policy makers allowing them to acquire tacit and explicit knowledge.

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