

Role Based Access Control for Knowledge Sharing in Remote Areas

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Abstract: - Many years ago, the Indonesian Government encouraged people from Java to migrate to other islands in order to enhance their living standard. In the case of Pasir Region, East Kalimantan, the 100 families who moved were originally from Jepara. Jepara is a very famous area of craft products and carving furniture. The problem is that they have to change their livelihood from a crafter to a farmer and lack the necessary original skills. This paper introduces a Role Based Access Control (RBAC) for e-Village in creating and sharing knowledge in a secure way. This includes secure information about marketing to help the products become an innovation and highly valuable. It also discusses and analyses the secure knowledge sharing and knowledge creating using e-village, not only for supporting the market development but also preserving the village culture more, especially in crafting and carving furniture. This study shows that the RBAC of e-village contributes significantly to the quality of knowledge for people in a remote area such as the Pasir Region village.

Key-Words:- RBAC, Knowledge Management, secured knowledge sharing, village development, e-village.

1 Introduction

From 1980 to early 1998, The Indonesian Government encouraged people from Java to migrate to other islands in order to enhance their living standard. This government program was called “transmigrasi”. This was coordinated by the former Department of Transmigration.

In our previous study in 1996 to Pasir Region, East Kalimantan, we found that there is one area in this region that originally came from Jepara, Central Java [1].

These people are famous for their crafting and carvings of furniture. Their carvings are famous not only locally but also internationally. Total Indonesian carving furniture exports to Europe each year reach about 20 billion Euros per year. Since the European Society considers furniture products as a primary requirement [2]. The export value of craft and carving furniture in the year 2008 reached US\$2, 65 million (BPS, 2009). It means also that their knowledge should become innovation product.

The innovation should direct to meets the three elements, which are: first, current, which is offering something that other people have not been able to make it. Second, complex, technology been used is very complex in order that the competitor cannot imitate it, which will inhibit competitors. Third, it has a strong design, which means that the resulting product has a long useful life that will lower the price [2].

The problem they face is that there are no markets in the village and they have to go one hour by truck to the nearest market. During our study in 1996, we had conducted a meeting in the office of Regional Division of Transmigration in the Pasir Region, Tanah Grogot, which urgently discussed the marketing of their products. After the Government realized this market is urgently needed, they built the market and macadam road. The young village people who came from Jepara wrote several small books as manuals to make carving furniture. The young people shared or transferred their knowledge of making crafts and carving furniture to other people in this village, who came from other regions. They realized that carving furniture has a higher pay than selling vegetables. Unfortunately, they were developing knowledge sharing in growing the vegetable instead of carving and later become knowledge culture in the village.

The fundamental question is how ICT affects the motivation for knowledge sharing. There are three sets of factors that should be distinguished upon which ICT influences knowledge sharing. First, individuals may differ in their appreciation of ICT as well as in which motivators will affect them. Second, a broad class of variables is discerned related to the context in which knowledge sharing is to occur. These variables include the proneness to knowledge sharing in the organization, or it describes as the “culture of knowledge transfer”. Third, it is acknowledged that knowledge sharing is

not a separate process that exists fully in its own right. Depending on the reasons why knowledge is shared, the process of knowledge sharing may take on a different form. In this rural example, there are certain people with knowledge, such as people from Jepara. They have that knowledge and want to share their knowledge with other people who came from other areas or regions. Consider why the people who came from Jepara wanted to share their knowledge, as they have to produce a mass production to become a valuable famous products and innovation products.

By producing these innovative products, such as carving furniture, their living standard will potentially be enhanced. It turns out that the price rises continuously. By routinely sharing their knowledge and conducting discussions about village problems, the people realized that routine meetings are important. This village program perceived to realize soon in supporting the Government program in e-village, which announced in 2010.

This knowledge included in skill knowledge, which means knowing how to do something of value to the village, and it should manage through job descriptions, training programs, performance evaluations, and other means.

2. The Methodology of Secured Knowledge Sharing and Creation in this Remote Area.

According to Nonaka and Hirotaka [3], knowledge management is about organizational learning and about organizational thinking. Except, of course, organizations do not ever really learn or think – only the people who work for them can do that. Why is knowledge sharing important? Since by sharing knowledge can they hope to develop their capabilities and be able to obtain new knowledge and eventually create valuable products from this new knowledge. Knowledge management, especially knowledge sharing, are not simply the arguments about the latest hardware, software, or groupware offering, but it is about the people thinking and learning. It is about what they spent on information technology to get the new knowledge that they can use it to enhance their new knowledge. Information and Communication Technology (ICT) could enhance knowledge sharing by lowering temporal and spatial barriers between knowledge workers, and improving access to information about knowledge [4]. Since knowledge sharing is related to communication, it means that there is a discussion between that entire village people in that

area. It also means during the discussion, people will share their knowledge to other people without decreasing or losing their knowledge, but instead they will enhance their knowledge or get a new knowledge from others. It is also an act of externalization. Knowledge sharing is needed as an act of reconstruction. Knowledge sharing is performed by at least two people, one is the knowledge holder, and the other is the knowledge seeker.

Knowledge sharing is identified as a major focus area for knowledge management [4]. The relevance of this theme particularly derives from the fact that it provides a link between the levels of the individual knowledge workers, where knowledge resides, and the level of the organization (or the rural area of my research), where knowledge attains its (economic, competitive) value. In the [5], it shows how Tanaka created knowledge in a 2x2 matrix. In each quadrant, knowledge is either tacit or explicit. There are also four modes of transfer from quadrant to quadrant, which are: socialization, externalization, combination, and internalization. This transfer from quadrant to quadrant in this village, shown in Figure 1.

To link ICT to the motivation for knowledge sharing [4], which presents a model that may help understand the additional factors to be considered and we consider to combine it in term of the role relations involved using RBAC.



Fig. 1. The transfer from quadrant to quadrant

The more fundamental question is to assess how ICT affects the motivation for knowledge sharing. This focus also takes the interest in knowledge-sharing technologies beyond their empowerment function. It leads to the recognition of questions concerning how using ICT may stimulate or perhaps even frustrate the will to share knowledge.

The village in East Kalimantan, Grogot Region (where our study conducted) shows that the village people still have the courage to share their knowledge on carving furniture. Since they know that, this carving furniture is a valuable product not only in Indonesia but also internationally. Therefore,

when the village people group heard that the government would soon build the market and the macadam road, the young people conducted a meeting to set a program for asking all village people to share their experience in making off-farm products, included crafted furniture, and other crafts or carving furniture. Two people who came from Jepara were making living room furniture, which are two chairs, one sofa chair, and one table. They transfer this knowledge to other people in this village. Then they built a small workshop, not only for knowledge sharing but also for building a training place for making this carving furniture and other crafts. It shows that other people, who came from Jepara were making carving furniture and transfer it to other people, who were not from Jepara.

Nevertheless, there are still problems that exist in this transfer, where they still need the information about the price of exporting or the price of the furniture products in other cities, which they formerly bought from Java. Therefore, we suggested to the Local/Region Government that they should build a social network. A social network, information on resources, relation/network and behaviors spread within networks [5]. Continuous dissemination of this information produces information on position, practice, and reputation of this village. Finally, this village can be a place for learning. Knowledge flow, which will occur in a socio-technology network, will become a basis of innovation.

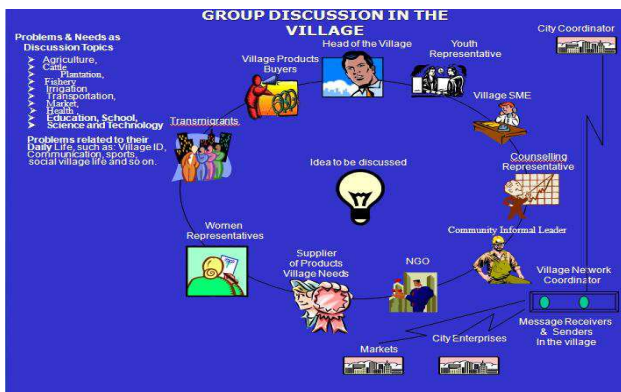


Fig. 2. Meeting group based on role of each knowledge seeker in a remote village.

Therefore, we suggested to the head of the Region and village to build an e-village, in Local and Region Governments. In 2010, the Ministry of Information and Communication Technology announced that they will build an e-village in each village in Indonesia and they will build a prototype of an e-village in Bali and Jawa. E-village means

that they will equip a village with electronic devices, which make information needs available in the village, and the village people can access data & information from every national or regional agency and institution. Villages should have professional staffs equipped with the talent and IT kiosks to tackle all aspects including agriculture, economic and business. These in-house engineers and technicians designed a custom system to meet the specialized requirements for the village people. Whether the project is for village developments or commercial buildings, but it is useful for informing the village people about whatever information service needed by them and they could be accessed easily.

We suggested to the Head of the village that they create a regular meeting with all groups of the village people, shown in Figure 2. They also share experiences or knowledge that they have. If the e-village is constructed, then the data and information as a result of the meeting will be stored in the village database. This meeting should be conducted regularly and become a village culture. Figure 2, above shows the regular village meeting. The idea of knowledge development in remote areas is that we have to grab their knowledge in this context which means, the accumulation of experiences, values, contextual information, intuitions and comments of several experts [2]. Nonaka and Hirotaka suggested to simulate a knowledge flow from tacit knowledge [3].

Tacit knowledge creator should be transferred to tacit knowledge seeker by using discussions. If they simulate it through internalization or write the discussion, this tacit knowledge will become explicit knowledge. This explicit knowledge when added by other people's explicit knowledge or other written experiences becomes a combination of knowledge. From this combination of explicit knowledge, the seeker then simulates through externalization by reading this culminated knowledge in order to understand the sense of knowledge. In addition, this explicit knowledge will be stored in the village library and village database, if they have already built it. If the knowledge seeker wants or needs it, they can find or read from this explicit knowledge in the village library or database. This knowledge cycle should become a culture in this village and it helps the village create valuable products.

Carving furniture is knowledge they can either receive from Jepara, or they can create it anew. Then, this creating of knowledge will become a decision for the village to produce this product based on their new knowledge or not. If they built

an e-village, then they will connect with other villages or other institutions or agencies in the cities or Departments/Ministries/National Agencies in the Central Government. This is the method by which the remote areas will get more information and knowledge. The decision making on producing the local products based on their local knowledge becomes an asset of the village, since from this synergized work of the people and creativity and also motivation of having higher living standard, they will produce innovation and will enhance their public service and it will be appreciated by the village people and the Government. Figure 3 shows the Development of Knowledge in Remote village.

In order to put the village in a regional or even national network, the Regional Government should also develop a Regional Network composed of the Regional Division, Local SMEs, Regional NGO, and National Universities, High Schools, and there must also be the Head of every village in this region as a member. Moreover, according [6] the Local Government also builds Knowledge by using the Knowledge Cycles of Hirotaka and Nonaka.

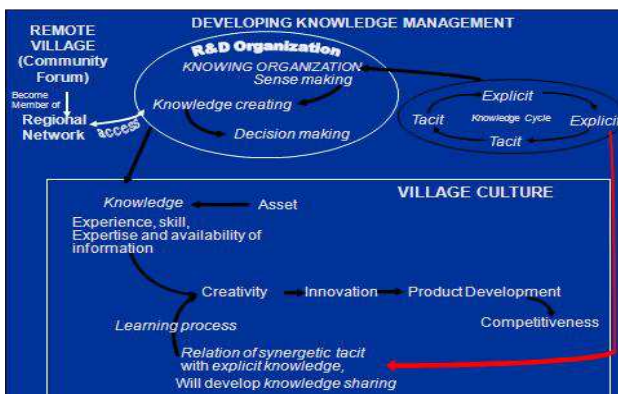


Fig. 3. The Development of Knowledge sharing in remote village.

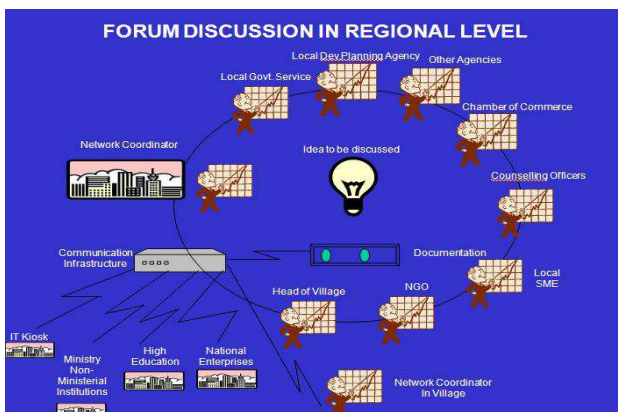


Fig. 4. Discussion forum as a knowledge cycles in the Region (Kabupaten).

This regional network should also connect it to all Local Institutions, and National Institutions, such as Research Institutes, Ministries Information, and Central Agencies, such as National Agency for Planning and Development.

Figure 4 shows the Regional Network which connect nationally. If the network of the village connects using the internet, then it should be built with an internet infrastructure. By internet, they will easily access any data and information from every connected village, city, and institution in Indonesia. This internet provides the common base knowledge that allows data exchange across all platforms.

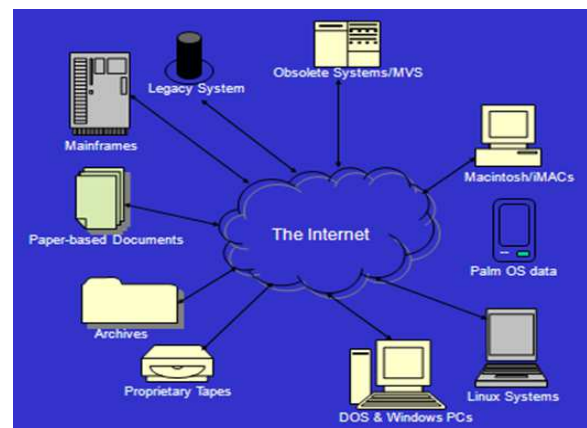


Fig. 5. Network Connecting Internet

The number of independent platforms, even in incomplete platforms, has not decreased even as the Desktop-computing Environment has standardized itself in Windows.

3. The Impact of Knowledge Exploration on Village People Standard of Life.

This innovation will be successful, if the information needed is available, and if there is the ability or capability of the village people to produce new commercialized products, heart ware (means desire to realize the production of the product) and commitment of the village people. However, the price of carving furniture is available in the Jepara's statistic only in the year of 2008, which is about Rp. 10,000,000 (ten million rupiah). Since, in 1997, Indonesia had an economic crisis and it was very difficult to get the standardized price of furniture for 1996 and 1997.

However, there was still a continuing benefit from manufacturing furniture and they do not deforest the jungle, since they plant teak trees for

making furniture. The important thing is that they do not lose knowledge of furniture manufacturing.

All these efforts mentioned above were used to grab the knowledge from Jepara through the village peoples' knowledge, and share their knowledge to others in the village. This knowledge will become an asset to the village or people in this remote area, then, it will enhance their living standard. The knowledge introduced in this remote village will become a culture for innovation and will enhance their living standard.

4. RBAC Model and Implementation in e-Village.

Role-based access control (RBAC) is a method of regulating access to a computer or network resource based on the roles of individual users within an enterprise. In this context, access is the ability of an individual user to perform a specific task, such as view, create, or modify a file. Roles are defined according to job competency, authority, and responsibility within the enterprise. [7]

RBAC appears to be a promising method for controlling what information computer users can utilize the programs that they can run, and the modifications that they can make. Role based security has been used in a variety of forms for computer system security for at least 20 years, and several proposals for incorporating roles into existing access control mechanisms have been published [8], [9], [10]. More recently, formal definitions for general-purpose RBAC notions have been proposed [11], [12]. When properly implemented, RBAC enables users to carry out a wide range of authorized tasks by dynamically regulating their actions according to flexible functions, relationships, and constraints.

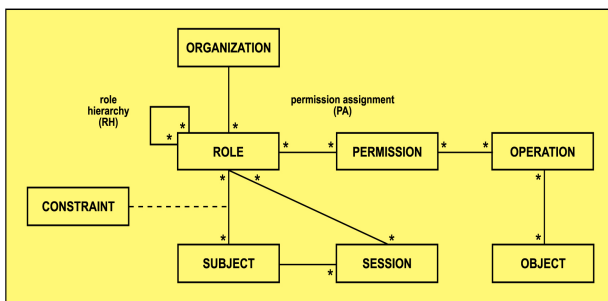


Fig. 7. The RBAC Model adapted from Ravi S. Shandu et al. [13].

This is in contrast to conventional methods of access control, which grant or revoke user access on a rigid, object-by-object basis. In RBAC, roles can

be created, changed, or discontinued as the needs of the enterprise evolve, without having to individually update the privileges for every user.

The following conventions are used in defining an RBAC model in relation to the knowledge sharing in Pasir Region:

- S = Subject = A person or automated agent, consisting of {Head of Village|Buyer|Supplier|Informal Leader|Transmigrant|Counselling Officer|... }
- R = Role = Job function or title which defines an authority level, consisting of P = Permissions = An approval of a mode of access to a resource, consists of
- P = Permissions = An approval of a mode of access to a resource, consists of {Access granted|Access Denied}
- O = Operation = specific functions to Objects consist of {Scan|Read|Write|Erase|Create|Modify|Access Control|Supervisor|...}
- O = Object = Data/Resources that Subject trying to access, consists of {Product Design|Tools & Methodology|Supplier|Buyer|Product Availability|Crafter|...}
- SE = Session = A mapping involving S, R and/or P
- SA = Subject Assignment
- PA = Permission Assignment
- RH = Partially ordered Role Hierarchy. RH can also be written: \geq (The notation: $x \geq y$ means that x inherits the permissions of y.)

Recently, considerable attention has been paid to researching the security needs of commercial and civilian organizations, which are concerned with protecting the confidentiality of information. This includes the protection of personnel data, marketing plans, product announcements, formulas, manufacturing and development techniques. [7].

Implementation of RBAC in the e-Village at Pasir Region is based on the Sadhu et al. model [13] as shown in Figure 7.

5. Conclusion

It proves that the Government's program on e-village is truthful and this program will enhance the village peoples' standard of living through sharing and creating knowledge, and the availability of data & information for all people even though they are in remote areas, which in the future will result in innovative products and services even in remote areas. Therefore, this village should develop e-

learning as a village cultural heritage, through knowledge sharing and creating.

This paper proposed RABC for e-Village in creating and sharing knowledge in a secure way. This includes secured information about markets to help the products become an innovation. This paper discusses and analyses secured knowledge sharing and knowledge creating using e-village, not only for supporting the market development but also preserving the village culture, especially in crafting and carving furniture.

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