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Study of Socio-Technical For Implemetation of Knowledge Management System

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Abstract. **Focus of this study to explain the importance of socio-technical aspects in the design and implementation of Knowledge Management Systems (KMS). This study was motivated by many failures in the KMS implementation and lack of research in the associated fields between the studies of socio-techno with KMS. The purpose of this study was to find factors in the socio and technical implementation of KMS in a state-owned company. The research method applied in the study is using an interpretative approach by conducting interviews, document review, focus group discussion (FGD) directly to end users. By knowing the Socio-Technical aspects, results of the studyexpected to be able to provide input for planning and to increase the success of knowledge management system implementation.**

Keywords: Socio tehnical, Stated owned company, knowledge management system (KMS)

1. Introduction

In the era of knowledge economy, the challenges to be faced by companies that want to win in the competition is collaboration, innovation, adaptation, technology, markets, and management of corporate intellectual assets [1]. From observation, the current implementation of KMS is a critical factor affecting the level of competition of an industry. In general, a KMS within the company is believed to be able to create competitive advantage, efficiency, and value added in the face of competition. However, on the other side was the experience of many obstacles and failures so that it also puts inefficiency in time, thought, energy and resources in company (finance, human resources, and infrastructure). The importance of planning is one critical key to successful implementation of KMS in an enterprise. approaching in socio-technical can be considered as factor in planning and implementing a KMS. Therefore, the research topic is divided into two reasons (general and spesific). General reasons, including the trend of organizations in implementing the KMS, the increase in users within the organization. The specific reasons, include the results of international conferences (I-Know) in 2010 in which the authors are able to indentify the state of art of knowledge management (KM) and knowledge management system (KMS) research.
In order to be able to design strategies of a holistic KMS, it needs to know the specific, concrete problems, and needs analysis. That will eventually become the most relevant inputs and appropriate in planning and implementing KMS. The majority of experts agree that most KM projects within the company involving IT [2]. This opinion is strengthened by the observation of 31 cases of KMS projects. The implementation of KMS translated in various IT projects that include knowledge repositories, databases, groupware, learning directory, arrchitecture information technology, hardware, communications, interface, software, user support, IT Support [3], collaborative tools, content management and business intelligence [4]. IT KM tools for global companies are as follows: portal, business intelligence, data warehouse, document management, intelligent. On the other hand,there are skeptical opinions regarding the application of IT in emerging KMS [5]. The other opinon said the business of technology is the easy one and , difficult is to change the culture and people. IT cannot only make KM more effective than, but also provide inspiration for a new approach towards the implementation of KMS in the company. Because if relying on the technology has the potential to mislead the managers of KM. From that point of view, that both of KMS and IT are not fully integrated is shown from the company's KM vision that can not be translated into IT. Regarding to these findings, it can be viewed that the implementation of KMS is considered to be able to accomodate all perspectives of human resources, processes, and technologies from the strategic middle, and operational level.

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From the above issues, the focus of this study aimed to explore socio technical factors in the implementation of a knowledge management system in state-owned electricity company.

This study begins by conducting fact finding by using a soft systems methodology in the state-owned power company. The results of fact finding is analyzed into the picture and made rich matrix between socio and technical aspects so that problems that occur can be precisely mapped.

Limitation of this study was not all top management involved in the process of collecting data so that researcher couldn't capture the overall problem and the expectations of top management.

2. Literature Review

To explain the role of the socio-technical aspects, the authors use some theoretical understanding of several aspects related to the concept of KM, KMS, IS/IT Project, KMS Project, and socio-technical aspects,.

A. Study of KM, KMS, IS/IT Project and KMS Project

KM in an organization arises when the organization's members share their knowledge, whether in the form of tacit knowledge or explicit knowledge. The implementation of KM not only gives benefits to the organization, but also to individuals who are part of the organization. The advantages perceived by employees are an increase in competence (skill) and have experience in working together and sharing knowledge and learning processes occured among employees, so that employees can improve personal performance making it possible to have a better career progression. At the level of public organizations, KM provides important benefits, such as improving organizational performance, by having direct access to knowledge, making decisions with better quality, having shorter process, reducing repetition of work, increasing innovation, having higher data integrity and better collaboration [6]. In other words, for the public sector, KM can reduce operational costs and improve customer service. Along with the developments of KM, information technology (IT) tools are instruments to help the creation of KM, in term of discovering process, capturing, sharing, storing, and retrieving. This role is called a knowledge management system (KMS) [4]. In the development of KMS, the IT concept for the KMS is extended as a system of ICT (Information and Communication Technology) which supports the creation, development, identification, capture, acquisition, selection, assessment, organization, linking, structure, formalization, visualization, distribution, storage , maintenance, repair, evolution, accessing, retrieval, and application of knowledge. Aspect of IT becomes an important factor in the implementation of KM for several reasons such as IT can improve the performance of the knowledge workers, organizational performance with the new business processes, and performance with effective interorganizational knowledge networks in organizations [7]. However, from the variety offered by IT, in fact the implementation of IT project (included KMS) has a lot of failures. The survey from The Standish Group, found that the success in IS / IT projects was due to factors of user involvement, executive management support, and clarity of the demand needs. On the other hand, the lack of user involvement as well as the incomplete and vague demand were the main factors that caused the IS / IT projects cancelled before it could be completed [8].

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Tabel 1. Success and failure in the IS/IT Project

No	Success Criteria	%
1	User Involvement	16
2	Executive Support	14
3	Clearly stated requirements	13
4	Proper planning	10
5	Realistic expectations	8
6	Smaller project milestones	8
7	Competent Staff	7
8	Ownership	5
9	Clear vision and objectives	3
10	Hard working, focused staff,	2
11	others	14

No	Failures were due to	%
1	Lack of user input	13
2	Incomplete requirements	12
3	Changing requirements	12
4	Lack of executive support	7
5	Technology incompetence	7
6	Lack of resources	6
7	Unrealistic expectations	6
8	Unclear Objectives	5
9	Unrealistic time frames	4
10	New technology	4
11	Other	23

The further investigation of the survey results, it can be concluded that the success in the implementation of IS / IT Project were due to some factors such as people (39%), process (31%), organizations (14%), and others (14%), while the failures were caused by process factors (39%), people (21%), technology (11%), organizations (6%), and others (23%). This result reveaed that technical factors (technology) was not a determining factor for the success of a project, otherwise non-technical factors dominated much to the success and failure.

The implementation of KMS, therefore, actually presents two different point of views. Some view their opinion sceptically. They say that the technology is easy, the difficulty is changing the culture and people. The survey about the failures of IT project occurred in the application of KMS was done and kept up to date. Most failures obtained were in the survey time (delay), cost (over budget), no match between the delivery of output to the user requirements, and total failure. The practice of KM is the case today, for most employees who do not obtain the positive results as expected. It was reported that 7% of the managers surveyed expressed their disappointment due to their KM practice. It was known that culture was the greatest obstacle to achieve an effective KM [9].

B. Study of Socio-Technical Approach.

The transition from the industrial era into the information age, not only brought the renewal to the presence of technology and utilization of information and knowledge for the organization, but also the changes to socio or social aspects. Socio technical term was first created and used in literature in 1951 by Trist and Bamforth. The motivation to examine the socio-technical problems is to describe other aspects of an organization that is a combination of social and technological sub-systems in the operational activities. Socio (personal and community) and technical (machinery and technology) factors are considered to have the same level of importance, so that it cannot be separated when analyzing an organization [10]. Apart from the scope of the above factors, socio-technical aspects also include t devices, tools and techniques needed to perform the transformation from input to output . While the social aspects of the system in a broader scope of human resources (at all levels) including knowledge, skills, attitudes, values and other needs are brought into the organization's operational environment. In addition, there are also another socio element which emphasizes on the relationship between social roles, including the factors of authority and legal dimensions. By looking at the definition, the interaction will form a condition that will lead to success or failure of the implementation and performance of a system. The interaction of these two aspects is to have a linear cause and effect relationships that interplay with each other. But paradox occurs because the researchers had assumed a human are unlike a machines, humans have a higher level that surpasses the machine and technology [11].

Regardless to the pros and cons of socio-technical aspects, this concept was evolved and accepted by practitioners and researchers because it was able to describe the social aspects that occur as a result of the presence of technology. Socio-technical system (STS) is a social system that is designed based on the technical aspects. The concept of STS inserted social requirements, human-computer interaction (HCI) requirements, and technical requirement itself. In everyday practice, in the company, the socio-technical systems use the technology that helps people to relate socially such as through email, social networks, blogs, facebook, knowledge exchange systems, chat rooms, and so on. Associated with it, what happens is rapidly evolving technologies, but social principles regarding the interactions between individuals do not grow as fast as technology. Socio-technical factors should be

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able to reduce levels of inequality between social needs and the technical performance, and between the needs of the community and technology that answers the needs. A community will form a synergy of its own values that affect the successful application of a technology within the company [12]. To form the synergy value, an approach is needed to design and develop the environment and individuals themselves. The basic principles of to design and develop the human values including the demands of the job, the individual the opportunity to learn, the area in decision making, social support, opportunities for working for social activities and the work leading to the forward [13]. The relationship of the social-technical approach can be described in the classical picture below: [14]

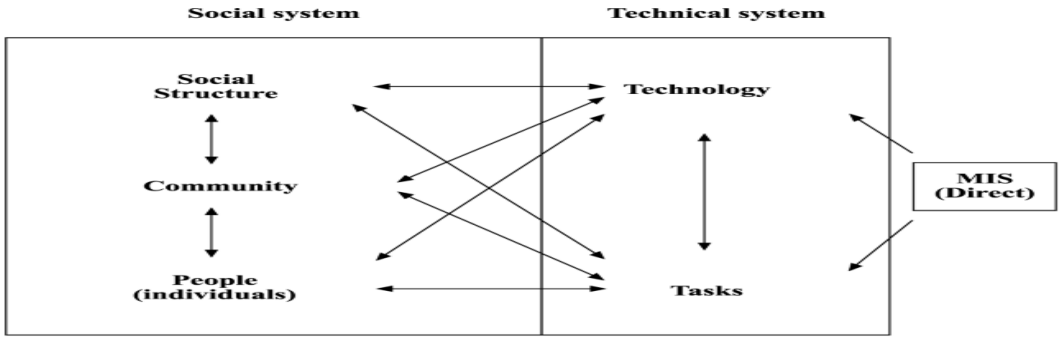

Figure 1. Classic Dimension of Social Technical

In its development, the socio-technical approach, is now focused on the aspect that refers to the society, community, organization, and the group as the impacts of the presence of technology [15].

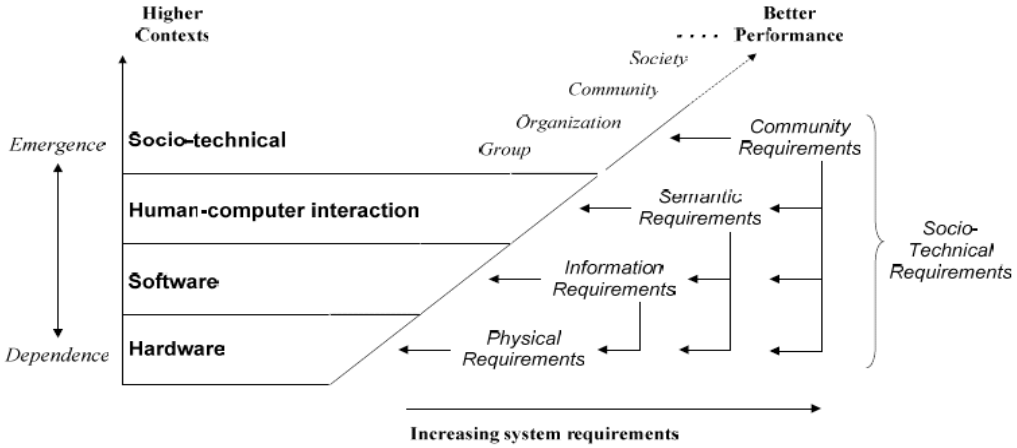

Figure 2. Development of Socio Technical Approach

For the hardware and software aspects of the physical needs and information requirements, human computer interaction requires sematic, and community socio-technical requirements. All of these requirements will can be seen in the socio-technical requirements. From this description, it is clear that the application of a technology must be carefully set so that all can be covered to achieve the maximum rate of success. Another discussion of socio-technical approach is related to the understanding of the user's behavior of the user (users) in which whether some individuals are eager to try a technology, some are sceptical or even rejected, and some can only try without committing to use it. Several theories have been developed to be able to understand and determine the factors of IT usage, including one of which is the intention models (based on aspects of social psychology).

The conclusion formulated in the exposure of the approach, is socio-technical factors are needed to describe an organization because socio and technical components are embedded in the overall factor. The factors are related to software, hardware, human-computer interaction, and socio-technical aspects of itself. To be able to design the socio-technical approach in accordance to the company it requires an analysis of the requirements in which each of the above factors is adjusted to the changing dynamics in the corporate environment. Therefore, socio-technical approach is widely adopted by both private

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companies and government as to the application of e-government in Indonesia so that it can be seen in a holistic problem, impact, and proposals for further development of e-government [16].

C. Study of Information System, KMS, and Socio-Technical

The discussions starts with the information system as the parent of the disciplines related to the information technology, organizational, and human resources. The terminology is often used to denote researches in the field of IS by using some terminologies such as information management, or management information systems. IS research began around 1960 by some researchers to focus on the importance of information technology research [17]. Although the research on IS has lasted for more than 40 years but the focus of the research is still maintained in IS development [18]. Other IS research topics are related to the explanation of models, frameworks, and approaches that promote IT. The models, frameworks, and approaches used are used for identying the importance of IT strategy and the position of IT itself [19]. The research conducted in the field of IS covers as in the six points: the system view, socio technical view, political view, actor-based view, the network approach and multilevel approach.

The research in the field of KM, which is a part of the IS research as a scientific discipline, conducts more on the parent process, development, and implementation of KM. So, the question of whether KM is important or not for the company is no longer debatable. Even though the popularity of KM has been more widely promoted and recognized, in fact only some part of the company that can actually implement it properly and get feel the benefits from the implementation of KM . In other words, significantly the ideas about KM are failure [20]. This is because the implementation of KM does not only involve some of the elements of the company, but also involves all elements such as technology infrastructure, people, process, organization, change management as the culture and management of knowledge types that vary in the company. The company will face a lot of troubles if they do not understand about the aspects consists in KM. The implemenation of KM is is considered as an issue to be studied and explored due to the forming elements in the company. From the results of IS and KMS researches, it is known that both of them have their respective research areas. The research on the socio-technical aspects is more related to the general technology in general in both hardware and software, or to the relationship between human being and computers. Associated to KM, the International Conference E-Know 2009 stated that an increase in the use of the global KMS, emerged the community of practice (CoP), the factor of leadership, alignment, culture, and IT Governance key to the successful implementation of KMS, as well as challenges in the process of KM such as identifying, creating, storing, sharing and using. Therefore, the research in socio-technical aspects for KMS has not been explored more depthly. The review of epistemology, explain that the socio-technical aspects of KMS are divided into three categories:

1) Cognitivism: A perspecitive forms the machine. It Assumes that knowledge with data, and information is considered as an abstract and a specific task and is directly targeted to solve a problem [21].
2) Connectionism: Connectionism views the process information as a basic activity of knowledge management initiative. Connectionism focuses on information and communication technology (ICT) as a tool that is designed in the community for sharing and interpreting [22] .
3) Autopoiesis: Autopoiesis considers knowledge as a social construction, being context sensitive, and being dependent on history. ICT is regarded as a communication tool to identify individuals then to be transferred through the interpretative personalisation strategy [21].

The explanation and discussion in the literature review show that this study gives a contribution to reserchers by complementing the existing theories. The conclusions made up from the literature review can be formulated as follows:

1) Reviews about trends, phenomena, and issues regarding to the Socio-tehnical aspects and KMS, provides an affirmation that the causes of success and failure in the implementation of IS / IT and KMS projects are caused by some factors: human being, processes, and organization. Technological factors themselves that do not contribute significantly to the success of IS / IT projects are not taken into account.
2) The study of the research, ensure the foundations that this study does have a close connection with the previous researches. The research on IS, promotes the socio-technical aspects of a subject in itself. While KMS Research emphasizes the implementation framework.
3) This research tries to combine the socio-technical aspects of KMS implementation of the KMS that can address challenges associated with KM and KMS in the enterprise.

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3. Result and Discussion

To verify the important role of socio-technical aspects in the implementation of KMS, a test was given to a state-owned company which is PT PLN. PT PLN was declared officially about KM within the company in 1998, but the new application was operated in 2000. Until now there have been constraints that hamper its speed in implementing at KM. To identify problems occurred in the implementation of KM in PT PLN, several stages of data collection, analysis, creating of rich picture, and conclusions were conducted.

D. Collecting data

There were several methods for collecting data applied in this study, i.e., document review, focus group discussion (FGD), interviews, observation, and questionnaires that were addressed to the top management, mid manager, and staff(operation).

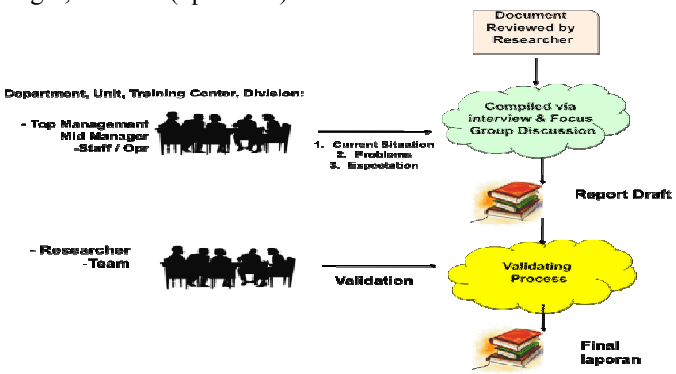

Figure 3. Method for collecting data

In the process of collecting data, the researchers made three groups for mapping the main issues, namely: current situations, problems that are currently occur and the expectation of the users. After all the data were obtained, each of the data was validated to ensure that the data were acurate and valid.

E. Analysis and Result

After collecting data, the next steps was examining the current KMS implementation in PT PLN. The Socio and technological aspects were identified and categorized based on the subjects actors in the company: The Board of Director, Mid Manager, operational staff (junior in project team), head office, Unit, operational staff, technical division (Research center), customer service, and customer. The following table shows the social and technical aspects that were identified.

Tabel 2. The socio and technical aspects indentified

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NO	ACTORS	DESCRIPTION & INTERACTION	PROBLEMS IN SOCIO ASPECT	PROBLEMS IN TECHNICAL ASPECT
1	*Board of Directors/ Senior Experts*	Board of Director (BOD) of PT. PLN, that related for making policy, commitment with knowledge sharing media.	1. *Enforcement* and *governance* for *roadmap* and KM planning has not been expressly or established yet. 2. Implementation KM not cross functional (departement). 3. Limited scope and understanding for knowledge sharing withing departement.	-
2	*Mid Managers/Senior Experts/ Project Leaders*	Mid Manager of PT. PLN, that related to implementing and coordinating within *knowledge sharing* activities and media.	4. Coordination and sharing are often constrained if the manager or leader is no outside duties. 5. Prefers Sharing informally and unschedule (no mechanism). 6. Ineffective communication up and down during the morning briefing. 7. The process of mentoring and coaching is done informally, mostly units can not be shared., And not having the procedure. 8. Informal coordination is more often discussed one on one instead of via the Portal.	-
3	*Operational Staffs/Junior Staffs/Project Team*	The employees of PT. PLN working in operational business processes. They interact directly in the media knowledge sharing.	9. Cafe for discussion and sharing has not maximum yet and purpuse of cafe has not socialized well. 10. Documentation is still weak in every discussion. 11. Dynamics of high employment and over time so there is no time for knowledge sharing	1. Portals KM CoP is difficult to use. 2. E-mail facilities are lacking maximized
4	PLN Head Office	The head office of PT. PLN. Consolidated data of all units and the manufacturing hub of the new system or system changes or new policies	-	3. SIMKP and SMUK quite helpful but not optimal. 4. Not yet integrated all the applications so that information retrieval is still long.
5	Unit - PLN	Nationally Unit office of PT. PLN, that interacted with portal KMS.	12. Ego sectoral and *reinventing the wheel*.	5. Infrastructure for internet and security issued for CoP *online*.
6	*Staff* operational	Operation staff of PT. PLN for daily activites.		6. Engineer field did not get to share it by writing all the technical experience and problems.
7	Technical Division (LitBang)	Research Center PT. PLN, that support *customer service/help desk* dan oprational staf who need *tools, documentation, and* technical guidance.	-	7. Helpdesk system has not optimal yet because repeatable process. 8. *Limited capacity in E-mail* and network bandwith.
8	*Customer Service*	Customer Relationship center/ Call Center/Complain Center, that interacted with customer.	-	9. Coordination via e-mail can also be done every day, but for the use of KM portal itself only on a certain
9	Customer	Customer of PT. PLN, tht interacted with *customer service* (complain issues).	-	-

In order to illustrate the problems, a picture that connects and integrates all aspects were developed as follows.

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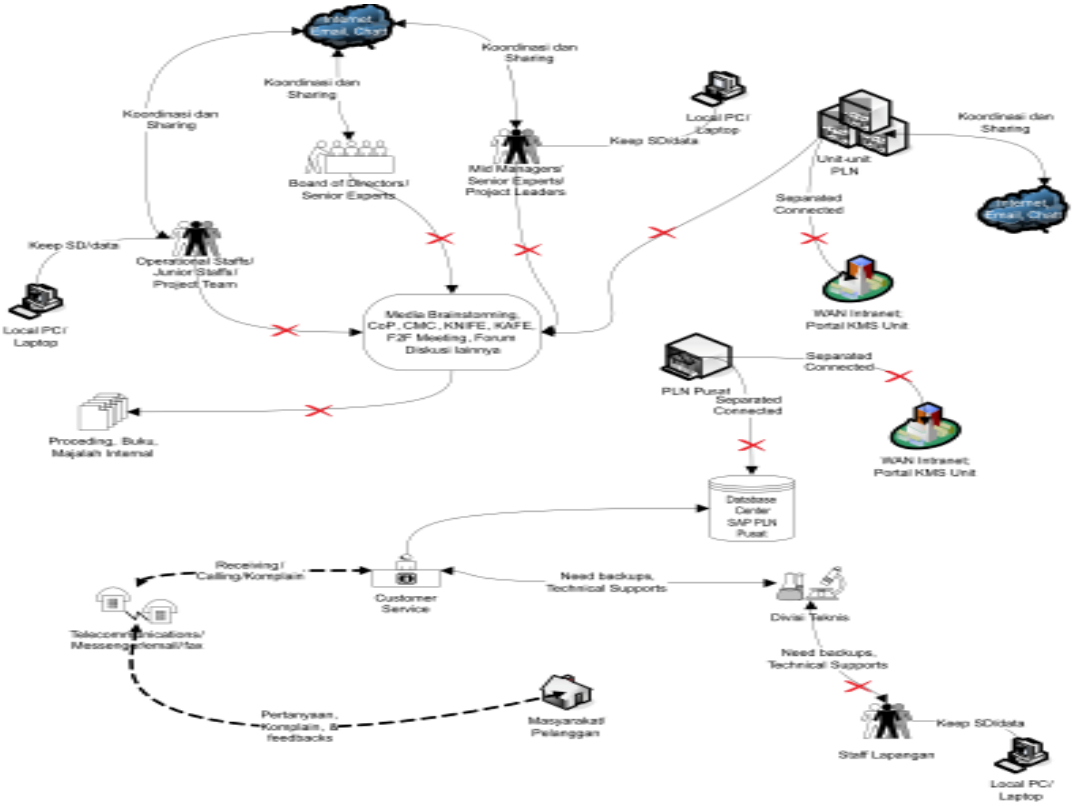

Figure 4. Rich Picture for implementation KMS in PLN

The result shows that there were 21 problems related to the current KMS implementation in PT PLN. Then, those problems were classified into two different aspects: socio and technical aspects. There were 12 problems consisted in the socio aspects regarding to people, organizations, and policy; while the others 9 problems were classified into the technology issues. Moreover, it was found that the socio aspects should be incorporated in part of planning and implementating KMS. These fndings has shown that not only technical aspects but also the socio ones contribute to the success of KMS implementation.

From strategic poin of view, the study results show that holistic planning, design, and implementation of KMS depend on the corporate strategy that are aligned with the KM strategies. The socio-technical aspects of the company could influence the corporate strategies that systematically give some impacts on the implementation phases. By knowing and understanding these aspects well, the company can determine the implementation of KM strategies more precisely and can identify the factors that are required in KMS, and finally can maximize the use of KMS in the company. The socio-technical model in relation to the corporate strategies, KM strategies, and implementation of KMS can be shown in the picture below:

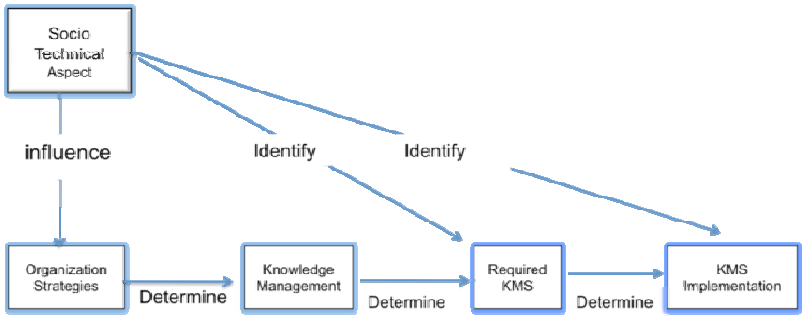

Figure 5. Holistic view of Socio-Technical Model in KM

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4. Conclusion

In conclusion, trends ini the KMS implementation in company shows increase from year to year. In fact, KMS implementation faced many failures, that caused by socio and technical aspects By identifying the socio-technical aspects in top management, mid manager, operational staff, and customers, the we will be able to find the factors which made required factors for designing of a KMS.

The results of this study, can be used as an input for the design within a KM framework as well as advanced research in the future. To include socio techincal aspects in the KM framework is expected to be used as a reference for state-owned enterprises to ensure the successful implementation of KM

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