

Applicability of Socio-Technical Model (STM) in Working System of Modern Organizations

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Abstract

Knowledge has been identified as one of the most important resources in organization that contributes to competitive advantages. Organizations around the world realize and put into practice an approach that bases on technological and sociological aspects to fill-up the gaps in their workplaces. The Socio-Technical Model (STM) is an established organizational model introduced by Trist since 1960s at Tavistock Institute, London. It relates two most common components exist in all organizations, namely social systems (human) and technological systems (information technology, machinery and equipment) in organizations over many decades. This paper reviews the socio-technical model from various perspectives of its developmental stages and ideas written by researchers. Therefore, several literature reviews on socio-technical model have been compiled and discussed to justify whether its basic argument matches with required practices in Techno-Social environments. Through a socio-technical perspective on Knowledge Management, this paper highlights the interplay between social systems and technological system. It also suggests that management and leadership play critical roles in establishing the techno-social perspective for the effective assimilation of Knowledge Management practices.

Keywords: Knowledge Management, Socio-Technical Model (STM), Techno-Social

INTRODUCTION

In a fast moving environment, where advanced technology changes rapidly and affects the competitive landscape, organizations are shifting their emphasis to knowledge management as an essential source of competitive advantage (Tasmin and Woods, 2007). Organizations are looking to manage this knowledge in order to create value. Managing knowledge is conceptualized as the way that companies create, store, distribute and apply their intellectual assets namely experts, patents, copyrights and trademarks.

Within the knowledge management (KM) literature, several approaches to socio-technical model (STM) in organizations are evident. These approaches can be classified broadly as the people approach, the technology approach, and the socio-technical approach (Grant and Shahsavarani, 2010).

Organizations must understand the relationship between data, information, and knowledge to really appreciate knowledge management concept. Davenport *et al.* (1998) notes that most managers point out the lack of a clear understanding of what knowledge is and how it can be distinguished from the information within their organizations.

An enhanced understanding of a knowledge management model can be attained by revisiting the works of Trist *et al.* (1963), Trist (1981), and Pasmore *et al.* (1982). Trist *et al.* (1963) coined the term “socio-technical” to describe a perspective of viewing organizations in which both the social and technological subsystems were intertwined and supporting each other (Pan and Scarbrough, 1998). Argyris and Schon (1996) stated that socio-technical systems started after the World War II at the Tavistock Institute in England. In fact, these systems were further studied by Pasmore and Pan in 1980’s and 1990’s (Tasmin and Woods, 2007).

SOCIO-TECHNICAL SYSTEM

Integration of social and technological systems has been sustaining organizations for decades (Emery, 1967). Such an integrated approach is well-received by a number of KM programme heads. Nokia had turned its focus to knowledge management system by appointing Ms. Kaisa Kautto-Koivula as Head of Knowledge Management Development in 1996 (Chase, 1997). Chase (1997) stated that “Ms. Kautto-Koivula believes that success for Nokia is based more on a human-driven approach and deep integration than on high technology”. This gives an emphasis on social interaction, integration, and also technology in KM initiatives. Ardichvili *et al.* (2006) also stressed on a similar KM perspective by stating that “knowledge management is a complex socio-technical system that encompasses various forms of knowledge generation, storage, representation, and sharing”. In addition, Pasmore *et al.* (1982) stated that a “socio-technical” view as an organizational system that consisted of people who produced products and services by applying some sorts of technology. This interplay between social and technical factors is illustrated through the socio-technical perspective model of knowledge management (Hughes and Jackson, 2004). According to Bressand and Distler (1995), this socio-technical perspective could be described in a three-layered model of KM system as follows:

- Infoculture (organizational background and social culture in knowledge sharing),
- Infrastructure (technological systems for networked communications), and
- Infostructure (protocols for knowledge exchange and a means to measure).

The socio-technical perspective describes the devices, tools and techniques needed to transform inputs into outputs to enhance the organizational performance. Tasmin and Woods (2007) showed that the socio-technical model (Figure 1) matched with the KM proposed elements of leadership and culture (infoculture), technology (infrastructure) and process and measurement (infostructure). Pan and Scarbrough (1998) stated that “the socio-technical perspective thus adopts

a holistic approach which highlights the interweaving of social and technical factors in the way people work”.

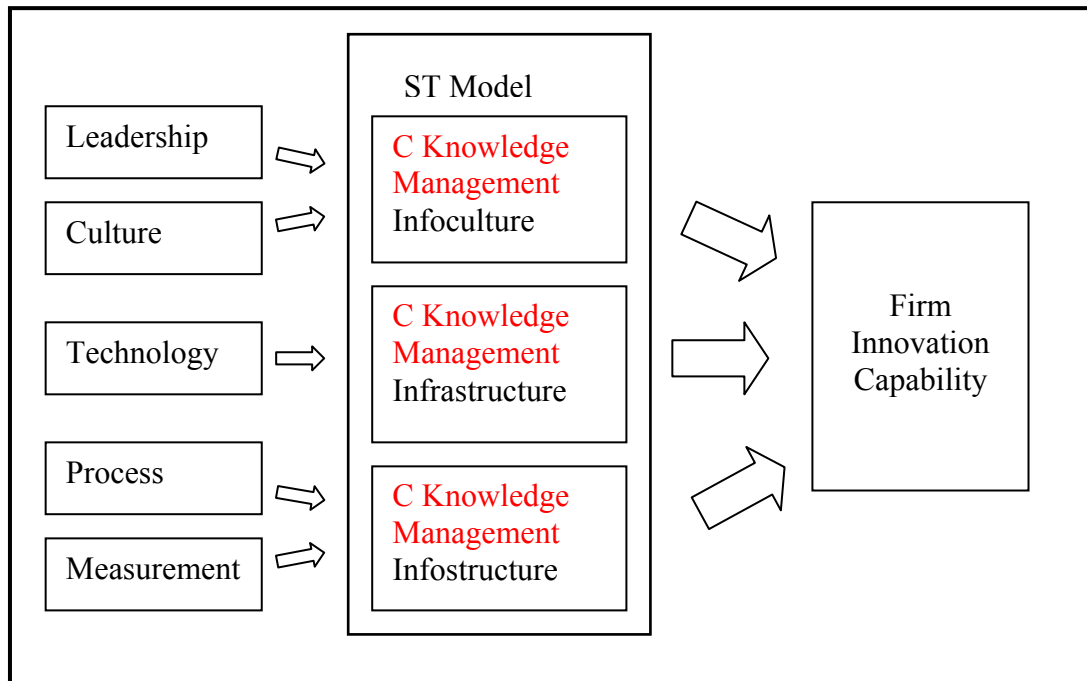


Figure 1. Socio-Technical Model

Source: Adapted from Tovstiga and Korot (2000), Bressand and Distler (1995), Amidon (1997), and Tasmin and Woods (2007).

The fit between the social system and the technical system together, build and organization. Laudon and Laudon (2004) stated that:

“In a sociotechnical perspective, the performance of a system is optimized when both the technology and the organization mutually adjust to one another until a satisfactory fit is obtained”.

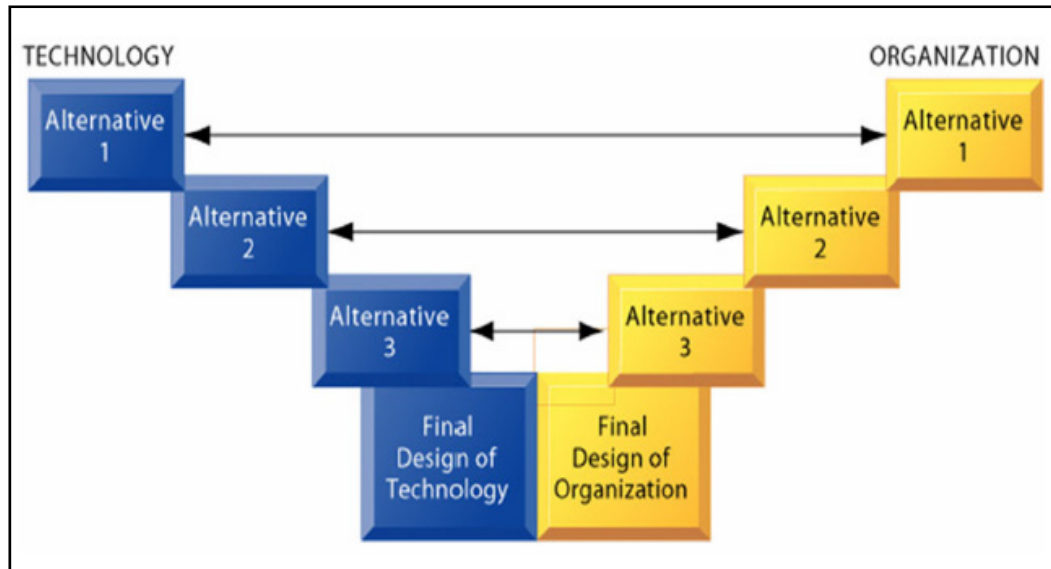


Figure 2. Socio-technical perspective

Source: Adapted from Laudon and Laudon (2007)

Davidson and Lamb (2000) supported that a socio-technical perspective, which does not privilege either social or technical influences but instead recognizes that the social and the technical are largely interwoven in practice, is particularly appropriate in this context. In addition, Coakes (2000) noted that socio-technical perspective knowledge is the capability of an organization and its employees to act effectively. In this perspective, organizational knowledge and the management of this knowledge is not simply seen as the storage of more data and information. Taylor (1998) suggests that people with the ability to make high quality decision will be the main factor in determining the success of the knowledge management initiative.

In most of the above socio-technical descriptions, it can be deduced that the socio-technical system encompasses technical issues and behavioral approaches which co-exist in many modern firm environment. Bhatt (2001) stressed that "...knowledge management is best carried out through the optimization of technological and social subsystems". This indicates a linkage between social interactions and technological elements in KM systems. Wolff and Baumol (1987) stated that knowledge creation and management sped up the social and technological changes among knowledge workers in organizations. The socio-technical model offers an option for managers to manage and share knowledge in organizations.

Coakes (2000) pointed that socio-technical principles have been considered in response to organizational change for the following reasons:

- a) The combination of technology and people to enhance the organizational performance;
- b) The enhancement of the quality of products and services;
- c) The development of communications and the relationships between all organizational parties;
- d) The development of the organization's change ability in dynamic environments;
- e) The improvement of individual work performance, namely level of involvement, skill levels, and job satisfaction;
- f) To provide an environment for continues improvement.

An organization needs to assess the climate and culture of the organization in support of a Knowledge Management Process (KMP). Some internal factors that need to be assessed are leadership, trust, structures, policies, recognition, need and experiences with change, morale, job satisfaction, learning and development, and communications (Dulany and Pelletiere, 2008). Organizations that actively exploit knowledge and use it to create innovative outputs do a better

job of delivering customer satisfaction (Hoopes & Postrel, 1999). The Ford Motor Company is a clear example of a firm that is re-inventing its corporate architecture by investing heavily in technologies for KM systems. It is using KM systems to redefine the auto manufacturing industry, gain a competitive stronghold in emergent electronic markets, and get closer to its customers (Meso and Smith, 2000).

The idea of socio-technical can also be illustrated with sociology and technology, as shown in Figure 3. This interactional overlapping leads to the segment of techno-social domain which has to be investigated. At the same time, there is growing understanding that information technology, though integral, is insufficient for development of knowledge work and knowledge management (McDermott, 1999; Shani & Sena, 2000).

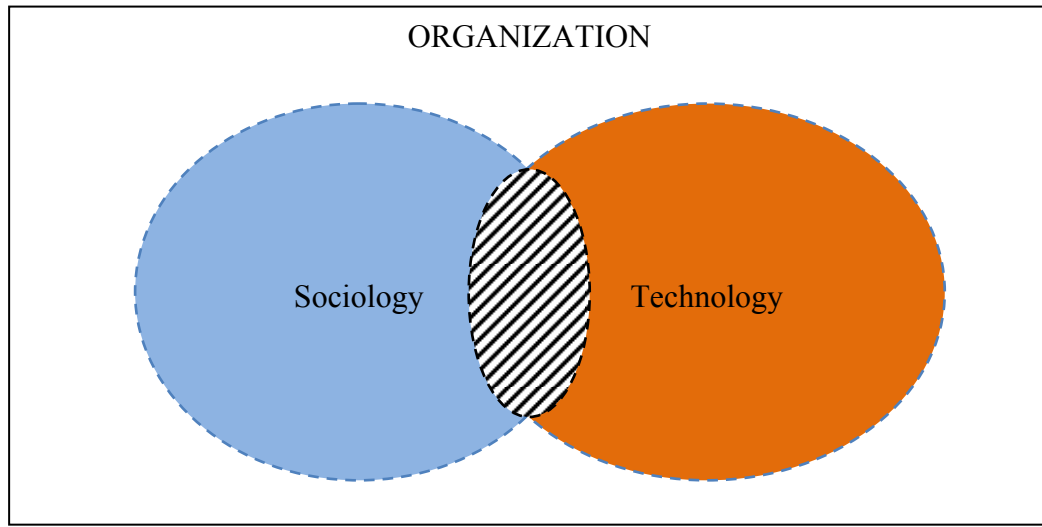


Figure 3. Interactional overlapping between sociology and technology
Source: Trist et al. (1963)

The original concept was conceived at London's Tavistock Institute in the late 1940s as a result of studies on coal-mining methods. The most comprehensive account of the socio-technical philosophy is given in the retrospective and sometimes emotional narrative by Trist (1981). In his study, he stated that "... a work system depends on the social and technical components becoming directly correlated to produce a given goal state". They are co-producers of the outcome. The distinctive characteristics of each must be respected else their contradictions will intrude and their complementarities will remain unrealized. This conclusion is based upon a distinction between "information", and the discretionary and social dimensions of "knowing". Information systems enable a knowledge economy, and yet, it takes human systems to achieve it.

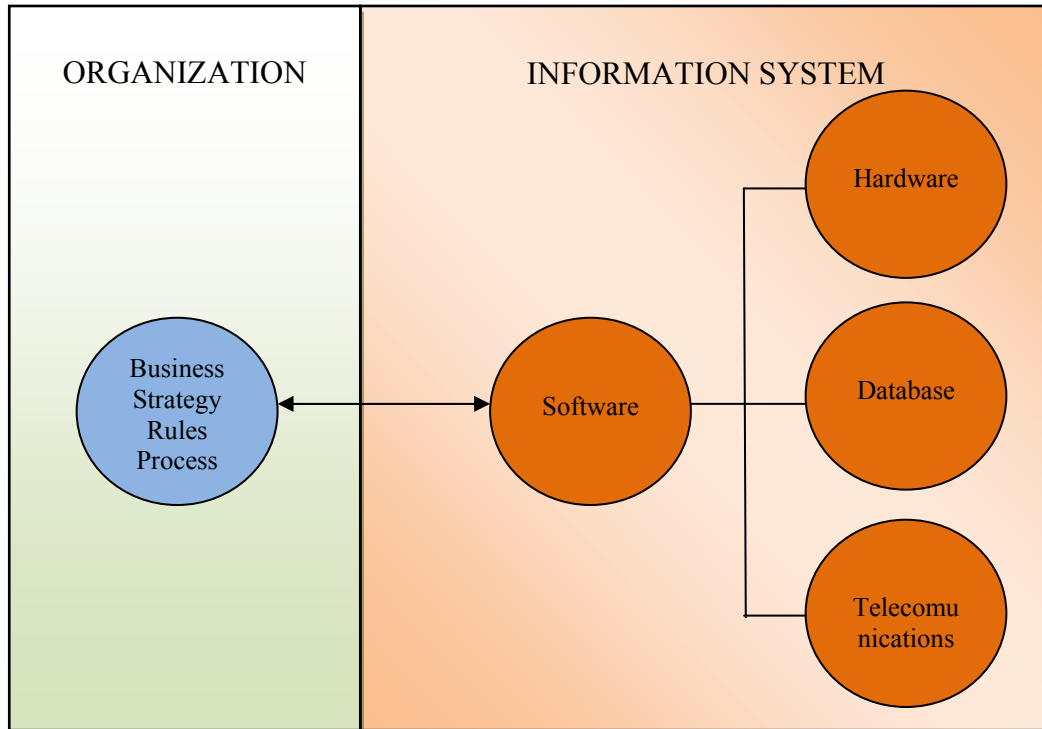


Figure 4. Interdependence between organizations and IS.
Source: Laudon and Laudon (2006); Wang et al. (2005)

In current internet-based environment, researchers significantly emphasize on the close interaction between the organization itself with the information system, as shown in Figure 4. The Laudon and Laudon (2006) and Wang *et al.* (2005) are among strong proponents on this perspective in viewing on how knowledge is managed in global e-based systems. This also augurs well with perspective of evaluation of the quality of an information system which should be concerned with both technical and social subsystems. The technical subsystem covers the nature of the tasks to be accomplished and the technology that enables their accomplishment. The social subsystem involves the individuals who are responsible for accomplishing the tasks and the means whereby their work can be coordinated. In short, the assessment of system quality reflects the tasks, the supporting technology, the people involved and the organization (Palvia *et al.*, 2001).

Socio-Technical System (STS) also influences the International Standard Organization (ISO). Guzman and Trivelato (2008) stated that "... by following socio-technical ideas, a participative work design approach (Mumford, 2003; Taylor and Felten, 1993) was applied in order to facilitate the development of work standards along ISO 9000 guidelines. At this stage some key socio-technical principles were applied. Moreover, O'Donnell et al. (2003) stated that communities are collections of people that engage in activities that encompass a common interest and ongoing learning through practice, not in their leisure time, but also as part of their work as employees of organizations. There is a business imperative for intellectual capital creation which is a socially constructed dynamic process of situated collective knowing that is capable of being leveraged into economic and social value.

Cherns (1993) in his study, stated the "minimal critical specification" principle, for example, was applied since the ISO project team entirely defined "how to do" the new tasks. Also, the "socio-technical criterion" principle was also applied since the ISO project team was allowed to deal with work organization "variances" (i.e. adaptation of current work processes following ISO 9000 norms) at the point of operation.

However, social and technological aspect still need to be kept under control. One of the thorny issues which has survived from the earliest socio-technical work concerns on how the socio and the technical aspects of the systems are designed.

The importance of the leadership in organization also contributes to the successful of social and technological implementations. In particular, leaders offered serving as role models for learning and knowledge sharing. Leaders must contribute to the creation of a corporate knowledge culture and a managerial mindset that promotes international co-operation and the flow of knowledge throughout the organization (Edvinsson and Malone, 1997). Leaders must also devote themselves to creating an environment in which knowledge creation and sharing can flourish (Pan and Scarbrough, 1998).

CONCLUSION

The socio-technical model (STM) has been a powerful tool when viewing at dynamic interaction between technological development and human behaviors that synergizes a working system in organizations. The application of technology by society shows the sustainability of technological development that really takes place. Therefore, techno-social environment perhaps is best supported by socio-technical model (STM). When governing for sustainability of techno-social system, all other innovations besides social and technological innovations are having effects on these techno-social domains which should be considered in future work. The elements of leadership in techno-social based system must be further investigated to determine whether it plays a more influential role in organizations as one wholesome working system.

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