

Philosophical Foundations for Organizational Learning and Information Technology in Organizational Researches: A Review and Topology

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Abstract

The purposes of this study are to understand the modes of organizational learning derived from organizational studies under different philosophical foundations, and what kinds of the information technology to be applied to the different types of organizational learning in order to achieve the learning objectives. Based on the above, a three-tier framework of ontology, epistemology, and methodology is used to demonstrate the relationships among organizations, organizational learning, and information technology. After examining the related literatures, we have argued that different types of organizations are characterized by different modes of organizational learning; the corresponding applications of information technology are also dissimilar. The research results suggest that: (1) knowledge-oriented organizations may adopt knowledge management information systems; (2) organic-oriented organizations may adopt decision support systems; (3) culture-oriented organizations may adopt information and communication technology; and (4) dialectic-oriented organizations may adopt group decision support systems. In addition, it is found that there remains a lack of applications for information technology on organizational learning, and thus, this aspect could be further studied in future research.

Key words : ontology, epistemology, methodology, organizational learning, information technology

從組織研究中的哲學基礎來探討組織學習的型式與 資訊科技的應用：一個回顧及分類的架構

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摘要

本研究的目的是瞭解組織研究在不同的哲學基礎下，會衍生出什麼樣的組織學習型式；以及對於不同型式的組織學習觀點，應運用什麼資訊科技來達到組織學習的目的。本研究以本體論、認識論與方法論的三層式架構來闡述組織、組織學習與資訊科技間的關係。本研究透過大量的文獻整理，發現在不同的組織型態下，組織學習的型式與資訊科技的應用是不相同的。本研究結果認為：（1）知識型組織可採用知識管理資訊系統；（2）有機型組織可採用決策支援系統；（3）文化型組織可採用資訊與溝通科技；（4）辯證型組織可採用群體決策支援系統。同時，我們也發現資訊科技在組織學習上的應用仍有許多不足之處，我們建議未來的研究方向可針對這部分多做加強。

關鍵字：本體論、認識論、方法論、組織學習、資訊科技

1. INTRODUCTION

The topic of organizational learning has become increasingly prevalent in management studies in recent years. In order to explain how and why it is necessary to study organizations, organization theorists have borrowed many concepts and theories from other disciplines such as psychology, sociology, strategy, production management, culture, and so on (Argyris & Schön 1978; Crossan et al. 1999; Easterby-Smith 1997; Holmberg 2000). As a result of these different perspectives, organizational learning researches are faced with theoretical pluralism.

From some organization and MIS scholars' viewpoints, information technology is a necessary tool that would support organizational learning (Croasdell 2001; Goodman & Darr 1998; Hong et al. 2006; Templeton et al. 2002). However, if theories of organizational learning are diversities, information technology how to support organizational learning? To answer this question, we have argued that different types of organizations are characterized by different modes of organizational learning; the corresponding applications of information technology are also dissimilar. Therefore, the research questions of this study are: (1) to understand the modes of organizational learning derived from organizational studies under different philosophical foundations; and (2) what kinds of information technology to be applied to the different types of organizational learning in order to achieve the learning objectives.

Behind every research there is a paradigm, which leads the researcher to face the nature of social realities, providing the attitude and viewpoint to be applied during the research, and demonstrating the interactive relationships between the researcher and the research object. Paradigm refers to the complete set of values and beliefs that a researcher possesses during research. Such values and beliefs will develop the techniques and procedures for solving problems based on the researcher's assumptions of social realities. Therefore, this study suggests that philosophical thoughts directed by ontology, epistemology, and methodology would help to understand the true nature behind all research, to investigate the relationships among organizations, organizational learning, and information technology from a clear and unobstructed perspective. In this study, we have attempted to formulate an organizational learning framework from the organization's perspective; moreover, we hope to explain that apply information technology to organizational learning as well as further explore the concepts of ontology, epistemology, and methodology that underlie organizational learning studies.

This paper consists of five major parts. First, we have explored organizational learning from its ontological viewpoint and examined objectivism- and subjectivism-based organizational studies in detail. Second, we have presented the epistemological framework through studies

on organizational learning. Third, we have further investigated subject matters that are related to information technology and organizational learning from the viewpoint of methodology on organizational learning. Fourth, we have presented characteristics of organizational learning of four different organizational types in management and information management. Finally, we have suggested further research directions from philosophical viewpoints and the role of information technology.

2. ORGANIZATIONAL LEARNING FROM THE ONTOLOGY PERSPECTIVE: THE CONCEPTS OF ORGANIZATION

The branch of ontology in philosophy is concerned with questions such as, if a human being is considered the central thinking subject in this world, what is the essence of this subject? Further, does this essence or intrinsic quality truly and perpetually exist in all human phenomena and behaviors? Ontology in western philosophy is characterized by two central viewpoints: the worldviews of *being* and *becoming*, which have also come to be known as, after further development, *objectivism* and *subjectivism*. In the following argument, we will comprehensively explain the meaning of an organization from the two key focal points of objectivism and subjectivism (Hatch 1997) in order to pave the way for further organization-related analyses and discussions.

2.1 Organizational Studies Based on Objectivism

Objectivism, or the *science of being*, assumes that there exists a reality out there in this world and that we can comprehend and articulate the universal truths or at least the universal principles in existence (Bergquist 1993). In terms of western philosophical views, objectivism primarily originated from *realism*; therefore, objectivism conveys the impression that the external transcendental world exists purely as a result of human consciousness.

Over the past century, organization theory in its contemporary form was predominantly built on mechanistic prospects. An organization operates by receiving inputs from the external world in the form of resources; it implements a transformation on these resources, and the resultant products or outputs are sent to other organizations. Such a process ensures equilibrium and homeostasis in this pendulous setting. The management of such an organization is based on scientific management, administrative principles, and bureaucracy-oriented classical management theory, in the form of precise work design, procedural adoption, different courses

of action, hierarchical separations of authority, written documentation, standardization, and other normalizing activity and competence evaluations. Organization theory studies at this stage are known as classical organizational studies (Hatch 1997).

Conversely, when the closed system viewpoint of organization theory becomes an incongruous factor in the face of rapid and massive changes in the surroundings, organization theory is also gradually transformed into its modern version, with further emphasis on respect for its environment. Due to this, not only does the organization theory encompass innumerable external factors but the organization is also obliged to allocate additional resources for coping with environmental factors during indefinite conditions, such as applying boundary spanning to buffer the uncertain conditions, and it becomes customary for the organization to adapt itself, through organizational evolution, to the changing surroundings. Thus, organization theory studies at this stage are known as modern organizational studies (Hatch 1997).

However, regardless of whether the theory is classical or modern, its source is the systems theory, which regards the organization as a single system, and this system's goal is to achieve whatever goal that has been set for the organization. With well-defined organizational structure designs, functions, and routines (Clegg 1992), researchers can manipulate objective perception using precise scientific calculations, in order to effectively represent the conversion of resources into products. Therefore, we have referred to organizational research based on the systems theory and objective measures approach as objectivism-based organizational research.

2.2 Organizational Studies Based on Subjectivism

Ontology relates to another remarkable argument, which concerns the philosophy of subjectivism. Subjectivism is derived from the worldview of becoming and is also regarded as the *science of becoming*. It essentially focuses on transitory changes; therefore, subjectivism is not result-oriented but focuses on the process itself. Subjectivism aims to offer another kind of research approach that is different from that of positive science in terms of objectivity, rationale, and empiricism.

Hatch (1997), by applying the fundamental concept of social construction, has put forward a symbolic-interpretive viewpoint in order to differentiate between classical and modern organizations. She believes that the symbolic-interpretive theory relies mainly on participants' observations to obtain related narratives or texts, through which it can contribute to organizational studies conducted on either an individual or an ethnographic scale. She also defines the organization as a group of companions who, by sharing the same values, traditions, and behaviors, seek to continue creating and sustaining a value structure. The communal values and principles of the organization are intended to lay down the standards for guiding members

within the organization as well as external individuals, in order to facilitate more profound interactions; in other words, these standards define the organizational culture (Jones 2001). In organizational research, this is called the cultural organization notion (Hatch 1997).

Ever since the 1970s, however, organizations have been confronted with two primary problems—the overwhelming size of organizations and the increasing complications between the groups of people within the organization (Bergquist 1993; Lowendahl & Revang 1998). This has tended to affect the equilibrium of power inside the organizational units and given rise to frequent disagreements. In order to sustain intrinsic stability under such circumstances, organizations have progressively developed principles of cooperation (Eisler 1987). However, despite efforts to strengthen the basic structure, routines, and system approaches, the rapid expansion of modern organizations in terms of scale and complexity have led to the further spreading out of the scheme and created divisions between the organization's professionalism and its specialization. As an organization becomes increasingly divided, it tends to invest more resources on performing functional integration (for example, administration, communication and monitoring, etc.) and coordination (Lawrence & Lorsch 1967); however, this gives rise to an even more complicated and unmanageable situation. Postmodernist studies have responded to the complexities and bulkiness of organizations by reassessing the popular values and structures of past organizations; such studies have suggested a return to a comparatively smaller and, in turn, a more controllable organization (Bergquist 1993).

However, both culture- and postmodernism-based organizational studies call attention to the researcher's subjectivity and rely on texts, narratives, and dialogues for their content (Hassard 1999; Rhodes & Brown 2005). Unlike objectivism, subjectivism emphasizes pluralistic viewpoints in organization researches (Clegg 1992; Hazen 1993); such studies are called subjectivism-based organizational studies.

3. ORGANIZATIONAL LEARNING FROM THE EPISTEMOLOGICAL PERSPECTIVE: THE MODES OF ORGANIZATIONAL LEARNING

Epistemology refers to the theory of knowledge. It is a branch of philosophy mainly concerned with studying the source, prerequisites, characteristics, range, and factualness (precision, reliability, and efficiency) of learning. Our study seeks to gain a better understanding of organizational learning through epistemological discussions on the organization (Miller & Lin 2010). In the following argument, we will review such studies on organizational learning

and provide an epistemological framework to explore the modes of organizational learning.

Objectivism treats organizations as the perfect machines, maintained a steady state. From the perspective of objectivism, organizational learning is an organizational action which is controllable and can be precisely predicted its process and outcome. Objectivism-based organizational studies address organizational learning on the basis of positivism and the systems theory—they consider the organization as an entirely integrated system and emphasize holism and synergism (Hodge et al. 2002). With well-defined organizational structure designs, functions, and routines (Clegg 1992), researchers can manipulate objective perception using precise scientific calculations, in order to effectively represent the conversion of resources into products.

In contrast, subjectivism-based organizational studies are founded on the basis of social construction, symbolic interactionism, hermeneutics, and postmodernism. Such studies regard the organization as a combination of many groups or ranks, accentuating the importance of interactions and affiliations between members (Bateson 1979); these studies rely on texts, narratives, and dialogues (Van Buskirk & McGrath 1992) that result from the researcher's subjective view in engaging organizational learning. Moreover, the members of such an organization can be given more authority, and instead of controlling them through bureaucratic means (Clegg 1992), the organization can encourage pluralistic voices, views, and values (Hazen 1993).

In addition, research strategies of organizational learning also can be divided into two types: process- and outcome-oriented (Robey et al. 2000). The process-oriented approach mainly describes the way in which organizational learning development is dynamic and continuous; includes the use of information, environmental changes, and the resulting feedback; and the incorporation of an integrated organizational learning into the members' beliefs. The process-oriented research strategy in organizational learning as studies pertaining to the process, method, nature, subject, and possible obstacles to such learning; this is a micro-level approach to organizational learning.

The outcome-oriented approach, rather than focusing on the process of organizational learning, focuses on the result of organizational actions and to infer learning from changes in outcomes over time. In this approach, organizational learning is goal-oriented and affects individuals; it also brings about stable changes in the organization. Therefore, organizational learning is a conscious process of goal-setting carried out by the organization itself. The outcome-oriented research strategy analyzes organizational learning based on the organization's capability and focused on the effect and outcome from the target-oriented viewpoint (Levitt & March 1988); it is also called the macro-level approach to organizational learning.

This study utilizes both objectivism- and subjectivism-based organizational studies as well as the process- and outcome-oriented research strategies to establish an epistemological

framework for organizational learning in the form of a two-by-two matrix, as depicted in Figure 1. In this way, each quadrant represents a different mode of organizational learning on the basis of organizational studies and learning strategies.

By inductively examining the related literatures on organizational learning, we find that most of them can be grouped into four ideal-type organizations—knowledge-, organic-, culture-, and dialectic-oriented organizations—are characterized by different modes of organizational learning. Each of these four organizational types has a rich and long-standing intellectual tradition, although various disciplines use different terminologies. Our study refers to four ideal-type organizations to clarify organizational learning in specific areas or contexts, and why organizational learning researches are faced with theoretical pluralism. Moreover, Table 1 outlines differences between the four organizational types in terms of their organizational learning under they are likely to operate. In addition to the four organizational types, however, this study does not exclude other possible organizational types. For example, some researches consider both features of knowledge- and organic-oriented organizations to take into account organizational learning in organizations (Bontis et al. 2002; Gnyawali & Grant 1997; Markóczy 1994; Raymond & Blili 2001; van der Bent et al. 1999), or culture- and dialectic-oriented organizations can co-exist in order to reach the goal of organizational learning (Brown & Starkey 2000; Ford 2006; Lawrence et al. 2005; Schein 1993; Srikantia & Pasmore 1996). Hence, the four ideal-type organizations can provide fundamentally different accounts of the sequence of events that unfold to explain organizational learning in an organizational entity.

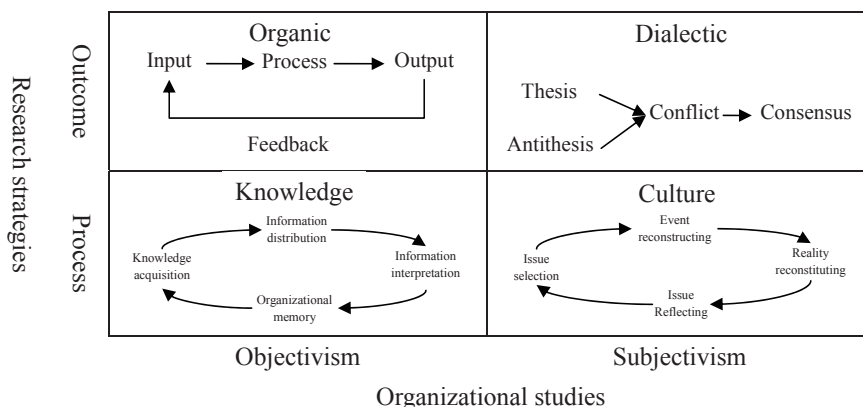


Figure 1: The epistemological framework on organizational learning

Table 1: Four organizational types and their researches focus on organizational learning

Organizational types	Knowledge-oriented organization	Organic-oriented organization	Culture-oriented organization	Dialectic-oriented organization
Philosophical foundation of organizational studies	Objectivism	Objectivism	Subjectivism	Subjectivism
Research strategies	Process-oriented research	Outcome-oriented research	Process-oriented research	Outcome-oriented research
Research focuses	How to manage and apply information between organizational members	How to use information to cope with environmental changes in order to improve organizational performance and competitiveness	How to generate a dialogical process to exert an influence on communal beliefs and values between organizational members	How to modify one's understandings by generating diversities and building a consensus, thereby changing the range of one's potential behavior
Suggestive actions for organization learning	Knowledge acquisition, information distribution, information interpretation, and organizational memory	Input, process, output, and feedback	Issue selection, event reconstructing, reality reconstituting, and issue reflecting	Thesis/antithesis, conflict, and consensus

3.1 Organizational Learning Studies Based on Objectivism

Organizational learning studies based on objectivism, which is theoretically derived from the *systems* and *information theories*, are considered under this category. From the systems theory viewpoint, the organization is seen from the holistic perspective. Scholars regard the organization as an integrated whole, comprising a range of frameworks and fields of position, wherein work is divided and executed in a cooperative manner so as to enable the entire system to preserve its equilibrium and continue its existence while increasing in maturity (Kululanga et al. 2001; Mirvis 1996). If we portray organizational learning in terms of the information theory, the action, in this case, would be the attempt to achieve the final aim, which would be accomplished by the members by means of organizational and technological ways of acquiring, processing, saving, and distributing information or knowledge and its relevant applications (Huber 1991).

Knowledge-oriented organizations use the process-oriented research strategy and objectivistic studies to focus on the management and application of knowledge, and all

related learning is divided into knowledge acquisition, information distribution, information interpretation, and organizational memory (Huber 1991). von Krogh and Roos (1995) characterized organizations as self-referential (autopoietic) learning systems, in which present learning draws on past learning. They also contend that knowledge is the basis for acting in and upon the world: “Knowledge enables us to perceive, act, and move in a world, and as we act, perceive, and move the world comes forth as a result of our actions and observations” (von Krogh & Roos 1995, p.51). Hence, knowledge-oriented organizations allow that organizations do not simply formulate knowledge as representations of the world; they also know by imposing upon the world. The role of the management is to apply this information to create new organizational standards, procedures, and workflows (Lähteenmäki et al. 2001) and then extensively share these new developments with different organizational members (Locke & Jain 1995).

For example, Fiol and Lyles (1985) argue that organizational learning refers to the process of improving actions through better knowledge and understanding; they have also suggested the concepts of lower-level and higher-level learning to correspond to single- and double-loop organizational learning. Similarly, Torres and Preskill (2001) propose that organizational learning is a continuous process of growth and improvement.

Organic-oriented organization, in contrast, emphasizes the outcome-oriented research strategy from the viewpoint of objectivism; it contends that by executing systematic input, process, output, and feedback mechanisms and taking appropriate contingency measures, an organization can cope with environmental changes to reach the goal of organizational learning (MacDonald 1995; Vickers & Cordey-Hayes 1999). As far as management is concerned, the aim of organizational learning is to improve the organization’s capability (Kim 1998; Levin 2000; Woiceshyn 2000), which will further improve its performance (Henderson & Lentz 1995) and competitiveness (Twomey 2002; Vandenbosch & Higgins 1995).

For example, Mirvis (1996) employs the systems approach and argues that analyses on organizational learning should consider the organization as a whole, not as consisting of parts that are connected to each other in a system; this gives the organization the abilities to self-organize, self-create, and self-correct under unexpected situations. In addition, Saban et al. (2000) believe that organizational learning is a capability that enables an organization to acquire and process new information on a continuous basis in order to elevate its knowledge and improve its decision-making processes.

In order to avoid being limited by the process- or outcome-oriented research strategies of the literatures presented in this study, we have also taken into account other studies that have considered both these aspects (Bontis et al. 2002; Gnyawali & Grant 1997; Markóczy 1994; Raymond & Blili 2001; van der Bent et al. 1999). For instance, Dixon’s organizational

learning cycle (1999) consists of information generation, information integration, information interpretation, and taking responsible action; based on this, we can determine that organizational learning is the intentional use of learning processes at the individual, group, and system levels that seek to continuously steer the organization in a direction that is increasingly satisfying to its stakeholders.

3.2 Organizational Learning Studies Based on Subjectivism

The fundamental theory underlying this category of organizational learning chiefly originates from *symbolic interactionism* and the *conflict theory*, with its core basis being subjectivistic organizational studies. When organizational learning is based on the symbolic interactionism approach, the emphasis instantly changes from the absolute influence of the organization, as suggested by scholars of functionalism, to the organizational members' abilities of initiation, interpretation, and construction. Accordingly, organizational learning is carried on through the symbolic interactions between members, who create their own significances regarding the organization's beliefs and values and pass down the applications of the organization's symbols and stories to organizational newcomers (Sims 1999). This process leads to the further extension of chronicles that will ensure the continuation of the organization.

Culture-oriented organizations stress on subjectivistic organizational studies and process focused learning strategy; therefore, the learning cycle is accomplished through issue selection, event reconstruction, reality reconstitution, and issue reflection (Oswick et al. 2000). As far as management is concerned, organizational learning will have its own communal beliefs and values (Yanow 2000) that are established by cognitive and initiative interpretations between members (Abell & Simons 2000; Crossan et al. 1999; Holmberg 2000; McKenna 1999; Nicolini & Mezner 1995) and are generated through a dialogical process (Oswick et al. 2000). This approach considers organizations as interpretation systems that involve data collection, interpretation, and learning (Daft & Weick 1984).

Hosking and Bouwen (2000) suggest that the focal point of organizational learning is the relational variant of social constructionism. According to them, inter-organizational knowledge cannot exist independently, since it cannot be learned, traded, transferred, or stored; relatively all knowledge should be interdependent and exist within the interrelations of the organizational members. In addition, they also suggest that the relational repositioning between the writer and the reader shifts from a subject–object to something like a subject–subject relationship (Bouwen & Hosking 2000).

Yanow (2000) points out that the methodology of organizational learning from the cultural viewpoint should be established on the basis of observations and interpretations. This way,

through an interpretative methodological approach, we can reveal the constructive character of the relationship between artifacts and their creators as well as the symbolic character of the relationship between artifacts and their embodied meanings. Yanow also suggests that organizational learning involves acquiring, sustaining, or changing intersubjective meanings through the artifactual vehicles of their expression and transmission and the collective actions of the group.

Dialectic-oriented organizations emphasize tactics based on subjectivism and outcome-oriented research strategy. It emphasizes the fact that organizational learning is the process of modifying one's cognitive maps or understandings by generating diversities and building a consensus, thereby changing the range of one's potential behaviors (Fiol 1994). If we proceed from this viewpoint of organizational learning, we recognize that according to the conflict theory, the organization's management needs to grant power and relax their authority to a certain extent in order to provide an opportunity for the freedom of communication and discussion. This which would help set up a common consensus regarding beliefs and values within the organization, which would further revolutionize the members' behaviors (Coopey & Burgoyne 2000; Örténblad 2002; Robey et al. 2002).

Blackler and McDonald (2000) suggest that organizational learning constitutes the organizational staff members' acts of altering their relationships and actions. They investigated a British high-tech company and performed a detailed analysis of the common objectives of an internal team within the company; however, due to myriad expectations and divergences in power, operational discrepancies surfaced during the working of the team. Based on this, they suggest that organizational learning involves the organization of stable communities of practice or stable networks by promoting collaborations in a decentralized, transient activity network.

As mentioned above in relation to subjectivism-based organizational studies, we need not merely emphasize the process or outcome of organizational learning strategies. While coordinating the related literatures, we have discovered that these two research strategies can co-exist (Brown & Starkey 2000; Ford 2006; Lawrence et al. 2005; Schein 1993; Srikantia & Pasmore 1996). Williams (2001) conceives that organizational learning is a process by which relatively stable changes are brought about in the way in which we perceive things as well as our behavior in pursuit of our goals. At the same time, organizational learning should have a socially relevant theoretical orientation rather than an information processing approach, since this learning is reflected in the construction, modification, and maintenance of our beliefs.

4. ORGANIZATIONAL LEARNING FROM THE METHODOLOGICAL PERSPECTIVE: THE APPLICATIONS OF INFORMATION TECHNOLOGY

This section discusses the applications of information technology to organization learning methodology in order to achieve the main purpose of such learning. Hence, we further analyze the role of ontology (objectivism and subjectivism) and epistemology (information theory, systems theory, symbolic interactionism, and conflict theory) in such learning. While discussing the application of information technology, we will also take a retrospective glance at the organizational learning related literatures we have described so far, on the basis of the organizational learning modes prevalent in the various types of organizations.

4.1 Knowledge-Oriented Organizations

In this regard, the researcher considers applying *information theory* to knowledge-oriented organizations. This learning perspective often involves micro-level analyses of organizational learning, therefore, from the viewpoint of information management, organizational learning is believed to constitute the organizational members' ability to acquire, process, store, and distribute information and knowledge through organizations and information systems, in order to attain the goal of organizational learning (Huber, 1991). Within organizational learning, information technology acts as a platform that provides for information or knowledge conservation, processing, and dissemination (Croasdell 2001; Goodman & Darr 1998; Hong et al. 2006; Templeton et al. 2002).

Petrides (2002) uses a similar viewpoint regarding the application of information technology in organizational learning. Petrides believes that the application of information politics and strategies should be consolidated in knowledge-based systems, so that decision-making may be guided by knowledge. In addition to focusing on the development of knowledge systems, Pentland (1995) has proceeded to analogically express the organization as a knowledge system and organizational operations as knowledge processes. These knowledge processes pertain to five areas—the construction, organization, storage, distribution, and application of knowledge. By applying information technology on numerous levels, the knowledge within the organization has also been embodied with various meanings and ways of operation.

To summarize the opinions of the abovementioned scholars, knowledge-oriented

organizations chiefly perform their associating interactions by applying the information theory in the form of information technology. Therefore, as regards the methodology of organizational learning, the gathering, storing, and distribution of knowledge through information technology would be imperfect without the existence of information technology itself, and organizational learning would be utterly unfeasible if this element were neglected. Based on the results of the abovementioned literatures, our study has classified *knowledge management information systems* (KMIS) as representative information systems.

4.2 Organic-Oriented Organizations

Under this category of literatures, an organization is seen from the organic-oriented viewpoint of organizational learning, which emphasizes the application of the *systems theory*. This theory stresses on a macro-level analysis and considers organizational learning as an organizational capability; therefore, from the perspective of information management, the goal of organizational learning is to increase the efficiency of information utilization in the organization and to thereby enhance the organization's decision-making and capabilities (Gill 1995; Salaway 1987; Stein & Vandenbosch 1996).

Vandenbosch and Higgins (1995) propose that since information and learning are closely correlated, executive support systems (ESS) could supply executives with additional valuable information. They have proposed a model to describe the relationships among ESS, learning, and performance and analyzed the impact of ESS on perceptions of competitive performance. The model views organizational learning as an organizational capability that is susceptible to information systems; therefore, the organization's performance and goal are bound to be affected by organizational learning. Taking this into consideration, many scholars have adopted this analytical method to process related researches in organizational learning methodology (Hall & Paradise 2005; Henderson & Lentz 1995; Vandenbosch & Higgins 1995; Woiceshyn 2000).

The organic-oriented organization, like a living system, is dependent upon its environment for the resources that support its life. By using feedback mechanisms, organizational members can adopt appropriate actions to cope with environmental changes in order to reach the goal of an organization. In support of organizational learning, information technology must supply information at different levels of activities and sustain decision-making processes for decision makers. For attaining deep learning for organizations, Kayande et al. (2009) argue that decision support systems (DSS) must be designed to induce an alignment of a decision maker's mental model with the decision model embedded in the DSS. They propose two DSS design characteristics that facilitate such alignment: (1) feedback on the upside potential for performance improvement and (2) feedback on corrective actions to improve decisions.

Most DSS contain stored data, data analysis procedures, and decision models, which refer to collectively as modules (Basu & Blanning 1994). These modules use precise mathematical

formalism to define the properties of the environment, the organizational capabilities, the ways the decision makers' actions change the state of the environment, and the decision makers' goals and preferences. From decision theory, it can provide a decision aiding methodology to develop the model of rationality that can operate in complex uncertain environments, and can act rationally to maximize decision makers' preferences (Tsoukiàs 2008).

After integrating the above concepts, organic-oriented organizations generally process uncertainties based on the systems theory, while the decision theory may be suggested as one of the theoretical bases for methodological design of information technology. From the viewpoint of organizational learning methodology, the processing and analyzing of information technology will effectively enhance the decision making of various hierarchies within the organization. Hence, information technology must provide organic-oriented organizations with three functions: (1) supply information to organizational members by using feedback mechanisms; (2) assist organizational members in improving decision quality; and (3) increase organizational performance. According to above mentions, we have selected the *decision support systems* (DSS) as the representation information systems under this category.

4.3 Culture-Oriented Organizations

In this category of literatures, organizational learning emphasizes *symbolic interactionism* and its application to culture-oriented organizations. In terms of information management, organizational learning is seen as a communicative or interpretative process conducted between organizational members by means of information systems, which help the organization to attain the goal of organizational learning. In order to accomplish this, information technology plays the essential role of a technological communicator, which allows the organizational members to express their viewpoints regarding self-interpretation and social construction to their fullest extents (Fulk 1993). Consequently, the *communication theory* may form one of the theoretical bases for this category.

Although many researches in this field have considered this aspect from the management's perspective, the studies have failed to uncover anything that would be relevant to the viewpoints of organizational communication, interpretation, or social construction in the application of information technology to organizational learning. This indicates that future researches can develop this aspect by conducting further investigations into it. Nevertheless, the organizational communication point of view is an inspiring approach. The media selection theory (Carlson & Davis 1998), for example, describes the selection and application possibilities of communication technology, while the information richness theory (Daft & Lengel 1986) suggests supplying the organizational members with supplementary information regarding communication.

With regard to the methodology of organizational learning, the use of interpretations,

social construction, symbolic interactionism, and so on serve to expand the scope of innovation in information technology and organizational learning. For example, Yates and Orlikowski's structural approach (Yates & Orlikowski 1992) suggests that when compared to face-to-face interactions or videoconferencing, E-mail still lacks several key factors when it comes to communication, which vindicates the information richness theory. Lee (1994), on the other hand, interprets E-mail as an information-rich media. E-mail is a communicative technology, but since there are too many communication devices to be listed out, with further differentiations in terms of their functions, this paper limits itself to classifying *information and communication technology* (ICT) under representative information technology.

4.4 Dialectic-Oriented Organizations

After reviewing the literatures in this category, we believe that the organization tends to become a dialectic-oriented organization when organizational learning focuses on the *conflict theory*. Conflicts and how they are handled is a central and crucial issue in organizational life, in all its manifestations and on all levels. In the past, the accepted premise was that conflict is harmful to organizations and should be suppressed. Today, the inevitability of conflict is accepted, and regarded as an opportunity and catalyst for organizational growth and development (Lieberman et al. 2009). From the perspective of fostering team innovation, Gebert et al. (2010) argue that an opposing but complementary action strategy can promote knowledge generation in organizations. Similarly, Shetach (2009) also believes that organization should take the suitable strategy for a constructive solution process to resolve conflicts so long as both parties continue to concentrate on the issues, keep the discussion matter-of-course, and cooperate among the parties.

In order to effectively manage conflicts, some scholars propose different conflict management strategies and tools, such as the four-dimensions model (Shetach 2009), conflict management systems (Lieberman et al. 2009), collaborative conflict management mechanism (Paul et al. 2004), and conflicts and dispute avoidance and resolution techniques (Ng et al. 2007). For the dialectic-oriented organization, it is important to adopt the appropriate strategy to conflicts between organizational members, by means of dialogue, the formation of a consensus and employee empowerment. From the information management viewpoint, the aim of organizational learning is to provide conflict detection and management mechanisms that will assist the members in arriving at various interpretations regarding the environment. Organizational learning also constitutes the use of an integrated strategy to reach a mutual agreement, thus helping the organization to achieve its goals. Therefore, this study suggests *strategy theory* as one of the theoretical bases to design information systems for conflict

management in dialectic-oriented organizations.

At present, there is only one research that deals with this category—Hine and Goul (1998) propose the formulation of a conflict detection organizational learning support system (OLSS), so that when the manager tends to have different interpretations of the surroundings, the organizational members can arrive at a mutual agreement by using conflict and consensus sets to assimilate unsettled opinions; thereby, the organization may execute the most appropriate decision. The above researchers have concurrently tested the conflict detection OLSS on 12 MBA students in order to obtain a better understanding of its performance.

Even though the literatures concerning this field are rather limited, from the viewpoint of information technology, there already exists a mechanism that provides for conflict management—group decision support system is often used to manage conflicts within a group (Miranda & Bostrom 1993; Sambamurthy & Poole 1992). Swaab et al. (2002), in contrast, have favored the more visualization-oriented support mechanism called the negotiation support system (NSS) that helps the organizational members to share and develop mental models in order to stimulate more productive negotiations. This being said, the present paper considers *group decision support system* (GDSS) to be the representative information systems under this category.

5. A TOPOLOGY OF ORGANIZATION, ORGANIZATIONAL LEARNING AND INFORMATION TECHNOLOGY

Based on the content presented in this paper, from the application of information technology to the methodology of organizational learning, to the extensive arrangement of the related literatures, we can understand that literatures pertaining to information or systems theories and their results can be quite wide-ranging. However, contemporary organization theories have simultaneously combined all these approaches, and the current trends involve the application of information technology to organizational learning by using information theory and systems theory (Real et al. 2006). Despite this, there appear to be few researches on organizational learning and information technology in relation to either symbolic interactionism or the conflict theory; therefore, this is a topic that requires further investigation in the future. Table 2 provides characteristics of organizational learning of four different organizational types in management and information management that are used in our study.

This paper has discussed the ontological, epistemological, and methodological perspectives of organizational learning and information technology and provided a detailed analysis

of various studies in the field. It has also explained the two approaches—objectivism and subjectivism—that may be used to define the organization's ontological perception; moreover, based on these approaches, the present paper has deduced the epistemological implications of information, systems, symbolic interactionism, and conflict theories. In conclusion, it has addressed the fact that information technology helps promote organizational learning in terms of methodology, which allows for the application of the information, decision, communication, and strategy theories.

After studying the literatures mentioned in this paper, we can explore the manner in which the process of organizational learning has evolved from objectivism into subjectivism. In this process, to any social science researcher, the problem and research strategy at hand would appear to be connected to the researcher's worldview. In fact, each researcher is unique in terms of his or her beliefs and values; these beliefs toward the social system, either intentional or unintentional, inspire not only the theories and attitudes of researchers but also their interactions with the researched objects and final interpretation of the results. Therefore, by scrutinizing the ontology, epistemology, and methodology of organizational learning, one can essentially gain a better understanding of the worldviews and values that are embraced within organizational learning studies.

In addition, when dealing with literatures relevant to the organization, organizational learning, and the field of information technology, we have seen that the outcomes of organizational learning and information technology are very dissimilar; in fact, these two fields present a wide discrepancy. For example, we find many literatures pertaining to organizational learning within the epistemological structure; however, if we look for researches relating to the methodological design of information technology, we chiefly find objectivism-based studies and few subjectivism-based ones. The ontological, epistemological, and methodological frameworks taken into account in this study undoubtedly offer a notable opportunity to observe the outcome and development of organizational learning and the application of information technology in organizations.

Table 2: Characteristics of organizational learning of four different organizational types in management and information management

Organizational types	Knowledge-oriented organization	Organic-oriented organization	Culture-oriented organization	Dialectic-oriented organization
Suggestive theory on organizational learning	Information theory	Systems theory	Symbolic interactionism	Conflict theory
Characteristics of organizational learning in management	Organizational learning is made through the applying of information to create new organizational standards, procedures, and workflow, and then extensively share these new developments with different organizational members.	Organizational learning is aimed at improving the organization's capability, which further improves its performance and competitiveness.	Organizational learning can only establish common beliefs and values by passing the members' cognitive and initiative interpretations through a generative dialogical process.	Organizational learning is the process of modifying one's cognitive maps or comprehension by generating diversities and building up a consensus, thereby changing the range of one's potential behaviors.
Suggestive theory on IT application	Information theory	Decision theory	Communication theory	Strategy theory
Representative information systems	Knowledge management information systems (KMIS)	Decision support systems (DSS)	Information and communication technology (ICT)	Group decision support systems (GDSS)
Characteristics of organizational learning in information management	Organizational learning by organizational members involves acquiring, processing, storing, and distributing information and knowledge through organizations and information systems, thereby attaining the goal of organizational learning.	Organizational learning is performed in order to increase the efficiency of information used by the organization, thereby enhancing the organization's decision-making and capabilities.	Organizational learning is seen as a communicative or interpretative process performed between organizational members through organizations and information systems; it helps the organization attain the goal of organizational learning.	Organizational learning seeks to provide conflict detection and management mechanisms that assist the members in formulating various interpretative results regarding the environment, and to use integrated strategy to reach to a mutual agreement, thereby achieving the organization's goal.

6. DIRECTIONS FOR FUTURE RESEARCHES

6.1 The Use of Scientific and Philosophical Viewpoints

In retrospect, organization theory has concurrently developed with the attempts of scholars to revolutionize technical standards, divide workflows, improve the work environment, determine the most feasible way of management supervision, and so on, in order to explore the numerous actions of an organization. Organization theory, therefore, is merely aimed at a further comprehension of the countermeasures that may influence the organization's performance, and in turn, lead to an improvement in its efficiency, effectiveness, and productivity. In fact, the systems theory is a method by which researchers can collect objective, neutral information and understand the usual rules in such a way as to predict future human actions; through the process of organizational learning, a similar method may be used to forecast the actions of others. Despite this, for scholars who believe that every entity possesses its own distinctiveness, human actions cannot be reduced to a solitary manner or assumption; instead, they stress on the need to consider the entity's growing background and living environment as well as the spatiotemporal divergences. This helps us realize that the systems theory perspective can no longer satisfy organizational scholars; they have also accepted research directions that are based on interpretive social science or critical social science.

Basically, different research paradigms simultaneously reflect not only the scholars' diverse worldviews but also certain characteristics of research problems. Organizational learning, for example, incorporates a multi-paradigmatic profusion of researches, which highlight organizational learning as an information phenomenon within an organization and stress on the importance of the systems theory. However, it would be most appropriate, in this context, to regard organizational learning as a process by means of which organizational members communicate and reach a consensus, which is undoubtedly in accordance with the approach of interpretive social science or critical social science.

In this way, by incorporating diverse scientific and philosophical views as well as the ontological, epistemological, and methodological processes mentioned above, it is possible to study organizational learning from a plethora of perspectives and various theoretical bases pertaining to interrelated fields. Such a variety of reference points can only promote organizational learning, provided we have substantial researches on information technology and organizational learning.

6.2 The Role of Information Technology

Information technology contributes to the organization in three ways (Orlikowski 1992).

First, with respect to the creation of a technological imperative model, information technology is seen as an independent variable, unidirectionally affecting the members' actions and organizational characteristics (such as structure, size, efficiency, (de)centralization, and so on). Second, with respect to the strategic choice model, technology is no longer an extrinsic entity; rather, it is an artificial item produced by organizational members through social interactions, strategy selections, and designs. This kind of technology is dependent on the organization for its existence. Third, from the viewpoint of emergence, the model of technology is regarded as a trigger of structural change; this puts information technology at an intermediary position between the members and the organizational structure.

While discussing information technology and organizational learning related topics, Masino (1999) presents two qualms regarding the role of information technology in organizational learning. First, with regard to the coordinative role of information technology, is it intended to strengthen the hierarchies within the organization or to amplify the members' autonomy? Second, with regard to the use of information technology in organizational learning, is it actually intended to enhance the skills and competitiveness of organizational members or to restrict their development and curtail their values within the organization?

Without doubt, the basic framework of this research has positioned information technology on the level of organizational learning methodology; this study regards information technology as a necessary tool that would support organizational learning. From among all the germane literatures that are related to information technology and organizational learning, the majority are of the opinion that the organizational learning system subsists because of the existence of the organization, which supports and maintains the implementation of organizational learning (Janson et al. 2007). To better explain this phenomenon, this paper suggests that future researches address the role played by information technology within the organization (Kang 2006; Real et al. 2006); it is hoped that such an application of information technology could be further boosted by exploring the various ways in which it can be positioned within the organization, thereby enriching the results pertaining to the use of information technology.

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