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Using Design Science Research to Develop a Conceptual Solution for Improving Knowledge Sharing in a Virtual Workspace

Lata Koneru
latasuvvari@gmail.com

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USING DESIGN SCIENCE RESEARCH TO DEVELOP A CONCEPTUAL SOLUTION FOR IMPROVING KNOWLEDGE SHARING IN A VIRTUAL WORKSPACE

By

Lata Koneru

Bachelor of Business Management
Andhra University
1993

Master of Business Administration
Indian Institute of Social Welfare and Business Management
1995

A dissertation submitted in partial fulfillment of the requirements for the degree of

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School of Public Policy and Leadership
Greenspun College of Urban Affairs
The Graduate College

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Dissertation Approval

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The University of Nevada, Las Vegas

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Lata Koneru

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Doctor of Philosophy - Workforce Development and Organizational Leadership
School of Public Policy and Leadership

Christopher Stream, Ph.D.
Examination Committee Chair

Kathryn Hausbeck Korgan, Ph.D.
Graduate College Interim Dean

Jayce Farmer, Ph.D.
Examination Committee Member

Elizabeth Barrie, Ph.D.
Examination Committee Member

Stoney Alder, Ph.D.
Graduate College Faculty Representative
Abstract

Enhancements in technology have resulted in significant changes to day-to-day operations of organizations in the present day. One especially noteworthy change is the alteration in the nature of teams from being co-located, with face-to-face interaction, to virtual, with the involvement of information and communication technologies (ICT) to facilitate communication. This change in team character has had a downstream impact on a key element of an organization’s competitive edge, namely knowledge.

Overall, there is consensus that knowledge is a crucial facet of the competitive edge of an organization. Consequently, knowledge management, knowledge sharing, and organizational learning are essential components of an organization’s sustained existence and effectiveness in the competitive marketplace and considerable academic and industry attention has been paid to this matter. However, the present day scenario of global organizations and dispersed teams, within and across geographies, transforms the matter of knowledge sharing and organizational learning into one of great complexity. Thus, the present study was interested in understanding the modalities of knowledge sharing and consequently organizational learning in the context of a virtual workspace, that is, teams operating from physically distinct locations and communicating using ICT tools.

Overall, the objective of this study was to propose a conceptual model using the Design Science Research (DSR) approach to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment. Further, the conceptual model is extended to propose the use of a Learning Grid as a means to implement the model. An approach to evaluate the proposed model is also suggested. Limitations and suggestions for further research are also provided.
**Keywords:** Knowledge Sharing (KS), Organizational Learning (OL), virtual workspaces, virtual teams, virtual communities, communities of practice, CoPs, virtual communities of practice, VCoPs, Connectivism, Learning Grid, Design Science Research (DSR).
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CHAPTER 1

INTRODUCTION

Overview

The objective of this chapter is to introduce the research topic under consideration by providing an overview of the background of the research and the problem statement. Furthermore, it highlights the research significance; study’s aims, objectives and research questions; introduces the research methodology and outlines the scope of the research. The key terms used in the research are also introduced. Lastly, the structure of the study will be presented.

Research Background

Knowledge, in the present day, has progressively become a significant facet of an organization’s competitiveness. Consequently, knowledge can be construed to be a unique organizational resource. Apart from knowledge itself, the manner in which it is shared within an organization is also crucial and fundamental not merely to the effectiveness of the organization where it originated but also to the persons and processes which share it as participants in the process of knowledge sharing also profit from it. Hence, shared knowledge facilitates an organization’s competitiveness. On the other hand, an organization’s competitiveness can be detrimentally impacted if the knowledge of employees is permitted to be lost (Csepregi, 2011). Moreover, the realization of the favorable and beneficial outcomes of knowledge sharing by employees can facilitate knowledge sharing within an organization.

However, globalization has compelled organizations to profoundly alter the manner in which they operate. As suggested by Duarte and Snyder (2006) companies must restructure
constantly to acclimatize to the latest changes in the global environment to obtain a competitive advantage. Virtual teamwork has become the most common way to accomplish this (Duarte & Snyder, 2006, p. 3).

In a knowledge-based economy, firms place emphasis on teams to deliver the required outcomes. The needs of teams are varied and can encompass communication, information and coordination. In the present day, virtual teams are the norm as employees may work from different offices, home, or on travel consequently giving rise to a new set of challenges associated with organization and planning. Thus, the dependence of organizations on information and communications technology (ICT) has progressively increased so as to support their globally-connected employees. Simultaneously, the relentless swiftness of change and competition have produced considerable interest not only with regard to the manner in which organizations manage, share and accumulate information but also the manner in which they develop and acquire new knowledge (Gorelick & April, 2001).

A novel means to produce and disseminate organizational knowledge is the community of practice (CoP) which connects a group of people who have something in common. This may be a concern, a group of issues, proficiency or a fervor about a subject (Wenger, McDermott, & Snyder, 2002; Wenger & Snyder, 2000). CoPs have become increasingly virtual (VCoPs) due to the use of ICT to aid in their communications, as ICT frees members of a CoP from being limited by time and physical constraints (Bourhis, Dubé, & Jacob, 2005).

Organizations establish comprehensive knowledge management operations and programs to ensure that the knowledge produced by teams is passed on to the organization for future reference. Technology, specifically collaborative technology, is a significant facilitator with regard to the interactional, directional and information distribution activities these
programs entail. To remain competitive, firms in the present day must use the specific expertise associated with their industry and the operational disciplines which span organizational units and locations advantageously to be able to rapidly satisfy the needs of customers.

A related concept that has attracted significant emphases in recent years is the concept of organizational learning (OL). OL has been admired as an instrument that can be employed to attain competitiveness in a dynamic business environment where organizations require novel techniques of management and strategies for development to remain successful and significant. The platform of OL works together with various corporate resources and develops from the distinctive combination of an organization’s business strategy, corporate history and culture, competitive forces, and technological complexity (Majila, 2012).

Antal, Lenhardt, and Rosenbroch (2001) observed that the research on organizational learning predominantly emphasized the competitive benefits that organizations could derive from participating in learning and the satisfaction obtained by employees in organizations that support learning. Dai, Duserick, and Huang (2007) suggested that this could be the factor that determines why competitive organizational learning cannot be replicated by competitors in a straightforward manner and also why there is a greater likelihood that competitive advantages resulting from learning can be sustained.

Organizations can only sustain success, competitiveness and efficiency if they are flexible with regard to organizational learning (Senge, 1990, 2006). This view was supported by Škerlavaj and Dimovski (2007) who observed that with regard to the notion of competitive advantage, organizational learning has surfaced in the late 1980s as one of the most favorable concepts in the literature related to strategic management. Dai and colleagues (2007) also supported this view when they suggested that an organization which has effectively advanced
learning in its boundaries should also accrue benefits from learning such as, return from learning and learning-based competitive benefits.

Several researchers regard organizational learning to be a basic feature of an organization’s competitiveness and associate it with knowledge acquisition and performance improvement. For example, studies have contended that organizational learning impacts competitive advantage (Jashapara, 2003), financial and non-financial performance (Bontis, Crossan, & Hulland, 2002; Dimovski, & Škerlavaj, 2005), the unit cost of production (Darr, Argote, & Epple, 1995), tangible and intangible collaborative benefits in strategic alliances (Simonin, 1997), and innovation (Montes, Moreno, & Morales, 2005).

Other authors have argued that the level to which organizations learn can regulate their obtaining of a competitive advantage. Moreover, Gustavsson and Harung (1994) observed that the speed at which organizations learn can grow to be their only maintainable source of competitive benefit. This observation was supported by Goh (2003) who emphasized that organizations must implement a policy of continuous learning to remain competitive.

Furthermore, studies (e.g., Baker & Sinkula, 1999; Dickson, 1996; Farrell, 2000; Hurley & Hult, 1998; Slater & Narver, 1995) have concurred that organizations must possess the capacity to participate in organizational learning practices to achieve long-term competitive benefits, by supporting innovation, specifically in the context of fast-changing and competitive settings.

Organizational learning has several benefits (Su, 2006):

- Learning enhances the capacity of employees to participate in the organization’s success; and
• Learning assists an organization in being more effective in achieving its objectives.

Honey and Mumford (1996) suggested that several benefits could be accrued by an organization if it prioritizes learning. For instance, its long-term success could be ensured. Moreover, continuous improvement could become a certainty. In addition, successes and best practices could be communicated and imitated.

Siemens (2005) drew attention to some important movements with regard to learning. First, several learners will shift to numerous varying, perhaps non-associated fields during their lifetime. Second, informal learning is an important facet of a person’s learning experience. Thus, learning is not limited to formal education but can occur in several ways including communities of practice, individual networks, and the achievement of work-connected tasks. Third, learning is a persistent process continuing over a person’s existence. Thus, learning is no longer distinct from work-connected activities and indeed may overlap. He also highlighted the growing role of technology in supporting learning. Moreover, he emphasized that both the organization and its employees are learning organisms which resulted in the need for a theory that explains the connection between individual and organizational learning that is, connectivism.

**Research Problem Statement**

From the preceding discussion, it can be inferred that in any organization, the management and sharing of knowledge and organizational learning are essential to its continued success and sustained competitive edge. However, in the current context of global organizations where teams are scattered and even in the same geographic location, alternate workspaces are provided to facilitate employee or organizational convenience, the matter of organizational learning and knowledge sharing can become a matter of great complexity.
Hence, it was perceived that this situation merited additional focus and study and to suggest a solution which can help organizations take advantage of the knowledge in their organizations and develop organizational learning would benefit global organizations and empower their employees.

Research Significance

The significance of the present study is primarily its contribution to knowledge, specifically the knowledge produced with regard to the challenges presented by virtual teams to organizational learning and knowledge sharing. It is expected that the findings of the study will:

1. Offer insights for HR managers regarding the various aspects of organizational learning and knowledge sharing;
2. Offer new information to organizational stakeholders who are interested in enhancing, maintaining and retaining the knowledge resources of the organization regardless of the physical location of team members;
3. Contribute to the existing literature regarding facets of knowledge sharing and organizational learning in the context of virtual teams/communities; and
4. Initiate further and extensive research on models for organizational learning and knowledge sharing in the context of persons working in virtual workspaces.

Aims of the Research

The overarching aim of this research is to develop a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment.
Objectives of the Research

The aim of the research is supported by the following objectives:

1. To understand the evolution of knowledge sharing and organizational learning in the context of virtual teams.
2. To recognize the key issues and challenges in knowledge sharing and organizational learning in the context of virtual teams.
3. To understand the participants in knowledge sharing and organizational learning.
4. To scrutinize the root causes of the key issues in knowledge sharing and organizational learning.
5. To develop a conceptual framework for improved organizational learning and knowledge sharing in the context of the virtual workspaces.

Research Questions

The study asks the following overarching research question.

What are the characteristics of organizational learning in the context of virtual workspaces and the factors that serve as barriers/facilitators to organizational learning in this specific context? Can these factors be employed to facilitate the creation of a conceptual framework to improve knowledge sharing and organizational learning in virtual workspaces?

Research Methodology

The research method chosen for this research is the Design Science Research (DSR) approach (Hevner & Chatterjee, 2010). This method will be used to ascertain and recognize opportunities and problems applicable to organizational learning in virtual workspaces and to provide an unambiguous approach to formulate or design novel or enhanced conceptual
measures to deal with those problems. DSR was chosen as the philosophical approach due to the following reasons:

1. Much of the academic research related to organizational learning has used varied methodologies to study organizational learning such as, exploratory, quantitative studies that employ surveys (e.g., Langerud, 2007; Tibet, 2015), action research using case studies (e.g., Haho, 2014), action research using detailed literature review (e.g., Majila, 2012), etc. The objective of most of these studies was to create a shared understanding of organizational learning.

2. The emphasis of DSR is practical problem-solving and encompasses narrow or solution-oriented knowledge where the outcomes from scientific reasoning (forecasting, recognizing or clarifying phenomena) can be employed in devising solutions to intricate and appropriate everyday issues. Thus, it is an approach driven by problems encountered in real-life and is also solution-oriented. In other words, DSR helps in drawing attention to the challenges in a field from a solution-based viewpoint. Hence, DSR can be used to develop knowledge that can be useful to professionals in the field under consideration to design solutions to their everyday problems by illustrating and examining other strategies to address such problems.

Different approaches to DSR have been suggested. However, the core research process across these remains consistent and can be condensed into three significant activities.

Figure 1.1 depicts the general design cycle in the design science research framework.
Figure 1.1 General Design Science Research (DSR) Framework

Source: Adapted from Hevner & Chatterjee (2010)

The current study uses the different steps suggested by Vaishnavi and Kuechler (2015) as part of the DSR approach namely, awareness of the problem, suggestion, development, evaluation, and conclusion.

First, the research problem will be identified and defined. Second, existing knowledge will be used to propose a solution. In the development phase, the actual deliverable (i.e., conceptual solution to enhance organizational learning and knowledge sharing in the context of virtual workspaces) will be developed. This deliverable will then be evaluated and the study concluded.

Scope of the Study

This study covers organizational learning and knowledge sharing within the general context of organizational systems, i.e., no specific manner of team or knowledge is considered. Also, this research focuses on conceptual rather than detailed solutions. By so doing, attention is drawn to the conceptual aspects of the studied domain, and a big picture approach is employed.
Additionally, for the purposes of this study, the term virtual workspaces will be used to indicate persons who work together collaboratively for short or extended durations from different physical locations which may include home or different geographical locations.

Overall, the areas included and excluded in the scope of the study are as follows:

- The intent of the study is to offer guidance for HR managers, and not to realize solutions.
- The guidance is for HR managers who are interested in improving the effectiveness of knowledge sharing in the context of their organization’s virtual teams.
- Existing definitions of organizational learning, knowledge sharing, and virtual teams and virtual workspaces are reused.
- The emphasis of the study will be on presenting existing expertise and research in organizational learning and knowledge sharing.
- The activities undertaken as part of the designated research approach (i.e., DSR) will be limited to conceptual and theoretical exploration of concepts.

**Introduction to Key Concepts**

This section provides a brief overview of the key concepts that will be undergo a detailed investigation by this study.

**Organizational Learning**

Organizational learning (OL) is described, in the organizational behavior literature, as the scrutiny of the manner in which organizations acclimatize to novel and fluctuating environments as a result of the implementation and incorporation of innovative and original systems (Davenport, 2013). Consequently, it is associated with the sociological notion of
diffusion analysis which considers the manner in which innovations are distributed across a specific population (Rogers, 2010; Rogers & Shoemaker, 1971) and inside an organization (Sandberg, 2007).

**Organizational Knowledge**

Tsoukas and Vladimirou (2001) defined Organizational knowledge as “the capability members of an organization have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalizations (propositional statements) whose application depends on historically evolved collective understandings and experiences” (p. 983).

**Teams**

In general, teams are defined by the International Project Management Association (IPMA) as “groups of people who work together to realize specific objectives” (IPMA, 2006, p. 52). For example, the Project Management Institute (PMI) describes a project team as containing a Project Manager, a project management team, and other team members who perform the work and are not necessarily concerned with the project’ management (PMBOK, 2008, p. 26). Concerning team development in project management, a significant and influential model is the Tuckman model (Tuckman, 1965). This model posits that the life cycle of a team passes through four stages namely, forming, storming, norming and performing. Nevertheless, this model is not without limitation. For instance, Johnson, Suriya, Yoon, Berrett, and La Fleur, (2002) observed that the Tuckman model was adequate to explain the forming, norming and performing stages of virtual teams but did not satisfactorily support the storming stage (Ingason, Haflidason, & Jonasson, 2010).
Virtual Teams

Virtual teams are a common element in the present day business environment. Kerzner (2009, p. 352) observed that project management, traditionally, was performed in a face-to-face context where team members were at a single physical location and team meetings could be conducted in a room with the physical presence of team members. The magnitude and complexity of present day projects make the placement of all team members the same roof nearly unachievable. Thus, virtual team members may be situated in various geographies and time zones and there is a high reliance on electronic communication. Martins, Gilson, and Maynard (2004) suggested that virtual teams are unlike other teams as their members interact with each other across geographical distances using computer-aided technologies. Duarte and Snyder (2001) drew attention to the role played by the advancements in ICT in the development of virtual teams across different project types such as, product development, design and software development, engineering and construction, to name a few.

Virtual teams have been in existence since the early 1980s coinciding with the Total Quality Management (TQM) movement. The latter part of the decade and the early 1990s saw several organizations effect policies related to self-supervision and giving power to work teams. Ebrahim, Ahmed, and Taha (2009) suggested that this move to make employees take on responsibilities conventionally associated with management such as, decision-making and problem-solving reduced bureaucracy, decreased cycle time and enhanced the service line. From this perspective, organizational transformation appears to take place to respond to the structural changes resulting from globalization.

Over the past two decades, considerable research has studied global virtual teams and how they could be distinguished from the formal (i.e., conventional, face-to-face) teams.
From various studies (e.g., Badrinarayanan & Arnett, 2008; Ebrahim et al., 2009; Prasad & Akhilesh, 2002) it could be seen that research on virtual teams continues to be at a nascent stage. Moreover, several areas have not been explored due to the relative recentness of the notion of virtual teams.

However, there is a lack of consensus in the literature with regard to precisely what a virtual team signifies consequently no single agreed-upon definition of this term can be recognized. Nevertheless, a deeper examination of the many definitions of virtual teams reveals that they are significantly similar with insignificant differences. In their review of literature related to virtual teams, Martins and colleagues (2004) concluded that all teams in present day organizations are virtual to some extent. In other words, people have progressed from working with people who are in physical proximity to working with people around the globe (Johnson, Heimann, & O’Neill, 2001).

A common definition of distributed teams as provided by several authors is “teams where the bulk of communication is done with the aid of information technology’ (Ingason et al., 2011). Two essential characteristics were added to the description of virtual teams by Ebrahim and colleagues (2009): 'small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies’. In a similar manner, PMBOK defines virtual teams as “groups of people with a shared goal, who fulfil their roles with little or no time spent meeting face to face. The availability of electronic communication, such as email and video conferencing, has made such teams feasible” (PMBOK, 2008, p.228). In addition, Duarte & Snyder (2006) stated that virtual teams “operate virtually, without the physical limitations of distance, time, and organizational boundaries. They use electronic collaboration technologies and other techniques to lower travel and facility costs, reduce project schedules, and improve decision-making time and communication” (p. 4).
As can be seen from the preceding discussion, there are several definitions of virtual teams. However, the common factor in these definitions is that members of a virtual team are physically separated (by time and/or space) and their primary mode of communication is electronic (Ebrahim et al., 2009; Powell, Piccoli, & Ives, 2004; Raval, Ebrahim, Ahmed, & Taha, 2010). As Raval and colleagues (2010) describe it:

\[ \text{virtual teams} = \text{teams} + \text{electronic links} + \text{groupware} \ (p. \ 1) \]

**Virtual Workplace**

The virtual workplace is defined by Verbeke, Schulz, Greidanus, and Hambley (2008) as a “workplace unfettered by traditional limits of time and space, where employees can work from geographically dispersed areas, both within and outside standard business hours” (p. 1).

**Communities of Practice (CoP)**

Communities of practice were described by Wenger (1998) as phenomena that occur naturally wherever groups of people with a common objective or interests are connected by a common need for knowledge.

Consequently, a community of practice is “a group of people who communicate with each other (mutual engagement) and develop ways and resources (shared repertoire) for reaching a common goal (joint enterprise)” (Agrifoglio, 2015, p. 35).

Virtual Communities of Practice (VCoPs) are described as “the union between individuals or organizations who share common values and interests using electronic media to communicate within a shared semantical space on a regular basis” (Schubert & Ginsburg, 2000, p.30).
This study will use the terms virtual teams, virtual workplaces, virtual workspaces, virtual communities of practice, and virtual communities interchangeably with no loss of meaning.

**Learning Theories**

Traditionally, three theories have been used to explain learning: Behaviorism, Cognitivism, and Constructivism. The premise, in behaviorism, is that learning is essentially incomprehensible. In other words, it is difficult to comprehend what goes on within the mind of an individual (the “black box theory”) (Siemens, 2005).

On the other hand, cognitivism is defined “as a psychology of learning in which knowledge is viewed as a symbolic mental construct in the learner’s mind. Learning is the means by which these symbolic representations are committed to memory. Knowledge is measured by what learners know and not by what they do” (Tomei, 2005, p. 258).

The constructivism theory has its origins in both philosophy and psychology. Davis, Maher, and Noddings (1990) described constructivism from the perspective of learners. “It is assumed that learners have to construct their own knowledge-- individually and collectively. Each learner has a tool kit of concepts and skills with which he or she must construct knowledge to solve problems presented by the environment. The role of the community-- other learners and teacher-- is to provide the setting, pose the challenges, and offer the support that will encourage mathematical construction” (p. 3). In essence, the core of constructivism is that learners use their experiences to actively build their own knowledge and meaning (Fosnot, 2013; Steffe & Gale, 1995).

Knowledge is perceived to be external learner in both behaviorism and cognitivism. Moreover, the process of learning is viewed as the act of knowledge assimilation (Siemens,
On the other hand, constructivism places emphasis on the active role of learners in developing awareness and understanding of the information (Kalpana, 2014).

**Connectivism**

Connectivism is a theoretical framework for gaining awareness of learning. The starting point for learning in connectivism takes place when knowledge is triggered by means of the method of a learner linking up with and supplying information into a learning community (Kop & Hill, 2008).

Siemens (2005) describes connectivism as a successor to behaviorism, cognitivism, and constructivism. He recognized three drawbacks of these theories: “their intrapersonal view of learning; their failure to address the learning that is located within technology and organizations; and their lack of contribution to the value judgments that need to be made in knowledge-rich environments” (Bell, 2011).

Knowledge, in connectivism, is composed of the development of connections between information nodes (i.e., networks). Moreover, it is suggested by connectivism that learning is composed of “the ability to construct and traverse those networks” (Downes, 2012, p. 85). In other words, as stated by Siemens (cited in Kop & Hill, 2008), “the learning is the network.”

Connectivism is guided by the comprehension that decisions are founded on foundations that change rapidly. Fresh information is constantly being obtained. The capacity to distinguish between significant and insignificant information is crucial. Another critical capacity is the capacity to identify that the landscape is altered as a result of new information which is itself the outcome of previously made decisions (Siemens, 2005).
Siemens (2005) provided a list of the principles of connectivism (p. 5)

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known. Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

**Knowledge Sharing**

Knowledge sharing is chiefly described as an activity during which information or other significant matters are shared (Bartol & Srivastava, 2002; Möller & Svahn, 2004; Li, 2010).

Bartol and Srivastava (2002) indicated that information is a component of knowledge sharing and describe knowledge sharing as the deed by which appropriate information is dispersed by employees to others within the organization. Möller and Svahn (2004) stated that knowledge sharing is “sharing not only codified information, such as production and product specifications, delivery and logistics information, but also management beliefs, images, experiences, and contextualized practices such as business-process development” (p. 220).
In contrast, Kharabsheh (2007) highlighted that knowledge sharing includes facets of reciprocity which differentiates it from information sharing which is “about the management making information available to all members of the organization and it could be unidirectional and unrequested” (p. 530).

Li (2010) defined knowledge sharing as an activity, but “in which participants are involved in the joint process of contributing, negotiating and utilizing knowledge” (p. 40).

**The Relationship between Organizational Learning and Knowledge Sharing**

Knowledge sharing has been recognized to be a prerequisite for organizational learning (Senge, 2006). Winter (1987) posited that knowledge sharing is an element of knowledge management that facilitates an organization’s increased competitiveness and also stimulates its capacity to learn and innovate. Moreover, a favorable association was detected between inclination to learning and knowledge sharing, an association that assists organizations in obtaining a competitive edge (Kharabsheh, 2007). A study by Dibella, Nevis, and Gould (1996) advocated continual learning by organizations to sustain a competitive edge. An organization’s capacity to learn is fostered by means of three phases of knowledge management namely, acquisition, use, and sharing of knowledge (Dibella et al., 1996). Summing these arguments, it was reported by Weerawardena (2003) that the overall process of organizational learning was a blend of four knowledge activities: “knowledge acquisition (the development or creation of skills, insights, relationships), knowledge sharing (the dissemination to others of what has been acquired by some), knowledge utilization (integration of the learning so that it is assimilated, broadly available, and can also be generalized to new situations) and unlearning (the review and renewal of existing knowledge and communication of changes within the firm)” (p. 411).
This study will therefore place greater emphasis on creating a conceptual model for knowledge sharing in the context of virtual teams (workplaces/workspaces/communities) as it is evident that one (i.e., knowledge sharing) leads to (or is an essential component of) the other (i.e., organizational learning).

**Chapter Layout**

The structure of this dissertation replicates the research process followed in this study (Figure 1.2).

**Figure 1.2 Dissertation Structure**

The chapters following the present (Chapter 1) are as follows:

**Chapter 2 - Review of Literature.** The second chapter contains a general review of extant literature on the topic of research. Extant literature associated with various aspects of
Organizational Learning, Knowledge Management and sharing, and virtual teams will be considered.

**Chapter 3 – Research Methodology.** This chapter describes the research strategy for the study that is, Design Science Research (DSR), in detail. This will include descriptions of the philosophical bases of DSR, the activities and artifacts and DSR, and methods of data collection.

**Chapter 4 - Awareness of the Problem.** This chapter aids in the establishment of the awareness of the problem as specified by the research strategy. Accordingly, deeper insights will be provided with regard to Knowledge sharing and Organizational Learning in the context of virtual workspaces as revealed by a systematic review of literature.

**Chapter 5 – Suggestion.** Chapter 5 further reviews the connectivism learning theory and discusses a conceptual solution keeping in mind the knowledge sharing requirements of virtual teams.

**Chapter 6 – Development and Evaluation.** This chapter demonstrates how the development of the conceptual solution took place. It presents the solution proposed by the study to solve the identified problem area. Moreover, the evaluation of the conceptual solution is described.

**Chapter 7 – Conclusion.** The last chapter offers a final overview of the outcomes along with the final answer to the research statement and the contributions of this work. Furthermore, recommendations for practical activities and future research in the subject domain are provided.

The list of academic and other sources used as references in this research will also be provided.
Summary

This introduced the research topic under consideration by providing an overview of the background of the research and the problem statement. Furthermore, the research significance; study’s aims, objectives and research questions; the research methodology; and the scope of the research were outlined. Key terms used in the research were also introduced. Lastly, the structure of the dissertation was presented. The next chapter will provide the first review of extant literature on the topic of research.
CHAPTER 2
REVIEW OF LITERATURE

Introduction

This literature review provides a context from literature for the research from both practical and theoretical perspectives. As the emphasis of the current study is on Organizational Learning and Knowledge Sharing in virtual teams, the objective of this chapter is to present an overview of associated theory and studies related to these topics. Accordingly, an overview is provided of knowledge, organizational knowledge, knowledge management, and knowledge sharing. Subsequent sections provide an overview of communities of practice, organizational socialization, organizational learning, and theories of learning. The final section provides an overview of learning in virtual teams.

Figure 2.1 depicts the flow of activities in the current study. The current chapter documents the review of literature.
What is Knowledge?

Knowledge has been defined in many ways and studies have been performed to classify and employ them for knowledge management in organizations (Sharp, 2003, 2007). Consequently, there are several features that come to the mind of employees when they conceptualize knowledge. That is, in their opinion, knowledge:

- is based on humans and signifies, in particular, the utilization of competences obtained through experience;
- is associated with its organizational perspective and beneficial when customized to it;
- enhances the usefulness, worth and/or competitive advantage of organizations;
- is of particular worth when it is utilized in the perspective of its organizational context;
- is similarly esteemed when sharing is possible (Sharp, 2007).
Davenport and Prusak (1998) provided a broad definition of knowledge which takes these features into account: “A fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms” (p.5).

A frequent description of knowledge is as a “justified personal belief that increases an individual's capacity to take effective action” (Alavi & Leidner, 1999, based on Huber, 1991 and Nonaka, 1994). This description points out that knowledge chiefly deals with the rational belief structures of individuals: “Information becomes knowledge once it is processed in the mind of an individual. This knowledge then becomes information again once it is articulated or communicated to others in the form of text, computer output, spoken or written words or other means. The recipient can then cognitively process and internalize the information so that it is converted back to tacit knowledge” (Alavi & Leidner, 1999).

There are several taxonomies that recognize different forms of knowledge. Nevertheless, the most essential distinction involves knowledge that is tacit and knowledge that is explicit. In general, tacit knowledge resides in peoples’ minds and its articulation is either unfeasible or challenging. For the most part, knowledge begins by being tacit. Subsequently, it is painstakingly nurtured over an extended duration. However, it is frequently underused since organizations do not know what they know (O’Dell & Grayson, 1998). In organizations, knowledge is present in business procedures, activities, and associations that have developed over time through continuous improvement (King, 2009).
Organizational Knowledge

The evolution of the so-called ‘knowledge economy’ of the 21st century has caused knowledge to be considered as a resource to be evaluated, extended and overseen (Bogdanowicz & Bailey, 2002). In general, the term ‘knowledge’ has been envisioned (Merton, 1957) to signify a collection of notions and beliefs. However, in organizational practice knowledge has been viewed from several different lenses. For example, some scholars regard it as a competitive benefit (e.g., Bogdanowicz & Bailey, 2002; Prahalad & Hamel, 1990; Inkpen, 1996; Nonaka, Toyama & Nagata, 2000; Pemberton & Stonehouse, 2000) while others perceive it to be in tacit and explicit forms (Bollinger & Smith, 2001; Collins, 1993; Nonaka, 2008; Pemberton & Stonehouse, 2000; Polanyi, 1967). Further perspectives of knowledge are that it is not merely information (e.g., Albino, Garavelli & Schiuma, 1998; Nonaka et al., 2000); it resides both in artifacts (Hargadon & Fanelli, 2002; McInerney, 2002) and in the brains of people (Grant, 1996; Lam, 2000; Davenport & Prusak, 1998); and is constructed, the outcome of the context-specific formation of a group of persons (Tsoukas & Vladimirou, 2001; Tsoukas & Mylonopoulos, 2004; Yanow, 2004).

The next section discusses knowledge in organizations.

Knowledge in the Organisation

It was claimed by Davenport and Prusak (1998) that “knowledge is what makes organizations go” (p. 10). Knowledge in organizations is present at different levels, namely in individuals, groups, and at the level of the organization (Roth, 2003). Within an organization, individuals are perceived to be both the agents and initiators of knowledge (Bogdanowicz & Bailey, 2002; Davenport & Prusak, 1998; Grant, 1996; Hargadon & Fanelli, 2002; Tsoukas & Vladimirou, 2001). This is not an unusual perception since human beings possess a mind and they think and develop knowledge which cannot be separated from them. As observed by
Nonaka (2008), “new knowledge always begins with the individual” (p. 97). However, it must be noted that individual knowledge can transform into organizational knowledge by means of the moderating conditions of groups. Groups, when taken together, form the composition of the organizational unit. One outlook perceives organizational knowledge as the interaction between tacit and explicit knowledge (Nonaka, 2008) whereas another perceives organizational knowledge from an artifact standpoint, that is, where knowledge is made definite by being extrapolated into artifacts (e.g., manuscripts, practices, procedures, standards, systems, methods, etc.) (Davenport & Prusak, 2000; Lam, 2000).

The notion of articulating individual tacit knowledge to change the organization was posited by Nonaka (2008). On the other hand, Tsoukas (1996) indicated that individuals possessed knowledge both local and foreign to the organizational context. As a result, the extent and worth of individual knowledge was difficult to measure. A disassociated perspective of knowledge was presented by Bogdanowicz and Bailey who regard knowledge as an object that “until it is acted upon…has no real value” (p.126). These outlooks on the relationship between individuals and knowledge are flexible. An individual communicates and this can have extensive significance aside from publicly stating what was previously unknown.

Consequently, it has been suggested that while knowledge is something possessed by people, neither or an item that can be passed from to another person or an artifact (McInerney, 2002), knowing “is something that they do” (Defillippi, Arthur, & Lindsay, 2009, p.10). In organizations, knowledge can be perceived to be “socially embedded” (Lam, 2000, p. 488), established in processes and systems (Blackler, 1995; Davenport & Prusak, 1998; Roth, 2003; Sharkie, 2003) which are themselves shaped by societal conventions.
Organizations desiring to designate knowledge as organizational could make acquiring what every person working in the organization knows as their objective in order to construct something that is available to all with the goal that the same knowledge be possessed by all (Bollinger & Smith, 2001). This is one manner wherein organizational knowledge can be understood in which the stimulus does not place emphasis on what transpires in the minds and mental processes of people, instead the emphasis is on the social practices that facilitate both learning and the internalization of knowledge. Lam (2000) suggested that the perspective of knowledge in organizations be modified to view knowledge as a ‘flow’ rather than as a piece of the organization’s ‘stock,’ such as in artifact form (p. 491). This could be attributed to the dynamic quality of knowledge which is present within people and between people. Consequently, it can be considered in a constructive, more adaptable and progressive fashion.

This occurs in teams and work groups because these offer “a shared context where individuals can interact […] and engage in [a] constant dialogue” (Nonaka, 2008, p.104). Such occasions for interaction are crucial openings for individuals to articulate tacitly held viewpoints and knowledge and an opportunity for them to augment their own knowledge foundations (Nonaka, 1994). In other words, sharing is the area of interest.

Employees convey tacit knowledge and invite opinions on their outlooks, validation of their principles in others’ actions and an association of behavior and standards from persons around them when they participate in activities such as procedures (Tsoukas, 1996; Decarolis & Deeds, 1999; Hargadon & Fanelli, 2002). This summation is also a method of externalization (Gao, 2007) as it requires individuals to articulate what they know. Moreover, this is a social procedure (Nonaka, 1994) that takes place at the combined level. That is, where individual knowledge transforms into “collective knowledge” (p. 105).
Knowledge, at an organizational level, can be found in manuscripts and storehouses (Davenport & Prusak, 2000); rooted in practices and consequently deeds (Blackler, 1993, 1995; Roth, 2003; Sharkie 2003); and also in guidelines, standards and systems (Lam, 2000); each of which produces a “corpus of generalizations in the form of generic rules” (Tsoukas, 2005, p. 124). It is the endeavor of organizations to gather and disseminate knowledge with the objective of facilitating success in problem-resolution and other organizational activities among their members (Lam, 2000). The course of converting the tacit knowledge into explicit knowledge permits the organization to utilize extant knowledge, and to change it into a mode that can be of mutual benefit not only to employees but the organization, as a whole. This practice of acquiring, systematizing, and sharing knowledge to facilitate functioning (Wagner, 2003) must be situated in the core of the activities of an organization (Roth, 2003).

The distinction of knowledge by level and type and the combination of different knowledge types signifies that administering knowledge within an organization can be an undertaking of considerable worth. The role of management, thus, is to cause the different levels to communicate; to convert tacit knowledge into explicit and to make sure that individuals are merged into groups with the intention of facilitating sharing of knowledge and developing awareness of what is currently known by the organization and the gaps in its knowledge. Knowledge in organizations does not exist merely for the benefit of persons in senior management but also for persons lower in the hierarchy who discover means of linking and associating the knowledge of other persons with their own (Tsoukas, 1996).

An organization that has the capacity to develop, acquire and effective exchange knowledge among groups and individuals can be deemed to be successful (Inkpen, 1996). Furthermore, such an organization progresses beyond using extant knowledge for the creation of goods or amenities (Grant, 1996) into developing novel organizational knowledge by
means of interacting and collaborating, distributing and partnering (Bollinger & Smith, 2001).

The forms of knowledge possessed by organizations delimit their capabilities and proficiencies (Albino et al., 1998) in such a manner that it permits them to prefer certain activities in comparison to others. Moreover, knowledge facilitates the definition of an organization and reveals its culture (Bollinger & Smith, 2001). Consequently, a shared awareness of what the organization signifies and its objectives emerges. Moreover, knowledge determines the strategies taken by an organization to realize its objectives.

The term ‘living organism’ (Nonaka, 2008, p. 97) was attributed to organizations by Nonaka (2008), indicating the individuals who form it as agents of knowledge.

Table 2.1 provides some of the definitions of organizational knowledge.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Nonaka, 1994</td>
<td>…the process of organizational knowledge creation is initiated by the enlargement of an individual’s knowledge within an organization</td>
</tr>
<tr>
<td>Grant, 1996</td>
<td>…‘that which is known’</td>
</tr>
<tr>
<td>Davenport &amp; Prusak, 2000</td>
<td>Knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information</td>
</tr>
<tr>
<td>Bollinger &amp; Smith, 2001</td>
<td>…the understanding, awareness, or familiarity acquired through study, investigation, observation or experience over the course of time</td>
</tr>
<tr>
<td>Tsoukas &amp; Vladimirou, 2001</td>
<td>…is the capability members of an organization have developed to draw distinctions in the process of carrying out their work</td>
</tr>
<tr>
<td>Tsoukas, 2005</td>
<td>…what makes knowledge distinctly organizational is its codification in the form of propositional statements underlain by a set of collective understandings</td>
</tr>
<tr>
<td>Gao, 2007</td>
<td>Organizational knowledge creation is a process of conceptualizing new perspectives from tacit knowledge shared by its individual composing members</td>
</tr>
</tbody>
</table>
The next section discusses the different types of knowledge in organizations.

**Types of Knowledge**

A classification of knowledge was developed by Collins (1993) who posited that knowledge can be of four types namely, symbol-type or encoded, embodied, embrained and encultured (p. 99). Attention was later drawn to a fifth category, embedded, by Blackler (1995). The term *embrained knowledge* signifies knowledge that depends on theoretical proficiencies and intellectual competences (referred also by Ryle (1949/2009) as ‘knowledge that’ and James (1890/2013) as ‘knowledge about’). On the other hand, *embodied knowledge* is knowledge that is concerned with action and is expected to be only partially explicit (referred also by Ryle (1949/2009) as ‘knowledge how’ and James (1890/2013) as ‘knowledge of acquaintance’). The third category of knowledge, *encultured knowledge*, signifies the method by which collective understanding is achieved whereas knowledge which is present in general routines is termed *embedded knowledge*. The concept of embedded knowledge investigates the meaning of associations and quantifiable resources (Badaracco, 1991). The final category of knowledge, *encoded knowledge*, and signified information communicated through the use of signals and symbols. Information that is encoded and electronically transferred comprises encoded knowledge along with conventional forms, such as books, manuals and codes of practice. The next section discusses tacit and explicit knowledge.

**Tacit and Explicit knowledge.** The origin of knowledge is from individuals and is characteristically intellectual. Moreover, what is said is not extensive, as observed by Polanyi (1967) when he stated “we can know more than we can tell” (p. 4).
Tacit knowledge has the following characteristics:

- It is personal (Bollinger & Smith, 2001; Inkpen, 1996; Lam, 2000; McInerney, 2002; Nonaka, 1994, 2008; Nonaka et al., 2000; Tsoukas, 1996),
- It is composed of prejudiced perceptions, surmises (Nonaka, 2008, Lam, 2000) and premonitions, personal perceptual standards and opinions and views (Nonaka, 2008),
- It is made up of technical skills or know-how (Nonaka, 2008),
- It takes individual principles, experiences and standards into account (Bogdanowicz & Bailey, 2002; Inkpen, 1996),
- Is unspoken and unseen (Lam, 2000; McInerney, 2002).

From the perspective of organizations, tacit knowledge is closely associated with practice, and knowing through practice and action (Lam, 2000; Nonaka, 1994, 2008; Spender, 1996; Tsoukas, 1996). Tacit knowledge embodies individual proficiency (McInerney, 2002).

In contrast, explicit knowledge is regard as more formalized and hence communicating and sharing such knowledge among members of the organization is simpler (Nonaka, 2008). Moreover, it can be transported because of its capacity to be stored in encoded forms (Collins, 1993), such as hard data and codified processes (Bollinger & Smith, 2001; Inkpen, 1996). Thus, explicit knowledge can be stored in a separate location in an independent manner (Lam, 2000). Explicit knowledge can be acquired through conventional education and training (Roth, 2003; Smith, 2001).

Other types of knowledge. Knowledge can also be distinguished by level, such as “know what,” “know how” and “know why” levels of knowledge (King, 2009, p. 4). “Know what” knowledge indicates the action to be taken when a set of stimuli are encountered. For
example, a “know what” level of knowledge is evident in a salesperson who has been taught to recognize which product is most appropriate for different contexts. “Know how” knowledge represents the next level of knowledge and indicates identifying the manner in which to finalize a suitable reaction to a stimulus. The need for such knowledge arises when the calculable associations between motivation and reaction are insufficient. A professional is permitted by “know how” knowledge to ascertain the most appropriate action. The next level of knowledge or “know why” knowledge is the highest level of knowledge. Persons with this level of knowledge have a profound awareness of fundamental associations, collaborative outcomes, and the degrees of ambiguity related to perceived indications or stimuli. This typically comprises an awareness of fundamental concepts and/or a variety of experience that encompasses numerous examples of variances, communication outcomes, and exclusions to the standards and traditional knowledge of a field (King, 2009).

Organizational Knowledge as a Source of Competitive Advantage

Bogdanowicz and Bailey (2002) observed that ‘…knowledge drives the global economy’ (p. 125). Accordingly, it could be inferred that knowledge contributes to the competitive advantage of an organization (Bogdanowicz & Bailey, 2002; Davenport & Prusak, 2000; Inkpen, 1996; Marr, Schiuma & Neely, 2004; Nonaka et al., 2000; Prahalad & Hamel, 1990) and consequently could be regarded as a benefit (Decarolis & Deeds, 1999; Pemberton & Stonehouse, 2000).

Organizations achieve a competitive advantage when they develop their core competencies in a faster and more cost-effective manner than their competitors (Prahalad & Hamel, 1990). These core competencies can be perceived to be the collective learning of an organization: its knowledge assets (Pemberton & Stonehouse, 2000) including such items as systems, technology, procedures, processes, products, structures, and services. In the present
day, reliance on their own competitive advantage is required by organizations, that is, their own recognizable competencies. As knowledge is the center of organizational competencies (Marr et al., 2004) it can be seen that knowledge is a resource to be nurtured and sustained by organizations.

Organization can widen and develop their knowledge base of tacit and explicit knowledge to expand their knowledge/intellectual capital and hence improve their competitive advantage (Bogdanowicz & Bailey, 2002). Also, new knowledge must be constantly created either by reutilizing, by reinterpretation, already confirmed knowledge (Nonaka et al., 2000) or by combining novel knowledge with present knowledge to cultivate even more beneficial knowledge and perceptions to enhance performance (Sharkie, 2003).

Such knowledge could be distributed across the organization and incorporated into novel products and technologies, processes and services thus leading to the improvement of existing entities (Nonaka, 2008; Nonaka et al., 2000). The inability of an organization to produce, collect and share knowledge and utilize this knowledge to build the competencies of the organization may provide an explanation for its weakening performance (Decarolis & Deeds, 1999; Inkpen, 1996).

Knowledge Management

The devising, systematizing, influencing and overseeing of individuals, activities and routines in an organization to make certain that its knowledge-associated resources are enhanced and successfully used is termed knowledge management or KM (King, 2009). The resources associated with knowledge encompass knowledge in different forms, such as in printed documents (e.g., manuals and patents), stored in electronic storage (e.g., best-practices databases), the knowledge of employees about the optimal manner in which to perform their tasks, knowledge possessed by teams who have been occupied with specific
problems, and knowledge that is rooted in the products, systems and associations of the organization (King, 2009).

KM practices comprise the procurement, construction, enhancement, archival, passing on, distribution and use of knowledge. In an organization, the task of KM is to direct these procedures, set up approaches and routines to sustain them, and inspire the involvement of individuals in them. KM’s objectives are to take advantage of and to improve the knowledge resources of an organization with the intent of creating advanced knowledge processes, enhanced organizational behavior, superior decisions and bettered performance of the organization (King, 2009).

The different KM processes can be accomplished by individuals. However, in organizations, KM is chiefly an organizational task that places emphasis on the manner in which managers can facilitate the achievement of KM objectives, can encourage the involvement of individuals in accomplishing these goals, and can develop societal practices to assist the effectiveness of KM (King, 2009).

The societal practices that can be adopted by organizations include communities of practice (CoPs), self-forming groups of individuals with a shared interest, and expert networks, networks created to permit persons with lower experience to interact with persons with more experience. These practices are necessitated as the effectiveness of KM depends on the transfer of the knowledge existing in a person’s mind to others through networks, social groups, and teams. Consequently, the practices in KM necessitate considerable involvement of people and it could be inferred that they are thus less dependent on technology than would be expected. However, in modern organizations, KM must be supported with the suitable use of information and communication technology (King, 2008).
Knowledge sharing

Within an organization, the extent to which knowledge is shared (Senge, 1990; Shieh-Cheih, Fu-Scheng, & Kuo-Chien, 2005) and used in methods (Fahey & Prusak, 1998) is a matter of some significance. While emphasis is placed by some researchers (e.g., (Alavi & Leidner, 1999; Sabherwal & Becerra-Fernandez, 2003) on the necessity to ensure that knowledge is accessible in suitable forms at any place and at whatever time the organization needs it, it is argued by other researchers (e.g., Nonaka & Takeuchi, 1995; Nonaka, Von Krogh, & Voelpel, 2006) that the sharing of knowledge gives rise to innovative notions and the creation of fresh knowledge.

As seen in the preceding discussions, KM does not involve solely technology but concerns managing the manner in which knowledge can be successfully shared by individuals (Liebenau & Backhouse, 1990). The genuine information systems in organizations are founded on the culture of the organization and employee interactions and comprise valuable and active tacit knowledge, which, if successfully channeled and regulated, can serve as a competitive advantage for the organization. The imparting of expertise, in particular, necessitates the creation of a culture of trust, and the inspiration to impart information to others may be detrimentally affected by any organizational system or activity that damages trust (Ackerman, Pipek, & Wulf, 2003).

Two kinds of persons are fundamental to knowledge sharing. The first, or knowledge seekers, are persons who seek knowledge, and the second, or knowledge sources, are persons who either possess the knowledge sought by the seeker or who can direct the seeker to the appropriate source of knowledge. Successful knowledge sharing takes place when suitable links are established between these two kinds of persons. Nevertheless, knowledge sharing
can be impeded by four significant barriers. However, these can be overcome through the use of a CoP (Hildreth & Kimble, 2004). The barriers are:

- **Awareness**, causing seekers and sources to discern their particular knowledge;
- **Access**, offering seekers and sources the required time and space to related to one another;
- **Application**, confirming that both knowledge seeker and source share the mutual interests and awareness essential to share their insights; and
- **Perception**, developing an environment where knowledge sharing activities between seekers and sources are esteemed and appreciated.

In general, apart from the storage and retrieval of information, the sharing of expertise places emphasis on human elements, such as intellectual, societal, ethnic, and organizational facets of knowledge effort. In contrast to conventional methods, where the emphasis is on the management’s role arranging the exchange of knowledge, this viewpoint emphasizes self-ordered activities of members of the organization. Organizations, by facilitating sharing, endeavor to link individuals with each other to encourage interaction, education, and organizational knowledge. The management of expertise includes the use of CoPs and knowledge communities to enhance the expertise of communities, professions, and groups, in general.

Ackerman and colleagues (2003) drew attention to three forms of knowledge sharing in organizations. The first, **knowledge retrieval**, signifies knowledge sharing from the organization to an individual. In other words, the individual’s purpose is to retrieve knowledge extant in the organization. The second form of knowledge sharing is **knowledge sharing**. This signifies the imparting of knowledge between individuals or the exchange of knowledge extant in an individual. The third form, or **knowledge creation**, indicates
knowledge sharing between individuals with the objective of creating new knowledge. The new knowledge arises from innovative blending of knowledge that is extant in an individual, a group of individuals, or the organization.

**Barriers and Limitations of Knowledge Sharing**

Knowledge sharing in organizations may encounter various barriers and be characterized by some limitations. For instance, cultural factors, such as absence of trust, varying ethnicities and languages, absence of time and suitable places to meet, deficiency in recipients of the capacity to learn, certainty that knowledge is the privilege of certain groups, etc., are regarded as a primary inhibitor of the transfer of knowledge (Davenport & Prusak, 1998).

On the other hand, Ackerman and colleagues (2003) regarded the hindrances to the capacity of persons to impart and convey their expertise from the cognitive and motivational perspectives. In general, cognitive shortcomings are associated with the manner in which information is stored and processed by experts. These may inhibit the sharing of expertise with other persons notwithstanding their motivation. Cognitive shortcomings encountered by experts originate partially from the manner in which they intellectually characterize the tasks. For instance, as expertise grows, the mental characterizations become more intangible and abridged. On the other hand, motivational shortcomings are associated with the evaluation and recompense processes of most organizations and also with the inherent competition between employees, teams, and departments. Resources, such as time and energy, are required for knowledge transfer. Moreover, the absence of organizational awareness and policies to support and facilitate knowledge transfer may impede the process as employees require to be recompensed for the time they invest in knowledge sharing and associated interactions. Nevertheless, motivational impediments to the sharing of expertise can be dealt
with in a straightforward manner by means of modifications in organizational systems, for instance, lessening rivalry between groups, permitting the evolution of CoPs, removing the emphasis from position-related hierarchies, and enhancing inducements for the sharing of expertise with others (Antonova & Gurova, 2006).

**Organizational Socialization**

The term organizational socialization signifies “a process by which employees learn about and adapt to the new jobs, roles, and the culture of the workplace” (Klein & Weaver, 2000, p. 47). In other words, the process by which a person obtains the social information and competences required to undertake a role in an organization is termed organizational socialization (Van Maanen & Schein, 1979; Taormina, 1997). Moreover, this takes place any time an employee moves between organizations (Van Maanen & Schein, 1979; Wachtfogel, 2009).

In general, studies about organizational socialization place emphasis on two different areas of research which commence from the practice and substance of organizational socialization (Chao, O'Leary-Kelly, Wolfe, Klein, & Gardner, 1994; Woo, 2006). The emphasis of research related to the practice of organizational socialization is on the phases encountered by individuals as they transform into integrated insiders from their earlier role as outsiders in the organization (Van Maanen & Schein, 1979; Wachtfogel, 2009). In contrast, the emphasis of research related to the substance of socialization is the learning necessitated for successful socialization to take place (Schein, 1971; Wachtfogel, 2009). Van Maanen and Schein (1979) recognized six strategic dimensions of organizational socialization tactics defined as “the ways in which the experiences of an individual in transition from one role to another are structured for him by others in the organization” (Van Maanen & Schein, 1979, p. 34-35). This taxonomy for socialization formulated communicates the different means by
which the persons undergo transition from one role to another in the organization. Moreover, it indicates that other persons in the organization have a role to play in the socialization of newcomers (Wachtfoel, 2009).

It was suggested by Fisher (1986) that four content areas clarify the practice of socialization, namely the principles, objectives and culture of an organization; principles, standards and relationships in workgroups; activities, required competencies and knowledge associated with jobs; and individual change associated with the recognition of self-image and motives. This notion was expanded by Chao and colleagues (1994) who extended the content-related fields and proposed a scale for evaluation. This study provided six dimensions related to content, that is, performance proficiency, or the extent to which the tasks, competencies and capacities required for the job are learned by a new employee; people, signifying an awareness of the key players in the organization who can assist the newcomer in adapting to the organization and the job; politics, which deals with acquiring knowledge about the formal and informal networks in the organization along with an awareness of the organizational power structures; language, which encompasses the awareness of the individual of the technical language of his/her profession along with the terminology, catchphrases and abbreviations peculiar to that organization; the emphasis of organizational goals and values is on the knowledge of the individual with regard to the organization’s formal and informal objectives and principles; and, history, which signifies the awareness of an individual of the conventions, legends, practices, and customs of an organization that foster a certain work environment (Chao et al., 1994; Watchfogel, 2009).

Organizational Learning

In general, there is consensus that an organization’s future performance is improved by learning (Fiol & Lyles, 1985). Moreover, there is agreement that learning in an
organization occurs at multiple levels (individual, group, and organizational) (Crossan, Lane, & White, 1999), at different intensities (single/ double/ triple or high/low level) (Altman & Iles, 1998; Argyris & Schön, 1978; Ebrahim, 2005; Fiol & Lyles, 1985) and modes (explicit/implicit) (Crossan et al., 1999). Thus, Fiol and Lyles (1985) defined organizational learning as “the development of insights, knowledge, and associations between past actions, the effectiveness of those actions and future actions’ (p. 811). Another perspective was provided by Dodgson (1993) who suggested that organizational learning is the manner in which knowledge and routines are built, augmented, and structured by organizations encompassing their actions and philosophies, modifying and maturing organizational productivity by enhancing the usage of their workforces’ broad skills. Supporting this perspective, Huysman and de Witt (2003) observed that “organizational learning is seen as the process through which an organization (re)constructs knowledge” (p. 29).

**Depths of Organizational Learning**

The study of Fiol and Lyles (1985) on organizational learning revealed that several researchers utilized various extents of learning, such as low-level learning, which signifies adapting behavior in an organizational framework (owing to recurring behavior), and high-level learning, which signifies modifying the general standards and guidelines (intellectual practices at a higher level of management). Moreover, Fiol and Lyles (1985) demonstrated that different researchers employed this aspect to depict the fundamental characteristics of organizational learning, only they used different nomenclatures for the concepts. For example, Argyris and Schön (1978) explained the concept of single-loop learning (modifications in the processes and policies of an organization) and double-loop learning (modifications in ‘governing variables’ or values which lie beneath the processes and policies). These two extents indicate the diverse intensities of learning.
Single-loop learning signifies remedial activity, endeavoring to resolve problems without extensive modification in the extant structure. On the other hand, double-loop learning signifies modification that could be attributed to underlying change, examining fundamental theories and attitudes and altering them if necessitated. A third extent, triple-loop learning was posited by Altman and Isles (1998) in allusion to Swieringa and Wierdsma (1992). According to this notion, single-loop learning occurs when the manner in which things are done is questioned. Double-loop learning takes place when the rationale for a thing being done is questioned. On the other hand, triple-loop learning denotes examination of the fundamental mission, vision, and values of an organization.

Levels of Learning

Crossan and colleagues (1999) suggested that organization learning and its application can occur at three distinct levels: individual, group and organization. In contrast, Fiol and Lyles (1985) suggested that learning can occur at two levels: individual or organizational. They posited that while individual learning is significant, the transmission of learning to others and to create memories, intellectual systems, and organizational learning necessitates systems. In this manner, an organization’s awareness and analysis of its environment can be obtained and the creation of strategies can be performed (Fiol & Lyles, 1985). This demonstrates that individual learning while significant does not suffice for organizational learning as organizational learning is not the natural outcome of individual learning. However, it must be noted that organizational systems can in their turn stimulate or obstruct individual learning. Consequently, it can be inferred that individual and organizational learning reciprocally strengthen each other.
The Process of Learning

Overall, there is consensus in extant research about organizational learning that organizational learning is an active process. A model of the fundamental cycle of organization learning was created by Ebrahim (2005). To this model, also referred to as the ‘Stimulus-Response Model of Learning,’ the influences of the organizational environment were added (Ebrahim, 2005, p. 116).

This learning model (Figure 2.2) suggests that within an organization, the learning process occurs in a learning cycle comprised of four steps. This learning cycle is affected by factors in the environment, such as government policies, competition, etc. The external factors inspire an organization to change and respond, while in turn the environment is modified to a certain extent by the organization. Thus, this learning model clarifies the manner in which experience and knowledge is acquired by organizations as they act in response to stimuli from situations encountered in the environment (Ebrahim, 2005).

Figure 2.2 Stimulus-Response Model of Learning

Source: Adapted from Ebrahim (2005), p. 116
Crossan and colleagues (1999) offered another model related to the process of organizational learning. In this model, organizational learning is depicted as a multi-layer and active process which commences as individual learning, then progresses to group learning, and culminates in organizational learning. Alluding to March (1991), Crossan and colleagues (1999) observe that organizational learning stems from administering exploitation (i.e., taking advantage of what has already been learned) and exploration (i.e., fresh learning). This is achieved by using feed-forward and feedback processes across the various phases of learning. Ebrahim (2005) also alluded to March (1991) and explained that learning can be achieved by doing, exploring, or imitating. In this context, learning by doing is exploitation, a cyclical process of trial and error within a procedure that is probably enhanced (Ebrahim, 2005). Exploration can be described as seeking for fresh concepts and practices without being able to perceive the complete outcomes of the decision (Ebrahim, 2005). March (1991) on the other hand described exploration as “search, variation, risk taking, experimentation, play, flexibility, discovery, innovation” (p. 71). Imitation is adopting the practices or tactics of other organizations (Ebrahim, 2005).

The model created by Crossan and colleagues (1999) is termed the “4Is” model and depicts organizational learning as deliberate regeneration by means of four practices at the three diverse levels of learning (individual, group, organizational) which entail the generation and use of knowledge. These four practices or processes are: Intuiting, Interpreting, Integrating and Institutionalizing or the 4Is (Figure 2.3) (Crossan et al., 1999).
Crossan and colleagues (1999) suggest that the process of learning commences at the level of the individual with intuition. In other words, where individuals handle insights based on their familiarity and capability. These insights are then deciphered and conveyed to the group. The analytical process is established by the individuals communicating their ideas with others in the group and converting them from implicit to explicit knowledge, thus assisting in the integration of this knowledge into the group’s intellectual representations. Interpretation occurs at both the individual and group levels. Finally, the integration takes place at the group level by accomplishing a logical, combined action which transmits the learning to the level of the organization. Integration occurs at the group and organizational levels. Knowledge is integrated at the organizational level and the ultimate process of institutionalizing can occur by means of systems, practices, and frameworks, which make the learning accessible to all organizational members (Crossan et al., 1999).

In brief, while a process of learning is included in Ebrahim’s (2005) model in addition to various depths of learning (single- and double-loop), it does not differentiate between the
various levels of learning (individual, group or organizational level). In contrast, the 4Is model of Crossan and colleagues (1999) includes a process of learning along with the different levels of learning (individual, group and organizational level). However, it does not include the different depths of learning (i.e., single- or double-loop).

**Facilitators and Barriers to Organizational Learning**

Fiol and Lyles (1985) posited that four circumstantial aspects govern the likelihood that learning will take place, namely culture, strategy, structure and environments (p. 804-805). These were renamed by Ebrahim (2005) as governing factors which may limit or facilitate learning at every phase of the learning cycle. The governing factors described by Ebrahim (2005) are cognitive capacities, relationships of power, and perceptual frames. Similarly, Lipshitz, Popper, and Friedman (2002) agreed that different groups of factors enhance the probability of learning. They created a comprehensive multi-feature model of organizational learning which comprises several significant aspects that govern the quality of organizational learning. This model builds on the earlier introduced notions as it constructs a framework of situations that enable learning and is termed the ‘Multifacet Model of Organizational Learning’ (Lipshitz et al., 2002, p. 81). The dynamics under which organizations are likely to learn are described in this model. Overall, the model posits that the better the accomplishment of these facets the greater the probability of learning. The five facets developed by Lipshitz and colleagues (2002) are structural, cultural, psychological, policy, and contextual facets. Each of these factors are set together by several favorable conditions (Figure 2.4).
Lipshitz and colleagues (2002) suggested that organizational organizations could be differentiated as learning ‘in’ (i.e., individual and group levels of learning) and learning ‘by’ an organization (i.e., organizational level) (p. 78). Accordingly, they argued that different organizational learning mechanisms (OLMs) are required for transforming and distributing the information to accomplish learning ‘by’ organizations (Lipshitz et al., 2002). Some examples of OLMs include the handling of information management and documentation about lessons learned in a centralized system to enable learning from these (Van Brabant, 2001). Moreover, reporting guidelines assist organizations in making reports more useful...
tools of information gathering. Another essential form of OLMs is handover mechanisms, which aid in the preservation of institutional memory and learning (Van Brabant, 2001).

**Theories of Learning**

Traditionally, three predominant theories have attempted to explain learning, namely behaviorism, cognitive and constructivism. Subsequent to later research, a few more theories have been suggested. These are described in this section.

**Behaviorist Theories**

Behaviorism is a concept that considers learning as a practice which reveals itself in the behavior of an individual. That is, learning is a practice that is evident to others (Watson, 1913). Frequently, behaviorist theories allow involuntary learning (Pavlov, 1927/2010). Thus, learning, for behaviorists, is the gaining of fresh behavior by means of ‘conditioning,’ with two forms of conditioning being recognized in the process of learning.

Classical conditioning, as per Pavlov’s (1927/2010) experiments, takes place when the behavior is a reaction to an impetus. He arrived at the inference that an ‘unconditioned’ impetus stimulates an unconditioned response, which, when introduced in conjunction with a conditioned impetus, subsequently becomes a conditioned response (Pavlov, 1927, p. 242).

The other form of conditioning, or operant conditioning (Skinner, 1957/2014), signifies behavior reinforced by an incentive or a penalty. It is argued by this theory that learning takes place when there are alterations in behavior, when this behavior is enforced or required by the circumstances, it supports the happening of these changes (Skinner, 1957/2010). His primary goal was to enhance the prospects of occurrences repeating themselves either by constructive or adverse reinforcement. Other researchers who have worked on behaviorist theories include Thorndike, Tolman, Guthrie, and Hull.
Social Learning Theory

The social learning theory can be positioned at the changeover between behaviorist and cognitive perceptions of learning. Social learning is founded on the notion that people learn by studying others. Accordingly, this theory places emphasis on the social context of learning, confirming the notion that individuals continually learn from each other by scrutinizing, mimicking or modeling each other. The chief advocate of describing learning in a social context is Bandura (1986). In contrast to the behaviorist theories, the social learning theory does not posit that learning will result in behavioral changes (Bandura, 1977). Instead, it draws attention to intellectual processes and such aspects as understanding and outlooks (Bandura, 1986). Another key notion in the theory is modeling and this is presented as an intellectual facet of social learning by means of which the behavior of others is acquired by concentration, memorizing, imitation of movements, and incentive.

Cognitive Theories

Cognitive theories emerged as a critique of the behaviorist approach. They contend that overt actions cannot independently explain learning (Chomsky, 1959). Instead, these theories posit that memory has a significant part to perform in the human brain from the perspective of utilizing and handling information in a systematic manner. In contrast to behaviorists, cognitivists place emphasis on the individual learning who is continually depositing information in short- or long-term memory (Ormond, 1999).

Constructivist Theories

Constructivist theorists (e.g., Piaget, Bruner, Vygotsky, and Dewey) are in consensus that learning is, in reality, a creation of fresh knowledge based on the personal experiences of an individual (Fenwick, 2003).
Social constructivism is a significant focus in constructivism. This implies that when an individual participates in social interaction, he/she must discover associations and construct his/her own knowledge by practice. This is in contrast to other theories which indicate individuals learn directly from other members of society. Active learning, reflective practice, transformational learning, knowledge-building, discovery learning, situated cognition, self-directed learning, experiential learning, and religious practice are some other variants of constructivism.

Connectivism

The origins of connectivism can be traced to the work of Vygotsky and the situated learning theory. However, connectivism enlarges on these theories by including facets of intricacy, routines, and the network principle. It was argued by Siemens (2005) that technology had not been counted as an influence on learning when the theories behaviorism, cognitivism, and constructivism were developed. As a consequence, they could be deemed to inadequately explain online learning environments. Connectivism was the new theory suggested as an alternative by Siemens (2005) which he posits is a learning theory more appropriate for online learning, in which information is plentiful and varied, adjusts continually, and includes several viewpoints.

It must be noted, however, that criticisms exist with regard to connectivism as a learning theory. For example, connectivism was rejected by Kerr (2007) as a theory, when he observed that adequate explanation is offered by constructivism or active embodied cognition and that connectivism offers no innovative principles. Moreover, Bell (2011), Williams, Karousou, and Mackness (2011), and Kop and Hill (2008) also criticized connectivism as a theory, observing that connectivism independently cannot adequately inform learning and the reinforcement provided by technology in an online world. Also, Kerr (2007) observed that
the process of learning (i.e.,) transferral-understanding, making-understanding, and building-understanding cannot be adequately explained by connectivism. Further, Williams and colleagues (2011) allude to the work of Barnes and Tynan (2007) as proving that social networking does not inevitably convert to learning. Williams and colleagues (2011) contended that for learning to occur in a connective environment, mechanisms for validation and self-correction and for balancing constraints and freedom were required. Ravenscroft (2011) argued that collaborative dialogue was required for thinking (learning) in networks, and that only by means of constant discourses that build and convey meaning can sense-making occur.

Consequently, it is evident that connectivism has not gained acceptance as an innovative learning theory, with criticism predominantly centered on its inadequate explanation of the method by which the learning relates to information. Nevertheless, it can be useful as a means by which systems of online learning and KM can be developed, a view endorsed by Kop and Hill (2008), who observed that while it cannot be recognized as a theory of learning, connectivism can contribute to new models of learning. Accordingly, Kop and Hill (2008) refer to connectivism as a pedagogical framework, and Boitshwarelo (2011) refers to it as an instructional framework, with pedagogical features. Siemens and Conole (2011) summed up the present academic thinking on connectivism when they observed “connectivism is perceived as relevant by its practitioners but as lacking in rigour by its critics” (p. iii).

**Learning in Virtual Teams**

With advancements in technology and increased globalization (Orlikowski, 2008; Watson-Manheim, Chudoba, & Crowston, 2012), organizations in the present day encounter new challenges to make certain that learning environments in the workplace can successfully
provide the proposed learning practices for their employees who are progressively being converted into participants of virtual teams. Certainly research indicates that almost half of all employees are part of some kind of virtual team in their organizations (Lepsinger & DeRosa, 2010).

Virtual teams have been defined in various ways in literature. The definitions may include three elements, namely, geographic dispersal (e.g., various locations, areas, and/or time), technological techniques for communication (e.g., virtual spaces), and accomplishment of tasks (Mesmer-Magnus, DeChurch, Jimenez-Rodriguez, Wildman, & Shuffler, 2011; Pazos, 2012). Andrade and Huang (2014) defined a virtual team as “collaboration amongst telecommuting employees that use various forms of technology to communicate and share knowledge in order to complete a task in a timely manner” (p. 65).

In general, virtual teams are common in organizations as they generate cooperative settings irrespective of physical obstacles, permit employee flexibility, and are economical to establish as there is no requirement for travel and per diem expenditure (Guo, D’Ambra, Turner, & Zhang, 2009). Moreover, there is a greater likelihood that members of virtual teams who operate cooperatively, out of need, may acquire beneficial knowledge to build their expertise thus enhancing their performance (Ebrahim, Ahmed, & Taha, 2011; Liu, Magjuka, & Lee, 2008).

However, while virtual teams are economical cooperative units in organizations, they are not without challenges. In particular, two matters regularly mentioned in studies are flimsy trust and unsettled disagreements between virtual team members which can be attributed to their failure to recognize and establish a social ‘presence’ in the virtual setting, which further influences the proposed learning and performance consequence (Bennett & Bierema, 2010; Liu et al., 2008; Mesmer-Magnus et al., 2011). A practical solution, to
surmount these drawbacks, is to assist team learning by means of the successful use of communication approaches in a virtual setting (Levi, 2014; Mayer, 2010; Mesmer-Magnus et al., 2011).

Social networking and virtual spaces are communication approaches that have been recognized as enhancing discussion between team members (Ebrahim et al., 2011; Mesmer-Magnus et al., 2011; Shachaf, 2008; Warkentin, Johnston, & Shropshire, 2011). Moreover, Shachaf (2008) found that global teams that interacted in a virtual team space reported enhancements in team cooperation owing to the capacity to mingle and impart knowledge. Additionally, it was reported that social interaction of employees through social network sites resulted in enhanced learning (Warkentin et al., 2011). Thus, it is evident that regular communication between members of virtual teams could foster knowledge sharing that in turn results in learning and enhanced performance in the workplace.

**Social Presence Theory for Enhancing Social Presence**

As mentioned briefly in the preceding discussion, one of the challenges in virtual teams is the inability of a person to establish as social presence. Recognizing the presence of team members in a virtual team setting may be challenging in comparison to face-to-face settings. Team members may see each other regularly in face-to-face settings. Consequently, their capacity to interpret verbal and non-verbal prompts from each other may become simple. However, in the context of virtual teams, the ability of team members to observe each other’s verbal and non-verbal prompts may be restricted and depend the system used for communication (Cheshin, Rafaeli, & Bos, 2011; Gunawardena & Zittle, 1997). Accordingly, the capacity of team members to publicly recognize each other’s presence is hindered, which in turn could result in a situation in which there is a reduction in learning and job performance (Montoya, Massey, & Lockwood, 2011; So, 2009). The theory of Social
Presence (Social Presence Theory; Short, Williams, & Christie, 1976) attempts to provide clarity with regard to consciousness of individuals to each other, and the social exchange that occurs through telecommunications. This theory suggests that social consciousness can be attained by two essential methods: intimacy and immediacy. The first, intimacy, is influenced by non-verbal and verbal prompts, such as facial expressions (e.g., beaming) and eye contact. The second, immediacy, signifies the physical distance between persons and can be realized by both non-verbal and verbal interactions such as facial expressions and physical closeness.

The design of virtual environments has been enhanced through the use of the social presence theory. Consequently, improvement has been observed in the interaction and learning among members of virtual teams (Cheshin et al., 2011; Montoya et al., 2011; So, 2009). By placing emphasis on improved interaction in the cooperative setting, So (2009) found that virtual teams which interacted regularly enhanced their awareness of social presence and knowledge to increase their job performance. The sense of social presence among members of virtual teams is increased by cooperative virtual world environments which in turn results in enhanced interaction and knowledge sharing (Montoya et al., 2011). Overall, it can be seen that regular communication with team members in virtual settings can improve the capacity of members to recognize each other’s social presence which in turn favorably influences learning and enhances performance on the job. Furthermore, trust building may take place speedily if members of a virtual team have an awareness of social presence.

**Swift Trust Theory for Trust Building**

Several researchers (e.g., Sarker, Ahuja, Sarker, & Kirkeby, 2011; Webster & Wong, 2008) have drawn attention to the considerable benefits of the swift building of trust among virtual team members as this implies that they would be capable of sharing knowledge regularly and accomplish tasks. However, two reasons make it challenging to develop trust in virtual teams. Firstly, there is unpredictable communication between the team members.
Developing trust in face-to-face settings is simpler than in virtual settings as team members may be encouraged by their physical viewing of each other to regularly communicate (Kahai, 2008). This regular communication can help team members to learn about each other, both from individual and professional perspectives, resulting in a trusting association that improves the performance of a team (Crisp & Jarvenpaa, 2013; Kahai, 2008). Secondly, there is a lack of individual and societal links in communication between members of a virtual team. The communication of members of virtual teams places greater emphasis on work-associated activities than non-work topics in contrast to teams in face-to-face settings. Developing trust would necessitate greater effort without being familiar with other members of a virtual team outside the workplace (Levi, 2014; Sarker et al., 2011; Webster & Wong, 2008).

The basis of the Swift Trust Theory (Meyerson, Weick, & Kramer, 1996) is the concept that transient groups have the capacity to trust each other from previous typecasts and developing trust through conventional approaches is constrained. This theory was enlarged by Mai and Raybaut (2010) to apply to virtual teams. They developed modeling systems to recognize the association between trust, performance and organizational aspects (i.e., knowledge sharing). The resultant models suggested that the performance of virtual communities could be rationalized by the degree of trustworthiness or suspicion in the degree of individual participation, not of necessity by the previous typecasts assumed, to develop a swift trusting association. That is, swift trust takes place in the virtual setting and is sustained during the course of the project’s existence by the activities of individuals within the team (Xu, Feng, Wu, & Zhao, 2007). These activities are chiefly accomplished by means of unofficial knowledge sharing, finishing tasks in a timely fashion, regular communication, and mutual respect (Crisp & Jarvenpaa, 2013; Dubé & Robey, 2008; Rusman, Van Bruggen, Cörvers, Sloep, & Koper, 2009; Sarker et al., 2011). It was inferred by Rusman and
colleagues (2009) that if a sense of social presence was felt by virtual team members and they gained knowledge about various facets of the project by interacting regular with each other, trust could be developed and result in performance of a high quality. In the context of global student teams, Sarker and colleagues (2011) concluded that trust facilitates the association between interaction and the performance of an individual. In other words, if a person has a high degree of trust, he/she will be able to communicate successfully, leading to good performance. On the other hand, if an individual has a low degree of trust, he/she will not be able to communicate successfully, leading to poor performance. In essence, developing a trusting association between members of virtual teams may also permit them to work cooperatively to solve problems.

**Conflict Attribution Theory for Conflict Resolutions**

In organizations, conflicts result from nonalignment between the outlooks and activities of individuals. However, conflicts are not always detrimental for the workplace (Liu et al., 2008). In general, a conflict in a team would involve two or more persons, team members experiencing a sense of strain, concealed participation from team members (i.e., team members who are not vigorously participating for several reasons), and numerous team members who are subduing or trying to control decisions (Montoya-Weiss, Massey, & Song, 2001). Researchers (e.g., Kankanhalli, Tan, & Wei, 2006; Pazos, 2012) have observed that there is greater tendency for frequent conflict in virtual teams as employees may feel the absence of social presence and trust. The Conflict Attribution Theory (Kankanhalli et al., 2006) offers a solution to put an end to conflict. This theory suggests that there are three approaches in which teams can decrease conflicts, namely **integrative**, **distributive**, or **avoidance**. Team members working cooperatively to resolve the conflict is an instance of the integrative approach. The distributive approach is in use when teams assertively solve a conflict. The avoidance approach can be recognized when the conflict at hand is ignored by
team members and attain no outcomes. In the context of virtual teams, the integrative and distributive approaches seem to enhance team performance as issues are discussed in the team. However, while the integrative approach recognizes and attains outcomes that are acceptable to all team members, the distributive approach produces outcomes that give preference to some team members over others. Ehsan, Mirza, & Ahmad (2008) suggested that by increasing communication using computer-mediated communication mechanisms, such as e-mail/instant messaging, conflicts in virtual teams can be reduced and worked out. Pazos (2012) examined virtual teams and performance outcomes using conflict management as basis and suggested that the commitment of teams is increased with regard to their objectives and finally performance on the task if they vigorously pursue the prevention and resolution of conflicts as they happen.

**Knowledge Processes in Virtual Teams**

Knowledge practices for virtual teams can be considered to be influenced by three key viewpoints. Firstly, knowledge practices of virtual teams have a significant association with individual and organizational learning. The importance of teams in learning (Edmondson, 1999; Senge, 1990) and as a significant means to integrate the knowledge resources of an organization (Grant, 1996) has been emphasized in organizational learning research. Moreover, teams play a significant role in individual learning from the perspective that individual rationale and conduct is influenced by the social setting of the workplace (Edmondson, 2002; Hackman, 1992), a viewpoint highlighted also in research associated with conveying of learning from group-to-individual (Olivera & Straus, 2004).

Secondly, a progressively significant role in controlling and assimilating knowledge across geographically distributed organizations has been assumed by virtual teams. Moreover, virtual teams have a crucial role in creative activities (e.g., innovation; Leonard &
Sensiper, 1998; Malhotra, Majchrzak, Carman, & Lott, 2001), in responding to a deficiency of know-how (resulting from present trends, such as downsizing, globalization), and in dealing with the preference of employees for enhanced flexibility and progress (Markus, Manville, & Agres, 2000; Townsend, De Marie, & Hendrickson, 1998).

Thirdly, an objective of virtual teamwork is required to more successfully achieve tasks by more effectively utilizing extant knowledge. As a result, studies investigating virtual teamwork must scrutinize knowledge and learning as a means, rather than an end in itself, as revealed in studies on distance-learning (Alavi & Leidner, 2001).

**Research Gap**

As discussed in the Introduction to the dissertation (Chapter 1), it can be inferred that in any organization, the management and sharing of knowledge and organizational learning are essential to its continued success and sustained competitive edge. However, in the current context of global organizations where teams are scattered and even in the same geographic location, alternate workspaces are provided to facilitate employee or organizational convenience, the matter of organizational learning and knowledge sharing can become a matter of great complexity.

Overall, the following gaps in research could be recognized from the general review of literature:

- Significant attention has been given to knowledge, knowledge management, knowledge sharing, organizational learning, theories of learning, and virtual teams. However, very few studies were observed to have explored the impact of virtual teams on knowledge sharing and organizational learning.
• Also, very few studies explored the interaction between the theories of learning and organizational learning and knowledge sharing.

• Moreover, models associated with organizational learning or knowledge sharing were not seen to be the emphasis of studies on either concept.

However, since this is the first level of literature review for the current study (Please see Chapter 3: Research Methodology for more details), it is anticipated that the subsequent systematic review may provide more insights which can inform the achievement of the study’s eventual goal.

Summary

This chapter provided an overview of knowledge, organizational knowledge, knowledge management, and knowledge sharing. Subsequent sections provided an overview of communities of practice, organizational socialization, organizational learning, and theories of learning. An overview of learning in virtual teams was also provided. The next chapter describes the research methodology used for the study.
CHAPTER 3

METHODOLOGY

Introduction

The purpose of the current chapter is to offer an overview of the research design and research methodology employed by the current study. Benbasat and Weber (1996) observed that “research methods shape the language we use to describe the world, and language shapes how we think about the world” (p. 392) In other words, the methodology selected for use by a study affects its outcomes and inferences. Therefore, the course of a study must include the selection of a suitable method of research to direct the investigation. Consequently, the motivation behind the choice of a methodology requires assessment.

Flick, Von Kardorff, and Steinke (2004) observed that the research design of a study is a strategy to gather and examine data that will enable the researcher to answer the research questions proposed by the study. Further, McMillan & Schumacher (1993) specified that a research design signifies the manner of strategy employed by the study to acquire data to resolve the research questions. Mouton (2001) described the research design of a study as its “architectural design or blueprint” and the accompanying execution of the design whereas the research process or methodology was the “construction process using methods and tools” (p. 56). Moreover, Mouton (2001) claimed that the research methodology emphasizes the process of research process and the type of instruments and processes to be utilized in the study. Mouton (1996) described a research method as the group of methods, in totality, used by researchers to achieve their objectives in the acquisition of legitimate information. On the other hand, it was asserted by Cohen, Manion, and Morrison (2013) that the term research method signified a variety of methods employed in educational research to collect data that is
to be utilized as a foundation for intervention and understanding for rationalization and extrapolation. Henning, Van Rensburg, and Smit (2004) suggested that “methodology” indicates the rational set of methods that balance one another to supply data and outcomes that indicate the research question and correspond to the research purpose.

Also, the research design of a study must recognize the type and form of data necessitated to provide answers to the research questions, the methods to acquire this data, and the process(es) utilized for data analysis (Gripsrud, Olsson, & Silkoset, 2016). A study’s design is governed by the researcher’s present awareness about the topic under consideration and the goals concerning the consequences of inspecting and describing the data (Gripsrud et al., 2016).

As described briefly in the Introduction to the dissertation, Design Science Research (DSR) was adopted as the research methodology for this study (March & Smith, 1995; Hevner, March, Park, & Ram, 2004). The chapter will thus provide an overview of the philosophical basis of design science research, the process of design science research and the approaches employed for data collection in the study. An overview of the research strategy used for the current study will also be provided.

Figure 3.1 depicts the flow of activities in the present study.
Philosophical Bases of Design Science Research

Oates (2005) suggested that the objective of research paradigms is to describe the basic philosophical viewpoints of groups of persons concerning the world they inhabit and the studies performed by them. With regard to IS and IT research, Olivier (2009) suggested that a research paradigm not only directs research but also directs the creation and operation of systems.

Research, in the IS and IT context, is explained by four principal philosophical foundations or basic theories: ontology, axiology, epistemology, and methodology. Ontology considers the quality of science or the quality of being. Hirschheim, Klein, and Lyttinen (1995) describe ontology as the “nature of what is being investigated” (p. 20). The philosophical perspective of the researcher, in scientific studies, defines the manner in which he/she will ontologically describe the details associated with a knowledge domain. For
instance, while a positivist viewpoint gives prominence to the revealing of truths regarding the present context of an event, a phenomenological viewpoint lays emphasis on the researcher’s mindset rather than real world events (Checkland, 1999; Dietz, 2010).

Ontology has also been described as the study that illustrates the character of existence or the manner of the areas of research to be studied (Adebesin, Kotzé, & Gelderblom, 2011; Vaishnavi & Kuechler, 2015). In the context of ontology, questions that can be asked include: ‘what is basic and what is derived’ or ‘what is factual and what is not.’ Many perspectives of reality can be expressed (Table 3.1).

**Table 3.1 Perspectives of Reality**

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single reality</td>
<td>This perspective suggests the existences of a single reality. Accordingly, it is the task of the researcher to unearth that reality. However, this may frequently be limited to a specific domain of possibility (Mertens, 2014).</td>
</tr>
<tr>
<td>Multiple realities that are socially constructed</td>
<td>This perspective suggests that there are multiple, relative realities. That is, more than one reality can exist due to multiple connotations that are socially fashioned. Opinions of reality may be altered during the course of research. The concept of socially constructed indicates that human beings do not locate or uncover knowledge as much as they build or fashion it (Mertens, 2014).</td>
</tr>
<tr>
<td>Socially constructed realities that are influenced by power relationships</td>
<td>Multiple accounts of what is recognized to be real and what is considered to be real necessitate critical assessment through a philosophical review of their role in preserving social structures and policies that are oppressive (Mertens, 2014; Tashakkori &amp; Teddlie, 2010).</td>
</tr>
<tr>
<td>Multiple realities that are contextually situated</td>
<td>Several circumstantially established world-states that are socio-technically supported could be in existence (Vaishnavi &amp; Kuechler, 2015).</td>
</tr>
<tr>
<td>Change in reality through man-made artifacts</td>
<td>A single, permanent grounding reality is required to create an artifact; however, the objective is to transform reality by the presentation of an original artifact (Vaishnavi &amp; Kuechler, 2015).</td>
</tr>
<tr>
<td>Change in reality as research proceeds</td>
<td>Reality is subject to change during the course of the research effort and the ontological perspective alters through the various iterations of a study (Adebesin et al., 2011; Vaishnavi &amp; Kuechler, 2015).</td>
</tr>
</tbody>
</table>

Axiology signifies the researcher’s values concerning the setting of the research (Adebesin et al., 2011; Vaishnavi & Kuechler, 2015). Also, axiology is the analysis of values and it takes into account the values held by individuals or groups along with the effect of
such beliefs on the conduct of research (Adebesin et al., 2011; Vaishnavi & Kuechler, 2015). Moreover, the values held by a researcher or a research community can be restated to denote what is advantageous for the community or researcher. For instance, whether the artifact produced during the research is of greater value or more advantageous to the community or researcher than the resolution of the problem. Typically, values are associated with ethics, scrutinizing the notions of what is good and right in personal and societal behavior, and with esthetics, examining the notions of harmony and beauty. Table 3.2 offers a list of probable values to be considered in research.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truth</td>
<td>Truth is the focus of natural science theories (Vaishnavi &amp; Kuechler, 2015) and the objective of behavioral research (Hevner et al., 2004).</td>
</tr>
<tr>
<td>Understanding</td>
<td>The design science researcher values traditional research values such as the pursuit of understanding (Vaishnavi &amp; Kuechler, 2015)</td>
</tr>
<tr>
<td>Caring, justice and community rapport</td>
<td>A role is played, in critical research, by the combination of principles of caring and justice along with robust community affiliation (Mertens, 2014)</td>
</tr>
<tr>
<td>Utility by practitioner</td>
<td>Utility is the objective and emphasis of design science research is utility (Hevner et al., 2004; (Vaishnavi &amp; Kuechler, 2015)</td>
</tr>
<tr>
<td>Creation</td>
<td>Inventive manipulation and regulation of the setting is esteemed by the design science researcher (Vaishnavi &amp; Kuechler, 2015).</td>
</tr>
</tbody>
</table>

It is significant to recognize that a value or appropriate consequence can be related to an objective even though a particular goal may not be supported by certain values. Hence, it is of merit to widen the discussion of values to additionally take account of whether the achievement of a goal is advantageous for the researcher. Vaishnavi & Kuechler (2015) suggested that a significant motivation for a researcher is the assessment received for their efforts and conclusions by themselves or the wider community of other researchers.
Moreover, the assessment is frequently related to the attainment of a specific research objective. Potential research objectives to be considered include:

- **Justified theory.** Research in the behavioral sciences is dealt with typically by the elaboration and rationalization of theories that clarify or forecast events associated with the recognized requirement (Hevner et al., 2004).

- **Prediction.** Awareness is knowledge that permits forecasting of the behavior of some facets of a phenomenon (Vaishnavi & Kuechler, 2015). The objective of theory is the projection of a phenomenon and outcomes of positivist studies can be typically duplicated and generalized (Adebesin et al., 2011).

- **Theoretical explanation.** The objective of theory, in social science, is to provide details regarding the existence of certain goals or to forecast the effects of related goals. However, the achievement of the goals themselves is not an objective (Adebesin et al., 2011).

- **Description.** While the emphasis of descriptive research is comprehension (Baskerville & Pries-Heje, 2010), descriptive learning is the objective of behavioral research (Winter & Baskerville, 2010).

- **Prescription.** The emphases of prescriptive research include improvement of phenomena (Baskerville & Pries-Heje, 2010), the offering of solutions for management issues (Gregor & Jones, 2007), and prescriptive learning (Winter & Baskerville, 2010).

- **Problem solving.** Problem solving is emphasized by the axiology of design research (Vaishnavi & Kuechler, 2015). Moreover, the development of an artifact to resolve an issue is the chief interest of the researcher (Holmström, Ketokivi, & Hameri, 2009). Therefore, it can be concluded that the design science paradigm is essentially a concept that emphasises problem-solving (Hevner et al., 2004).
- **Pragmatic practical use.** The primary objective is to verify the effectiveness of an artifact, not to speculate or substantiate the reason why the artifact is effective (Hevner et al., 2004).

- **Changing of reality.** The intent of action researchers is to propose and proceed to modify a component of reality (Järvinen, 2007).

**Epistemology**, the third fundamental principle, reflects on the relationship between the researcher as an individual and the objective of the research. It signifies the manner in which the research produces knowledge about the phenomenon of interest. In other words, emphasis is placed on the manner in which the character of knowledge is considered or the facts about the knowledge obtained in the process are described by the researcher. Hirschheim and colleagues (1995) suggested that epistemology represents “the nature of human knowledge and understanding that can possibly be acquired through different types of inquiry and alternative methods of investigation.” (p. 20). For instance, in the background of design science research, Vaishnavi & Kuechler (2015) propose that an epistemology of “knowing through making” interconnects the association between the researcher and his/her purpose.

The association between researcher and participants establishes the degree to which they can have an effect on each other. It is acknowledged that the researcher’s assumptions, hypotheses, and background information can powerfully affect the phenomenon being studied (Mertens, 2014).

The fourth principle, **methodology**, consists of “developing or constructing.” In other words, methodology involves the examination of the outcome of a hypothesis or a phenomenon from the usage standpoint. Moreover, methodology can signify the approach by which the researcher logically progresses to ascertain everything he/she believes can be made aware of. From a philosophical viewpoint, methodology deals with the manner in which
knowledge is acquired and is a combination of process, methods, artifacts and guidelines (Nunamaker, Chen, & Purdin, 1990).

Table 3.3 provides a summary of the philosophical assumptions of Design Science Research.

Table 3.3 Philosophical Assumptions of Design Science Research

<table>
<thead>
<tr>
<th>Philosophical Perspectives</th>
<th>Design Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td>Several, contextually positioned substitute world states, enabled socio-technologically</td>
</tr>
<tr>
<td>Axiology</td>
<td>Regulation, construction, evolution (i.e., enhancement), awareness</td>
</tr>
<tr>
<td>Epistemology</td>
<td>Knowing through making: impartially limited interpretation within a setting, recurring circumscription discloses significance</td>
</tr>
<tr>
<td>Methodology</td>
<td>Evolving, determine impact of artifacts on the aggregate system</td>
</tr>
</tbody>
</table>

Source: Adapted from Adebesin et al. (2011), p.310

As discussed in Chapter 1 (Introduction), design science research (DSR) was chosen as the research paradigm for the current study. Briefly, the usage of DSR is in the design of artifacts or innovations to resolve problems or alter the condition of the world (Vaishnavi & Kuechler, 2015). Ontologically, the researcher in DSR engages in the research through various related incidents, that is, Organizational Learning and Knowledge Sharing in various situations. Epistemologically, during the course of the research, the researcher practices the gathering of knowledge by explaining, identifying and comprehending that the setting impacts the process. In the current study, the developing of knowledge was to obtain an awareness of Organizational Learning as a method of Knowledge Management (KM) in organizations which include Knowledge Sharing (KS). Furthermore, the knowledge obtained in one phase gave rise to awareness of what was necessitated to commence the next phase. Methodologically, a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment was proposed by reusing an organization’s existing KM experience and tasks for OL. From an
axiological standpoint, the researcher in DSR understands that artifacts aid in the resolution of problems and also constructive change in organizations. Moreover, aside from comprehending and controlling the essential facets of research, the research also understands the whole setting of the study (Vaishnavi & Kuechler, 2015). The artifact, in the current study, signifies a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment and consequently enhancement alignment between the stakeholders in organizations.

DSR is described in more detail in the next section.

**Design Science Research**

Research was described by Soanes & Stevenson (2008) as the organized inquiry into and examination of objects and resources to determine truths and draw new deductions. The essential features of research (Walliman, 2005) are as follows:

- In contrast to the process of acquiring experience which is spontaneous and unplanned, research is orderly and methodical.
- Deduction can be performed in a conceptual universe, separated from existence. Conversely, research is pragmatic and refers to familiarity and the encircling universe for corroboration.
- The striving of research is to be self-adjusting contrary to familiarity and motivation. The course of research entails meticulous evaluation of the attained outcomes. Also, procedures and findings are laid open to critique and assessment.

DSR is a method of research utilized to creating inventive concepts calculated to resolve everyday issues and, thus, to further the theory of the field where it is utilized (Lukka, 2003). Moreover, March & Smith (1995) regarded DSR as a method that engages in the
scrutiny of innovative or alternate resolutions for problems, clarifies the course of exploration and strives to develop the course of problem resolution and assist human objectives. According to Saunders, Lewis, and Thornhill (2011), the primary intention of academic management studies, from a design science viewpoint, is to produce functional knowledge to assist in the solving of real-time organizational issues. This assistance can be exact, related or lesser—presenting wider information with regard to the manner of problem in question. Essentially, DSR’s purpose is to produce scientific awareness with the intention of facilitating artifact or mediation design by professionals and to draw attention its knowledge-centeredness. That is, action is not the emphasis of DSR instead the emphasis is on the knowledge to be utilized in devising solutions. Action based on the design is a subsequent step (Van Aken, 2005).

There are two significant features of DSR. First, it is driven by problem-solving; second, the outcomes of a study are of prescriptive nature. Hevner and colleagues (2004, p. 87; 2010, p. 205) highlighted the contributions accruing from DSR for organizations:

- Recognition and well-defined portrayal of an organizational problem;
- Proving the non-existence of a distinct solution;
- Design, elaboration and demonstration of an artifact (e.g., construct, method, model, or instantiation);
- Exhaustive scrutiny and valuation of the artifact’s utility;
- Describing the artifact’s value addition, both practical and conceptual; and
- Clarifying the outcomes of an artifact’s implementation to representatives of an organization, technical and managerial.

Conceptual instances of DSR research include mathematical algorithms, innovative mathematical units, computer science, technical sciences, and clinical medicine (Kasanen,
Various models of the DSR research process have been suggested (e.g., Hevner, 2007; Järvinen, 2004; Kasanen et al., 1993; Lukka, 2003; March & Smith, 1995; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007; Vaishnavi & Kuechler, 2015a). The research activities between a few of these models are compared in Figure 3.2.

<table>
<thead>
<tr>
<th>Model</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasanen et al. (1993)</td>
<td>Find a problem with practical relevance and that also has research potential</td>
</tr>
<tr>
<td></td>
<td>Obtain an understanding of the topic</td>
</tr>
<tr>
<td></td>
<td>Innovate, namely construct a solution</td>
</tr>
<tr>
<td></td>
<td>Demonstrate that the solution works</td>
</tr>
<tr>
<td></td>
<td>Present its connection to theory and the research contribution</td>
</tr>
<tr>
<td></td>
<td>Assess the scope of application of the solution</td>
</tr>
<tr>
<td>March &amp; Smith (1995)</td>
<td>Create things that serve human purposes</td>
</tr>
<tr>
<td></td>
<td>Evaluate the performance of the things in use</td>
</tr>
<tr>
<td>Hevner (2007)</td>
<td>Problem and opportunities</td>
</tr>
<tr>
<td></td>
<td>Build, design artefacts and processes</td>
</tr>
<tr>
<td></td>
<td>Evaluate additions to knowledge base</td>
</tr>
<tr>
<td>Lukka (2003)</td>
<td>Find a practically relevant problem with potential for theoretical contribution</td>
</tr>
<tr>
<td></td>
<td>Assess the likelihood for long-standing research collaboration with the target organisations</td>
</tr>
<tr>
<td></td>
<td>Obtain an understanding of the problem from a practical and theoretical perspective</td>
</tr>
<tr>
<td></td>
<td>Innovate a solution idea and develop a solution that solves the problem at hand</td>
</tr>
<tr>
<td></td>
<td>Implement the solution and test how it works</td>
</tr>
<tr>
<td></td>
<td>Identify and analyse its theoretical contribution</td>
</tr>
<tr>
<td>Vaishnavi &amp; Kuechler (2015)</td>
<td>Awareness of the problem</td>
</tr>
<tr>
<td></td>
<td>Suggestion</td>
</tr>
<tr>
<td></td>
<td>Development</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
</tr>
<tr>
<td>Vaishnavi &amp; Hevner (2015a)</td>
<td>Awareness of the problem</td>
</tr>
<tr>
<td></td>
<td>Suggestion of a tentative design</td>
</tr>
<tr>
<td></td>
<td>Further development of the tentative design and implementation</td>
</tr>
<tr>
<td></td>
<td>Evaluation of the design against previously defined criteria</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
</tr>
</tbody>
</table>

Figure 3.2 Comparison of DSR Models

Source: Adapted from Rocha, Formoso, Tzortzopoulos Fazenda, Koskela, & Tezel (2012)

It can be inferred from Figure 3.2, that the essential processes in DSR are 1) establishing awareness of a problem; 2) Development and evaluation of artifacts; and 3) theory building. The following section provides more details on these activities.

Activities in Design Science Research

Vaishnavi & Kuechler (2008, p. 489; 2015) describe five steps in the design research process:
1. *Awareness of problem.* The researcher becomes aware of a problem. Accordingly, this phase entails the recognition of a problem, a necessity or a concept where the design and construction of an artifact, model, construct, method, theory or framework can result in probable solutions. A research proposal is the outcome of this phase.

2. *Suggestion.* Involves the suggestion of a possible design or solution by making use of appropriate extant knowledge or concepts.


4. *Evaluation.* Entails the appraisal and evaluation of the artifact using either quantitative or qualitative techniques.

5. *Conclusion.* The outcomes of the design research offer a valuable contribution to existing knowledge in the manner of an established, acknowledged, and authorized artifact.

Vaishnavi & Kuechler (2015) offered additional detail about the logical activities involved in DSR:

- Solutions to the recognized problems are derived from existing knowledge and/or concepts related to the problem area, during the suggestion phase.

- Existing knowledge and suggestions are utilized in an endeavor to resolve a problem utilizing the circumscription process, during the development and evaluation phases. Circumscription (McCarthy, 1980) is a formal rational approach which supposes that every fragment of knowledge is usable only in certain situations and that validity cannot be regularly forecast from theoretical factors. Deduction signifies the “understanding that could be gained from the specific act of construction” and assessment of artifacts (Vaishnavi & Kuechler, 2015, p. 10).

- Deliberation and consideration are utilized to create a knowledge input of innovative or revised design and functional standards and concepts in a conclusive phase.
Artifacts in DSR

Artifacts are considered to be research outputs (March & Smith, 1995) or the end objectives of DSR projects (Hevner & Chatterjee, 2010). Regardless, these can be broadly categorized as:

- **Instantiations.** May be a realization of an artifact in IT. Other examples include when systems are implemented or prototype systems are developed.
- **Methods.** Series of steps explaining how to achieve something such as, algorithms and practices.
- **Models.** Statements or propositions describing a set of constructs to solve a problem such as, abstractions and representations.
- **Constructs.** Instances include concepts, syntax or language (vocabulary and symbols) used in a specified context to describe a problem and find a solution.

Methods of Data Collection

Data collection is an essential component of research and is included in all research projects in some manner or other. In fact, the choice of a specific approach of data collection for a study is as noteworthy as the choice of research design and plan (Maxwell, 2012). The effectiveness of data collection is contingent on whether the intent of the process to collect data has been determined. Defining and understanding this intent can facilitate the development of the data collection process and also the mode in which the data can be analyzed. In DSR, the chief task is to determine specific aims regarding the characteristics of the artifacts to be inspected. For example, the technical characteristics of an artifact could be scrutinized or its worth and effect. The selection and utilization of appropriate approaches
and methods to data collection are governed by the intent, artifact and the research questions in question.

DSR projects can utilize both quantitative and qualitative data. However, this depends on the purpose of the research. Among other components of the research design, a study’s research methods depend upon what the study involves and the study’s specific viewpoint (Maxwell, 2012). Hevner and Chatterjee (2010) proposed that trials, modeling, and explorations could be performed to study functional artifact problems such as usability. Qualitative interviews, quantitative surveys, field studies or observational case studies are potential methods for use when socio-technical characteristics such as usefulness are studied. Also, more than one approach may be necessitated during the course of the study. This may be a direct consequence of the usage of the circumscripitive DSR method or to determine the rigor of the study.

Another facet of data collection that needs reflection is the source of data. In general, primary data denotes new data that has not been previously examined or explained whereas secondary data signifies data obtained from existing sources, that is, data that has been previously examined and explained (Hofstee, 2006; Myers, 2013).

Method of Data Collection used in the Current Study

The current study used a qualitative research approach. The advantage of qualitative methods is that they permit the researcher to gain awareness of stakeholders’ views. Typically, the emphasis in qualitative approaches is discovering by personally hearing, observing, or living through the existence of study participants (Hevner & Chatterjee, 2010). Nevertheless, due to a shortage of time and the conceptual manner of the study, it was decided to use only secondary data in the current study. Therefore, the approach to data collection utilized involved the exploration of literature at two levels to determine the
challenges with regard to Organizational Learning and Knowledge Sharing in virtual workspaces. The first level of literature review focused on the general concepts associated with OL and KS whereas the second was a more in-depth investigation undertaken through the mechanism of a systematic review (SR).

**General Literature Review**

Generally, the examination and corroboration of the significance of a study is facilitated by a review of literature. Literature is scrutinized during the study and knowledge is acquired to support theories or claims (Oates, 2005). In fact, the basis for a study is provided by a literature review (Oates, 2005). Additionally, a researcher’s credentials, the study’s theoretical foundation, and the perspective and relevance of a study are validated by a literature review (Hofstee, 2006).

Different materials may be explored during a review of literature and sources typically include books, journals, articles, conference proceedings, newspaper reports, radio and television broadcasts, reports, etc. Moreover, multimedia sources and the Internet may also be utilized.

A review of literature, in the context of DSR, as explained by Hevner and Chatterjee (2010) is not needed merely to located the study by employing scientific basics such as models, methods and frameworks but also to examine present design consequences, processes, and the knowledge and capabilities of other researchers.

Other scholars (e.g., Gregor & Hevner, 2013) emphasized the differences between descriptive and prescriptive knowledge and asserted that both types of knowledge required consideration in DSR. Descriptive knowledge denotes awareness of natural events and the
rules and certainties that oversee them whereas prescriptive knowledge signifies awareness of artifacts developed by humans.

The literature review for the current study entailed a detailed review of books, theses, conference proceedings, journals, dissertations, reports and other electronic sources to scrutinize information associated with the study. Descriptive knowledge, for example, concepts and models, was utilized to draw parallels between current knowledge and the study. Prescriptive knowledge, for example, models of OL, was also used as reference material to direct awareness of the problem and suggestion of a solution.

The objective of the general literature review was to draw attention to the current gap in research with regard to the study’s area of focus.

**Systematic Review (SR)**

A systematic review (SR) of literature pertaining to OL, KS in the context of virtual teams was performed as a means to thoroughly examine existing research and literature. In general, a systematic review is an approach to methodically recognize, evaluate, and integrate all the applicable studies on a specified matter (Petticrew & Roberts, 2008).

SRs can be utilized to find resolve any quantity of research questions and are typically followed by meta-analyses to assess data dispersed in several quantitative studies (Littell, Cocoran & Pillai, 2008). Although SRs are frequently combined with meta-analyses, they can also be performed independently as will be done in this study. A sequence of seven activities are generally associated with an SR. Firstly, the research question(s) is defined. Secondly, the kinds of studies required to satisfy the research question(s) are determined. Thirdly, an exhaustive search of the literature is performed. The fourth activity entails inclusion or exclusion of literature based on predefined criteria. The fifth activity involves a critical
assessment of the studies included for review. Synthesis of the studies and evaluation for
homogeneity is the sixth activity. Finally, the findings of the review are published (Petticrew
& Roberts, 2008).

The generic procedure utilized for the identification of literature for the SR was as
follows. Literature for the SR was obtained chiefly via searches on Google and Google
Scholar using multiple keywords (e.g., organizational learning, knowledge sharing, virtual
workspaces, virtual teams, connectivism, etc.). The keywords to be utilized were determined
prior to the commencement of the SR and were obtained by deconstructing the study’s
overarching research question. Studies were selected after a careful screening process which
entailed evaluation of their title, abstract and full-text. Cross-referred studies from the
reference lists of the selected studies were also similarly evaluated. The search was limited to
an approximately eleven-year period between 2006 and 2017 (delimited to July 31, 2017).

Thirty articles pertaining to the matter under consideration were recognized for
review after a rigorous selection process. Articles were considered for inclusion in the SR if
the following general criteria were satisfied:

1. It was an empirical quantitative, qualitative, or mixed method study focusing on
knowledge sharing and organizational learning in general or in the context of
virtual teams.

2. It clearly drew attention to the features/barriers/facilitators/models/theories
concerning knowledge sharing and organizational learning in general or in the
context of virtual teams.

3. It was a full-text paper published in English and dated between 2006 and July 31,
2017.
4. Studies with unclear titles or without occurrences of at least one of the searched keywords were excluded.

Relevant studies obtained from Google Scholar were uploaded into the Mendeley Desktop tool and duplicates, if any, were removed. Reference lists of previously undertaken systematic reviews were thoroughly reviewed to identify other studies relevant for the context of the present study. Papers were scrutinized by title, by abstract and by full-text, that is, in three stages. In other words, the titles of the articles were evaluated; the abstracts were thoroughly reviewed using the inclusion and exclusion criteria; and finally the full-text of each downloaded paper was thoroughly reviewed. At each stage, papers which did not satisfy the inclusion and exclusion criteria were excluded (Meade & Richardson, 1997). It must be noted that the screening was performed independently by the researcher. A total of 30 papers progressed to the next stage.

As the research approach selected for the current study is Design Science Research, the individual results of the various selected studies were not statistically linked. Instead, each included study was qualitatively analyzed. Moreover, the characteristics and outcomes of each study were separately evaluated. The first step in producing data for such a study was achieved through the in-depth review of the full-text of each article. Statistical merging and meta-analyses of the included studies was not undertaken due to the overarching research approach.

Instead, a narrative review of the literature was performed due to the diversity of disciplines playing a role in knowledge sharing research, the few empirical studies examining specific aspects in each area of emphasis, the absence of usage of general quantifiers of knowledge sharing, and the need of the current research to understand the various theories or models that have been utilized as the foundation for research on knowledge sharing.
Narrative reviews, as a methodology, offer a deeper awareness of a phenomenon by allowing scrutiny across numerous studies and in several settings over the course of time (Shadish, Cook, & Campbell, 2002). Moreover, in comparison to meta-analysis, the scrutiny of change in research trends over time is also permitted by a narrative review. Additionally, it offers the capacity to answer questions concerning the overall pattern of research features in a given discipline (Wildman, Thayer, Pavlas, Salas, Stewart, & Howse, 2012).

Figure 3.3 depicts the flow of activities in the selection of articles for the systematic review.
Research Strategy for the Current Study

Given the nature of the current study, that is to propose a conceptual solution for a real-life problem, the researcher decided to proceed with the design science approach. The different steps suggested by Vaishnavi & Kuechler (2015; 2015a) were employed as part of the approach: awareness of the problem, suggestion, development, evaluation, and conclusion. First, information about the concepts relevant to the study was provided and the research gap was identified (Chapter 2). Subsequently, a systematic review of literature associated with the matter under consideration was performed to obtain deeper insights into the research problem and to propose a solution (Chapters 4 and 5). In the development phase, the actual deliverable (i.e., the conceptual model) was developed. This deliverable was then evaluated (Chapter 6) and the study was concluded (Chapter 7).

As described earlier, artifacts from the design science research approach include: methods, models, constructs, design theories, and instantiations (Gregor & Hevner, 2013; Hevner et al., 2004), social improvements, novel or hitherto unfamiliar qualities of social/technical/informational resources (March & Storey, 2008), new clarifying hypotheses, new models for design and development, and procedures and approaches for implementation (Ellis & Levy, 2010).

The study’s proposed outcome is to develop a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present-day work environment.

In general, the following steps were used to implement the DSR framework in the current study: First, a literature review (see Chapter 2) was performed to understand the theoretical backgrounds of OL and KS. Subsequently, a deeper investigation of the literature associated with OL and KS was performed to identify any other concepts or missing links
which need to be scrutinized and addressed through the proposed conceptual solution (Chapter 4). Subsequently, the conceptual approaches and theories were united to suggest a conceptual model (Chapter 5). The suggested model was then developed and evaluated (Chapters 6 and 7).

Summary

The objective of the current chapter was to describe the research design and research methodology used in the current study. First, an overview was provided of the philosophical basis of design science research. Subsequently, details were provided with regard to design science research and the methods of data collection used in the study. The final section summarized the research strategy used for the current study.

The next chapter describes the problem awareness phase of the current study.
CHAPTER 4

PROBLEM AWARENESS

Introduction

The first activity in the current research was a review of the academic literature associated with Knowledge and Learning in Organizations. From the perspective of Knowledge, the literature reviewed provided a general understanding of Knowledge, Organizational Knowledge, Knowledge Management, and Knowledge Sharing. From the perspective of Learning, insights were offered with regard to Organizational Learning, Theories of Learning and Learning in Virtual teams. Two additional concepts, Communities of Practice (CoP) and Organizational Socialization, were introduced in the review of literature to draw attention to the complexity of communities in an organizational context and the need for socialization even in virtual contexts.

The intent of this chapter is to perform a deep dive into the findings from the literature review to recognize any other concepts or missing links which require scrutiny and tackling through the proposed conceptual solution to enhance knowledge sharing in the context of the virtual workspaces. As discussed in the Methodology chapter, this will be achieved through a systematic review of literature.

The first part of this chapter briefly reviews the approach utilized in the systematic review. Subsequent sections deal with deeper insights into knowledge sharing and organizational learning as identified through the systematic review. As mentioned in the Introduction to this dissertation, knowledge sharing is recognized by scholars to be an essential component or enabler of organizational learning. Consequently, the exploration of organizational learning in the context of virtual teams is chiefly to identify any aspects which
are relevant to the current study but not explored in knowledge sharing research. The outcome hoped for at the end of this chapter is recognition or awareness that existing models of knowledge sharing and organizational learning are inadequate in the context of virtual teams and require extension by incorporating different elements that are appropriate in this context.

Figure 4.1 highlights the current activity in the present study.
Approach to the Systematic Review

Search procedures

Systematic searches were conducted in the Google Scholar electronic database and utilizing the Google search tool. Searches were limited to empirical quantitative, qualitative, or mixed method studies which placed focus on different aspects of knowledge sharing and organizational learning in the context of virtual teams. Moreover, only the searches were limited to studies written in English. The searches utilized the terms “virtual teams,” “virtual communities,” “knowledge,” “organizational learning,” and “connectivism” as keywords (for example, “virtual teams and knowledge”). Studies were selected after a careful screening process which entailed evaluation of their title, abstract and full-text. Cross-referred studies from the reference lists of the selected studies were also similarly evaluated for possible inclusion. Hand searches in the journals that had published studies included in the review were not undertaken. Searches of databases and reference lists took place in the period June, 2017 to May, 2018.

Inclusion and Exclusion Criteria

As mentioned in the Methodology chapter, a study had to satisfy certain inclusion criteria to be included in this review. First, the title of the study had to contain references to at least one of the keywords utilized in the search. Second, the study had to be an empirical quantitative, qualitative, or mixed method study focusing on knowledge sharing and organizational learning in general or in the context of virtual teams. Third, the study clearly drew attention to the features/barriers/ facilitators/models/theories concerning knowledge sharing and organizational learning in general or in the context of virtual teams. Fourth, the study was documented in a full-text paper published in English and dated between 2006 and July 31, 2017.
Data Extraction

All the studies identified during the systematic search were first evaluated for inclusion. However, it could be seen that there was an evident paucity with regard to the research and understanding in this subject area namely, knowledge sharing and organizational learning in the context of virtual teams. For example, there are a limited number of papers, especially in the management literature, that deal directly with virtual teams/communities, knowledge sharing, and organizational learning, while there are several in the information systems and human resources literature that deal with the subject in an indirect manner. Consequently, what follows is not a systematic review of literature in the conventional sense but rather the outcome of a search of identified literature in pursuit of relevant concepts.

Subsequently, the findings from the studies included in the review were encapsulated in terms of recurring themes in knowledge sharing research; characteristics of virtual teams/communities; knowledge sharing in virtual communities; factors, motivators, barriers, and enablers of knowledge sharing in VCoPs; theories utilized in knowledge sharing research; models of knowledge sharing in virtual teams/communities; instruments for knowledge sharing; organization learning theory; models of organizational learning; dimensions of organizational learning; antecedents of organizational learning; effects of organizational learning; measures of organizational learning; and routines for organizational learning in virtual teams.

The researcher was the sole person involved in the database searches and was also responsible for screening the resulting articles for inclusion. A total of thirty (30) articles were ultimately identified for use in the review. It must be noted that the findings from studies included in the systematic review were utilized in this chapter and also in the
succeeding chapter (i.e., Suggestion of a Solution). The basis for segregating the findings was to separate awareness of the problem from suggestions for its potential resolution.

**Findings from the Systematic Review**

The process of systematic search and use of the predetermined inclusion criteria resulted in the inclusion of 25 studies in this segment of the review. Table 4.1 provides a list of the studies reviewed in this phase.
### Table 4.1 Studies included in the Awareness Phase

<table>
<thead>
<tr>
<th>Author</th>
<th>Area of relevance to the study</th>
<th>Focus</th>
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<tbody>
<tr>
<td>Chiu, Hsu, &amp; Wang (2006)</td>
<td>Knowledge Sharing</td>
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<td>Ardichvili (2008)</td>
<td>Knowledge Sharing</td>
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<td>Kanawattanachai &amp; Yoo (2007)</td>
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<td>Rosen, Furst, &amp; Blackburn (2007)</td>
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<td>Staples &amp; Webster (2008)</td>
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<td>Pangil &amp; Moi Chan (2014)</td>
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<td>Hsu, Ju, Yen, &amp; Chang (2007)</td>
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<td>Schoch, Oelschlaeger, Huskey, &amp; McNamee (2011)</td>
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<td>Kotlarsky, van den Hooff, &amp; Houtman (2015)</td>
<td>Knowledge Sharing</td>
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<td>Liang, Chang, Rothwell, &amp; Shu (2017)</td>
<td>Knowledge Sharing</td>
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<td>Pee &amp; Min (2017)</td>
<td>Knowledge Sharing</td>
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<td>Dasi, Pedersen, Gooderham, Elter, &amp; Hildrum (2017)</td>
<td>Knowledge Sharing</td>
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<td>Sáenz, Aramburu, &amp; Rivera (2009)</td>
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<td>Argote &amp; Guo (2016)</td>
<td>Knowledge Sharing</td>
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<td>Mueller, Hutter, Fueller, &amp; Matzler (2011)</td>
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<td>Klitmøller, Schneider, &amp; Jonsen (2015)</td>
<td>Knowledge Sharing</td>
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<td>Yilmaz &amp; Peña (2015)</td>
<td>Knowledge Sharing</td>
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<td>Pathak (2015)</td>
<td>Knowledge Sharing</td>
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<tr>
<td>Dixon (2017)</td>
<td>Organizational Learning</td>
<td>Direct</td>
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<td>Hotho, Lyles, &amp; Easterby-Smith (2015)</td>
<td>Organizational Learning</td>
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<td>Berta, Cranley, Dearing, Dogherty, Squires, &amp; Estabrooks (2015)</td>
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<td>Rerup &amp; Levinthal (2014)</td>
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<td>Berends &amp; Lammers (2006)</td>
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<td>Spector &amp; Davidsen (2006)</td>
<td>Organizational Learning</td>
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Knowledge Sharing

Recurring themes in knowledge sharing research. Individual-level knowledge sharing was studied by Wang and Noe (2010) from the perspective of developing a framework of knowledge sharing research. They highlighted five areas of emphasis in this context: “organizational context, interpersonal and team characteristics, cultural characteristics, individual characteristics, and motivational factors” (p. 115). Key concepts that were recognized from the perspective of organizational context were: organizational culture and climate, management support, rewards and incentives and organizational structure. Under organizational culture and climate, trust was recognized to be a key aspect as it has been linked to individual knowledge sharing and an organization’s capacity to exchange knowledge. On the other hand, an organizational climate that encourages individual competition could serve as a barrier to knowledge sharing whereas a cooperative climate facilitates the creation of trust and hence knowledge sharing. Other aspects of organizational culture explored by this study that support knowledge sharing include emphasis on innovation, executives’ opinions regarding the business benefits of knowledge sharing, the association between knowledge sharing and learning culture; and the association, based on social capital theory, between reciprocity and knowledge sharing.

Investigation of management support for knowledge sharing found that supervisory control could significantly predict the individual effort that was associated with the regularity of knowledge sharing. In other words, the likelihood of knowledge sharing was influenced by management support. Moreover, the typology of social power (French & Raven, 1959) was found to favorably influence self-reported knowledge sharing of employees when viewed from the perspective of reward power (i.e., manager’s control of rewards for desired behavior) and expert power (belief of employees that managers had knowledge and expertise in the area under consideration). Other theories used to examine the relationship between
management support and knowledge sharing includes social exchange theory and agency theory. Rewards and incentives were also found to influence knowledge sharing. Theories explored in this regard include the social exchange and social capital theories. A final aspect of organizational culture and climate that was investigated is the organizational structure and this study found that an organizational structure segmented by function was likely to restrict knowledge sharing across functions and CoPs (Lam, 1996; Tagliaventi & Mattarelli, 2006). Moreover, it has been demonstrated that a less centralized organizational structure may facilitate knowledge sharing (Kim & Lee, 2006). Similarly, designing a work setting (e.g., open workspace) that supports interaction among employees (Jones, 2005), job rotation and flexible job descriptions (Kubo, Saka, & Pan, 2001), and supporting inter-department communication and informal meetings (Liebowitz, 2003; Liebowitz & Megbolugbe, 2003; Yang & Chen, 2007) may also serve to facilitate knowledge sharing. In general, it is suggested by extant literature opportunities for employee interaction should be created by organizations and rank, status and seniority of employees should receive lower emphasis to assist knowledge sharing.

Further, the study by Schoch, Oelschlaeger, Huskey, and McNamee (2011) found indications that a key driver of knowledge sharing behavior may be the organizational climate. This study found that knowledge-exchange behavior can be predicted by climate, motivator, and demotivator scales. For instance, a 54% increase in proactive knowledge sharing was indicated by the increase of one point on the ‘collaborative climate’ scale. On the other hand, knowledge sharing was reduced by ~74% by a similar increase of one point on the ‘negative social motives scale.’ Schoch and colleagues (2011) found that intrinsic motivation was the single most significant factor affecting knowledge seeking and sharing behaviors. The study by Liang, Chang, Rothwell, and Shu (2016) revealed that online knowledge sharing was significantly affected by trust, interaction, and leadership. Liang and
colleagues (2016) found that significantly better knowledge sharing was evident in team members with high degrees of trust, interaction, or leadership in contrast to team members with low or medium levels of trust, interaction, or leadership. Also, they found the interactive impact of trust and interaction on online knowledge sharing was significant as was the interactive impact of leadership and interaction. However, trust and leadership was not found to have a significant interactive impact on online knowledge sharing. Dasí, Pedersen, Gooderham, Elter, and Hildrum (2017) studied the impact of organizational separation on knowledge sharing by individuals in MNCs. They found that within business units, innovative values, intrinsic motivation, and job autonomy are significant drivers of knowledge sharing. On the other hand, across business units, the significant drivers are extrinsic motivation, outcome-oriented values, and involvement in corporate employee development.

Interpersonal and team characteristics summarized by Wang and Noe (2010) include team characteristics and processes, diversity and social networks. Studies have suggested that team characteristics and processes do impact knowledge sharing in virtual teams. Similarly, diversity could adversely influence knowledge sharing especially if team members consider themselves to be part of a minority (e.g., based on marital status, gender, or educational qualification). Ties among persons in organizational social networks could facilitate quantity and quality of knowledge transfer (e.g., Cross & Cummings, 2004; Hansen, 1999; Reagans & McEvily, 2003) when viewed from the perspective of tie strength (Granovetter, 1973; Perry-Smith, 2006). In the context of virtual communities, it has been demonstrated that both the number of direct ties and personal relationships an individual has with other members are favorably associated with the quantity and the apparent usefulness of the knowledge shared (Chiu, Hsu, & Wang, 2006; Wasko & Faraj, 2005). Chen (2007) suggested that the expectation of individuals that their social ties would be maintained and strengthened by their
regular participation in a web-based professional community favorably influenced their resolve to persist in participating in that community. Overall, it can be inferred that network connections and the social capital associated with them can assist in knowledge sharing within a community of practice (e.g., Kankanhalli, Tan & Wei, 2005; Nahapiet & Ghoshal, 1998).

Differing cultural characteristics of employees in multinational organizations can further pose challenges for knowledge sharing (Ford & Chan, 2003; Minbaeva, 2007). Individual characteristics such as, openness to experience, comfort level with ICT tools, educational level, work experience, confidence, etc., can influence the attitude of employees towards knowledge sharing (e.g., Cabrera, Collins, & Salgado, 2006; Constant, Kiesler, & Sproull, 1994; Jarvenpaa & Staples, 2000). However, knowledge sharing could be adversely affected by an individual’s evaluation apprehension (Bordia, Irmer, & Abusah, 2006). The study by Klitmøller, Schneider, and Jonsen (2015) reported that language differences adversely influence knowledge transfer in organizations (Barner-Rasmussen & Aarnio, 2011; Luo & Shenkar, 2006; Makela, Kalla, & Piekkari, 2007). In the context of virtual teams, language differences have caused individuals to avoid virtual interaction (Lauring & Klitmøller, 2015). Hinds, Neeley, and Cramton (2014) indicated that language could result in fault lines and an “us versus them” attitude in global virtual teams. Klitmøller and colleagues (2015) further proposed that media (verbal or written) in combination with the variance with proficiency in a common language could contribute to social categorization in global virtual teams. Yilmaz and Peña (2015) also investigated the manner in which interpersonal behavior and social identities of team members can affect the use of language in group effort in virtual teams. They submitted the proposition of Chudoba, Wynn, Lu, and Watson-Manheim (2005) that successful group effort in the virtual context involves the creation of both shared meaning and shared language.
Motivational factors recognized by Wang and Noe’s (2010) study included beliefs of knowledge ownership, perceived benefits and cost, interpersonal trust and justice, and individual attitudes. For example, Constant and colleagues (1994) and Jarvenpaa and Staples (2000) posited that the likelihood of employees engaging in knowledge sharing was higher if they believed that they were the information owners (instead of the organization). Studies have shown that knowledge sharing is favorably affected by perceived benefits whereas it is negatively affected by perceived costs, a finding in line with the social exchange theory (Blau, 1964; Emerson, 1981). Some other studies (e.g., Hew & Hara, 2007; Lin, 2007a; Wasko & Faraj, 2000, 2005) found that knowledge sharing in online CoPs is related to enhancement of internal satisfaction, a sense of duty to respond to the gains in knowledge from the forum, improved professional standing, and aiding the development of the community. Curiously, Bordia and colleagues (2006) found that benefits positively influenced knowledge sharing only in a technology-aided sharing context. Overall, earlier research indicates that knowledge sharing has a more robust association with the perceptions of employees regarding the usefulness of their shared knowledge than with the individual benefits they obtain (Chiu et al., 2006; Siemsen, Balasubramanian, & Roth, 2007; Wasko & Faraj, 2000). Reasons for not sharing knowledge include lack of time and lack of familiarity with the topic under consideration (Hew & Hara, 2007). Other reasons include weak trust concerning the use of shared knowledge by other employees (Kankanhalli et al., 2005).

Concerning interpersonal truth and justice, ten behaviors and practices that inspire interpersonal trust (trust builders) from a knowledge sharing perspective were identified by Abrams, Cross, Lesser, and Levin (2003). Other studies (e.g., Chowdhury, 2005; Mooradian, Renzl, & Matzler, 2006; Wu, Hsu, & Yeh, 2007) have shown that knowledge sharing between two individuals or across teams is positively affected by affect- and cognition-based trust. Moreover, three facets of trustworthiness namely, competence, honor, and goodwill
were examined by Bakker, Leenders, Gabbay, Kratzer, and Van Engelen (2006) who found that employees were inclined to share lower amounts of knowledge with team members whom they believed to be very competent (competence) and to share greater amounts of knowledge when they perceived that colleagues were truthful, just, and principled (honor). Lin (2007b) found that the effects of both distributive and procedural justice on tacit knowledge sharing via organizational commitment were favorable and indirect while knowledge sharing was also affected by distributive justice through trust in coworkers.

Research associated with individual attitudes is deeply established in the theory of reasoned action and the succeeding technology acceptance model which explain the manner in which the behavior of individuals is affected by principles and opinions (Davis, 1989; Fishbein & Ajzen, 1975). Bock and Kim (2002) found that positive attitudes to knowledge sharing were related to individuals’ anticipation that their knowledge would be useful and that by sharing this they would be able to have better associations with others. This in turn was associated with intention and actions to share knowledge. Moreover, organizational attitudes such as, organizational commitment and job satisfaction, also support knowledge sharing (de Vries, van den Hooff, & de Ridder, 2006; Lin, 2007b,c). In general, it could be seen that knowledge sharing is significantly influenced by job and organizational attitudes. Attitudes toward knowledge sharing not only directly influence knowledge sharing but also indirectly influence self-reported sharing action by favorably influencing intent to share (e.g., Bock, Zmud, Kim, & Lee, 2005; Lin, 2007a).

Figure 4.2 depicts the wide recurring themes in knowledge sharing research.
Characteristics of Virtual Teams/Communities. Chiu and colleagues (2006) described virtual communities as online social networks wherein individuals with mutual interests, objectives, or routines collaborate to impart knowledge and information, and participate in social communications. According to them, virtual communities are sustained by the kind of social communication and the network’s group of embedded resources. In contrast to traditional organizations, virtual communities do not have a definite reward system to support the processes of shared trust, collaboration, and exchange between individuals. Moreover, Chiu and colleagues (2006) highlight that knowledge sharing through online means cannot succeed if online members do not actively participate. In other words, poor motivation hinders knowledge sharing.

On the other hand, studies (e.g., Ardichvili, 2008; Ardichvili, Page, & Wentling, 2003; Gourlay, 2001; Vestal, 2006) have drawn attention to the significance of communities
of practice with regard to combined learning and creation of knowledge in organizations. One of the most significant advantages of CoPs is their capacity to permit the creation and distribution of tacit knowledge. Thus, CoPs may be considered to be a platform where tacit knowledge can be shared and internalized and hence a principal agent of organizational learning (Brown & Duguid, 1991; Rucker, 1999; Wenger et al., 2002).

CoPs were originally associated with face-to-face and communities in the same location (Lave & Wenger, 1991; Wenger, 1998). The increase in online tools for collaboration along with the swift international growth of businesses caused the appearance of a novel approach to communal learning and sharing of knowledge that is, virtual communities of practice or VCoPs (Von Wartburg, Rost, & Teichert, 2006). Von Wartburg and colleagues (2006) further indicated that virtual interactions in some measure were a characteristic of VCoPs is and hence VCoPs were frequently stated to be a “more effective organizational form for knowledge creation than traditional and formal ways of structuring interaction” (p. 299). However, in contrast to virtual teams which are typically established by organizations to accomplish definite performance objectives, the organization of VCoPs is around the common interests of community members while not typically targeting the accomplishment of definite performance objectives (Ardichvili, 2008).

Several studies (e.g., Ellis, 2001; Haimila, 2001; Powers, 2004; etc.) have reported that from the perspective of knowledge management (KM), a vital role is played by VCoPs in numerous organizations. Some experts (e.g., Rosenberg, 2005) also contend that the online sharing of knowledge can be considered to be a significant system of collective learning.

Rosen, Furst, and Blackburn (2007) drew attention to the potential benefits of virtual teams due to their capacity to unite geographically dispersed experts in various fields through digital or electronic means. Consequently, virtual teams that can prevail over the apparent
threats in communicating knowledge of members and cultivate successful strategies to share
knowledge should control their combined knowledge more effectively in comparison to
virtual teams which are not capable of sharing such knowledge. Rosen and colleagues (2007)
posit that one means of doing so is by the development of a team transactive memory system
(TMS). A TMS denotes the cooperative team knowledge developed, learned, encoded, or
accumulated by distinct team members which they can retrieve and is possibly of value to the
team. The TMS of a team evolves over time and helps team members to speedily find
essential knowledge in this cooperative, intellectual team data repository. A mature TMS
permits virtual teams to function more competently by distributing the intellectual effort.
Specifically, as team members work together, they are expected to acquire understanding
concerning the distinctive competences and unique expertise possessed by their colleagues.
Knowledge of “who knows what” offers members the opportunity to gain access to the
specific personalized knowledge stores of other team members. As a result, each team
member does not need to become an expert on every significant issue associated with the
team. Instead he/she only needs to be aware of who on the team either has the knowledge
required to address an issue or can guide them to the source of the looked-for knowledge.

Kotlarsky, van den Hooff, and Houtman (2015) suggested that TMS development
may be adversely affected by syntactic and pragmatic knowledge boundaries (Carlile, 2002,
2004). Three knowledge boundaries were distinguished by Carlile (2002, 2004) as
potentially emerging at the boundaries between the practices related to various professional
fields: “(1) syntactic boundaries, resulting from differences in vocabulary and lexicon; (2)
semantic boundaries, caused by different interpretations across different practices; and (3)
pragmatic boundaries, related to differences in interests that question key assumptions
inherent to a particular practice” (Kotlarksy et al., 2015, p. 2). Obstacles for communication
are created by these boundaries. Moreover, they impede knowledge integration between team members (Carlile, 2004; Liao, Jimmieson, O’Brien, & Restubog, 2012).

Mueller, Hutter, Fueller, and Matzler (2011) found that virtual universes can potentially serve as KM platforms as they aid global and immediate interaction, generate a mutual context for cooperation, unite various communication tools, and improve processes associated with knowledge and knowing. However, Mueller and colleagues (2011) highlighted that this was only possible if the virtual universe was able to prevail over challenges such as, platform stability, or issues related to user interface or security.

Pangil and Moi Chan (2014) enumerated some of the reasons that virtual teams are adopted by organizations:

- To enable them to recruit the finest employees regardless of their location;
- to extend the global workday from 8 hours to 24 hours; or
- to offer flexibility to further the internationalization of business and organizational activity with the objective of improving the organization’s competitiveness and responsiveness in the marketplace.

However, virtual teams also have some limitations (Cohen & Bailey, 1997; Nunamaker, Reinig, & Briggs, 2009; Pangil & Moi Chan, 2014). For instance,

- Lower frequency of face-to-face contact thus team members may be constrained by the lack of visual cues which facilitate interaction;
- Collaboration to achieve a certain project or task is only possible by means of evolving information and computer technologies;
- Deficiency of various non-verbal prompts;
- Fewer mechanisms for casual conversation;
- Lower occasions to develop friendships;
• Differences in time zone;
• Technology that is complex and/or unpredictable;
• Building consensus is problematic when separated by distances;
• Establishing shared meaning is problematic at a distance;
• Variations in work processes; and
• Cultural differences.

**Knowledge sharing in virtual communities.** In general, the different types of actions to be taken by team members to ensure the availability of knowledge (Edmondson, 1999) include

• Seeking feedback;
• Sharing information, in particular, the unique information each member holds;
• Asking for help;
• Testing assumptions;
• discussing differences of opinion openly rather than privately or outside the group;
• talking about errors;
• experimenting; and
• reflecting together on results:

“It is through such activities that teams can detect changes in the environment, learn about customers’ requirements, improve members’ collective understanding of a situation or discover unexpected consequences of their previous actions” (Edmondson, 1999, p.2)

Chiu and colleagues (2006) suggested that the greatest challenge in nurturing a virtual community is knowledge supply, or in other words, the willingness of members to share knowledge with each other. Further, they suggested that different aspects of social capital
namely, social interaction ties, trust, norm of reciprocity, identification, shared vision and shared language, influence knowledge sharing by individuals in virtual communities. Moreover, they contended that knowledge sharing in virtual communities can be engendered by outcome expectations that is, community-related outcome expectations and personal outcome expectations.

Rosen and colleagues (2007) posited that knowledge sharing encompasses both the distribution of current knowledge between team members and the transporting of fresh knowledge from outside the team into the team. Mechanisms of knowledge sharing within virtual teams include communication via e-mail, telephone, messaging (instant/ text), electronic discussion forums and bulletin boards, the use of modified groupware for distributing documents, and the development of web pages devoted to the team, frequently supported with complex search capacities. Nevertheless, the core components in knowledge sharing are not merely the software and hardware but also the virtual team members’ capacity and readiness to keenly participate in the process of knowledge sharing. Knowledge sharing entails responsiveness of virtual team members to inquiries, involvement in electronic decision-making and brainstorming, publishing documents, updating team web sites, and distributing ideas with their colleagues.

Further, Rosen and colleagues (2007) suggested that effectiveness of virtual teams is enhanced by knowledge sharing as it facilitates better use of team resources while lessening errors associated with implementation. Enhanced unity, satisfaction, and enthusiasm can be expected by virtual teams adept at knowledge sharing. Nevertheless, they also draw attention to the potential risks of knowledge sharing from the perspective of virtual team members. First, virtual team members could potentially submit erroneous knowledge and have to endure embarrassment and/or the resulting loss of standing among the other members of the virtual team. Second, if virtual team members perceive that their inputs to team assignments may be
subject to unjust scrutiny, they may restrict the sharing of expert knowledge and instead focus on commonplace insights. Third, virtual team members who share knowledge may encounter team mates who do not reciprocate with knowledge contributions of their own. For knowledge sharing to be successful in virtual teams, both team members who are enthusiastic and user-friendly mechanisms for sharing knowledge.

Pathak (2015) submitted that virtual teams, as other teams, are expected by organizations to successfully and competently manage knowledge. However, virtual teams may encounter particular challenges in accomplishing this. Pathak (2015) suggested that this could be attributed to the essential nature of virtual teams as they are often created for short and predetermined projects. As such, members may not have adequate time to gain experience while performing the tasks of the team. Moreover, members of virtual teams may not be familiar with each other prior to the setting up of the virtual team, a factor that could impede the knowing of which team member has what knowledge. Thus, virtual teams require effective knowledge management to avoid inefficiency and a lack of cohesiveness (Pathak, 2015).

The study by Pee and Min (2017) drew attention to prior research (e.g., Ipe, 2003; Cavaliere, Lombardi, & Giustiniano, 2015; Riege, 2005) on the various personal (e.g., motivation, work experience, personality) and environmental (e.g., organization culture) factors that influence knowledge sharing. They suggested a model that explains the impact of PE fit on knowledge sharing of employees. The findings from the assessment of the model indicate that PE fit in the “norm of collaboration, innovativeness and skill variety” causes the development of more robust affective commitment and, consequently, higher knowledge sharing behavior.

Factors, motivators, barriers, and enablers of knowledge sharing in VCoPs. Ardichvili (2008) suggested that certain factors affect the openness of individuals to knowledge sharing in VCoPs. For instance, culture can impact cooperative learning. As highlighted by Wenger and colleagues (2002), the readiness of an individual to “ask questions that reveal their ‘ignorance’, disagree with others in public, contradict known
experts, discuss their problems, follow others in the thread of conversation—all these behaviors vary greatly across cultures” (p. 118). Ardichvili, Maurer, Li, Wentling, and Stuedemann (2006) drew attention to several cultural characteristics that could impact the patterns of knowledge sharing of employees in multinational organizations. These include, among others, fear of losing face; power distance; differences in recognizing what signifies modest behavior; and in-group and out-group orientation (Ardichvili et al., 2006).

Ardichvili (2008) further summarized the significant factors influencing employees’ motivation to share knowledge (Table 4.2). These factors are categorized as personal benefits, community-related considerations, and normative considerations.

**Table 4.2 Factors influencing Employees’ Knowledge Sharing in Virtual Communities of Practice (VCoPs)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Factors</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Benefits</td>
<td>Status and career advancement, enhancement of professional reputation</td>
<td>Ardichvili et al., 2003, 2006; Wasko &amp; Faraj, 2005; Scarbrough, 2003</td>
</tr>
<tr>
<td></td>
<td>Emotional benefits (boosting of self-esteem, being able to contribute, being useful)</td>
<td>Wasko &amp; Faraj, 2000; Van Winkelen &amp; Ramsell, 2003</td>
</tr>
<tr>
<td></td>
<td>Intellectual benefits (developing expertise, expanding one’s perspective, finding new challenges)</td>
<td>Chiu et al., 2006; Van Winkelen &amp; Ramsell, 2003</td>
</tr>
<tr>
<td></td>
<td>Material gain (community participation linked to compensation and benefits)</td>
<td>Van Winkelen &amp; Ramsell, 2003; Garfield, 2006; Vestal, 2006</td>
</tr>
<tr>
<td>Community-related</td>
<td>Sharing as means of establishing ties with others</td>
<td>Scarbrough, 2003</td>
</tr>
<tr>
<td>considerations</td>
<td>Sharing as means of building a stronger community and strengthening one’s embeddedness</td>
<td>Ardichvili et al., 2003; Chiu et al., 2006; Wasko &amp; Faraj, 2005; Scarbrough, 2003</td>
</tr>
<tr>
<td></td>
<td>Sharing as a means of protecting against external threats</td>
<td>Scarbrough, 2003</td>
</tr>
<tr>
<td>Normative considerations</td>
<td>Shared values and vision</td>
<td>Chiu et al., 2006</td>
</tr>
<tr>
<td></td>
<td>Conformity, following leader’s example</td>
<td>Scarbrough, 2003; Vaast, 2004</td>
</tr>
<tr>
<td></td>
<td>Reciprocity</td>
<td>Chiu et al., 2006</td>
</tr>
</tbody>
</table>

Source: Adapted from Ardichvili (2008), p. 548
Ardichvili (2008) also provided insights with regard to the chief motivators, barriers, and enablers of knowledge sharing in VCoPs namely, organizational culture and leadership, trust, and supporting tools and technology.

**Organizational culture and leadership.** Several studies (e.g., De Long & Fahey, 2000; Janz & Prasarnphanich, 2003) have found that a supportive organizational culture is directly related to effective knowledge sharing. On the other hand, a culture that supported knowledge hoarding was found to be the second most significant barrier to knowledge sharing (Hackett, 2000). A closely related facet is the support of executive leadership (Vestal, 2006; Scarbrough, 2003).

**Trust.** As seen in preceding discussions, trust has been recognized as the chief factor supporting involvement in virtual communities (Chiu et al., 2006; Ridings, Gefen, & Arinze, 2002). Ardichvili (2008) draws attention to two kinds of trust: personal knowledge-based trust and institution-based trust. The development of the first, that is, personal knowledge-based trust, depends on repeated societal communications between the person who trusts (trustor) and the person who is trusted (trustee). Moreover, this form of trust is established when persons become familiar with each other and become capable of predicting what to anticipate with regard to the other person’s response to particular situations (Tschannen-Moran & Hoy, 2000). Nevertheless, trust is not always based on direct knowledge of certain individuals. Hence, the notion of institution-based trust is founded on the belief of employees that the existence of essential organizational systems and processes serves to ensure that individual organizational members will behave in a trustworthy manner and also that members are safeguarded from the detrimental effects of managerial and technical errors (McKnight, Cummings, & Chervany, 1998). For instance, participants in a VCoP may feel less reluctant to share information if they perceive that other participants will be prevented
from exploiting posted information by the presence of organizational systems of control (Ardichvili et al., 2003).

Supporting tools and technology. Studies (e.g., Barab, Schatz, & Scheckler, 2004; Hung & Chen, 2001; Jian & Jeffres, 2006; etc.) have utilized the Vygotskian activity theory to scrutinize online communities and online learning systems and have consequently theorized online cooperation as a vibrant communication between human representatives and technological objects (e.g., collaboration software, electronic databases, etc.). Hence, as Barab and colleagues (2004) suggest, a VCoP can be imagined to be a sociotechnical communication network which encompasses “people, data, equipment, documents and messages, legal arrangement and enforcement mechanisms, and resource flows” (p. 26). Brown and Duguid (1991) posited that the tacit knowledge created via community collaboration and development of a practice is frequently ignored as it is generally scattered between persons, guidelines and standards of practice, and instruments utilized in practice. Hence, in VCoPs, the technology utilized should not be considered to be merely an instrument but also as an element which has a significant effect on the identity, nature, and behavioral patterns of the community.

Chiu and colleagues (2006) suggested that the motivation for knowledge sharing could be explained by the social cognitive and social capital theories. That is, knowledge sharing was influenced by social influences, strong community ties, satisfaction with member–member interactions and organizer–member interactions, trust, group norms, reciprocity, anticipated reciprocal relationships, a sense of community and social identity, self-efficacy, outcome expectations. Moreover, knowledge sharing was affected by the dimensions of social capital (i.e., structural, relational, and cognitive).
Figure 4.3 depicts the motivators, barriers and enablers of knowledge sharing in VCoPs. It can be seen that factors affecting the motivation for knowledge sharing are dependent on personal benefit, community-related expectations, and normative benefits. Barriers to knowledge sharing include interpersonal factors, absence of sufficient awareness of systems or benefits, deficiency in technological skills, and cultural standards. Knowledge sharing can be encouraged by eliminating barriers and also by developing or promoting several enablers such as, a supportive organizational culture, an environment of trust, and existence of suitable supporting tools.

**Figure 4.3 Motivators, Barriers, and Enablers of Knowledge Sharing in VCoPs**

*Source: Adapted from Ardichvili (2008), p. 550*

Rosen and colleagues (2007) identified six barriers to information and knowledge sharing in virtual teams. They also provided accompanying recommendations or “best
practices” for overcoming these barriers. The barriers and the accompanying solution are summarized in Table 4.3.

Table 4.3 Barriers to Knowledge Sharing in Virtual Teams and Corresponding Recommendations

<table>
<thead>
<tr>
<th>Barriers to knowledge sharing in virtual teams</th>
<th>Recommendations to overcome barriers to knowledge sharing in virtual teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraints on building trusting relationships</td>
<td>Leaders as shapers of a psychologically safe team culture</td>
</tr>
<tr>
<td>Time constraints and deadline pressures</td>
<td>Overcoming time constraints and deadline pressures</td>
</tr>
<tr>
<td>Technology constraints on knowledge sharing</td>
<td>Adapt technology to virtual team needs</td>
</tr>
<tr>
<td>Team leader constraints on knowledge sharing</td>
<td>Leaders as knowledge sharing role models</td>
</tr>
<tr>
<td>Failure to develop a transactive memory system</td>
<td>Building a transactive memory system</td>
</tr>
<tr>
<td>Cultural constraints on knowledge sharing</td>
<td>Overcoming cultural barriers to knowledge sharing</td>
</tr>
</tbody>
</table>

Source: Adapted from Rosen et al. (2007)

Theories utilized in knowledge sharing research. Different authors have drawn attention to the theories utilized in knowledge sharing research. For instance, Wang and Noe (2010) highlighted the variety of theories that have been used in knowledge sharing research such as, “theory of reasoned action, social exchange theory, and social capital and network theories…expectancy theory, agency theory, knowledge-based view of the firm, equity theory, Kelley and Thibaut's (1978) interdependence theory, Hofstede's cultural framework, theory of absorptive capacity, social power theory, innovation diffusion theory, the similarity-attraction paradigm, social cognitive theory, economic exchange theory, Zand's (1972) model of the dynamic of trust, job characteristics model, expectation–confirmation theory, social categorization theory, the Big Five personality theory, attribution theory, balance theory, social influence theory, Detert et al.’s (2000) framework of culture, Constant et al.’s (1994) theory of information sharing, McAllister's (1995) classification of trust, empowering leadership, Swan's (1999) community model, mechanistic versus organic organizational

Chiu and colleagues (2006) used the social cognitive and social capital theories to build a model to examine the motivations for individuals to share knowledge in virtual communities.

**Models of knowledge sharing in virtual teams/communities.** A few models of knowledge sharing discussed in the reviewed studies. For example, as mentioned earlier the social cognitive and social capital theories were utilized by Chiu and colleagues (2006) to develop a model to examine the motivations for individuals to share knowledge in virtual communities. Human behavior is defined by the social cognitive theory as “a triadic, dynamic, and reciprocal interaction of personal factors, behavior, and the social network (system)” (p. 1873). The social cognitive theory, however, deals narrowly with the elements within a social network and the manner in which the behavior of an individual is influenced by these. Therefore, Chiu and colleagues (2006) introduce the social capital theory as an additional theory to serve as the basis for scrutinizing the effect of social network on the sharing of knowledge in virtual communities. It is posited by the social capital theory that the web of associations owned by a person or a social network, that is, social capital, has a robust influence on the degree to which interactive sharing of knowledge takes place. It was also argued by Bandura (1989) that the behavior of individuals is an outcome of their social network. Individuals are capable of increasing the intensity, extent, and effectiveness of reciprocal knowledge exchange by means of intimate societal interactions. Social capital was defined by Nahapiet and Ghoshal (1998) to encompass three discrete elements namely, structural (the general model of links between participants), relational (the type of private
associations developed by people with each other over several exchanges), and cognitive (the resources offering mutual interpretation, representations, and systems of significance between parties). Chiu and colleagues (2006) utilize both the social cognitive and social capital theories to scrutinize the impact of outcome expectations and aspects of the social capital dimensions on the sharing of knowledge in virtual communities from the perspectives of extent (quantity) and value (quality). They utilize two forms of outcome expectations regarding the sharing of knowledge: community-related and personal (Compeau & Higgins, 1995). Thus, in effect their study suggested that the different aspects of social capital will impact the knowledge sharing by individuals in virtual communities. Moreover, knowledge sharing can be stimulated by outcome expectations. Figure 4.4 depicts the research model utilized by Chiu and colleagues (2006) to investigate knowledge sharing in virtual communities.
In contrast, the social exchange theory was used by Staples and Webster (2008) to develop a ‘parsimonious’ model (Figure 4.5) to associate trust with knowledge sharing and also to associate knowledge sharing with virtual team effectiveness. Staples and Webster (2008) examined the moderating effects of virtuality and task interdependence on these two associations and found a robust and favorable association between trust and knowledge sharing for different team types (i.e., local, hybrid and distributed). However, the study found that the relationship was more robust with low task interdependence, providing reinforcement for the position that the criticality of trust is greater in weak structural situations. Although knowledge sharing was favorable related to team effectiveness outcomes, this association was offset by team imbalance and hybrid structures causing a weaker association between sharing and team effectiveness.
Kanawattanachai and Yoo (2007) developed a model (Figure 4.6) of the manner in which three behavioral aspects related to transactive memory systems (TMS) in virtual teams namely, expertise location, task-knowledge coordination, and cognition-based trust, and their effect on the change in team performance over time. They found that the frequency and quantity of task-oriented interaction among virtual team members had a significant role to play in establishing expertise location and cognition-based trust in the early stages of a project. However, the importance of task-oriented communication diminished once TMS were established. In its place, task-knowledge coordination was revealed to be a core construct influencing team performance integrating the influence of all other constructs toward the completion of the project. Thus, this study showed that TMS can be established even in the virtual team setting where communication primarily takes place via electronic media. However, it must be noted that TMS take a comparatively long time to mature in virtual teams. Moreover, once developed, TMS becomes indispensable to effective task
performance in virtual teams.

Figure 4.6 Structural Model of TMS in Virtual Teams

Source: Adapted from Kanawattanachai & Yoo (2007), p. 788

Hsu, Ju, Yen, and Chang (2007) drew on Bandura’s (1982, 1986, 1997) social cognitive theory to propose a model for knowledge sharing behavior in virtual communities (Figure 4.7). The factors considered in the social cognitive theory, namely personal factors, influence of the environment, and behavior, work together while also influencing each other (Wood & Bandura, 1989). The study of Hsu and colleagues (2007) limited its examination to the part played by personal factors and influence of the environment on the behavior of individuals whereas the social cognitive theory promotes the association of “triadic reciprocality” among the three factors (Bandura, 1986; Wood & Bandura, 1989; Compeau & Higgins, 1995). Moreover, Hsu and colleagues (2007) viewed knowledge as an object that members of virtual communities could access and retrieve (Alavi & Leidner, 2001). The
study considered that self-efficacy and outcome expectations are principal influences on the behavior of individuals and hence viewed these two factors as having the capacity to predict personal factors (Bandura, 1982, 1986, 1997; Igbaria & Iivari, 1995). Conversely, trust is considered to be a significant environmental factor impacting both behavior and personal factors since it can potentially, from an organizational perspective, alter structural components (e.g., stability, density, etc.) (McEvily, Perrone, & Zaheer, 2003); decrease complexity, and develop an inclusive structure for interpersonal communications (Gefen, 2000). Moreover, trust could enable the formation of the collective features of organizations (e.g., reliability, predictability, fairness, etc.). Hsu and colleagues (2007) suggest that it can be assumed, based on the social cognitive theory, that the features and environment of an organization which is formed by trust should have an effect on a behavior and personal factors.

Hsu and colleagues (2007) also provided some insights with regard to the determinants of trust in virtual communities. They submitted that trust in virtual communities is founded on attainable economic advantage, established community set up, and robust administrative systems and that these in turn will encourage members to take part in and rely on the community. In addition, the skills, generosity, and honesty of members will serve to aid other members to recognize them as associates in the community. That is, trust in virtual communities is founded on attainable economic advantage in the early stages. As associations are developed, this economy-based trust progresses to become trust based on knowledge (i.e., knowledge-based trust) and finally to trust based on affinity or relationship (i.e., identification-based trust).
Instruments for knowledge sharing. Sáenz, Aramburu, and Rivera (2009) discussed the different IT-based instruments utilized for knowledge sharing (Dalkir, 2011; Davenport & Prusak, 1998). These include E-mail; Online discussion forums and/or blogs; Intranet; Extranet; Groupware tools; and Online knowledge repositories. They also reported the different mechanisms related to people-focused knowledge sharing which promote social interaction between individuals. These include Communities of practice and/or meetings by field of interest; Forums; Storytelling and/or lessons learned and/or best practice collection and diffusion; Coaching and/or mentoring; Employee functional rotation; Employee external mobility; and Meeting events and/or workshops in order to promote reflection as well as knowledge and experience sharing with external agents.
Organization learning theory. A study by Berta, Cranley, Dearing, Dogherty, Squires, and Estabrooks (2015) provided insights into organizational learning theory which is a meta-theory that regards learning about new knowledge from the socio-organizational perspective. Moreover, it regards the individual level aspects that impact learning and fresh knowledge, the influences of the macro-environment on knowledge use and learning, and the effect of the quality of the knowledge on succeeding processes of learning (Argote, 2012; Argote & Miron-Spektor, 2011; Nonaka, 1994). Berta and colleagues (2010) submitted that this theory has great relevance with regard to gaining awareness of the phenomenon of knowledge transformation. The process of organizational learning is social. In other words, organizational members work together to build sense and knowledge regarding action-outcome associations and impact of the context of the organization (learning environment) on those associations (Brown & Duguid, 1991; Duncan, 1991; Fiol & Lyles, 1985; Nutley & Davies, 2001; Simon, 1991). Noticeable alterations in the behavior and work routines of employees is a manifestation of some learning, whereas other learning, such as learning that causes resolutions not to change, is not noticeable. In an organization, individuals learn in a social setting containing other learners, with past knowledge and accumulated learning rooted in that setting. Therefore, organizational learning is not limited to what is known and learned by individuals. Moreover, it can endure well past individual tenures. Persistent learning may be summarized in unambiguous and predetermined formal processes and policies, in systems to collect data and information (Argote, 2013; Berta & Baker, 2004; Crossan et al., 1999), or in more implicit forms related to compilations in the memory of an organization, unofficial channels of communication, culture, and societal standards (Brown & Duguid, 1991; Virani, Lemieux-Charles, Davis, & Berta, 2009).
**Models of organizational learning.** In their study of the processes characteristics of organizational learning, Berends and Lammers (2006) highlighted the existence of many process models representing organizational learning as a well-defined process composed of various activities or phases. For example, March and Olsen’s (1975, 1976) model of adaptive learning; the experiential learning cycle of Kolb (1984); Boisot’s (1995) social learning cycle; Dixon’s (1999) organizational learning cycle; and the 4-I model of Crossan and colleagues (1999). Moreover, Berends and Lammers (2006) posited that models of organizational knowledge creation can also be considered, such as Nonaka's (1994) SECI model and Zollo and Winter’s (2002) knowledge evolution cycle since learning is the creation of organizational knowledge that enhances the range of an organization’s activities (Berends, Boersma, & Weggeman, 2003; Huber, 1991).

Berends and Lammers (2006) also drew attention to process theories which place emphasis on using a series of events to explain change. Van de Ven and Poole (1995) offered significant insights regarding the process-related theories in organizational studies. They recognized four kinds of theories associated with development and change. All the theories perceive processes to be diverse cycles of change incidents and regulated by various fundamental mechanisms. The four kinds of theories differ on two fundamental aspects: (1) is the operation of change on single or multiple units? And: (2) Is change stipulated (prescribed) or beneficial (constructive)?

The four kinds of models offered by Van de Ven and Poole (1995) are life cycle models, teleological models, dialectical models, and evolutionary models. Prescribed change in a single entity is described by life cycle models. That is, they represent an entity’s process of change as advancing through a requisite series of phases, controlled by an internal program, guideline or compatible adaptation. On the other hand, the emphasis of teleological models is to depict beneficial change in a sole entity of analysis. Development is viewed as
focused on goals, and taking place by means of process phases, such as adaptation and evaluation, in such models. In the third kind, or dialectical, models, constructive change processes are described as operational on several entities. Change, in such models, is explained by means of the conflict between a hypothesis and an antithesis. Efforts to establish ascendancy result in a synthesis, the ascendancy of a single viewpoint or an existing state of affairs. The final model is the evolutionary model which place emphasis on prescribed change on numerous units. Development and transformation are depicted as a series of disparity, choice, and maintenance, by this model. Influences considered by the model are shortage, rivalry and choice of environment.

Dimensions of organizational learning. Rerup and Levinthal (2014) drew attention to the different dimensions of organizational learning. Although this study was again from a general perspective, the insights can be inferred to be applicable to virtual teams. The dimensions emphasized by Rerup and Levinthal (2014) are the periodicity with which learning occurs (i.e., rarely or often); the extensiveness of the object of learning (i.e., local or global); and the degree of cognitive intensity in the learning process (i.e., inert or reflective).

In general, organizational learning is scrutinized by tracking evident transformations (Kim & Miner, 2007) in behavior, know-how and reasoning or results (Miner, BassoL, & Moorman, 2001). Nevertheless, transformation and steadiness in reasoning and behavioral attributes are core facets of organizational learning (March, 1991).

Figure 4.8 depicts the model conceptualized by Rerup and Levinthal (2014) which depicts three dimensions of organizational learning. Rerup and Levinthal (2014) draw on Gavetti and Levinthal (2001) to highlight three dimensions that make a distinction between different views on change and learning. The three dimensions are: “1) the degree of cognitive intensity in learning and change, (2) the extensiveness of the object of learning and
change, and (3) the periodicity with which learning and change occurs” (Rerup & Levinthal, 2014, p. 38). These dimensions are diverse and produce conceptual variation while intersecting in their emphasis on the significance of reflective and more preemptive facets of organizational learning and transformation (Gavetti, Greve, Levinthal, & Ocasio, 2012; Rerup & Salvato, 2012).

Figure 4.8 Model for Dimensions of Organizational Learning

Source: Adapted from Rerup & Levinthal (2014), p. 39

**Antecedents of organizational learning.** Hotho, Easterby-Smith, and Lyles (2015) studied the reciprocal impact of global strategy and organizational learning. In their study they provide insights with regard to the antecedents of organizational learning. Although their emphasis was from the perspective of global firms, it could be seen that the insights are relevant in the context of virtual teams as well. Hotho and colleagues (2015) submitted that processes of global learning and their consequences are typically described using facets such as, knowledge stores, maturity, and organizational design. However, learning processes may
be influenced by other factors, for instance, social factors, such as politics and power as suggested by Lawrence, Mauws, Dyck, and Kleysen (2005), or culture, interaction, and social identity as proposed by several researchers (e.g., Cook & Yanow, 1993; Kane, Argote, & Levine, 2005; Taylor & Osland, 2011; etc.).

Technology and materiality are other facets utilized by researchers (e.g., Dodgson, Gann, & Phillips, 2013; Kane & Alavi, 2007; Kauppila, Rajala, & Jyrämä, 2011) to explain organizational learning outcomes. The essay on transactive memory systems by Ren and Argote (2011) indicated that technology enables communication across geographies and hence it can be anticipated that technology influences learning and knowledge systems. A summary of antecedents of organizational learning is provided in Table 4.4.

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Factors</th>
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<tbody>
<tr>
<td><strong>Knowledge Characteristics</strong></td>
<td>Types of knowledge: tacit, explicit, forgotten; external internal</td>
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<td></td>
<td>Shared knowledge between partners</td>
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<td></td>
<td>Innovation</td>
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<td></td>
<td>Complexity, ambiguity</td>
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<tr>
<td><strong>Learning Processes</strong></td>
<td>Knowledge gaps and experiential learning</td>
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<td>Knowledge transfer</td>
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<td></td>
<td>Knowledge sourcing</td>
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<td></td>
<td>Absorptive capacity</td>
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<td></td>
<td>Multiple and alternative forms of learning</td>
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<td></td>
<td>Exploration and exploitation</td>
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<tr>
<td><strong>Social dimensions</strong></td>
<td>Social relations, networks, degree of embeddedness</td>
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<tr>
<td></td>
<td>Institutional factors</td>
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<td></td>
<td>Cultural factors</td>
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<td>Close vs. far</td>
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<td></td>
<td>Teacher/student</td>
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</table>

*Source: Adapted from Hotho et al. (2015)*
Effects of organizational learning. Hotho and colleagues (2015) also reviewed the impacts of organizational learning which may be negative or positive. For instance, erroneous conclusions may be drawn by firms from past experiences which is an unfavorable effect of organizational learning (Levinthal & March, 1993; March, 2010; Argote & Miron-Spektor, 2011). In a similar fashion, the focus of the association between organizational performance and organizational learning may be impacted by various unforeseen events, such as changing aspects of the industry (Besanko, Doraszelski, Kryukov, & Satterthwaite, 2010).

Measures of organizational learning. Spector and Davidsen (2006) highlighted the difficulties in measuring organizational learning. They posited that this was due in part to the multi-faceted and dynamic nature of situations and issues and also since the assembling of suitable measures is a cumbersome and expensive venture in itself. The effectiveness of organizational learning can rarely be established adequately by interim measures. Instead, it is necessary to assess performance against recognized goals. In addition, it is a challenge to connect performance to different mediating systems. Performance changes may be the outcome of changes external to the organization or the consequence of a definite strategy.

On the other hand, the endeavor to assess organizational learning may be considered to be itself a sign of organizational learning. It is recognized that a person who is a successful learner is successful in self-control and skillful at metacognition. In a similar manner, an organization that learns successfully can be recognized by its engagement in activities which are concerned with tracking advancement against corporate objectives, and systems and policies that propose to further the accomplishment of these joint goals (Spector & Davidsen, 2006).

Spector and Davidsen (2006) further provide some insights into the facets of organizational learning that are measurable. These include:
• Actions as revealed with regard to flow of information, invention, participation, and outcomes;

• Processes for setting goals which include the capacity to recognize examples of interrelation and attrition of goals;

• Engagement of leaders which encompasses sharing of vision and connections across the hierarchy;

• Events for introspection, including unrestricted interactions to identify issues, evaluate situations, and study alternate solutions;

• Opinions as indicated in outlooks and inclinations concerning trust, consistency, value, and support;

• Team practices, incorporating systems of cooperation, management, interaction, and reciprocal peer mentoring (co-mentoring); and

• Openness to error, consisting of support for investigational and proof-based analysis.

**Routines for organizational learning in virtual teams.**

Dixon (2017) submitted that for effective learning, virtual teams must “have developed an agreed upon goal toward which their learning is aimed, have the independence to experiment with actions to reach that goal and function within an environment of trust, so team members can engage in the necessary learning behaviors to invent new possible actions, evaluate the actions they take and reflect on the outcomes they achieve” (p. 138). Moreover, teaming routines must be established by team leaders to meet these prerequisites in order for team learning to flourish in a virtual setting. In general, the term routine indicates a fixed and constant deliberate pattern. However, they can also be transitory, vibrant, and fluctuating in reaction to altering requirements. The twin character of organizational routines as both change enablers and change outcomes were emphasized by Rerup and Feldman (2011).
Virtual team members can scrutinize results and accordingly modify routines after they have worked together for some time. Zuzul and Edmondson (2016) described routines that encouraged involvement and invited not only research but also invention.

Gilson, Maynard, Jones Young, Vartiainen, and Hakonen (2015) suggested that virtual teams may operate more successfully if they have met face-to-face at an early stage. However, there is mounting substantiation that virtual teams that develop routines which involve periodic face-to-face meetings support a degree of emotional security that encourages learning behavior and enhances feelings of belonging and connectivity (Dixon, 2017).

In the context of tasks that necessitate a great extent of interdependence, Maznevski and Chudoba (2000) suggested that regular face-to-face meetings are crucial for the successful functioning of the virtual team. Moreover, the submitted that the rate of recurrence of such meetings is associated with the extent of interdependence as determined by the task, the scale of common perspective, and the robustness of the association between members. The ability of participants in virtual teams to effectively choose the manner of technology-mediated communication to utilize to deal with various kinds of issues develops over time. Furthermore, virtual team effectiveness could be increased by the use of methodically planned communication in combination with ad hoc communication (Maznevski & Chudoba, 2000).

Individualized technology-mediated communication, such as email and instant messaging, was found in a study by Suh, Shin, Ahuja, and Kim (2011) to favorably influence the network size and structural holes outside the group. On the other hand, tie strength inside the groups were enhanced by shared technology-mediated communication, such as group calendars, video and audio conferences, group discussions).
Dixon (2017) therefore suggests that team leaders are responsible, in virtual teams, to set up learning routines, to monitor the team’s progress over time to ascertain the adequacy of the routines, and to set up new routines as and when required by the team. However, it must be noted that routines are environment- and team task-specific. Hence, routines cannot be generalized across organizations.

Although a similar objective is fulfilled, different routines are utilized for teaming when teams are in the same location and when they are working in virtual mode. Dixon’s (2017) study confirmed that over time routines can and indeed must be altered to respond to the modifications in the setting and task characteristics. Degree of task interdependence establishes the rate of recurrence of each routine, for instance, the routine is more frequently used if the interdependence is high. Nevertheless, regardless of rate of recurrence, the occurrence of routines is planned rather than unplanned.

Furthermore, Dixon (2017) found that routines assisting agreed goals involved obtaining the wide objectives from leaders and providing time for teams to mutually understand the objectives. Also, such routines involved encouraging team members to provide their inputs concerning the agenda for both face-to-face and virtual meetings. On the other hand, routines associated with independence to experiment entailed eliminating hierarchy from exchanges relating to team tasks, while continuing to support these exchanges; assisting the visualizing of ideas by team members to support collaborative reasoning and research; setting apart time for the teams to jointly reflect on their learning and their opinions on what could be done differently; and providing opportunities for repeated customer interaction with the objective of satisfying customer needs. The last kind of routines was routines associated with developing trust and psychological safety. These routines incorporate direct encounters among team members that take place over time; occasions for team members to learn about the proficiencies, knowledge, strong and weak points of other
team members; the usage of complex virtual technology, specifically open chat and video discussions; strong social practices implemented in the course of co-location that subsequently serve to sustain teams through later periods of virtual work where a diminishing may be seen of trust and a common sense of purpose.

**Significant Themes of Relevance to the Present Study**

The systematic review revealed that some themes recurred with great frequency in the context of knowledge sharing and organizational learning. A few themes relevant to the current study are explored in greater detail in this section and are considered to be elements of the findings of the systematic review.

**Trust and its Impact on Knowledge Sharing in Virtual Teams**

Pangil and Moi Chan (2008) drew attention to trust in virtual teams from the perspective of the contribution of trust to their effectiveness. They reported findings from various authors (e.g., Bergiel, Bergiel, & Balsmeier, 2008; Brahm & Kunze, 2012; Kiffin-Petersen, 2004; Sarker, Valacich, & Sarker, 2003) who supported the criticality of trust to successful team practices and functioning. Moreover, Brahm and Kunze (2012) demonstrated that the impact of different variables on the effectiveness of a virtual team is moderated by trust. Thus, while trust has a multifaceted influence on the performance and successfulness of a virtual team (Brahm & Kunze, 2012; Kanawattanachai & Yoo, 2007), the relationship is complicated and challenging to establish.

Attention has been drawn to the challenges associated with developing trust in virtual settings. For instance, members of the team typically do not have a shared history and also might not have a future to utilize as a basis to develop trust. Moreover, they may not have had any face-to-face encounters. In addition, the developing of trust in virtual teams is also
complex since simultaneous communication is prevented by differences in time and geography. The conventional constraints and synchronization that team members are familiar with in the context of team interactions at the same location are frequently absent in a virtual setting further complicating the development of trust (Powell, Piccoli, & Ives, 2004).

It has been suggested by some researchers that the virtual team life cycle is composed of five definite stages:

1. Founding the team;
2. Initiation;
3. Forming;
4. Evolution; and
5. Task achievement.

Team leaders and managers can find it challenging initially to stimulate the building of trust and also to cultivate trust through the different life cycle stages. The principal issue is since it has been proven that the basis of trust varies across the life cycle (Greenberg, Greenberg, & Antonucci, 2007). Moreover, the robustness of the working of the virtual team is greatly dependent on dedication and individual trust associations, which may progressively dissolve over time without social interactions which are co-located and in person (Nandhakumar & Baskerville, 2006). Consequently, the extended success of virtual teams is challenging if robust trust is not established between team members.

Trust within virtual teams can be defined as “the degree of reliance that individuals have on their remotely located team members taken collectively (i.e. as a group)” (Pangil & Moi Chan, 2014, p. 96). Overall, three dimensions describe trust in virtual teams. These are based on personality (i.e., which develops during a person’s early upbringing), institutional conformance (i.e., conformance to an organization’s rules and regulations), and cognitive
(i.e., which develops during interpersonal interaction) (Sarker et al., 2003). However, in virtual teams, it is difficult to determine whether a person can be trusted based on their personality due to the restricted communication. On the other hand, institutional-based trust is vital for the effectiveness of virtual teams since such teams require team members who are self-monitoring and fear the detrimental outcomes of not accomplishing assigned tasks. Virtual teams inhibit the development of the third type of trust, cognitive trust, due to their inherent limitations (Sarker et al., 2003). However, concerted efforts to develop such trust within virtual teams will be beneficial to the success of the team (e.g., Kanawattanachai & Yoo, 2007).

In general, when persons trust each other, they are confident that the other person will be ready to and capable of sharing their knowledge and that they in turn will be required or obligated to share their knowledge (Staples & Webster, 2008). Consequently, they share knowledge to respect this obligation. Zhang, Fang, Wei, and Chen (2010) also confirmed the influence of trust on knowledge sharing in virtual communities. Thus, it can be contended that trust not only has a significant role to play in the success of virtual teams but also in the rate of knowledge sharing among members of virtual teams.

Overall, Pangil and Moi Chan (2014) posit that personality-based trust is the fundamental condition for knowledge sharing in a virtual team. This can be explained drawing on van den Hooff and de Ridder (2004) who suggested that knowledge sharing is a reciprocal activity wherein persons reciprocally trade their knowledge and mutually develop new knowledge. Intuitively, people will display greater willingness to share knowledge with other persons who appear to be trustworthy thus personality-based trust is vital in virtual teams. Nevertheless, since members do not have regular (or no) face-to-face contact, establishing personality-based trust can be difficult. As a result, it is imperative for the availability of institutional-based trust to encourage knowledge sharing among members of
virtual teams. Virtual team members must depend on each other’s anxieties concerning the penalty for not conforming to the organization’s rules and regulations as the starting point of trust for knowledge sharing. Other studies (e.g., Holste & Fields, 2010) have emphasized the significance of cognitive-based trust on knowledge sharing. Overall, it is the apparent expertise and efficiency of each member that causes others to be willing to share knowledge.

Organizational Routines and their Connection to Knowledge Sharing

Argote and Guo (2016) studied organizational routines from the perspective of their being repositories of knowledge. Cohen and Bacdayan (1994) described organizational routines as recurring, mutually supporting models of activity. Routines are utilized by organizations to accomplish uniform levels of function over a period. Extrapolating this, it can be inferred that an organization’s previous experience is stored in the form of routines. The concept of routines as one of the methods by means of which an organization preserves knowledge was first introduced by March and Simon (1958) and Cyert and March (1963). The concept was extended by Nelson and Winter (1982) who submitted that routines function as organizational genes, transmitting knowledge across time. These authors posited that routines are a vital resource for organizational competences. Cohen (2007) drew attention to the differences of routines from the habits of an individual. For instance, while an individual can complete a task by utilizing a consistent, repetitive process, routines are mutually supporting and include several doers.

Experimental studies have demonstrated that routines are composed of succession of actions initiated by impetuses. One person’s activity in a routine creates an impetus that produces activity in others. Thus, persons can execute the routine without conscious thought as they instinctively react to impetuses (Cohen & Bacdayan, 1994). Pentland and Rueter (1994) provided another viewpoint on routines when they submitted that routines are
“effortful accomplishments” (p. 488) of their executors. Since reconstruction of a task process every time executors complete the task is not required by routines, they offer performance benefits. A recurring sequence of activities provides uniform performance outcomes over time.

March and Simon (1958) suggested that the process of identification of a routine entailed observation of organization members to ascertain recurring behavior. For example, job shadowing is a typical method by which organizations teach existing routines to new personnel. Through job shadowing, new employees recognize prevailing routines and endeavor to learn them by observing older employees. An additional method suggested by March and Simon (1958) to recognize routines were interviews and recorded artifacts.

On the other hand, Cyert and March (1963) explained the notion of standard operating procedures (SOPs) which are the “memory of the organization” (p. 101). SOPs are critical facets of behavior since long-run planning receives limited time from organizations. In addition, SOPs are self-sustaining, simple, and help organizations to avoid ambiguity. Moreover, they “give stability to the organization and direction to activities that are constantly recurring (Cyert & March, 1963, p. 103). Also, SOPs may be regarded to be like rules since both help to store memory and regulate procedures (Cyert & March, 1963). Four kinds of procedures were identified by Cyert and March (1963) namely, task-performance, information handling, record-keeping, and planning, all of which allow the “transfer of past learning” to the current circumstance (p. 104) as they save the manner in which earlier employees have addressed problems. Furthermore, SOPs permit behavior to be well-regulated and uniform within the organization so that different departments can anticipate specific processes, contributions, and outputs from other departments. Other aspects of routines recorded by Cyert and March (1963) include: they have many sources; they can be clearly planned to accomplish specific tasks; can be presented, by teaching and coaching
workers, to the organization; can be created by understanding from experience; and they can originate from the external environment, such as via recruitment as new employees can bring SOPs from their previous assignments into the organization.

Nelson and Winter (1982) extended the notion of routines to indicate a recurring activity pattern in an organization. Moreover, they indicated that organizational memory is stored in routines. Additionally, routines can perform the function of internal control between the various departments of an organization. Overall, Nelson and Winter (1982) argued that routines make up an organization’s competence.

**Transactive Memory Systems as Repositories of Organizational Knowledge**

Argote and Guo (2016) also studied transactive memory systems from the perspective of their being knowledge repositories. A transactive memory system (TMS) has been described as a cooperative system for coding, archiving and recovering information in a societal structure (Lewis & Herndon, 2011; Wegner, 1987). A TMS is also referred to as systems of “who knows what.” Accordingly, a TMS offers individuals the right to use more information than they personally own. Two components constitute a TMS namely, the expert knowledge that exists in individual minds and the transactive procedures that connect persons and permit them to synchronize their specific know-how and capabilities (Wegner, Giuliano, Hertel, & Ickes, 1985). Teams and firms are aided by a TMS to assign tasks to the member most suited for them. Moreover, members are aided by a TMS in recognizing whom to seek advice from in different areas, a benefit that is especially beneficial when tasks are ambiguous and the likelihood of new challenges arising in their accomplishment is high (Ren, Carley, & Argote, 2006). In addition, the benefits of TMS to group performance have been demonstrated (Ren & Argote, 2011).
A TMS is also a kind of societal reasoning. Studies (e.g., Hinsz, Tindale, & Vollrath, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Ilgen, 2006; Larson & Christensen, 1993) have drawn attention to the influence of information processing systems to social psychology and organizational behavior.

The notion of TMSs can be traced back to the research of Wegner in the late 1980s and hence is a comparatively newer notion than routines. Wegner (1987) developed the notion of TMS to describe the kind of expert knowledge that arises between two persons in an intimate interactive association, where one might be in charge of recalling and executing certain items and the other for recalling and executing others. This concentration of memory offers the foundation for cooperation and helps couples to accomplish tasks with greater success. Wegner, Erber, and Raymond (1991) demonstrated the benefits of a TMS by investigating the impact of a forced division of tasks in existing and new couples. Wegner and colleagues (1991) found that the performance of the existing couples was adversely affected by the forced division of labor as both members were already aware of each other’s competences and had accordingly devised the division of tasks to best suit their knowledge and capabilities. As well as not suiting their inherent knowledge and capabilities, the forced division of tasks did not suit the knowledge and capabilities they had acquired due to their experience of interacting with each other. On the other hand, Wegner and colleagues (1991) found that the performance of the new couples was aided by the forced division of tasks as these persons were not aware of each other’s competences and had not devised their own allotment of tasks.

Liang, Moreland, and Argote (1995) extended the notion of TMSs to groups. They separated the groups into two halves and controlled TMSs by coaching the members of one half of the groups together and the members of the groups in the other half individually to build radios. The study found that the groups where members had been trained together had
a more robust TMS than the groups where members had been trained separately. Better recall and fewer mistakes were found in groups with members who had been trained together.

Other studies (e.g., Faraj & Sproull, 2000; Lewis, 2004) have found that well-developed TMS is related to better performance in software and consulting teams. Heavey and Simsek (2015) studied TMS at the organizational level by placing emphasis on TMS in senior management. They found that the performance of firms could be predicted by the interaction of the TMS, external ties, and environmental dynamism.

The effects of TMSs on strategic management and organizations’ competitive edge have also received consideration in research. For instance, Argote and Ren (2012) reviewed the manner in which the knowledge entrenched in TMSs can be a basis of competitive edge for a firm. They contended that four properties of TMSs deliver competitive edge. First, experience is the basis of development of TMSs. Second, TMSs are characteristic of a specific organization as they depend on the members of an organization. Third, transferring TMSs to diverse settings is challenging as they are complex and contain elements that have advanced together to suit the context of the present organization. Fourth, imitation of TMSs by competitors is difficult as they are hard to see.

**Insights from the preceding Review of Literature**

It could be seen from the preceding sections that the attention to knowledge sharing and organizational learning in the context of virtual teams was diffuse and points of convergence were few and varied.

Knowledge sharing from an individual perspective was found to be influenced by organizational context (organizational culture and climate, management support, rewards and incentives and organizational structure), interpersonal and team characteristics (team
characteristics and processes, diversity and social networks), cultural characteristics (collectivism, in-group/out-group, etc.), individual characteristics (openness to experience, comfort level with ICT tools, educational level, work experience, confidence, etc.), and motivational factors (beliefs of knowledge ownership, justice, trust, individual attitudes, etc.) (Wang & Noe, 2010).

It was also found that while there were various definitions of virtual teams and virtual communities, researchers in general were in agreement concerning the advantages of virtual teams and their use of information technology for communication. From the perspective of knowledge sharing or organizational learning, it was evident that the very nature of virtual teams/communities could limit the sharing of knowledge as in general, people share knowledge only with those whom they see and trust unless there is some other compulsion to do so. In other words, it could be inferred that the social capital and social cognition in virtual teams is low and knowledge sharing is consequently impacted. Nevertheless, there was consensus that knowledge sharing would enhance the effectiveness of a virtual scenario.

Factors influencing knowledge sharing in virtual scenarios could be categorized as personal benefits, community-related considerations, and normative considerations. Organizational culture and leadership, trust, and supporting tools and technology, were some facets that served to motivate/impede/enable knowledge sharing. Theories used to explain the motivation for knowledge sharing included the social cognitive and social capital theories.

Wang and Noe (2010) drew attention to the numerous theories that had been employed in knowledge sharing research, for instance, theory of reasoned action, social exchange theory, expectancy theory, agency theory, knowledge-based view of the firm, social power theory, etc.
Various models of knowledge sharing have been developed by researchers (e.g., Chiu et al., 2006; Staples & Webster, 2008; Kanawattanachai & Yoo, 2007; Hsu et al., 2007, etc.). However, most have limited direct applicability in the context of virtual teams as all contain some element of trust. The existence of various IT-based tools for knowledge sharing could also be established (Sáenz et al., 2009).

From the perspective of organizational learning, the organizational learning theory served to emphasize that learning in an organization was a social activity. Models of organizational learning typically were found to focus on process (e.g., Crossan et al., 1999; Dixon, 1999; Kolb, 1984; March & Olsen, 1975, 1976; etc.).

Dimensions of organizational learning were found to be associated with cognitive intensity, periodicity, and extensiveness (Rerup & Levinthal, 2014). Antecedents of organizational learning included, to name a few, social factors (e.g., politics, power), culture, interaction, social identity, organizational design, etc. Moreover, it could be seen that the effects of organizational learning could be favorable or unfavorable.

Measures of organizational learning encompassed facets, such as actions, processes, leader engagement, introspective events, opinions, team practices, etc. (Spector & Davidsen, 2006). The role of routines in organizational learning in virtual teams (Dixon, 2017) was also scrutinized.

Overall, the key following insights could be gleaned:

a. Trust is essential for knowledge sharing.

b. Organizational routines and Transactive Memory Systems are repositories of organizational knowledge.
Hence, it could be inferred that a model for improving knowledge sharing and hence organizational learning in a virtual context must place some emphasis on the development of trust and the use of one or more repository of organizational knowledge while building on existing learning theories (if any) that support learning in an online/virtual context.

Figure 4.9 depicts the researcher’s visualization of knowledge sharing and organizational learning in virtual teams as derived from the various reviewed studies.

![Knowledge Sharing and Organizational Learning in Virtual Teams](image)

**Figure 4.9 Visualization of Knowledge Sharing and Organizational Learning in Virtual Teams**

**Summary**

The objective of this chapter was to synthesize the findings from the literature review to recognize any other concepts or missing links which require scrutiny and tackling through the proposed conceptual solution to enhance knowledge sharing in the context of the virtual
workspaces. As discussed in the Methodology chapter, this was achieved through a systematic review of literature.

The first part of this chapter briefly reviewed the approach utilized in the systematic review. Subsequent sections provided deeper insights into knowledge sharing and organizational learning as identified through the systematic review. It could be seen that the existing models of knowledge sharing and organizational learning are limited in the context of virtual teams and require extension by incorporating different elements that are appropriate in this context. Further analysis of the literature from the perspective of providing a suggestion to resolve the identified problem will be undertaken in the following chapter, “Suggestion of a Solution.”
CHAPTER 5
SUGGESTION OF A SOLUTION

Introduction

The previous chapter described the problem awareness phase and drew attention to the areas of emphasis in research with regard to knowledge sharing and organizational learning in the context of virtual teams. The objective of the current chapter is to unite the various concepts to derive a conceptual model to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment. Accordingly, an attempt is made to investigate the means by which individuals can learn through online methods and the manner in which this learning can be converted to organizational learning.

As inferred in the previous chapter (Awareness of the problem), a model for improving knowledge sharing and hence organizational learning in a virtual context must place some emphasis on the development of trust and the use of one or more repository of organizational knowledge while building on existing learning theories (if any) that support learning in an online/virtual context. Accordingly, the first part of this chapter picks up from the previous chapters and further scrutinizes Connectivism as a theory applicable in online learning contexts, such as virtual teams and online CoPs. It must be noted that findings from the systematic review which pertain to connectivism are recorded in this chapter. An attempt is made to recognize the role of connectivism in virtual teams and online CoPs and utilize the understanding from this endeavor to suggest a model for knowledge sharing relevant in the context of the present study.

Figure 5.1 highlights the current activity in the present study.
Findings from the Systematic Review (Contd.)

The process of systematic search and use of the predetermined inclusion criteria resulted in the inclusion of five (5) studies in this segment of the review. Table 5.1 lists the studies reviewed in this phase.
Table 5.1: Studies included in the Suggestion Phase

<table>
<thead>
<tr>
<th>Author</th>
<th>Area of relevance to the study</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mysirlaki &amp; Paraskeva (2012)</td>
<td>Connectivism</td>
<td>Direct</td>
</tr>
<tr>
<td>Sharma &amp; Kumar (2017)</td>
<td>Connectivism</td>
<td>Direct</td>
</tr>
<tr>
<td>Bell (2009)</td>
<td>Connectivism</td>
<td>Direct</td>
</tr>
<tr>
<td>Boitshwarelo (2011)</td>
<td>Connectivism</td>
<td>Direct</td>
</tr>
<tr>
<td>Kop (2011)</td>
<td>Connectivism</td>
<td>Direct</td>
</tr>
</tbody>
</table>

Features of Connectivism

Boitshwarelo (2011) provided insights regarding the key features of connectivism from a study of relevant literature (e.g., Siemens, 2005; Downes, 2005; Kop & Hill, 2008). These are as follows:

- Learners learning through connection to a learning community and profiting from the community while also supplying it with knowledge is the dominant concept in connectivism. The learning community is a set of people drawn together by similar interests who learn collectively by means of constant discussion.

- The learning community is regarded to be a node which is a component of a more extensive network of nodes. Independent, distinct, and innovative development of knowledge is supported by these networks which are varied but linked.

- Knowledge is not considered to be limited to existence in the brain of a single individual or to a single location but as spread within a knowledge network or several individuals. Consequently, the acquisition and formation of knowledge depend on various perspectives and outlooks and on admittance to diverse centers or flows of information.

- The legitimacy and correctness of knowledge requires continual assessment as the information underlying the knowledge is constantly being altered.
• The processes of knowledge creation are connected across disciplines especially in the setting of the Internet which is characterized by the distributed quality of information.

At this juncture, it is necessary to emphasize that the applicability of connectivism is not restricted to online settings. However, the adaptability of online settings improves the fulfillment of the features just described. Consequently, online settings are a crucial medium in the development and enablement of connectivism (Boitshwarelo, 2011).

An examination of the facets of connectivism shows that learning settings using connectivist principles are fundamentally intricate for two reasons. First, they can be differentiated by the existence of networks of persons, groups, and sometimes disciplines. Second, they are dynamic and need constant encounters between learners. As a result, it can be seen that connectivist learning environments integrate theories such as CoPs which play a distinctive yet balancing and intersecting role during the creation of knowledge (Boitshwarelo, 2011).

**Connectivism and Learning**

Kop (2011) observed that a learning organization in the view of connectivists does not pertain to a “body of knowledge” to be passed on to learner from educator; neither does it indicate a single environment for learning to take place. In its place, the learning environment is spread about the Web, and learning is equivalent to the engagement of persons with this environment.

Kop (2011) further submitted that four principal forms of activity can be envisioned to enhance learning

1) aggregation, access to and collection of a wide variety of resources to read, watch, or play; 2) relation, after reading, watching, or listening to some content, the learner might reflect and relate it to what he or she already knows
or to earlier experiences; 3) **creation**, after this reflection and sense-making process, learners might create something of their own (i.e., a blog post, an account with a social bookmarking site, a new entry in a Moodle discussion) using any service on the Internet, such as Flickr, Second Life, Yahoo Groups, Facebook, YouTube, iGoogle, NetVibes, etc.; 4) **sharing**, learners might share their work with others on the network. This participation in activities is seen to be vital to learning.

Further, new models of learning are developing and are probably advantageous in the present multifaceted learning environment, which is characterized by constantly transforming and evolving technologies (Conole, de Laat, Dillon, & Darby, 2008). It was claimed by Downes (2009) that personal learning environments (PLE) and networks can be created and used by individuals to locate information, establish connections with chosen experts, and become keenly engaged in aggregation, relation, creation, and sharing, to increase their learning.

**Challenges to Connectivist Learning**

Kop (2011) also highlighted three challenges associated with connectivist learning. The first, self-directed learning, relates to the need for a connectivist learner to be somewhat independent to have the capacity to learn autonomously, without the support of educational institutions, and to be involved in the activities of aggregation, relation, creation, and sharing. In other words, in a networked learning setting, a learner has to take responsibility for making information available, coordinating time, and organizing the learning activities and objectives. In informal networks, learners are allowed to select the subject they want become conversant with or the activities they want to participate in. However, in connectivist settings, other choices will also have to be made. For example, learners have to manage time, establish their own learning objectives, locate resources, and test and implement new tools.
The second challenge is related to learner’s presence. The fundamental motivation of a person has an emotional aspect (Jones & Issroff, 2005; Picard et al., 2004; Zaharias & Poylymenakou, 2009). Other scholars (e.g., Dron & Anderson, 2007; Lombard & Ditton, 1997) have highlighted other issues associated with motivation in the form of “presence.” It is contended by these authors that the warmer the ties between the individuals involved, the greater the extent of presence and the greater the degree of engagement in the activity of learning.

Lombard and Ditton (1997) suggested that there is a great degree of presence when a person taking part in an online activity goes through the activity as it were really taking place, without the computer’s intervention. Garrison, Anderson, and Archer (2000) drew attention to the influence of three kinds of presence that contribute to intense and significant learning: “cognitive presence,” which guarantees a particular extent of intensity in the practice of education; “social presence;” and, “teacher presence” in formal educational environments. In general, Kop (2011) concluded that in connectivist learning, similar to classroom-based learning, individuals required interaction with, cooperation and feedback from others, to participate and contribute enthusiastically and significantly. Overall, the greater the extent of presence, the greater the degree of participation in the online activity, hence, the extent of presence in connectivist learning is significant as this would increase the intensity of learning and consequently the learning experience.

Another significant element, or challenge, in connectivist learning is the extent of essential knowledge (or critical literacies) in individuals. In a learning environment where other persons have poor presence and do not provide adequate reinforcing and offering scaffolds for learning, there is a greater need for specific competences in the self-directed learner for him/her to locate and use resources and information, and to propel, in his/her turn, resources and information for others to use and learn from (Kop, 2011).
Connectivism and virtual teams

In a study exploring tools that facilitate connection in social networks and support the creation of online communities, Mysirlaki and Paraskeva (2012) presented a theoretical framework to examine the social dealings in multiplayer games, from the perspective of CoPs, connectivism, self-organization, and activity theory. Accordingly, they drew attention to the need for online cooperation and the new tools that continually arise to connect persons in social networks and facilitate the creation of online communities. Examples of social media created in response to this need include blogs and microblogs (e.g., Twitter), social networking sites (e.g., Facebook), content communities (e.g., YouTube), collaborative projects (e.g., Wikipedia), virtual game worlds (e.g., World of Warcraft), and virtual social worlds (e.g., Second Life) (Kaplan & Haenlein, 2010).

Researchers (e.g., Beck & Wade, 2004; Reich, 2010) have suggested that considerable time is spent by users of such technologies and tools in examining new conditions; communicating with unfamiliar persons; resolving problems unaided and speedily; and improving their analytic and cooperative capabilities. Lessig (2001) suggested that online communities enable people to collaborate online to discuss any conceivable problem; to inquire and share stimulating perceptions which can be responded to by other people. Consequently, such online societal situations can develop into online learning communities when participants are encouraged to actively participate in idea sharing with others, leading to sharing of knowledge (Gibson, Aldrich & Prensky, 2006).

The connectivism learning theory provides a conceptual basis for examining learning in community contexts where exchangers of information are connected. A community in the context of connectivism is believed to be “the clustering of similar areas of interest that allows for interaction, sharing, dialoguing, and thinking together” (Siemens, 2003).
In connectivism, the individual is the starting point and has his/her personal knowledge. The sharing of this knowledge is through nodes (learning communities) into a bigger and continuously expanding network composed of colleagues, associates, etc. Intensity of information and the number of individuals traversing a node determine the size and robustness of the node (Downes, 2006). When considered from this perspective, learning progresses from being an activity that is distinctive and internal to a “network” (Siemens, 2005, 2006).

Mysirlaki and Paraskeva (2012) utilized the example of MMOGs (Massively Multiplayer Online Games) to indicate that players organize themselves into CoPs and that the social and continually changing cooperative universe of MMOGs provides a practical instance of connectivism. As observed by Galarneau (2005), “only by examining social learning in an environment where it occurs naturally through spontaneous self-organisation of participants into learning ecosystems will we gain insight into its true possibilities within an educational framework” (p. 7).

In another study, Sharma and Kumar (2017) drew attention to the role of connectivism in improving the use of prevailing learning theories in a networked universe. Moreover, the use of the Internet and related technology to share and acquire knowledge is explained by connectivism. In addition, connectivism enables the creation of connected communities in online mode to share knowledge. It also offers a basis and structure for gaining awareness of cooperative environments in the process of online learning. Knowledge, in connected networks, experiences frequent change in order to collect and disseminate useful information to individuals. Connectivism offers the basis of using technology to connect individuals.
Bell (2009) submitted that an advantage of connectivism is that it permits a community of persons (occupied with learning technologies) to legitimize what they are carrying out. For example, teachers who desire to expand social media usage within their practice can enhance and distribute knowledge more rapidly by means of affiliation to various communities.

**Connectivism and Online Communities of Practice**

As seen from the previous discussions, connectivism is associated with being attached to communities and to the overabundance of accessible resources in any setting especially utilizing the networking capacities of ICTs. Hence, the notion of online CoPs becomes significant as a means to implement connectivism (Boitshwarelo, 2011).

This is an important aspect in the context of the current study as virtual CoPs (or teams/communities) have become common in the organizational context and can be developed not only as a means for collaborating for work-related activities but also as a channel to facilitate significant and linked (or shared) learning. This is an outcome of the prospects offered by ICTs to link people and to aid them to interact in ways that were not previously possible (Boitshwarelo, 2011).

Learning is facilitated by CoPs in several ways. For example, from the viewpoint of Piaget’s theory CoPs potentially encourage equilibration while from the viewpoint of Vygotsky’s theory, CoPs can encourage cognitive scaffolding from the perspective of bridging the gap regarding the zone of proximal development (Boitshwarelo, 2011).

Lave and Wenger (1991) and Brown, Collins, & Duguid (1989) posited the situated cognition is a core concept of the idea of CoPs. The core idea in situated cognition is that interactions between people, the tools utilized by them, the actions they take, and the
sociocultural setting influences learning as learning is fundamentally a social activity (Hansman, 2001). Knowledge is an outcome of opportunities and actions and is hence inseparable from these (Brown et al., 1989). Thus, cognition and setting are conjoined entities. Regarding the manner in which situated cognition is connected to CoPs, Gasson (1997) observed that “…situated cognition deals with how individuals learn to participate within communities of practice and how their development is shaped by the activities in which they engage…” (p. 227). Consequently, Hung and Chen (2001) submitted that, “…learning from a ‘communities of practice’ perspective is [also] congruent with recent notions of situated cognition…” (p. 4), where there is a fundamental connection among context, cognition and learning.

Another aspect relevant to connectivism is the notion of distributed cognition which assumes fundamentally that no single individual or machine owns all the information required to accomplish an assignment or to resolve an issue (Hutchins, 1996; Winn, 2002). Therefore, this concept regards knowledge to be distributed across a group of people and the tools utilized by them (Stahl, 2005). That is, “…knowledge is distributed among a community of people and devices” (Winn, 2002, p. 341). Distributed cognition recognizes that (Hutchins, 1996):

- Its basis is formed by communication and that to be useful knowledge has to be shared;

- Combined information equates to shared information and this can be utilized by the most qualified individual for the whole team’s benefit;

- Accomplishment of a task requires the elements of a distributed system to rely on each other.
These various components highlight exchange and sharing of information and also usage for the purposes of learning and productivity which is fundamentally the promise of connectivism. As submitted by Bell and Winn (2000), learning environments, such as CoPs, which have a high level of interaction and networking, provide occasions for these components of distributed cognition to be implemented.

Overall, it could be seen that online CoPs are certainly an indication of connectivism. Consequently, connectivism is implemented in the establishment and operation of CoPs, whether instinctively or by design (Boitshwarelo, 2011). In the context of the current study, it could be seen that present day virtual workspaces do result in the creation of online (virtual) CoPs and hence it can be inferred that virtual CoPs/teams in the present day are already evidence of connectivism. Thus, it is possible to extend the researcher’s visualization of knowledge sharing and organizational learning in virtual teams as seen in Chapter 4 to incorporate connectivism (Figure 5.2).
Summary

The current chapter united the extended conceptual knowledge of knowledge sharing and organizational learning along with the concept of connectivism in the context of virtual teams and online CoPs to visualize a conceptual model to enhance knowledge sharing in the context of the virtual workspaces. Therefore, this study suggests that treating teams which collaborate over virtual workspaces be regarded as online CoPs which are an instance of the use of connectivism. Consequently, this study provides a model for knowledge sharing that extends the scope of existing models to incorporate connectivism. The next chapter will describe the development and evaluation of this model.
CHAPTER 6
DEVELOPMENT AND EVALUATION

Introduction

The objective of this chapter is to provide an overview of how the suggested model to enhance knowledge sharing in the context of the virtual workspaces can be developed and evaluated. Figure 6.1 depicts the flow of activities in the current study. This chapter presents the development and evaluation phases of the DSR methodology as applicable to the project.

![Figure 6.1: Current Activity in the Study](image)

Development

The last two chapters reviewed various aspects of the extant literature related to knowledge sharing, organizational learning, and connectivism, in general, and with reference
to virtual teams, in particular. As previously stated, the chief objective of this current study was to derive a model which enhances knowledge sharing in the context of the virtual workspaces of present day organizations. Accordingly, an extended model of knowledge sharing which incorporates connectivism is suggested.

As seen in the various reviews of literature (Chapters 2 and 3), there is significant study related to the sharing of knowledge and organizational learning in a general context and several theories and models have been proposed to explain and support knowledge sharing. However, with the increased virtualness in working arrangements, it is evident that existing models do not provide adequate explanation of the knowledge sharing needs of persons who work in this scenario and organizations that need to build repositories of knowledge which incorporate the knowledge of persons who work virtually. Accordingly, a brief description of a few popular models for knowledge sharing was provided. For example, the research model provided by Chiu and colleagues (2006) for knowledge sharing in virtual communities; the generic research model for knowledge sharing of Staples and Webster (2008); and structural model of TMS in virtual teams of Kanawattanachai and Yoo (2007).

Therefore, as seen in Chapter 5 (Suggestion of a Solution), it could be inferred that a model to enhance knowledge sharing in a virtual context should take not only the various factors that facilitate/enable/impede knowledge sharing but also elements that support/facilitate organizational learning into consideration. Hence, a combination of various perspectives, theories and models related to knowledge sharing, organizational learning, and virtual teams/communities is required. Moreover, the influence of the connectivism learning theory in such a context is also to be considered.

The researcher’s experience with knowledge sharing and organizational learning in the general context of organizations inspired the suggestion of use of the concept of the
Learning Grid to serve as the basis to enhance and develop the conceptual model which is the proposed outcome of the present research project.

**Learning Grid**

Capuano, Gaeta, and Ritrovato (2008a) defined a Learning Grid as follows:

A Learning Grid is an enabling architecture based on three pillars: Grid, Semantics and Educational Modelling allowing the definition and the execution of learning experiences obtained as cooperation and composition of distributed heterogeneous actors, resources and services (p. 6).

As seen in the definition, a Learning Grid is composed of a group of services arranged in three layers (Figure 6.2).

![Learning Grid Architecture](source: Capuano et al., 2008a, p. 7)

The role of the Infrastructure Services is to implement the Web Service Resource Framework (WRSF) specifications with the purpose of describing the fundamental service
model. The role of the Grid Middleware for VO (virtual organization) Management is to implement the services detected by the Open Grid Services Architecture (OGSA) permitting the creation and management of a distributed VO and to combine, virtualize, and administer services and resources on it. The third group of services, the Semantic Annotation, Discovery and Composition Services, offer functionalities distinct from learning that are founded on requirements and languages utilized for the semantic description of Web services (e.g., OWL-S). These services permit the automatic mediation, detection and configuration of Grid Services. Contextualized characteristics associated with the prescribed narrative of learning experiences founded on Education Modeling Languages (e.g., IMS-LD) are provided by the Educational Modeling and Execution Services. In addition, these services use these narratives to provide the spontaneous detection, configuration, and implementation of learning services and resources accessible on the Grid (Capuano et al., 2008a).

As can be seen in Figure 6.2, Infrastructure Services and a Grid Middleware for VO Management constitute a Grid; Grid along with Semantic Annotation, Discovery and Composition Services constitute a Semantic Grid; and a Semantic Grid along with Educational Modelling and Execution Services and a group of “environment” services constitute a Learning Grid. The environment services support the formation, the function, the progression and the preservation of a learning community in the following manner:

In the context of the present study, the conceptual model for knowledge sharing can be implemented through a Learning Grid as it facilitates creation of a virtual learning community. However, it must be noted that organizations would require to additionally consider the social and human perspectives of trust and motivational factors in the context of implementing Learning Grids in their organizations to support virtual teams. The underlying technology of the learning grid can be determined based on the resources available to the organization. Since cloud technologies are a fairly standard component of an organization’s
technology infrastructure in the present day building a virtual learning environment based on cloud computing may be an obvious conclusion.

Figure 6.3 depicts the final visualization of the conceptual model for knowledge sharing. Thus, an organization must expend considerable resources in building organizational knowledge through the conventional approaches of building trust and organizational routines and transactive memory. This knowledge sharing mechanism can be supported by means of a Customized Learning Grid Infrastructure, for example, cloud computing.

Figure 6.3: Final visualization of the conceptual model for knowledge sharing in virtual teams
Evaluation

Before describing the process of evaluation of the suggested model, it is imperative to establish the understanding of effectiveness of organizational learning (as an outcome of effective knowledge sharing) as perceived by this study.

This study understands that organizational learning is effective when some or all of the following aspects are in evidence as suggested by Spector and Davidsen (2006):

- **Actions** as revealed with regard to flow of information, invention, participation, and outcomes;
- **Processes** for setting goals which include the capacity to recognize examples of interrelation and attrition of goals;
- **Engagement of leaders** which encompasses sharing of vision and connections across the hierarchy;
- **Events for introspection**, including unrestricted interactions to identify issues, evaluate situations, and study alternate solutions;
- **Opinions** as indicated in outlooks and inclinations concerning trust, consistency, value, and support;
- **Team practices**, incorporating systems of cooperation, management, interaction, and reciprocal peer mentoring (co-mentoring); and
- **Openness to error**, consisting of support for investigational and proof-based analysis.

Thus, it is evident that there are multiple facets of evaluation of the model for knowledge sharing in virtual workspaces proposed in section 6.2.4. That is, dimensions, such as organizational, technical, socio-psychological, cultural, and business goals can be utilized to evaluate the model. These dimensions are briefly described:
• **Organizational**: The model can be evaluated from the organizational learning perspective with regard to the setting up of routines that store learning and the building of an organizational TMS. One means of measuring a TMS is through the scale (Figure 6.4) developed by Lewis (2003) which involves inputs from users. Additionally, facets such as management support, rewards/incentives, organizational structure, culture/climate, characteristics of leadership, and context which are part of the environmental factors (Wang & Noe, 2010) affecting knowledge sharing can be assessed.

![Table: Transactive Memory System Scale Items](http://example.com/scale.jpg)

**Figure 6.4: Transactive Memory System Scale**

*Source: Adapted from Lewis, 2003, p. 604*

• **Technical**: Evaluation of the cloud infrastructure, such as traffic, usage of services, etc.

• **Socio-psychological**: Assessment of the impact of the motivational factors including knowledge sharing, such as beliefs of knowledge ownership, perceived benefits and costs,
justice, trust, individual attitudes, social costs, team level trust and cohesiveness, leader-member exchanges (LMX) (Wang & Noe, 2010).

- “Cultural” facets of knowledge sharing (e.g., in-group/out-group, other cultural context).

- Business goals: assessment from the perspective of outcomes in terms of quantifiable and non-quantifiable parameters (e.g., financial results, time to market, customer satisfaction, quality improvement etc.).

**Summary**

This chapter provided an overview of how the suggested model to enhance knowledge sharing in the context of virtual workspaces could be developed and evaluated. Accordingly, details were provided with regard to the concept of the Learning Grid, scenarios of the use of Learning Grids, a few methods to implement learning grids. Also, an approach to evaluate the model was suggested. The next chapter provides the conclusion to the dissertation.
CHAPTER 7

CONCLUSION

The present study was undertaken in response to a perceived need to investigate the extent and effectiveness of knowledge sharing and hence organizational learning in the context of teams working in virtual workspaces. The management and sharing of knowledge and organizational learning are essential to the continued success of any organization and its sustained competitive edge. However, in the current context of global organizations where teams are scattered and even in the same geographic location, alternate workspaces are provided to facilitate employee or organizational convenience, the matter of organizational learning and knowledge sharing can become a matter of great complexity. Consequently, it was seen that this situation merited additional focus and study and to suggest a solution which can help organizations take advantage of the knowledge in their organizations and develop organizational learning would benefit global organizations and empower their employees. Therefore, the overarching aim of the study was determined to be the development of a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment.

The aim of this final chapter is to summarize and reflect on the study as described in the dissertation and to provide the reader with an overview of the findings from the study. The contributions of the research are also summarized. Finally, recommendations for further research are made.

Summary of the Dissertation

Section 1.1 of the Introduction to the dissertation provided an overview of the structure and flow of information in this dissertation. Each chapter is now briefly revisited.
Chapter 1 (Introduction) introduced the background of the research and drew attention to the purpose of the research. The research statement was composed and the accompanying research objective and questions were provided.

The overarching aim of this research is to develop a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment.

The aim of the research was supported by the following objectives:

1. To understand the evolution of knowledge sharing and organizational learning in the context of virtual teams.
2. To recognize the key issues and challenges in knowledge sharing and organizational learning in the context of virtual teams.
3. To understand the participants in knowledge sharing and organizational learning.
4. To scrutinize the root causes of the key issues in knowledge sharing and organizational learning.
5. To develop a conceptual framework for improved organizational learning and knowledge sharing in the context of the virtual workspaces.

Correspondingly, the study asked the following overarching research question.

*What are the characteristics of organizational learning in the context of virtual workspaces and the factors that serve as barriers/facilitators to organizational learning in this specific context? Can these factors be employed to facilitate the creation of a conceptual framework to improve knowledge sharing and organizational learning in virtual workspaces?*

The accompanying sub-questions were as follows:
• What are knowledge sharing and organizational learning in the context of organizations, in general, and virtual workspaces, in particular?
• Who are the participants and/or stakeholders in organizational learning?
• What are the theories, if any, underlying learning, in general, and organizational learning, in particular? How do these contribute to an understanding of knowledge sharing and organizational learning?
• What are the features of virtual workspaces and individuals who operate in such environments?
• What are the challenges to knowledge sharing in the context of virtual workspaces?
• How can the implementation of organizational learning and knowledge sharing be improved in the context of virtual workspaces?

The second chapter contained a general review of extant literature on the topic of research. Extant literature associated with various aspects of Organizational Learning, Knowledge Management and sharing, and virtual teams were considered. Since the research methodology for the present study was chosen to be Design Science Research, Chapter 3 provided a detailed description of DSR. This included descriptions of the philosophical bases of DSR, the activities and artifacts and DSR, and methods of data collection. A more precise review of literature was performed in Chapter 4 using a systematic review (SR) to establish of the awareness of the problem which is the first activity of Design Science Research. Accordingly, deeper insights were provided with regard to Knowledge sharing and Organizational Learning in the context of virtual workspaces as revealed by a systematic review of literature. Chapter 5 continued with the SR as it further reviewed the connectivism learning theory and discussed a conceptual solution keeping in mind the knowledge sharing requirements of virtual teams.
Chapter 6 continued onto the final steps of the DSR methodology. This chapter demonstrated the manner in which the development of the conceptual solution took place. It presented the solution proposed by the study to solve the identified problem area. Moreover, the evaluation of the conceptual solution was described.

The next section summarizes the research project.

**Summary of the Research**

As described in Chapter 3, the strategy followed in the research was the Design Science Research (DSR) methodology. The Awareness phase of the main DSR cycle began with a general review of literature (Chapter 2) which provided an overview of knowledge, organizational knowledge, knowledge management, knowledge sharing, communities of practice, organizational socialization, organizational learning, theories of learning, and learning in virtual teams. The Awareness phase continued with more specific focus in Chapter 4 with a systematic review of literature associated with knowledge sharing and organizational learning, in general, and in the context of virtual teams/communities, in particular. This systematic review offered insights with regard to the recurring themes in knowledge sharing research; characteristics of virtual teams/communities; knowledge sharing in virtual communities; factors, motivators, barriers, and enablers of knowledge sharing in VCoPs; theories utilized in knowledge sharing research; models of knowledge sharing in virtual teams/communities; and instruments for knowledge sharing. From the perspective of organizational learning, insights were provided into organization learning theory; models, dimensions, antecedents, effects and measures of organizational learning; and routines for organizational learning in virtual teams. Themes of particular relevance to the present study were found to be associated with trust and its impact on knowledge sharing in virtual teams; organizational routines and their connection to knowledge sharing; and transactive memory.
systems as repositories of organizational knowledge. The findings from the reviewed literature helped the researcher create an initial visualization of knowledge sharing and organizational learning in the context of virtual teams. Thus, the outcome of this chapter was recognition or awareness that existing models of knowledge sharing and organizational learning are limited in the context of virtual teams and require extension by incorporating different elements that are appropriate in this context (Chapter 4).

This awareness was used to unite the extended conceptual knowledge of knowledge sharing and organizational learning along with the concept of connectivism in the context of virtual teams and online CoPs to visualize a conceptual model to enhance knowledge sharing in the context of the virtual workspaces (Chapter 5).

Chapter 6 extended the conceptual model to include the Learning Grid as a means to implement the model. Accordingly, different methods to implement learning grids were described. Finally, an approach to evaluate the contextual model proposed by the study was suggested.

Overall, it could be seen that the study fulfilled its objectives. That is, it explored knowledge sharing and organizational learning in the context of organizations, in general, and virtual workspaces, in particular. Moreover, it recognized that the participants and/or stakeholders in organizational learning included employees, leaders, and the organization itself. Furthermore, the study explored the various theories underlying learning, in general, and organizational learning, in particular and explored their contribution to understanding knowledge sharing and organizational learning. In addition, the features of virtual workspaces and individuals who operate in such environments were reviewed along with the challenges to knowledge sharing in the context of virtual workspaces. Finally, the study
provided a conceptual model to improve the implementation of organizational learning and knowledge sharing in the context of virtual workspaces.

The next section discusses the contributions of the research.

**Contributions of this Study**

The following contributions can be perceived from this study. First, this study contributed to the existing literature regarding facets of knowledge sharing and organizational learning in the context of virtual teams/communities. Second, insights were offered for HR managers regarding the features of virtual teams/communities and the different aspects of organizational learning and knowledge sharing. Third, new information was offered to organizational stakeholders who are interested in enhancing, maintaining and retaining the knowledge resources of the organization regardless of the physical location of team members. The suggested factors and approach for the evaluation of the suggested conceptual model could be utilized for other models of knowledge sharing. Moreover, it is hoped that this study will stimulate the initiation of further and extensive research on models for organizational learning and knowledge sharing in the context of persons working in virtual workspaces.

The next section discusses the limitations of the research.

**Limitations of the Research**

The depth of the analysis in the present study was constrained to available secondary sources due to the limited time available for the study and the limited resources available to the researcher. Also, the development and evaluation of a conceptual model for knowledge sharing in virtual workspaces had to be limited to a theoretical model which could not be actually implemented.
Furthermore, there was no involvement of stakeholders in the field (e.g., employees, supervisors, etc.) who could have provided insights which could be quantitatively or qualitatively analyzed to confirm / refute the rationale utilized to arrive at the conceptual model.

**Recommendations for Further Research**

The current research was constrained by the lack of inputs from organizational sources. Hence, one opportunity for future researchers would be to replicate the same study with insights from primary sources using methods such as interviews and/or organizational case studies.

Another opportunity for research would be for future researchers to implement the suggested model using cloud computing (e.g., Sharma & Kumar, 2017) or the Globus Toolkit (e.g., Roy et al., 2014) and evaluate the knowledge sharing and organizational learning outcomes real-time organizational scenario.

**Conclusion**

The overarching aim of this study was to develop a conceptual solution to enhance organizational learning and knowledge sharing in the context of the virtual workspaces of the present day work environment. Accordingly, the study progressed through the various stages of developing this solution using the different phases of the Design Science Research (DSR) approach. Two levels of literature reviews, general and systematic, were utilized to obtain awareness of the problem under consideration and to suggest a conceptual solution for knowledge sharing in virtual workspaces. Moreover, suggestions were provided with regard to the development of the solution and its evaluation.
In general, as a human resources practitioner who has extensive experience in various organizations, I have encountered different kinds of teams and have been aware of their challenges with regard to collaboration, knowledge sharing, and performance. With the increased flexibility in work arrangements, teams can no longer be clearly demarcated into co-located or distributed. For instance, team members in the same city can work from different physical offices or their own homes, that is, different virtual workspaces. Hence, the concept of the virtual team.

I was therefore keen to understand the implications of the ‘virtual’ element on collaboration, knowledge sharing, etc., on this new kind of team. I was aware that the notions of knowledge sharing and organizational learning have been extensively researched in the general organizational context and was curious if a similar exploration could be performed in the context of virtual teams. The findings from the secondary sources utilized in this study identified and confirmed various aspects of virtual teams, knowledge sharing, and organizational learning. Moreover, the conceptual model provided in this study could contribute to the effectiveness of knowledge sharing in virtual teams. Nevertheless, it is conceded that further research is required in this area due to the growing pervasiveness of virtual workspaces in different kinds of organizations.
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Curriculum Vitae

LATA KONERU, MBA, PMP

latasuvvari@gmail.com

HR and Financial Management Professional

• 20 years of progressively responsible experience in managerial positions in the HR, finance, Manufacturing and Higher Ed areas, including 15 years leading cross-cultural teams face-to-face and virtually
• Conducted Workshops, Classroom style and individual training for cross functional teams on HR, Finance and Management related topics.
• A seasoned program manager, a certified PMP with extensive experience planning and executing international projects as well as developing and deploying project resources and system life cycle processes, tools and organizations effectively
• Effectively bridge HR and business gaps to achieve innovation, drive efficiency and improve productivity
• Demonstrated ability to manage multiple teams simultaneously and deliver creative solutions to business challenges.

Areas of expertise:

– Human Capital Management
– Financial Management
– Strategic planning and governance
– Workforce Development
– Project and program management
– Benefits Administration
– Systems integration
– Process re-engineering

Experience

CSN, Las Vegas, NV
Executive Director, HR and Financial Systems
Led the Workday HR and Financial implementation at CSN.

AVERY DENNISON, Las Vegas, NV
Project & Applications Support Manager, Corporate Division

• Led the global financial systems production support teams in transforming the production support process over the years leading to a reduction of on call support during after office hours by over 70% and realigning resources to other projects while improving system performance and issue resolution time to over 50%

VERIZON WIRELESS, Dallas, TX
Sr. Consultant
Led business process reengineering initiatives and enhancements to management reporting.

• Designed and helped develop new enhancements such as new dashboards and changes to existing HR, Finance and other management reports via extensive coordination with various teams in IT, HR, Finance and Procurement.

PRICE WATERHOUSE COOPERS
Management Consultant
• Carried out initial assessment of business processes and mapped them to the PeopleSoft product and led the Gap-Fit analysis for the HR and Financial business processes.