A KNOWLEDGE VISUALIZATION TOOL FOR KNOWLEDGE TRANSFER:

THE CASE OF USING ELECTRONIC SLIDE PRESENTATION FOR

INFORMATION PROCESSING ENHANCEMENT OF FIELD SALES FORCE

By

DARANEE DELORME

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Author:	Daranee Delorme
Thesis Principle Supervisor:	Dr. Adshariya Agsornintara
Thesis Supervisor:	Dr. Sawittree Sutthijakra
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ABSTRACT

This research explores how a simple knowledge visualization tool, i.e. electronic slide presentation, used to transfer knowledge, enhances information processing of receivers of knowledge. In this study, the receivers of knowledge are the field sales force of a consumer product company. The exploratory and qualitative study research design presents the findings via content analysis, pattern matching, and explanation-building. Parental theories that help construct the theoretical framework of this research are information processing and cognitive load theories.

Findings reveal that the tool enhances some of the steps of information processing and there are other factors helping to enhance the process. Data show rather than the tool, the presenter of knowledge, and the receivers of knowledge all have parts in each of the different steps of information processing. The knowledge delivery model that emerged explains in which parts the tool, the presenter, and the receiver have roles. Traits of the presenter help enhance information processing, important in getting attention, comprehension, transferring knowledge to long-term memory, and retrieval of knowledge, while the tool alone is important in delivering knowledge and transferring knowledge to short-term memory. Finally, the receivers of knowledge are important in encoding their own knowledge.

Lessons learned are that gestalt laws of presentation in the content of the tool help reduce extraneous cognitive load. The knowledge content reveals that there are both low and high element interactivity knowledge in the tool. The evidence shows that high element interactivity knowledge of optimal of three knowledge elements can still be transferred and learned. This has academic contributions and business implications especially to the field of knowledge management, knowledge visualization, and cognition.

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GLOSSARY

1) Knowledge visualization: the use of visual representations to improve the creation and transfer of knowledge between at least two people (Eppler & Burkhard, 2004).

2) Knowledge visualization tools: tools that can be used to construct and convey complex insights (Eppler & Burkhard, 2004).

3) Information processing: Huitt (2000) suggested that human minds took in information with limited capacity. There exists some type of control system for dealing with stimuli. The process includes presentation, attention, comprehension, yielding, retention, and behavior.

4) Enhance: the incremental in the aspect of help and guide by knowledge visualization tools (Longman, 1991)

5) Information processing model: the model of communication that imitates the processing of information of a computer (Belch & Belch, 2004).

6) Cognitive load theory: the theory that states that learners may be loaded by information and if the complexity of their instructional materials is not properly managed, this will result in a cognitive overload (Sweller, 2009).

7) Intrinsic cognitive load: the complexity of the learning material, the number of elements that the learner must attend to simultaneously understand the learning material (Renkl & Atkinson, 2003).

8) Extraneous cognitive load: load not inherent within the instruction, but is imposed by the instructional designer as they structure and present information (Sweller, 2009).

9) Germane cognitive load: reflects the effort that contributes to the construction of schemas or learning. For example, if the learners do have schemas or learnings about trees, new knowledge about trees can be easily linked to former knowledge and hence takes less effort to learn and contribute to having high germane cognitive load (Renkl & Atkinson, 2003; Sweller, Merrienboer, & Paas, 1998)

10) Schema: Huitt (2000) explained that the model of schema emphasized the fact that information was stored in multiple locations throughout the brain in the form of nodes or connections.

11) Short-term memory: holds small amounts of information for three to twenty seconds. Short-term memory can be stored as images and sound. (Coon & Mitterer, 2002)

12) Long-term memory: the memory system used for relatively permanent storage of meaningful information. (Coon & Mitterer, 2002)

13) Cognition: the process of thinking or mentally processing information (images, concepts, words, rules and symbols). (Coon & Mitterer, 2002)

14) High element interactivity: in this study, element is defined as detail of each
knowledge presented to receivers. When the elements of knowledge can be
learned in isolation, they can be described as having low element interactivity.
However, high element interactivity or connectedness occurs when a knowledge
cannot be learned without learning the connections between a large number of
elements (Sweller, 1994); e.g. in the knowledge of promotion the receivers need
to learn the brand of product, its variance, its size, price, discount percentage,
which budget to use, which type of store, and the period of promotion.
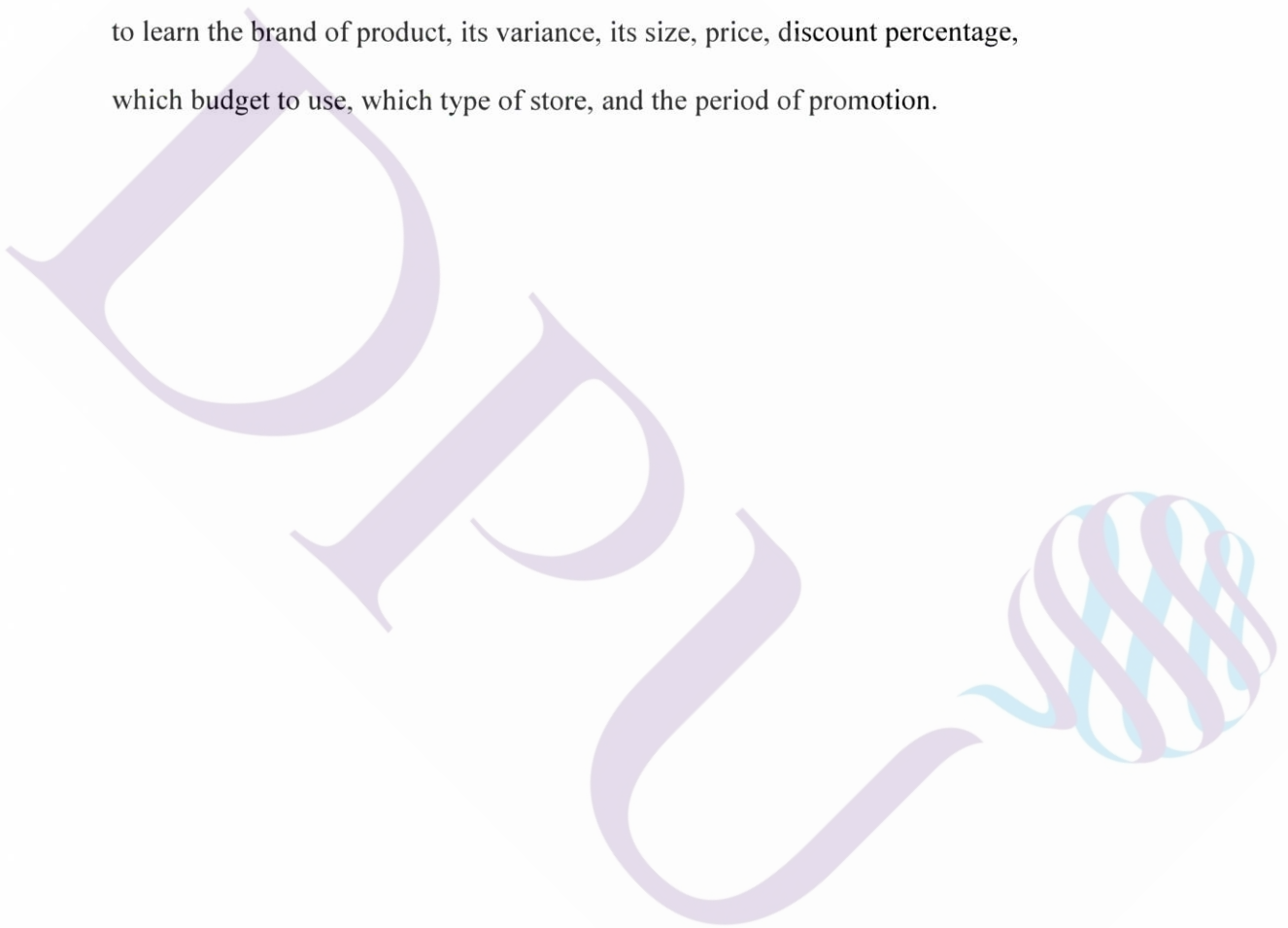
CHAPTER 1

INTRODUCTION

1.1 Background and Significance of Research

This research investigates the use of knowledge visualization tool in a case of electronic slide presentation to explain how the tool helps in transferring knowledge and enhancing information processing of the receivers of knowledge (field sales force). In this research, the theoretical framework is built from the gap on the literature and studies from three major areas: a) knowledge transfer, b) knowledge visualization, and c) cognition in the aspect of humans' information processing.

The literature gap that inspires and guides this research is Knowledge Management (KM), which is concerned with the transfer of knowledge. Studies done by Eriksson & Hauer (2004), Mento et al (1999), Nast (2006), and Eppler (2004) have revealed that in transferring knowledge, tools are used and knowledge visualization tools enhance learning, understanding, and recall (Eriksson & Hauer., 2004), (Mento, Martinelli, & Jones, 1999), (Nast, 2006), (Eppler, 2004). Burkhard (2004) found that knowledge transfer could be improved when planners and business decision makers used traditional visualizations with business knowledge visualizations. That study showed improvement in decision making due to the business knowledge received. Burkhard evidenced a statement from Davenport and Prusak (1998) that the knowledge transfer cycle would not be complete until the receivers of knowledge

received and learned the knowledge. The review shows that knowledge transfer via tools can enhance learning, understanding, and recall but not in the aspect of information processing process.

Electronic slide presentation is one of the knowledge visualization tools widely used in both business and education sectors (Earnest, 2003). It is used as knowledge visualization tool or visual aid to transfer knowledge. A study by Earnest (2003) about electronic slide presentation indicates that a control group that has knowledge transfer without electronic slide presentation performs more poorly than the group that has knowledge transfer with electronic slide presentation (Earnest, 2003). Electronic slide presentation has been further developed to add an add-in feature to control the presentation remotely (Kumar, William, Ming, Cai, & Mihai, 2011). The system developed by Kumar et al (2001) is set forth for remotely controlling a presentation in a loop mode to allow the presentation to continue in the absence of a communication channel between the portable electronic device and remote presentation device (Kumar, et al., 2011). Another study is done to develop a system that assists users in viewing videos or electronic slide presentation of lectures on small screen devices, such as cell phones (Tung, Swaminathan, Efrat, & Barnard, 2011). Lai, Tsai, and Yu (2011) conduct a study to experiment whether a dual-slide presentation in a classroom would encourage learning (Lai, Tsai, & Yu1, 2011). The result indicates that the proposed system based on cognitive theory can effectively help students in the experimental group to have better learning efficacy for lectures than that of the conventional group (Lai, et al., 2011). All results in learning encouraged but not in the aspect of information processing process.

Knowledge visualization tools develop into complicated tools for specific use such as electronic spatial map in geometry (Ware, 2004). A study done by Sangin, Molinari, Nussri, and Dillenbourg (2010) explore the use of Knowledge Awareness Tool (KAT) in learning environment to see the effects of collaborative outcomes (Sangin, Molinari, Nüssli, & Dillenbourg, 2010). The result shows that the tool yields positive learning outcome (Sangin, et al., 2010). Social visualization interface has been used in a study to encourage student's social engagement in class (Hsiao et al., 2012). Electronic slide presentation as knowledge visualization tool is often claimed by commercial articles that it can improve learning; however, academic peered-reviewed articles about how it enhances information processing process are rare.

At a visualization summit in 2007 jointly organized by scholars in visual science in Zurich, Switzerland, researchers set goals to achieve visualization developments (Remo Aslak Burkhard et al., 2007). The summit in 2007 revealed that there was a need to focus on the users or the recipients of knowledge because their needs have been ignored, while earlier studies emphasized only on developing the tools to transfer knowledge (Remo Aslak Burkhard, et al., 2007). This statement from the summit revealed the evidence of a research gap in knowledge transfer and knowledge visualization tools implementation. The needs of the receivers of knowledge had to be emphasized and learning objectives by the tool should be achieved. Studies in the field of knowledge visualization tools has often stopped at developing the tools to more effectively transfer information or knowledge. Tergan et al. (2006) introduce the integration of information and knowledge by using concept maps but do not extend to the realm of the knowledge visualization tools to enhance or support cognition, especially in the aspect of information processing (Tergan,

Keller, & Burkhard, 2006). Kerren et al. (2007) state that humans played an essential role in information visualization, so psychology and related fields must be involved (Kerren, Stasko, Fekete, & North, 2007).

This study reviews literature in learning. The review finds that human learning involved many different stages. To learn the knowledge, the process of humans' cognition is involved. Cognition is a way humans learn, and the study of cognition has been defined by Neisser (1967) as the study of how people encode, structure, store, retrieve, use or otherwise learn knowledge (Neisser, 1967). When knowledge is learned, it is encoded in memory ready for retrieval. Memory is one of the main areas being studied (Lutz & Huitt, 2003), and information processing system is a form of cognition that explains the process of human memory. Each process is similar to the information processing of a computer in such a way that there is an input of data, information, or knowledge via keyboard or the human sensory system then these are processed either in the brain or in the central processing unit, and output is shown on screen or as for human the output is the action being taken. The researcher explains the concept of human's information processing process in details in literature review section in Chapter 2.

Studies in knowledge transfer, knowledge visualization, and cognition have matured in parallel in their directions and have not merged. Review showed that cognition in knowledge transfer via tools is not studied enough to know if the tool really helps enhance human's information processing. Review of studies in KM, visualization, and cognition gives birth to the theoretical framework that is later used as a guide for this research. The conceptual framework, as a part of theoretical

framework, includes seven steps of information processing from getting attention to knowledge retrieval. The theoretical framework includes information processing and cognitive load theories. Theoretical framework defines the scope of this research to find out how the tool enhances the seven steps of information processing and how the theories affect or confirm the study. Information processing of the receivers is explored according to the theoretical framework developed prior to the investigation. In this research, information processing is the process in which information is given attention to, acquired, stored, and retrieved for later use (Chaicharoen, 2008). With this background, research gap is emerged revealing research questions in section 1.2.

1.2 Research Questions

The aim of this study is to explain how knowledge visualization tool like electronic slide presentation used to transfer knowledge enhance cognition in information processing. This research addresses the following research questions:

1) How does electronic slide presentation, used to transfer knowledge, enhance cognition from the aspect of information processing?
2) What are other factors that can enhance cognition?

1.3 Scope of Investigation

This research explores and investigates how electronic slide presentation used to transfer knowledge enhances information processing of receivers of knowledge, in this case a field sales force. The subjects of this study are a field sales

force of a consumer product company in Thailand who receive knowledge on a monthly basis by means of an electronic slide presentation as knowledge visualization tool presented to them by a presenter.

Semi-structured interview guides are developed according to the theoretical framework to achieve answers to the research questions. This research covered four research sites of field sales force with forty-three receivers of knowledge. The findings to address the research questions are based on empirical data collection from 30th January to 8th February 2010.

The unit of analysis of this research includes only the field sales force who are individual sales representatives representing a consumer product company in selling products according to monthly plans. Monthly plans come in the form of knowledge presented by an electronic slide presentation as a knowledge visualization tool through a presenter.

Knowledge in this research presented by the presenter each month comes in four knowledge content areas: a) sales target, b) new products, c) promotion, and d) product displays. The presenters of each site identify which knowledge is expected to be retrieved by the receivers of knowledge. Knowledge retrieval of each site is examined according to the pre-determined expectations of the presenters of each site.

Knowledge visualization tool in this research is the electronic slide presentation shown at knowledge transfer sites. Knowledge transfer comes through electronic slide presentations shown on screen, and print-outs of the content are distributed to all receivers as reference during knowledge transfer. The tool contains knowledge about sales target, new products, promotion, and product displays.

The investigation covers documentation of the tool, in-field observation, and interview with presenters and receivers of knowledge. The study does not intend to cover the knowledge transfer measurement into how efficient it is transferred but rather to find out how each steps of information processing is enhanced. A test is, however, conducted with receivers of knowledge to test understanding and learning. In the groups of six receivers like site one and two, the researcher individually tests understanding and learning by interview while in the groups of fourteen and seventeen people in site three and four, the researcher distributes blank sheet of paper and dictates the test to the whole group and each receivers writes the answers in the paper.

1.4 Research Method

This research employs an exploratory and qualitative study approach to address the research questions. The receivers of knowledge are closely observed while the knowledge is transferred, and interviewed to explain how the tool enhances information processing. The pattern of the use and the learning of the users are observed to explain how the tool enhances each stage of information processing.

Content of the knowledge used in slide presentation is collected as part of field documentation and is analyzed against gestalt laws of presentation (see Appendix B) of presenting knowledge to discover if the tool follows the rules of presentation to achieve optimal visual perception. The Gestalt laws easily translate into a set of design principles for information displays (Ware, 2004). Ware proposed eight gestalt laws: a) proximity, b) similarity, c) connectedness, d) continuity, e)

symmetry, f) closure, g) relative size, h) common fate. All data from observation notes including interview scripts are arranged in tabulated worksheets and QSR NVivo 8 and analyzed to create pattern, theme, to explain the incidents and answer the research questions.

1.5 Research Objectives

1) To explain how electronic slide presentation used to transfer knowledge enhances cognition in the aspect of information processing.

2) To explore what enhances information processing.

3) To understand the optimal context of knowledge transfer and understand if there are other factors enhancing information processing.

1.6 Significance of Research and Contributions to Fields of Study

Findings that correspond to research objectives are as follows:

1) Electronic slide presentation helps enhance information processing but not in all seven steps. The tool is present in getting receivers' attention, transferring the knowledge itself, helping receivers understanding knowledge, and transferring knowledge to short-term and long-term memory. The steps in which the tool is not present are encoding and retrieving knowledge.

2) The tool, the presenter, and the receivers have their parts in each of the information processing steps.

3) Another factor that enhances information processing is the traits of the presenter which are argumentativeness, extraversion, openness, agreeableness, and conscientiousness.

This research contributes to academic knowledge in the areas of knowledge visualization, knowledge transfer and delivery, and psychology in the aspect of cognition. It has contributed to a complete theoretical model of knowledge delivery. The model indicates who are important in each of the information processing steps. It also extends the theory of cognitive load and captures the use of gestalt laws of presentation to reduce extraneous cognitive load. Intrinsic cognitive load continues to exist with the complexity of knowledge but the knowledge element of optimal of three with high element interactivity can still be transferred. In order to transfer and deliver knowledge to the users and make them use that knowledge to complete the task, their information processing has to be complete. The tool, the presenters, and the receivers of knowledge are aware of the parts they are taking in each step of the process to instill knowledge into their long-term memory in order to be able to retrieve for later use.

The research findings present valuable business implications in the aspect of human resources and sales. The finding about the traits of the presenters can be applied to trainers of the organizations or those disseminating knowledge. They would know how to act to drive knowledge to the receivers. In sales organizations where knowledge is delivered every month, the users will know that different types of knowledge need different treatment. They will need to be responsible for their own

knowledge encoding. This revelation will make knowledge delivery more effective and efficient through to knowledge retrieval.

1.7 Chapter Outlines

This research includes six chapters in presentation. Chapter 1, the introduction, gives an outline of this research especially on the background, research question, research objectives, research rationale, significance of the research, a brief method, definitions of terms, and its contribution.

Chapter 2 includes the literature review in three major fields: a) knowledge management and transfer, b) knowledge visualization, and c) cognition. As these three fields have matured in parallel, the review reveals the gap for this research. Furthermore, a theoretical framework is constructed and shown in this chapter.

Chapter 3 explains the detailed methodology employed for this research which includes research approach, the data collection method, research instrument, unit of analysis, data analysis direction, validity, and reliability of this research.

Chapter 4 describes the study in vivid details. It starts with the description of the tool, description of sampling groups and setting, then the introduction to the study sites, the description of knowledge, and data analysis direction.

Chapter 5 reveals findings from the qualitative study with elaborated evidence. In this chapter, findings are analyzed according to the theoretical framework earlier constructed to give answer to research questions and objectives. The evidence of how the tool, presenters, and receivers of knowledge co-drive the

information processing model is shown. The findings extend the theoretical framework built prior the research.

Chapter 6, which is the final chapter, offers a conclusion that includes the recall of research gap and research questions, research methodology, findings and observations, academic contributions, business implications, future research, and concluding remarks.

CHAPTER 2

LITERATURE REVIEW

This chapter provides a review of the literature that results in revealing a research gap. The review includes the following areas:

- Knowledge management (KM)

- Knowledge transfer

- Visualization of data, information, knowledge, and the tools

- Cognition

- Visual science

- Models of response

- Traits of presenter

- Related theories

In order to answer the research questions, these areas are important in getting to understand the context of the research. Knowledge transfer has its own process that involves sender and receiver while visualization of data, information, and knowledge links with different tools to handle them. Visual science introduces how human eyes and perception react to visuals. Models of response explain the process from receiving knowledge to taking action. Traits of presenter are reviewed to find out their effects in knowledge transfer. Theories are reviewed to identify parental

theories that can guide this research. These areas of review can later be translated into a theoretical framework that is later used as a guideline to conduct this research.

The concept of knowledge management is introduced next.

2.1 Knowledge Management (KM)

The term knowledge management (KM) has been a familiar term in many organizations. It includes many steps and processes regarding knowledge creation up until knowledge dissemination. Moreover, the term has been used so frequently and widely that sometimes its meaning has become unclear. Thus, this review will start by introducing what knowledge management means.

Scholars have given meaning to KM, but the meaning that has the widest applicable perspective is the one given by Dalkir (2005). Dalkir (2005) states that from a business perspective knowledge management is a collaborative and integrated approach to the creation, capture, organization, access and use of an enterprise's intellectual assets. He explains further that from the cognitive science or knowledge science perspective, knowledge means the insights, understandings, and practical know-how that we all possess. From the process/technology perspective, knowledge management is the concept under which information is turned into actionable knowledge and made available in a usable form to the people who can apply it (Dalkir, 2005). That is by far the most extensive meaning of knowledge management that the researcher encounters. The next review is on the meaning of knowledge.

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The meaning of knowledge consists of data and information. Knowledge is defined to be neither data nor information, although it is related to both (Awad & Ghaziri, 2004). There might then be a question of what the difference of data, information, and knowledge is. The most extensive definition of data, information, and knowledge is the one given by Davenport and Prusak (1998). They define data, information, and knowledge as a set of discrete, objective facts about events. Data are most usefully described as structured records of transactions. However, data describe only a part of what happens, not the whole picture. They provide no judgment or interpretation and no sustainable basis of action. They are the essential raw material for the formation of information. Prusak and Davenport (1998) further describe information as a message. It is meant to shape the person who gets it, to make some difference in his/her outlook or insight. Unlike data, information has meaning—the "relevance and purpose." Knowledge is 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. In hierarchy, knowledge derives from information as information derives from data (Davenport & Prusak, 1998). In summary, data are pure facts that do not have interpretation, while information has meaning in it. Knowledge has facts, meanings, and valuable insights. One can say that knowledge contains both information and data.

In this research, knowledge will be dealt with in the context of knowledge transfer. Knowledge transfer is one of the important processes of KM. KM involves

the strategies and processes of identifying, creating, capturing, organizing,

transferring, and leveraging knowledge to help individuals and firms compete

(Martin, Brown, DeHayes, Hoffer, & Perkins, 2005). To see different KM processes,

KM processes have been discussed by various authors. Dalkir (2005) gathers

knowledge management processes from many authors in his book *Knowledge*

Management in Theory and Practice. The first KM cycle that Dalkir (2005) mentions

is the Meyer and Zack KM cycle as seen in Figure 2.1.
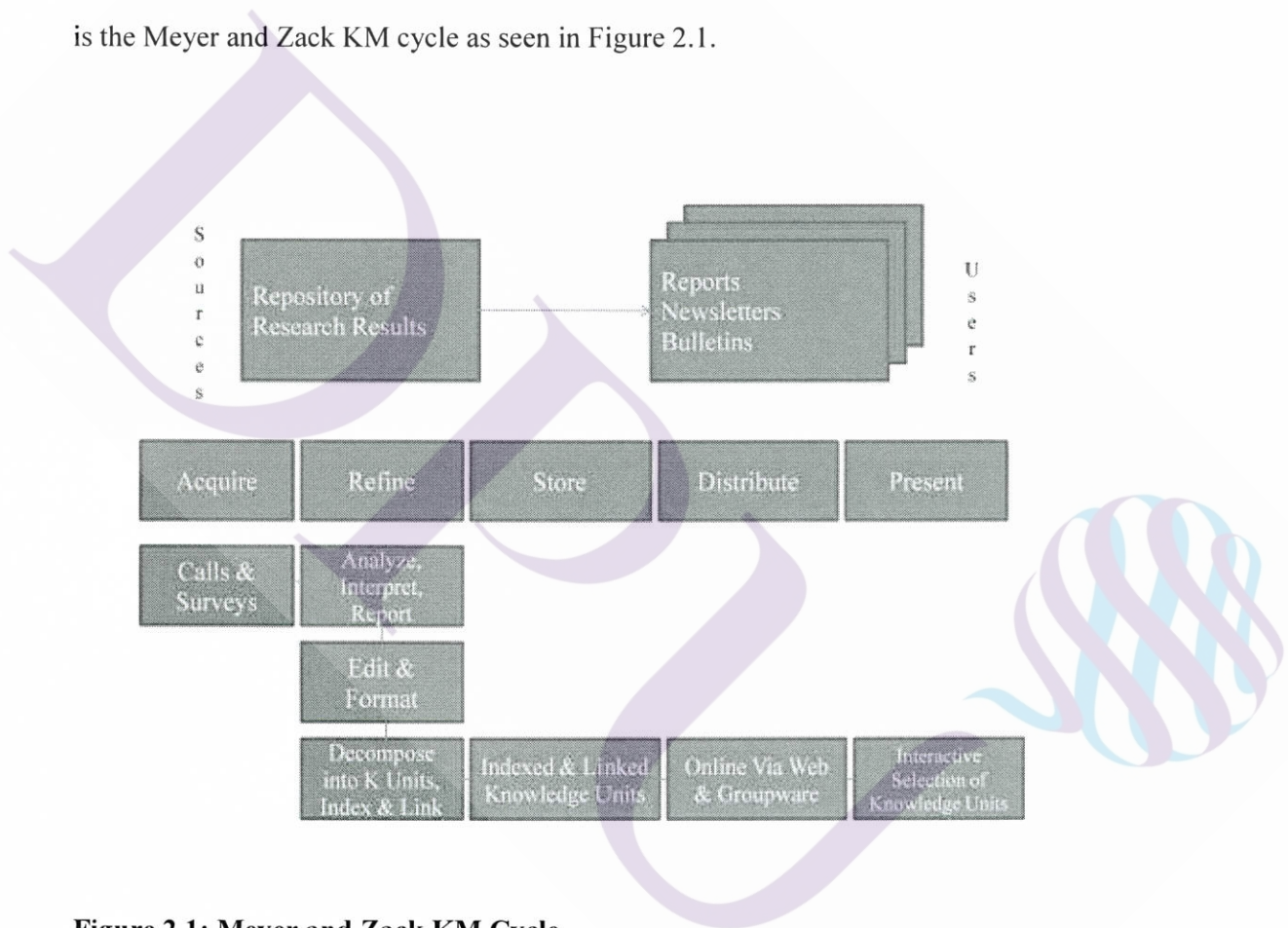
Figure 2.1: Meyer and Zack KM Cycle

Source: Dalkir (2005)

The Meyer and Zack KM cycle includes the repository of knowledge which starts from acquiring the knowledge from calls and surveys then refining the knowledge and organizing it in usable form before storing, distributing, and presenting the knowledge to the users. Dalkir (2005) argues that this KM cycle would be more complete if it includes the process of renewing the knowledge to keep it up to date all the time.

Another KM cycle Dalkir (2005) reviews is the Bukowitz and Williams KM cycle as seen in Figure 2.2.
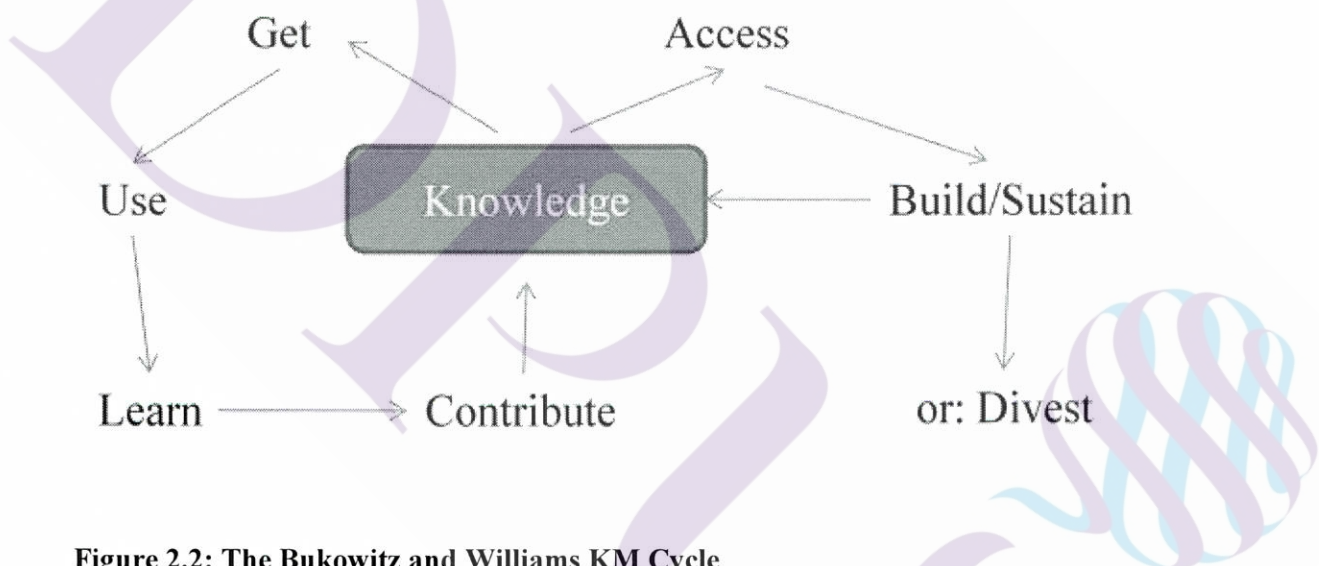
Figure 2.2: The Bukowitz and Williams KM Cycle

Source: Dalkir (2005)

The Bukowitz and Williams KM cycle points into two directions: getting and accessing knowledge. One starts with getting the knowledge into the system, then using it, learning from it, and contributing the new learning to the knowledge system again. This direction is for knowledge users who use it and then adding processed

knowledge to the system. The other direction is accessing knowledge, building or

sustaining it, then divesting the knowledge to close the process. This direction is for

knowledge builders who access the system build or maintain the knowledge or take

the obsolete knowledge out of the system. After that the knowledge bank is assessed,

built more or sustained it and if it is valuable and would be beneficial to the public,

the organization could divest it (Dalkir, 2005). Another interesting KM cycle Dalkir

presents is the McElroy KM cycle as seen in Figure 2.3.
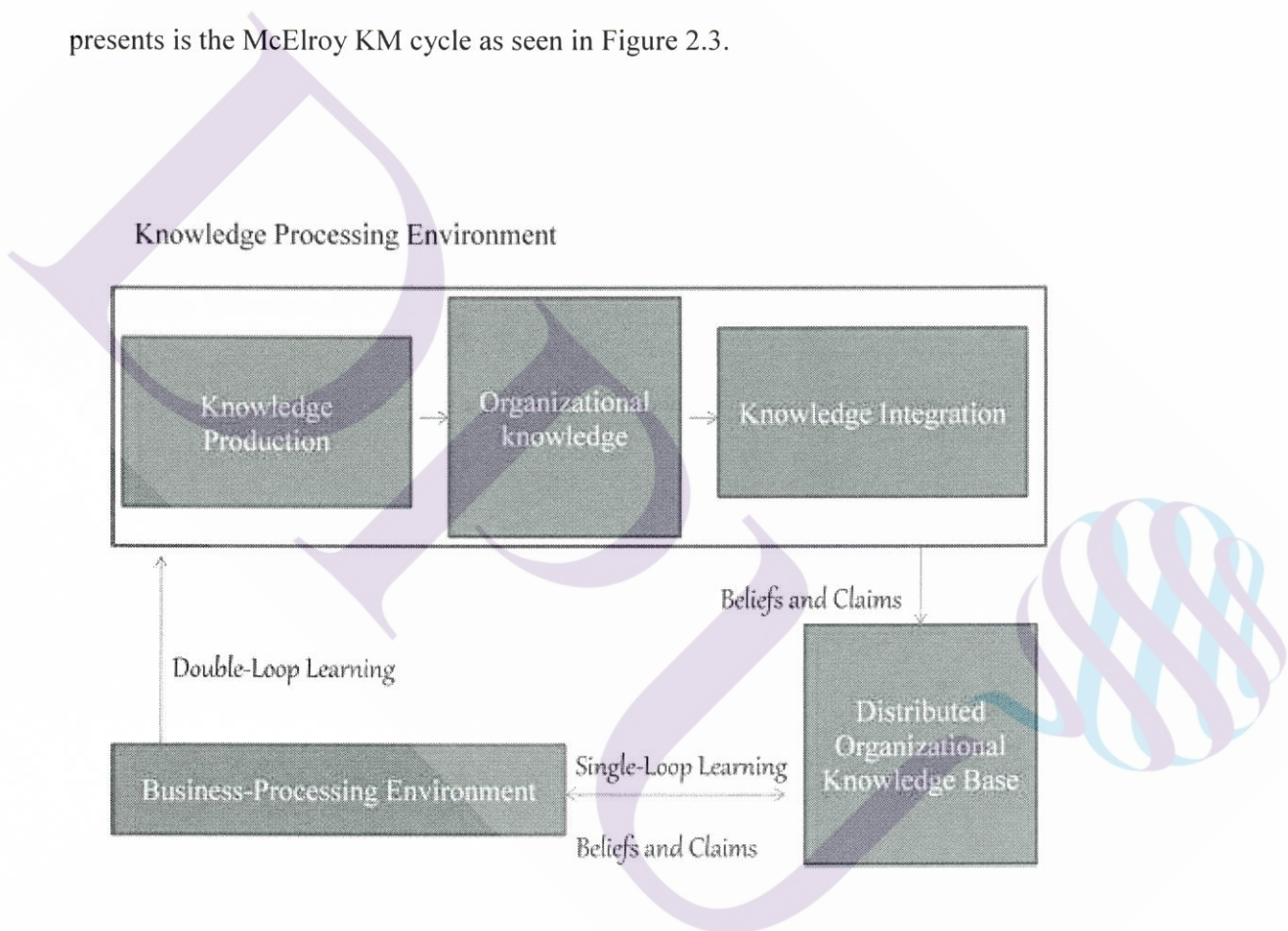
Figure 2.3: The McElroy KM Cycle

Source: Dalkir (2005)

In the McElroy KM cycle, knowledge is processed within the organization, and the cycle does not capture the gathering of knowledge. Knowledge creation is bundled with organizational knowledge, and it takes into account the beliefs and claims of the organization to be organizational knowledge as a whole and then distributes the knowledge for learning. If the learning is shared back to the organization again, then the KM cycle is complete (Dalkir, 2005). Next, the Wiig KM cycle is shown in Figure 2.4.
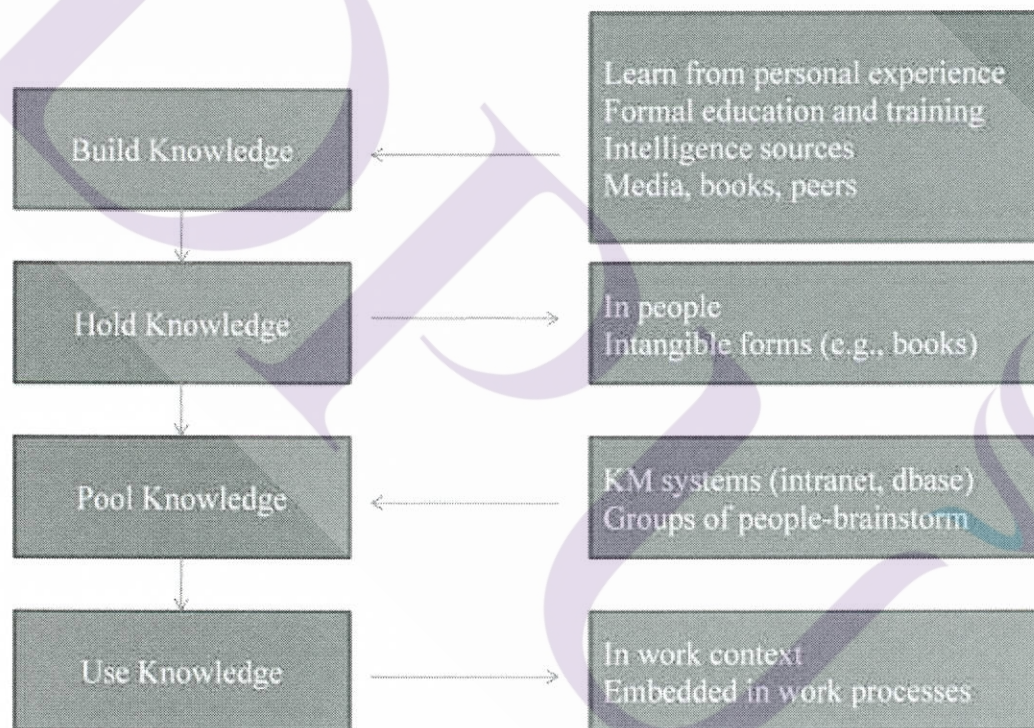
Figure2.4: The Wiig KM Cycle

Source: Dalkir (2005)

The Wiig KM cycle is a simple KM cycle that includes the creation of knowledge, storage, KM system, and the use of the knowledge (Dalkir, 2005). With the above KM cycles presented, Dalkir synthesizes the cycles into an integrated KM cycle that captures the necessary KM processes of gathering knowledge, sharing it, and the application of it. Dalkir (2005) integrates KM cycle is shown in Figure 2.5.
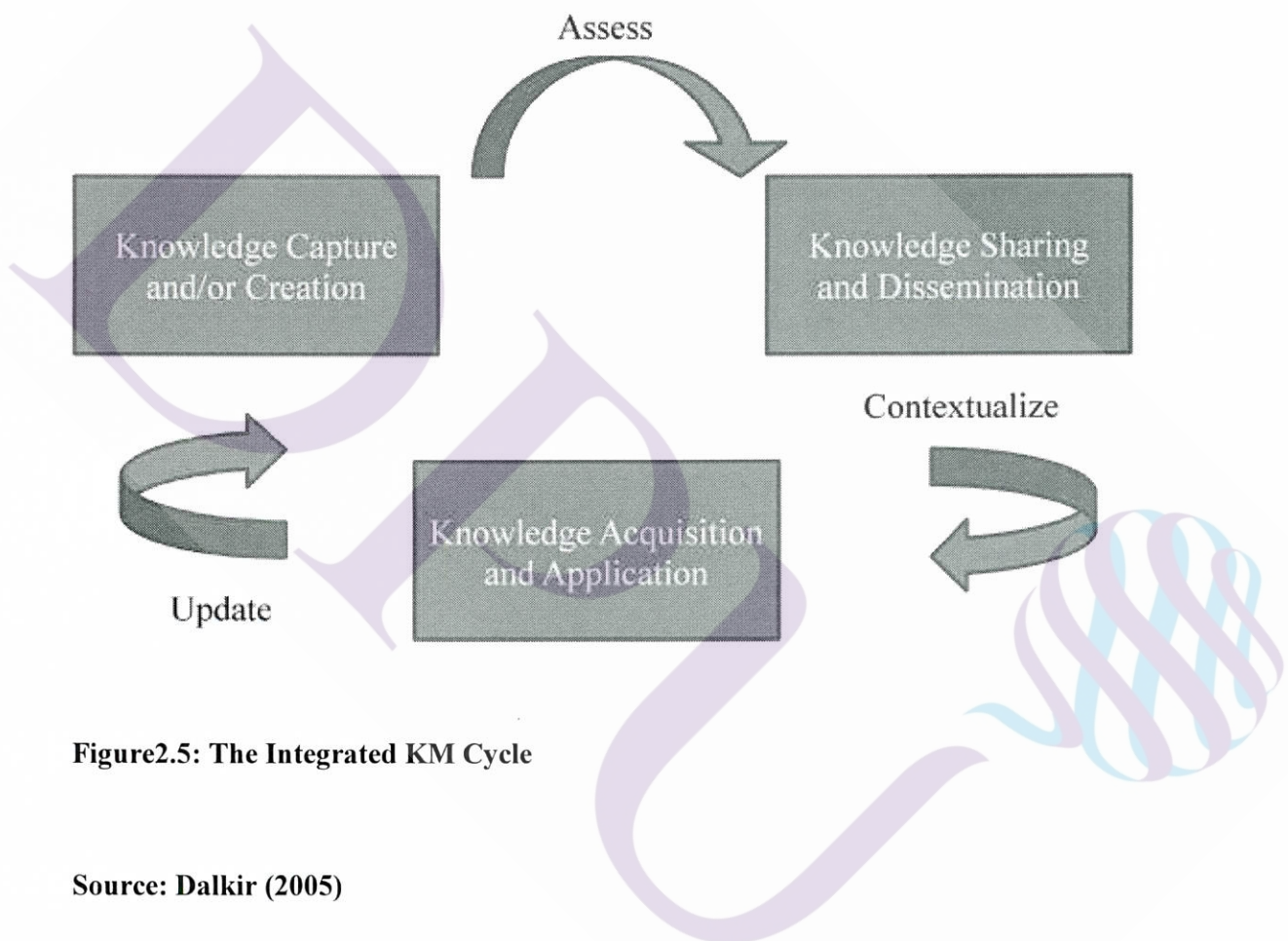
Figure2.5: The Integrated KM Cycle

Source: Dalkir (2005)

Dalkir's integrated KM cycle is a complete cycle with knowledge creation, dissemination, knowledge application, and knowledge update. Meyer and Zack's KM cycle lacks knowledge renewal process while Bukowitz and Williams' KM cycle

lacks knowledge dissemination. McElroy's KM cycle includes only knowledge production neither gaining nor capturing knowledge, while Wiig's KM cycle lacks knowledge dissemination.

KM is concerned with behavior changes to reflect new knowledge and insights. KM is not about relying on technology to improve processes; rather, KM relies on recognizing the knowledge held by individuals and the firm (Martin, et al., 2005). KM cycles and processes have been created as frameworks for knowledge management systems to follow and sustain. However, knowledge will not be useful if it is not used. To put knowledge into use, it will have to be transferred to those who need it. Knowledge transfer is one of the important processes in knowledge management, and it is the process that this research will focus on. In transferring knowledge, there are two actions involved, which are transmission and absorption (Davenport & Prusak, 1998). Knowledge transfer will not be successful if the knowledge is not absorbed (Davenport & Prusak, 1998). Thus, the importance of knowledge transfer will be discussed in the next section.

2.2 Knowledge Transfer

Knowledge transfer is a knowledge management process as seen in Figure 2.6.

Leverage   Identify

Transfer   Knowledge management process   Create

Organize   Capture

Figure 2.6: Knowledge Management Process

Source: developed for this research

The knowledge management process in Figure 2.6 is the process that has been integrated from all the KM cycles reviewed, and focusing on knowledge transfer. Though knowledge transfer is only a part of knowledge management, it is especially significant because knowledge is of no use if it is not transferred to the right people at the right time. Knowledge transfer is a prerequisite for knowledge sharing for competitive advantage, performance, and profitability (Awad & Ghaziri, 2004). Recent work by Zack, McKeen, and Singh (2009) shows that knowledge transfer relates to organizational performance which in turn relates to financial performance (Zack, McKeen, & Singh, 2009). Another study done by Zhang, Yang,

and McLean suggests that knowledge management mediates organizational effectiveness and partially mediates the impact of organizational structure and strategy to organizational effectiveness (Zhang, Yang, & McLean, 2009). Although knowledge may be transferred between persons and computers, computers and computers, teams and individuals, or between individuals (Awad & Ghaziri, 2004), by far, the most effective channel for knowledge transfer is face-to-face meetings in the business place (Awad & Ghaziri, 2004). Face-to-face meeting is also one of the steps of the famous knowledge spiral model of Nonaka and Takeushi (1995) known as socialization. They theorized that the creation of knowledge was the result of a continuous cycle of four integrated processes: a) externalization, b) internalization, c) combination, and d) socialization. These four knowledge conversion mechanisms are mutually complementary and interdependent and changed according to the demands of context and sequence (Nonaka & Takeushi, 1995).
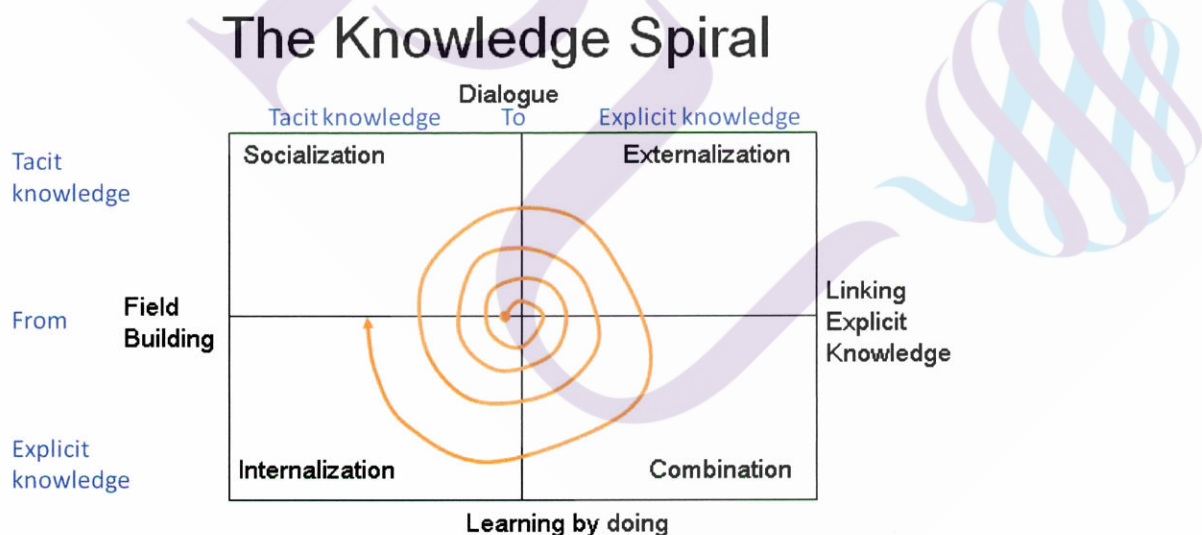
Figure 2.7: The Knowledge Spiral Model

Source: Nonaka & Takeushi (1995)

In the model shown in Figure 2.7, two types of knowledge are introduced: tacit and explicit knowledge. Coined by Hungarian medical scientist Michael Polanyi (1891-1976), tacit knowledge includes intuitions, values, and beliefs that stem from years of experience (Smith, 2003). Awad and Ghaziri (2004) summarized that tacit knowledge is knowledge embedded in the human mind through experience and jobs. In contrast, explicit knowledge is knowledge codified and digitized in books, documents, reports, white papers, spreadsheets, memos, training courses, and things that are similar to what has mentioned.

The knowledge spiral model of Nonaka and Takeushi has been a popular model used in knowledge transfer. Its four mechanisms work by externalizing tacit to explicit knowledge in the form of metaphors and models. Combination mechanism joins explicit knowledge with explicit knowledge by using the techniques of sorting and combining. The next mechanism is internalization, which turns explicit knowledge to tacit knowledge through learning. Socialization is sharing experiences with others by turning tacit knowledge to tacit knowledge.

Though the knowledge spiral model has been well-accepted, there has been negative criticism. Wilson (2002) argued that Nonaka and Takeushi appeared to have either misunderstood Polanyi's work or deliberately distorted it to enable them to construct the well-known two-by-two diagram. He said that Polanyi defined tacit knowledge as knowledge that a person may not know that he/she knew. If that were the case then tacit knowledge could not be captured. What can be captured then is implicit knowledge, which is something expressible. Implicit knowledge is knowledge we take for granted in our actions and which may be shared by others

through common experience and culture. He concluded that Nonaka and Takeushi's work lacked the understanding of implicit knowledge (Wilson, 2002).

A study done by Eppler (2007) about knowledge communication problems between experts and decision makers outlines knowledge transfer problems into their micro levels. The first problem is caused by the experts. Experts are not able to articulate their insights to the decision makers. The second problem is caused by the decision makers. They are not able to make the experts understand their expectations. The third problem is the failure in giving feedback and input from both sides. The fourth problem is caused by information overload. The fifth and final problem found by Eppler is the cause of having indirectly aligned organizational contexts (Eppler, 2007). Eppler (2007) simply identifies knowledge transfer problems that could occur in an organization, which poses opportunity for future research.

In summary, three types of knowledge were introduced in this review: a) tacit, b) implicit, and c) explicit. This research considered all three types in the aspect of knowledge transfer by knowledge visualization tools. The term knowledge in this research includes the three types of knowledge reviewed because the context of this research is focusing on transferring knowledge as a whole that includes all three types mentioned.

In transferring knowledge, both information and knowledge are transferred. Knowledge transfer is done directly by working together, communicating, learning by doing, apprenticing, through face-to-face discussions, or embedding knowledge through procedures, mentoring, or documents exchange (Awad & Ghaziri, 2004). The means to transfer can vary, but the core model of transfer is

based on a basic model of communication. The next section discusses the basic model

of communication.

2.3 Basic models of communication

This model of communication shown in Figure 2.8 is derived from a

communication model developed by Aristotle.
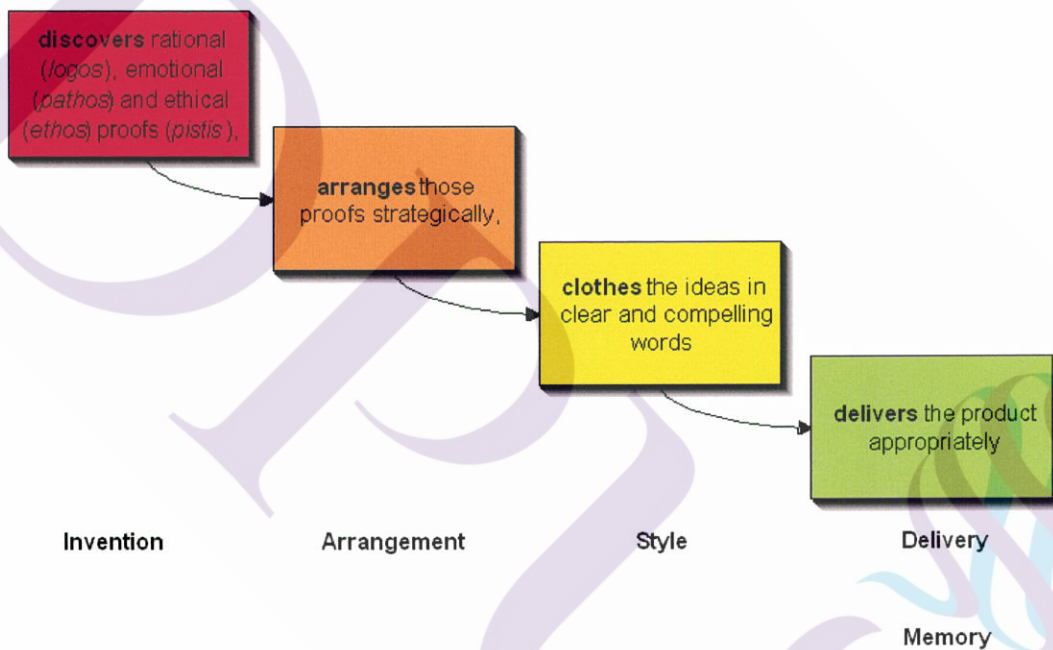
Figure 2.8: Aristotle's Model of Communication

Source: Shkaminski (2008)

Figure 2.8 shows Aristotle's model of communication, which is speaker-centric. This speaker-centric approach is important to this research as the presenters of knowledge are the speakers in Aristotle's model of communication. The model is so speaker-centric that it does not mention receiver. Rather, it shows the thinking process of the speaker in managing knowledge before communicating it out. This model can be a guide for speaker to follow when delivering knowledge to the receivers which is important in transferring knowledge. Aristotle emphasizes that the speaker invents the message, arranges it, styles it in a clear form, and delivers it to the receivers (Shkaminski, 2008).

Another compelling model that is a basis of other communication models is the Shannon-Weaver Mathematical model created in 1949. The model is originally created to formulate a theory to guide the efforts of engineers in finding the most efficient way of transmitting electrical signals from one location to another. Though it shows the transmission of electrical signals, it presents a similar concept of transferring knowledge or a message from senders to receivers. The model is presented in Figure 2.9.

The Shannon-Weaver Mathematical Model, 1949
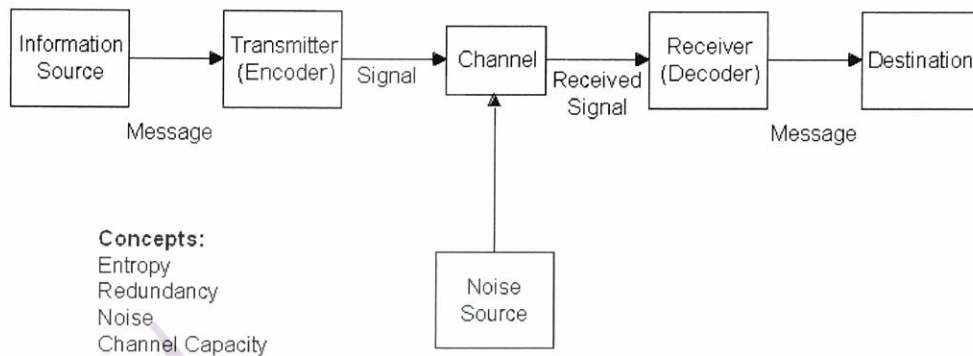
Figure 2.9: The Shannon-Weaver Mathematical Model (1949)

Source: Shkaminski (2008)

This model includes the sender, the message, and the receiver of the message. It also includes the noise and the consideration of entropy, redundancy of the message, and the channel capacity (Shkaminski, 2008). Though this model is developed to represent engineers transmitting electrical signal, it is very much similar to the way communication model transmits message or knowledge. The sender or the speaker sends out the message via the tool or the channel then the receiver receives the message.

A further model of communication deriving from the Shannon-Weaver Mathematical Model, which the researcher applies in this research is the basic model of communication from Belch and Belch (2004) shown in Figure 2.10. It is developed considering the response, feedback, as well as incorporating the human characteristics of the sender's and receiver's experience. The experience of senders and receivers is important in receiving and encoding the message sent. Once the message is sent,

response and feedback could be sent out and given to create interaction for further communication.

Figure 2.10 shows the basic model of communication which has similar process to the Shannon-Weaver Mathematical model. The Shannon-Weaver and basic model of communication can represent knowledge transfer from speakers to receivers which can be connected after Aristotle's model in which the speaker has thought through the message and now deliver it to the receivers. Since the main focus of this research is also knowledge transfer, these models explained can be used as guides in deriving to the framework later created.
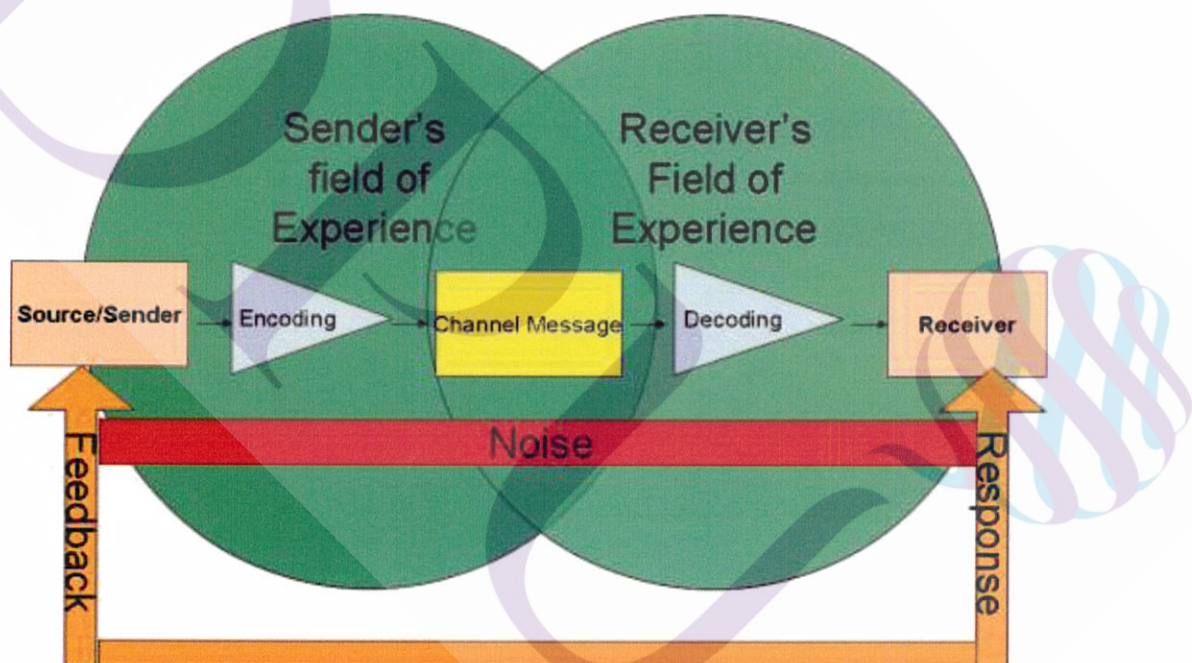
Figure 2.10: The Basic Model of Communication

Source: Belch and Belch (2004)

From the above model, two elements represent major actors in the communication process, the sender and the receiver. Another three elements are the major communication tools, message, and channel. Four other elements are the major communication functions and processes: a) encoding, b) decoding, c) response, and d) feedback. The last element, noise, refers to any extraneous factors in the system that can interfere with the process and work against effective communication (Belch & Belch, 2004).

The basic models of communication reviewed are later used as guides in data collection. They are digested and incorporated into theoretical framework that emerged.

The next section provides the background and introduces the concept of the visualization of data, information, and knowledge in order to differentiate each type of visualization, which later led to knowledge visualization tools in this research.

2.4 Visualization of Data, Information, and Knowledge

This research deals with knowledge visualization for knowledge transfer. However, there is also visualization of data and information which is different from visualization of knowledge and is defined here for clarification. Data visualization focuses on well-structured data tables, with limited data types and scales, that map to graphics in a relatively straightforward manner using established views (Kerren, et al., 2007). Card, Mackinlay and Shneidermann (1999) define information visualization as the use of computer supported, interactive, visual representations of data to enhance cognition (Card, Mackinlay, & Shneiderman, 1999). Eppler and Burkhard (2004) also

say that the field of knowledge visualization examines the use of visual epresentations to improve the creation and transfer of knowledge between at least two people. Knowledge visualization designates all graphic means that could be used to construct and convey complex insights. Beyond the mere transport of facts, knowledge visualization aims to transfer insights, experiences, attitudes, values, expectations, perspectives, opinions and predictions in a way that enables someone else to re-construct, remember, and apply these insights correctly (Eppler & Burkhard, 2004). Eppler and Burkhard (2004) further explain that information visualization explores large amounts of abstract (often numeric) data to achieve new insights or make the stored data more accessible. Knowledge visualization, on the contrary, aims to improve the transfer and creation of knowledge among people by giving them richer means of expressing what they know.

To make it simple, data, information, and knowledge visualization serves different purposes. Data visualization makes the data easier to look at in the forms of tables, charts, or graphs. Information visualization makes a large amount of data easier to understand and retrieve, while knowledge visualization facilitates the transfer and creation of knowledge. Keller, Tergan and Coffey (2006) study the knowledge and information awareness (KIA) tool to identify interaction made by the groups using it. The results show that the participants of the experimental condition evaluate the use of the KIA tool as helpful. It also shows that the experimental group achieve higher performance and that the tool is helpful for problem-solving performances (Keller, Tergan, & Coffey, 2006).

Another study done by Burkhard (2004) about visual knowledge transfer between planners and business decision makers shows that planners who combine traditional visualizations with business knowledge visualizations could improve the transfer of knowledge. Such combination could reduce information overload, prevent misinterpretation, increase the information quality, improve communication, and improve decision making.

Studies have been done to identify the usefulness and helpfulness of the tools but not yet in the aspect of enhancing information processing of the receivers of knowledge. Tools have been developed to test their helpfulness and usefulness, and tools can be the means to transfer knowledge. Knowledge visualization is accomplished by means of tools. It can either be manual or computer-aided tools. The next section introduces and discusses computer-aided or knowledge visualization tools that facilitate the creation of knowledge and knowledge transfer.

2.5 Knowledge Visualization Tools

Many visualization or computer-aided tools facilitate the creation and transfer of knowledge. According to Eppler and Burkhard (2004), six formats can be distinguished in knowledge visualization: a) Heuristic Sketches, b) Conceptual Diagrams, c) Visual Metaphors, d) Knowledge Animations, e) Knowledge Maps, and f) Scientific Charts. Refer to Appendix A for examples of knowledge visualizations.

Eppler and Burkhard (2004) further explain that it seems justified to refer to these graphic formats as knowledge visualizations as both their content and their format are distinct from that of regular visual depictions. In terms of their content,

they capture not just (descriptive) facts or numbers, but rather (prescriptive and prognostic) insights, principles, and relations. In terms of format, knowledge visualizations rely on indirect communication that trigger sense-making activities in the viewer and motivate him or her to complete the picture of himself or herself. The viewer who is familiar with the visuals can make sense and relate new knowledge represented to former knowledge. Those who are not familiar can, however, use the visuals as aids that complement the knowledge of the speakers to make sense of what is being transferred. Electronic slide presentation is among the tools used to transfer knowledge. Other tools that are used include concept maps, mind mapping, movie clips, motion pictures, and many others.

In knowledge visualization, cognition is enhanced by receiving visual information and knowledge. Cognition is the process of thinking or mentally processing information (images, concepts, words, rules, and symbols) (Coon & Mitterer, 2002). Transferring knowledge by knowledge visualization is a way to create and transfer knowledge. Moreover, knowledge visualization helps to reduce information overload to its essential main idea to enhance thoughts and cognition that can lead to action. Several studies indicate that visualization tools could support learning, teaching, understanding, and recalling of information and knowledge. Coffey, Hoffman and Canas (2006) suggest that concept map-based knowledge modeling might serve as learning resources (Coffey, Hoffman, & Canas, 2006). Tergan, Keller and Burkhard (2006) claim that knowledge and information visualizations are used to make structures of knowledge and information apparent and to help users cope with complex tasks and ill-structured subject matter. A study of visual metaphor as in London underground map known as the tube map helps make

users understand project milestones (Remo A. Burkhard & Meier, 2004). A study that compared concept maps, mind maps, conceptual diagrams, and visual metaphors supports that visualization tools facilitate recall and understanding of information and knowledge (Eppler, 2006).

Electronic slide presentation such as Microsoft PowerPoint can be found in more than two hundred and fifty million computers around the world (Parker, 2001). It is a widely used software in both business and education sectors. It started its existence in 1990s and has become a common tool ever since, with continuing improvements in its design ease of use. In spite of its popularity, however, Tufte (2003) considers PowerPoint's downfall. He says that it is presenter-oriented, not content- or audience-oriented. The presenter is usually preoccupied with its format not content (Tufte, 2003). Though PowerPoint is adopted widely, the number of studies of its effectiveness (n<20) is surprising (Craig & Amernic, 2006). Generally, the available studies lack substance and internal and external validity and adopt rather constrained characterizations of the concept effectiveness. The results of journal articles indicate that students like to be taught using PowerPoint and think that PowerPoint presentations are entertaining, enhance clarity, and aid recall. There is little consistent evidence, however, to show that teaching with PowerPoint leads to significantly better learning and significantly better grades than teaching by more conventional methods. Not to mention that there is no study about how PowerPoint or electronic slide presentation enhances information processing. From the review, however, there have been no studies suggesting specific ideas for the enhancement of the tools to information processing which is the aim of this study. Users just assume that knowledge is transferred. No studies have concluded if it is transferred.

Electronic slide presentation has been further developed to add an add-in feature to control the presentation remotely (Kumar, et al., 2011). The system developed by Kumar et al (2001) is set forth for remotely controlling a presentation in a loop mode to allow the presentation to continue in the absence of a communication channel between the portable electronic device and remote presentation device (Kumar, et al., 2011). Another study is done to develop a system that assists users in viewing videos or electronic slide presentation of lectures on small screen devices, such as cell phones (Tung, et al., 2011). Lai, Tsai, and Yu (2011) conduct a study to experiment whether a dual-slide presentation in a classroom would encourage learning (Lai, et al., 2011).

Before any further review, it is important to understand visual science, the basis of visualization and knowledge presentation. Gestalt laws or rules of visual perceptions are parts of visual science reviewed. Gestalt psychologists discover that human perceptions have a powerful tendency to form meaningful patterns (Coon & Mitterer, 2002). The Gestalt laws easily translate into a set of design principles for information displays (Ware, 2004) which will be used to analyze the content of the tool used in this research whether it follows this set of design principles to enhance perceptions and learning or not.

2.6 Visual Science

Visual science is reviewed because of its importance in designing visualization tools to enhance perception and cognition (Ware, 2004). Visual science includes the physics of light, visual optics, changes in light, color vision, visual

attention, information display, object display, spatial cues, and integration of images and words. Understanding visual science presents an advantage for visual developers to develop tools that could catch attention and improve perception.

Knowledge visualization tools have been developed for the receivers' eyes to see and send messages to the brains. Ware (2004) says that human eyes act as the opening windows receiving everything seen before sending the visual information to the perception process and memory in the brain. The perception process and memory as stated by Ware (2004) have three stages. In stage one, information is processed in parallel to extract basic features of the environment. In stage two, active processes of pattern perception pull out structures and segment the visual scene into regions of different color, texture, and motion patterns. In stage three, the information is reduced to only a few objects held in visual working memory by active mechanisms of attention to form the basis of visual thinking. Visual thinking then proceeds to memory. Coon and Mitterer (2002) explain that there are three types of memory: iconic, working, and long-term. Iconic memory is a very brief image store until it is replaced by something else. Working memory holds the objects that we see of immediate attention. Long-term memory is the information we store from everyday experience. We learn when we take information and knowledge into our memory. Ware (2004) states further that memory provides the framework that underlies active cognition.

Perception as defined by the Merriam-Webster dictionary is the way one thinks about or understands someone or something. Visuals that humans see trigger perceptions. Gestalt psychologists discovered that human perceptions have a powerful

tendency to form meaningful patterns (Coon and Mitterer, 2002). The Gestalt laws easily translate into a set of design principles for information displays (Ware, 2004). Ware proposes eight gestalt laws:

1) Proximity: things grouped close together are also perceptually grouped.

2) Similarity: similar elements and shape tend to be grouped together.

3) Connectedness: connecting things together is a very powerful way of indicating that there is some relationship between them.

4) Continuity: humans seem to recognize things that are linked together smoothly and continuously rather than things that are connected by lines that abruptly change in direction.

5) Symmetry: this could provide powerful organizing construct. The law of symmetry captures the idea that when human perceives objects we tend to perceive them as symmetrical shapes that form around their centre. Most objects can be divided in two more or less symmetrical halves and when two unconnected elements that are symmetrical are shown, human unconsciously integrate them into one object.

6) Closure: humans tend to fill the gap when something is missing.

7) Relative size: smaller components of a pattern tend to be perceived something small when they could actually be something big being covered partially by something smaller.

8) Common fate: elements that are moving in the same direction seem to be perceived as a collective unit.
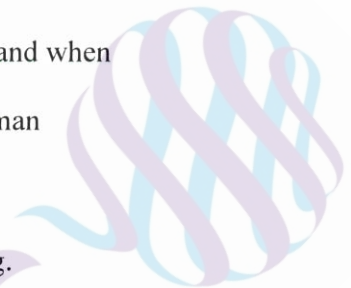
These eight gestalt laws are used to see patterns of knowledge presentation in the content to see if this set of laws is applied to facilitate knowledge transfer and to make knowledge perception easier. Ware (2004) states that the brain is a powerful pattern-finding engine. His statement explains why gestalt laws are important in visualizing knowledge. Knowledge that is visualized according to the laws could be easily perceived. Illustrations of gestalt laws can be seen in Appendix B.

A study in the field of visual science showed that a visual that pops out draws attention whether it is relevant to the task or not. Though with practice, participants could not restrain from not looking at the visual that irrelevantly pops out (Theeuwes, 1992). It means that an irrelevant message should not be created to pop out, else it would draw unnecessary attention of the receivers of knowledge. The study shows that visuals are very important in gaining attention that later leads to learning. Humans' brains are triggered by visual information and continue to process through cognition. Another study done on visual short-term memory shows that subjects allocated memory capacity to different visual stimulants with varying sets and sizes (Sims, Jacobs, & Knill, 2011). Visual that has higher stimulants and with less feature can increase memory capacity. Cognition is the process of thinking and learning. The concept of learning, cognition, and related learning theories is discussed in the next section.

2.7 Learning, Cognition, and Theories

Cognition and learning are discussed in order to understand more about learning, especially in the aspect of information processing, which is the focus of this

research. Theories of learning have long been divided into two schools: behaviorism and cognition. Coon and Mitterer (2002) say that most of human behaviors are learnt. The school of behaviorism is based on stimuli and responses as in Pavlov's famous experiments in classical conditioning, i.e., the dog that salivates because it associates ringing a bell with the arrival of food. However, cognition is the learning beyond behavioral conditioning. Cognition is defined by one of the most influential researchers in cognition, Neisser (1967), as the study of how people encode, structure, store, retrieve, use or learn knowledge. It seems like a complete process of KM system, but it is in the human mind. We receive knowledge then encode it. We structure it in our brains in such a way that we will understand it better. Then we store it in our memory. When necessary, we retrieve the knowledge, use it and learn from it. Cognitive learning refers to understanding, knowing, anticipating, or making use of information-rich higher mental processes. It goes beyond basic conditioning into memory, problem-solving, thinking, and language (Coon & Mitterer, 2002). Cognition starts when we are born as stated in Piaget's theory of cognitive development. Piaget's theory is divided into four stages of learning: a) sensorimotor stage, b) preoperational stage, c) concrete operational stage, and d) formal operations stage (Coon & Mitterer, 2002). Piaget's theory is the basis of other learning theories developed in later years.

Chaicharoen (2008) explains that Jerome Bruner believes that learning could occur when learners interact with the environment. This learning then leads to the discovery and problem solving learning called discovery approach (Chaicharoen, 2008). Another learning theorist, Ausubel, believes that learners learn when new learning can be connected with the existing ones. This is called meaningful learning

(Chaicharoen, 2008). When we come to think of learning, learning theories seem to come to our lives in different stages and situation. We learn best when things are something we already know about or when the environmental factors such as light, sound, and temperature are right.

Theories of information processing and cognitive load are the theories that are relevant for this research. The information processing theories focus on the acquisition, storage, and recall of knowledge (Chaicharoen, 2008). They lie under the umbrella of cognition. Cognitive load theories concern the noises that can interfere with information processing.

The most widely used model of information processing that deals with memory is stage theory by Atkinson and Shiffrin (1968) as cited by (Lutz & Huitt, 2003). This model hypothesizes that as new information is taken in, it is manipulated before it is stored (Lutz & Huitt, 2003). The stage theory recognizes three types of memory: sensory, short-term, and long-term memory (Lutz & Huitt, 2003). Figure 2.11 shows the stage theory of memory.
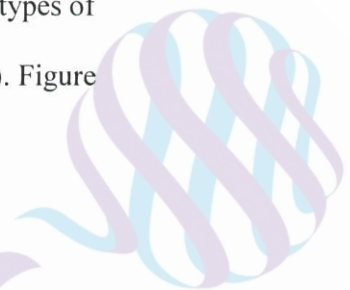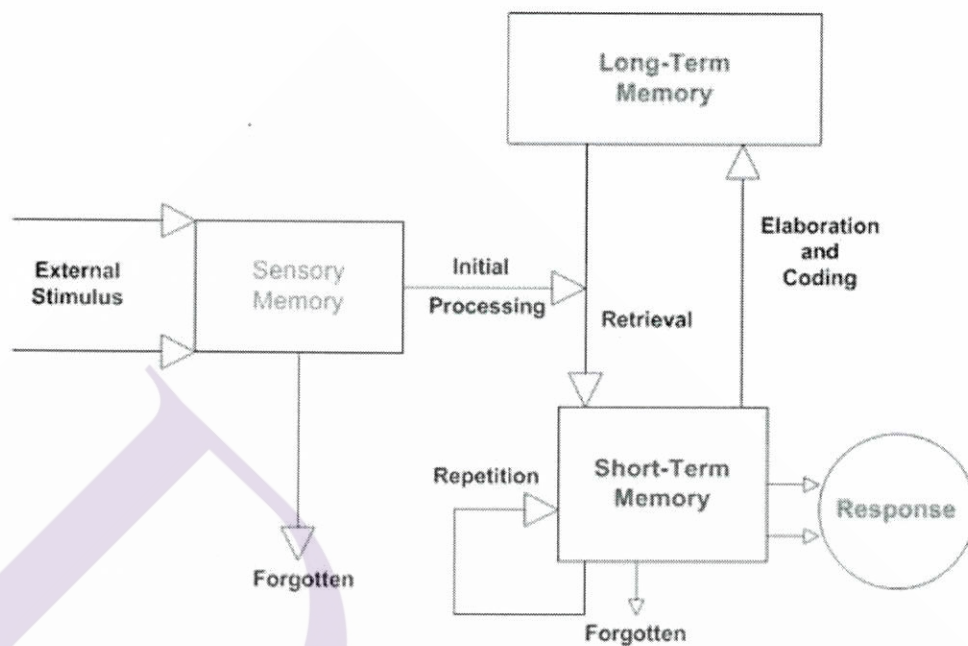
Figure 2.11: A Stage Model of Memory

Source:(Lutz & Huitt, 2003))

From the stage theory shown in Figure 2.11, the receivers of knowledge are stimulated by an external stimulus and they accept the message in their sensory memory. Once the receivers process the message received, the message is stored in short-term memory. This stage needs repetition to maintain the message in short-term memory as well. To enter long-term memory, the message needs to be elaborated and coded in meaningful terms by the receivers of knowledge. The message entered into long-term memory can later be retrieved and responded to. The stage model of memory or stage theory is a continuous process that happens every time the human mind receives new information. Attention facilitates the integration and transfer of the

information but it is impacted by many factors that include the meaningfulness of the new stimulus to the learner, the similarity between competing ideas, the complexity of the new information, and the physical ability of the person to attend (Lutz & Huitt, 2003).

Another memory theory that is an alternative to the stage theory is the Levels of Processing theory by Craik and Lockhart (1972). They argued that stimulus information was processed at multiple levels simultaneously depending on characteristics, attention and meaningfulness. The more deeply the information is processed, the more that it is remembered (Craik & Lockhart, 1972).

Dual Coding Theory is another theory in information processing by Paivio (1986). This theory suggests that there are two separate systems for processing, verbal and non-verbal information. The "imagens" system is for mental images, and "logogens" is for verbal entities. These separate systems are used when information is received in different forms, be they images or verbal entities (Paivio, 1986).

Rumelhart (1980) develops the schema theory of information processing and memory. He suggests that a schema is a data structure for representing generic concepts stored in memory (as cited by (Craik & Lockhart, 1972). Huitt (2000) explains that the model of schema emphasizes the fact that information is stored in multiple locations throughout the brain in the form of nodes or connections.

The theories discussed next serve as parental theories of this research and also contribute to the construction of the theoretical framework for this research. Information processing theories as discussed by Craik and Lockhart (1972), Rumelhart (1980), Paivio (1986), and cognitive load theory by Sweller (1988) are the

basis to explain how cognition at each stage of information processing (attention, acquisition, storage, and retrieval) is enhanced. The main model, approach, and theories that drive this research are the information processing model by McGuire (1978), the information processing approach by Huitt (2000), and cognitive load theory by Sweller (1988).

The information processing model is derived from a model developed by McGuire (1978) as shown in Figure 2.12. Figure 2.12 shows the flow of the model which starts from presentation, attention, comprehension, yielding, retention, and behavior (McGuire, 1978). Data, information, and knowledge are first presented to the receivers to get their attention. Knowledge transferred then enters the comprehension process of the receiver, is yielded in the memory and retained there until further use.

Stages	Models			
	AIDA model	Hierarchy of effects model	Innovation adoption model	Information processing model
Cognitive stage	Attention	Awareness	Awareness	Presentation
				Attention
		Knowledge		Comprehension
Affective stage	Interest	Linking	Interest	Yielding
		Preference		
	Desire	Conviction	Evaluation	Retention
Behavioral stage			Trial	
	Action	Purchase	Adoption	Behavior

Figure 2.12 Models of Response Process

Source: Belch and Belch (2004)

Huitt (2000) arranges the information processing approach in stages similar to the information processing model. The focus of this approach is on how information is stored in memory. The model proposed that information is processed and stored in three stages. Information is thought to be processed in a serial, discontinuous manner as it moves from one stage to the next (Huitt, 2000). The key point is that all stimuli that activate a sensory receptor cell are permanently stored in memory, but that different levels of processing (e.g., elaboration) contribute to an ability to access, or retrieve, that memory (Huitt, 2000). Huitt (2000) notes that this approach has been extended by Bransford (1979), who suggests that it is not only how the information is processed, but also how the information is accessed. When the demands for accessing information more closely match the methods used to elaborate or learn the information, more is remembered.

Miller (1956) provides two theoretical concepts fundamental to cognitive psychology and the information processing framework. The first concept was chunking and the capacity of short-term (working) memory (Miller, 1956). Miller (1956) presents the idea that short-term memory could only hold five to nine chunks of information (seven, plus or minus two) where a chunk was any meaningful unit. A chunk could refer to digits, words, chess positions, or people's faces. The concept of chunking and the limited capacity of short-term memory has become a basic element of all subsequent theories of memory. Miller's second concept, that of information processing, used the computer as a model for human learning. Like the computer, the human mind took in information, performed operations on it to change its form and content, stored and located it and generated responses to it. Thus, information processing involved gathering and representing information, or encoding; holding

information, or retention; and getting at the information when needed, or retrieval. What the model, the approach, and the theories all have in common is that the process of information or knowledge enters the brain, is retained there, and is retrieved for later use.

The last theory to be covered in this section is cognitive load theory. Cognitive load theory proposes that since working memory is limited, learners might be loaded by information, and if the complexity of their instructional materials is not properly managed, this results in a cognitive overload. This cognitive overload diminishes schema acquisition later resulting in lower performance (Sweller, 1988). Cognitive load theorists distinguish between three types of load: a) intrinsic, b) extraneous, and c) germane cognitive load. When Sweller (1988) first describes intrinsic cognitive load, he says that intrinsic cognitive load is imposed by the basic characteristics of the information rather than by instructional design. So it is the content of the knowledge itself that can impose intrinsic load to the receivers of knowledge. Sweller (1988) and his associates describes that "extraneous cognitive load" is load not inherent within the instruction, but imposes by the instructional designer as they structure and present information. The third type of cognitive load is germane cognitive load. This final type of cognitive load is the remaining free capacity in working memory which may be redirected from extraneous load towards schema acquisition (Sweller, 1988).

Information processing theories and cognitive load theory are incorporated in the theoretical framework of this research discussed in Section 2.10. These theories guided the research throughout and framed data collection and analysis.

It is clear that cognition is the study of how people encode, structure, store, retrieve, use or learn the knowledge. Information processing is the process that human minds take in knowledge similar to the way computers do, and the human mind has stages of memory in storing knowledge. The deeper the knowledge is processed, the deeper it is put in memory. Moreover, memory separates itself in processing images and verbal entities, and knowledge is stored in schema form or in nodes or connections in the brain. To transfer knowledge and enhance information processing, environment in terms of stimuli or tools that are used is very important. Studies about information processing in terms of cognition have led to the study of memory. Koriat (2008) finds that easily learned material could easily be remembered (Koriat, 2008). This is relevant to visual science and knowledge visualization in such a way that visual science and knowledge visualization makes the materials easy to understand and comply with humans' visual perception. Easily learned materials reduce cognitive load which can interfere with learning.

Next section introduces the models of response when knowledge is received.

2.8 Models of Response

This section introduces models of response when people receive information and knowledge. Models of response include the AIDA model, hierarchy of effects model, innovation adoption model, and information processing model. Besides understanding the cognition process, models of response are reviewed to understand more how the receivers of messages or information were brought through

from the stage of being aware of the information and taking action. Models of response are important in generating a research theoretical framework when combined with the understanding of knowledge transfer, knowledge visualization, and cognition.

Models of response give a better understanding of how the receivers of knowledge go through from being unaware of knowledge to taking action. A number of models have been displayed as in Figure 2.12 to demonstrate the stages individual pass through in moving from not being aware of information and knowledge to actual behavior.

Figure 2.12 shows models of response that have been extensively used in the field of marketing. The AIDA model—Attention, Interest, Desire, Action—is developed to represent the stages a customer must go through in the personal-selling process. A salesperson must get the attention of a customer, create interest and desire that can lead customer to take action, which is purchasing. The hierarchy of effects model shows the process of how advertising works. A customer must pass through a series of steps that advertising will take from being aware to finally making a purchase. The innovation adoption model is developed from diffusion of innovations. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. A customer must pass through a series of steps before taking in a new product or service.

The model most relevant to this research is the last model, the Information Processing Model developed by William J. McGuire. McGuire (1978) suggests that the series of steps that a receiver goes through in being persuaded constituted a response hierarchy. McGuire's model includes a stage not found in the other models: retention, or the receiver's ability to retain that portion of the comprehended information that he or she accepts as valid or relevant (Belch & Belch, 2004). This is most relevant to this research because this model can be linked to information processing theories in such a way that it synchronizes the process of humans taking in messages, retain them, and put them into actions. In model of communication, there are elements needed to transfer message. This information processing model shows how the message is processed.

As a basic model of communication suggested that the process of communication involves both senders and receivers of knowledge, it is important then to understand the traits of the senders of knowledge, also known as presenters in this research. Section 2.9 explains the traits of the presenters of knowledge that play an important role in knowledge transfer.

2.9 Traits of the Presenters

Presenters' traits are researched to find out if there are particular traits that affect knowledge transfer and could help enhance or disrupt the information processing of the receivers of knowledge. Littlejohn and Foss (2004) indicate that a trait is a characteristic of an individual that consistently thought, felt, and behaved across situations (Littlejohn & Foss, 2005). Three commonly discussed traits in

communication literature covered in this review that can affect knowledge transfer are conversational narcissism, argumentativeness, and social and communicative anxiety. Besides these three traits, trait-factor models and nonverbal communication are also covered here as they can be related and shown in the speakers or the presenters of knowledge when transferring knowledge.

Vangelisti, Knapp and Daly (1990) point out communicators who tend to have a conversational narcissism trait—that is, they want to control the flow of conversation (Vangelisti, Knapp, & Daly, 1990)—tend to talk about themselves and exhibit exaggerated gestures to maintain conversational control. They are also insensitive or nonresponsive to others. This can happen, for example, if the speakers are experienced and proud of what they are speaking about. They only want to speak about what they know and do not seem to take into consideration if the audience members are interested.

Infante, Chandler and Rudd (1989) state that the argumentativeness trait is the tendency to engage in conversations about controversial topics, to argue to support one's own point of view, and to argue about opposing beliefs. Argumentativeness is a positive trait to improve learning and help other people sees others' points of view (Infante, Chandler, & Rudd, 1989). A study done by Infante et al (1989) results that couples who argue constructively tend to have healthy marriages. Argument can happen in other context rather than marriages. In transferring knowledge, there can be discussion. Ideas that rise from the discussion may not be agreed and speakers and receivers can argue constructively to reach the agreement.

Communication anxiety is a common trait said McCrosky (1984). It is the trait in which a communicator develops the stage fright effect, which includes symptoms of the heart beating faster, facial blushing, and sweating palms when communicating in front of others. A high level of communication anxiety can result in avoidance in communicating and participating in social events (McCroskey, 1984). This can happen if the speakers are not experienced and knowledgeable in what they are speaking about. It can affect the articulation of knowledge.

The last trait to review is the trait-factor model. This model consists of a small set of general traits that can explain many other traits (Littlejohn & Foss, 2004). The trait-factor model reviewed in this research is the five-factor model by Digman (1990): a) neuroticism, b) extraversion, c) openness, d) agreeableness, and e) conscientiousness (Digman, 1990).

Neuroticism is the tendency to feel negative and distress. Extraversion is the tendency to like groups, be assertive, and think optimistically. Openness is the tendency to be reflective, have imagination, pay attention to inner feelings, and be an independent thinker. Agreeableness is the tendency to like and be sympathetic toward others. Conscientiousness is the tendency to be self-disciplined, to resist impulses, be well organized, and see tasks to completion (Littlejohn & Foss, 2005). This trait-factor model can be used later to identify the traits that the speakers have. Different traits can create different results in knowledge transfer as can later be seen from the results of the study.

Besides verbal communication, the communicators or presenters might use nonverbal communication to communicate. Nonverbal codes are groups of behaviors

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used to convey meaning (Littlejohn & Foss, 2005). Burgoon (1994) claims that nonverbal codes are analogic in such a way that they are continuous and cannot be classed into categories. Burgoon (1994) continues that nonverbal code systems can be classified according to the type of activity. Burgoon (1994) suggests seven types: a) kinesics, bodily activity; b) vocalic, voice; c) physical appearance; d) haptics, touch; e) proxemics, space; f) chronemics, time; and g) artifacts, objects (Burgoon, 1994).

There are different traits that speakers can exhibit while transferring knowledge and that can affect knowledge transfer and knowledge received by the receivers. Non-verbal communication exists and can act as noise or an aid in knowledge transfer, which the research results will exhibit.

The review has led to an initial theoretical framework which will later guide this research. Details will be discussed next.

2.10 Theoretical Framework: An Initial Framework

In this section the theoretical framework derived from earlier literature review is constructed. The conceptual framework, information processing model, information processing approach, information processing theories, and cognitive load theory are relevant and connected to each other as illustrated in Figure 2.13.

Conceptual Framework	Information Processing Model	Cognitive Load Theory
	McGuire (1978)	Sweller (1988)
Get receiver's attention	Presentation	
Transfer Knowledge via Knowledge Visualization Tools	Attention	Intrinsic cognitive load
Understand Knowledge	Comprehension	Extraneous cognitive load
Knowledge Transferred to short-term memory	Yielding	
Encode		
Knowledge Transferred to long-term memory	Retention	Germane cognitive load
Retrieve Knowledge	Behavior	

Figure 2.13: Theoretical Framework: An Initial Framework

Source: developed for this research

The information processing model by McGuire (1978) is most suited to accompany the conceptual framework because it shows the flow of the model which starts from presentation, attention, comprehension, yielding, retention, and behavior (McGuire, 1978). The model not only completes the input and output of knowledge but also explains the processing process. The model is served as a basis of the conceptual framework. Data, information, and knowledge are first presented to the receivers to get their attention. Knowledge transferred then enters the comprehension

process of the receiver, is yielded in the memory and retained there until further use. Cognitive load theory is incorporated here as one of the parental theories used in this research. It is the main theory especially in transferring knowledge. The theory explains the noises and load that could occur during knowledge transfer (Sweller, 1988).

The focus is on transferring knowledge from sender to receiver by means of knowledge visualization tools through the information processing model to enhance cognition in the aspect of information processing of the receiver. There are seven steps of the conceptual framework: a) get receivers' attention, b) transfer knowledge via knowledge visualization tools, c) understand knowledge, d) transfer knowledge to short-term memory, e) encode, f) transfer knowledge to long-term memory, and g) retrieve knowledge. This research uses an aid of electronic slide presentation to facilitate the transfer of knowledge. The researcher then observes the transfer in each of the step to see how the tool enhances the process. Cognitive load can come in the way while transferring knowledge and it affects the knowledge enhancement. In order to get receiver's attention, a presentation of knowledge by means of knowledge visualization tool must be made. To start transferring knowledge, receivers must pay attention to take in the knowledge and experience the first cognitive load which is intrinsic or the content of the information or the knowledge presented. To understand knowledge, receivers' comprehension process must be reached and there must be low extraneous cognitive load to increase comprehension. Receivers then yield the knowledge using short-term memory. From understanding to transferring knowledge to short-term memory, sense-making is involved. Receivers understand something, relate it to earlier knowledge then place it

into short-term memory. Sense-making involves turning circumstances into a situation that is comprehended and that serves as a start of other actions (Weick, Sutcliffe, & Obstfeld, 2005). Knowledge is selected and encoded before being transferred to the long-term memory to be retained there with the germane cognitive load that triggers schema stored in the long-term memory. Receivers then start their behavior with knowledge retrieval. This theoretical framework served as a guide in designing research methodology and data collection discussed in Chapter 3.

2.11 Research Gap and Conclusion

Literature in knowledge transfer, knowledge visualization tools, and learning showed parallel growth of those fields. Knowledge transfer has matured into complex knowledge management system and data mining. Knowledge visualization tools have developed into complicated tools for specific use such as electronic spatial map in geometry (Ware, 2004). A study done by Sangin, Molinari, Nussri, and Dillenbourg (2010) explore the use of Knowledge Awareness Tool (KAT) in learning environment to see the effects of collaborative outcomes (Sangin, et al., 2010). The result shows that the tool yields positive learning outcome (Sangin, et al., 2010). Social visualization interface has been used in a study to encourage student's social engagement in class (Hsiao, et al., 2012). Learning has also yielded new techniques of teaching. Another study is done to develop a system that assists users in viewing videos or electronic slide presentation of lectures on small screen devices, such as cell phones (Tung, et al., 2011). Lai, Tsai, and Yu (2011) conduct a study to experiment whether a dual-slide presentation in a classroom would encourage learning (Lai, et al.,

2011). However, these fields matured in parallel but did not merge leaving a gap for this research, which is to find out how a electronic slide presentation enhances humans' information processing.

From literature review and studies done, it seems that knowledge visualization tools could increase performance, improve communication, and reduce misinterpretation. However, the importance of human-centric issues, especially in the aspect of cognition in information processing, is noted (Remo Aslak Burkhard, et al., 2007). With this research gap and literature review, a theoretical framework has inductively emerged to guide the details of data collection and methodology.
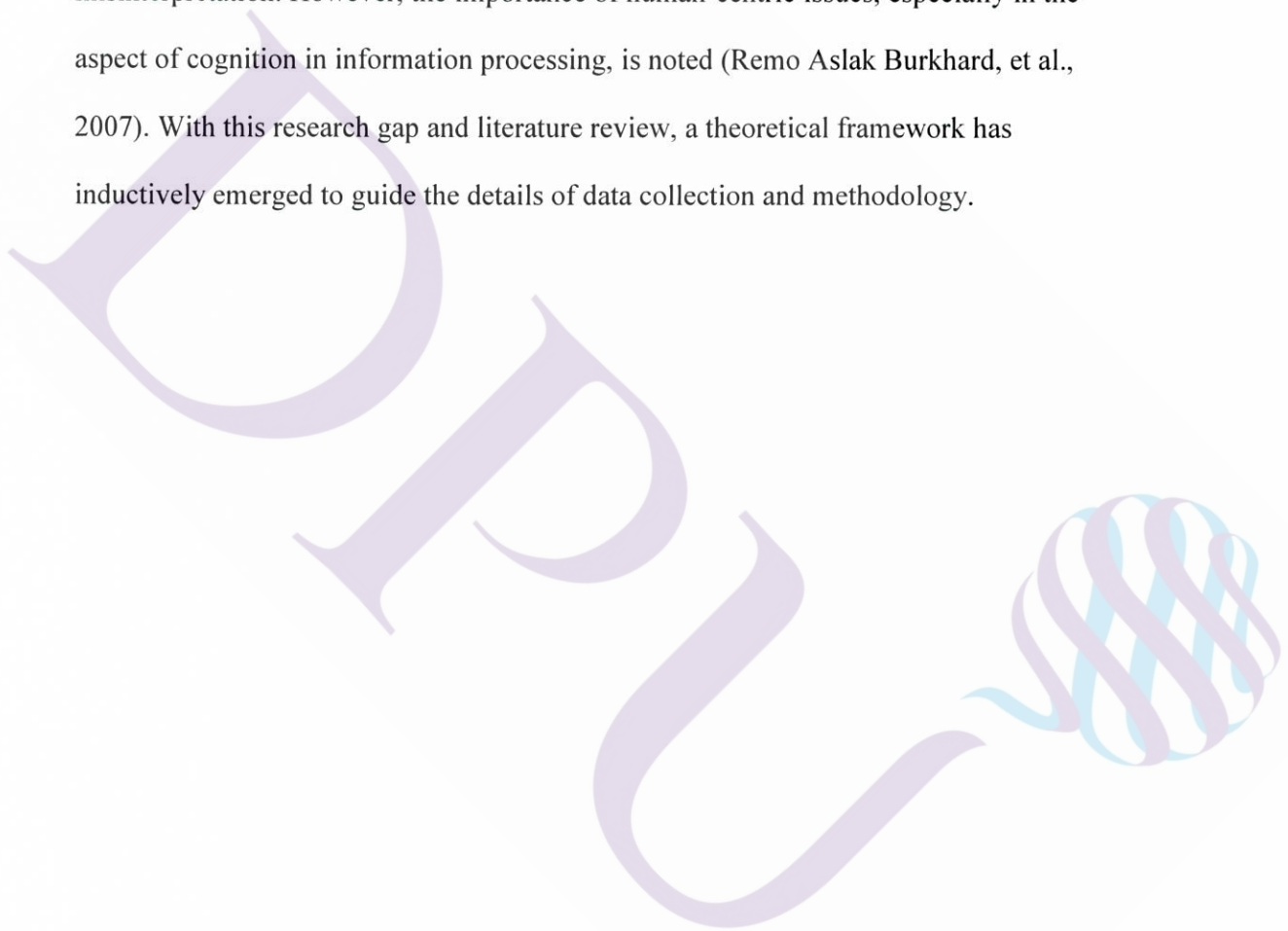
CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the methodology to answer the research questions of 'How does electronic slide presentation used to transfer knowledge enhance cognition from an aspect of information processing?", and "What are other factors that can enhance cognition?". Concerning the detailed data collection method to achieve research objectives, this research employs an interpretative social science approach in the aspect of constructivism. A qualitative exploratory study method is used to design the research. Data collection methods employ are documentation, observation, and interview.

This research is designed to meet the following research objectives: a) to explain how electronic slide presentation used to transfer knowledge enhances cognition in the aspect of information processing, b) to explore what enhances information processing, and c) to understand the optimal context of knowledge transfer and understand if there are other factors that can enhance information processing.

Chapter 3 is organized as follows. This chapter starts with the formation of the research question in Section 3.1. The research approach is explained in Section 3.2. The research scope is carefully laid out as discussed in Section 3.3. Section 3.4 reveals research design. The unit of analysis of this research is discussed in

Section 3.5. The detailed data collection method is elaborated in Section 3.6. Data analysis direction is explained in Section 3.7. Finally, research validity and reliability are presented in Sections 3.8 and 3.9. Section 3.10 concludes the chapter.

3.1 Research Questions

The current research questions formulated for this research are:

1) How does electronic slide presentation, used to transfer knowledge, enhance cognition from the aspect of information processing?

2) What are other factors that can enhance cognition?

3.2 Research Approach

This study employs an interpretative social science approach in the aspect of constructivism. A qualitative exploratory study was used to explain the empirical setting to answer the research questions. According to Creswell (2006), there are five qualitative approaches to consider: narrative, phenomenological, grounded theory, ethnographic, and case study research (Cresswell, 2006). Narrative research is suited with the type of research that is aimed to explain the experiences of an individual or individuals in a story-like and in a chronological order. Phenomenological research is aimed to explain the feeling and experience of an individual or groups who are facing a phenomenon. Grounded theory research is conducted to inductively derive with a theory that is never achieved before. Ethnographic research is aimed to explain how culture works within ethnographical groups. Case study research is aimed to explain a

real-life issue through one or more cases within a bounded system (Cresswell, 2006). For this study, it seems that case study research will be most suited to explain a real-life context of a questioned issue of how the information processing in enhanced.

The researcher followed Yin's (1994) approach to make the study as operationalised as possible as to create the reliability of the research. One must conduct the research as if someone is looking over one's shoulders (Yin, 1994). Yin (1994) adds that the protocol contains the procedures and general rules to follow in using the instrument. The protocol intends to guide the research in carrying out the study. This research follows the protocol as outlined by Yin (1994) in order to not miss out any details of this research. As stated by Yin (1994), a protocol should contain the following: 1) an overview, 2) field procedures, 3) study questions, and 4) a guide for the study report.

In collecting data, the study questions are guided by the concept of sensitizing framework of Patton (2002). These questions are posed when collecting data so that details of the fields are not missed. Patton (2002) summarizes topics to review as follows:

1) Describing the physical environment

2) Describing the social environment

3) Capturing historical perspectives

4) Describing planned program implementation activities and structured interactions

5) Observing informal interactions and unplanned activities

6) Recording receivers' special program language

7) Observing nonverbal communication

8) Watching for unobtrusive indicators

9) Analyzing documents, files, records, and artifacts

10) Commenting on notable nonoccurrence (what does not happen)

11) Constructing nested and layered studies during fieldwork for intersecting and overlapping units of analysis

12) Observing oneself: Reflexivity

This research took the qualitative explanatory study approach to explain how electronic slide presentation enhances cognition in the aspect of information processing; thus, the study report is descriptive. The empirical evidence is collected from the field. The multiple study report approach to be followed by this study was theory-building structures according to Yin (1994). Figure 3.1 shows the inductive theory building process that this study follows.
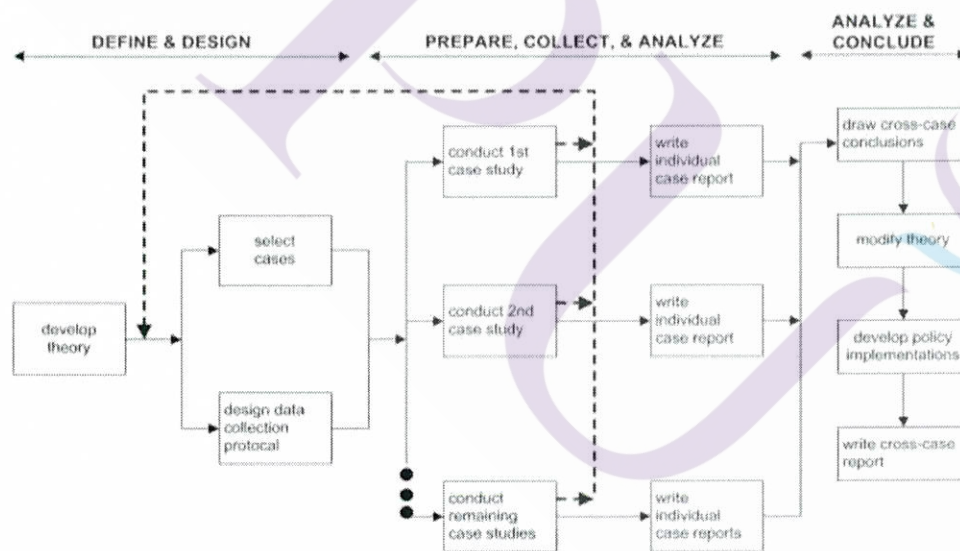
Figure 3.1: Inductive Theory Building

Source: Yin (1994)

The logic of the study depends on the specific topic and theory (Yin, 1994). In this research, the report is written according to the analysis and the logic of the theoretical framework being established. Data collected should reveal results that explain how the tools enhance each step of information processing of the field sales force. Results should extend the theoretical framework and inductively create a knowledge delivery model that can be generalized theoretically.

This research is examining the real-life context. Results and findings would be explained. Explanations or interpretations are complex and may be in the form of an unfolding plot or a narrative story about particular people or specific events (Patton, 2002). The context of this research is the real-life usage of knowledge visualization tool to transfer knowledge. The case seeks to explore and explain how the tool enhances information processing of the receivers.

In the first phase of the study, documentation is used as the research method to analyze data obtained from the content used in the tools. It is a technique used to gather and analyze the content of text (Neuman, 2005). Neuman (2005) further explained that the content referred to words, meanings, pictures, symbols, ideas, themes, or any messages that could be communicated. This is to find out if knowledge presented by the tool has any particular patterns that can enhance information processing of the receivers of knowledge.

The second phase of the study is observation. Patton (2002) says that direct observations allow the researcher to better understand and capture the context which people interact. The researcher gets firsthand experience from the setting. Some routines might escape the awareness of the people in the context, but the

researcher has an opportunity to see that (Patton, 2002). Patton (2002) claims further that direct observation gives the opportunity to the researcher to see things that people in the context are not willing to talk about.

The third phase is the interview. The purpose of interviewing is to allow the researcher to get into the other person's perspective (Patton, 2002). In this case, the researcher conducts interview with the presenters and the receivers of knowledge to gain insight to answer research questions and achieve research objectives.

Data analysis of this research would follow content analysis, pattern-matching and explanation-building. Neuman (2005) says that quality field data are detailed descriptions from the researcher's immersion and authentic experiences in the social world of members (Neuman, 2005). The data obtained from this research is in the form of documents, detailed observation notes, and interview scripts. Once the data are obtained, there are four dominant analytical techniques (Yin, 1994): 1) pattern-matching, 2) explanation-building, 3) time-series analysis, and 4) program logic models. Techniques relevant to address this research question are pattern matching and explanation building. The most important is to explain the causal links in real-life interventions that are too complex (Yin, 1994). Patton (2002) says that during the fieldwork ideas about how to analyse will emerge. Patterns will begin to appear. Themes might be clearer. The first stage of data collection tends to be generative, but the later stage will be to confirm insights found and pattern that seems to appear.

3.3 Research Scope

The researcher follows Yin's (1994), and Patton's (2002) qualitative protocol as guides in conducting research. Data collection was conducted in four days. One day was needed at each site on 30th January 1st, 5th, and 8th February 2010. Each observation took place on the one day of the month designated for knowledge transfer. A single day only was required because the knowledge transfer incident happened once a month at each site for each group and lasted one day each time. The knowledge visualization tool and its contents were collected for content analysis. Observation notes and interview scripts were recorded. Collected data was analyzed to find the answer to the research questions according to the theoretical framework developed.

As stated earlier that this study was to find out how electronic slide presentation used in transferring knowledge enhances information processing of the receivers, the context of the study was where the transferring of knowledge via knowledge visualization tool occurred. A specific context that fitted this study was a transfer of information and knowledge of sales representatives of a consumer product company in Thailand. Forty-three sales representatives of two distributors were interviewed. The researcher sent out a letter of consent (see Appendix C) and received access to two out of eleven distributors of this consumer product company. These two distributors have businesses that cover the Bangkok metropolitan area and eight other provinces in central and southern parts of Thailand. An interview with the channel leader of the distributor channel showed that the nature of knowledge transferred and the context was similar in eleven distributors[1]. Gaining access to two distributors should give an overall picture of how the knowledge was transferred and enhanced

information processing of the receivers[1]. The channel leader further addressed that accessing the sites for qualitative data collection such as this was very rare for a consumer product company, which was fast-moving in nature; any knowledge leakages could mean a competitive disadvantage to the company[1]. However, the raw data were carefully kept and filed so that evidence of research could be examined as needed.

In this consumer product company, sales representatives were located in eleven distributors. Each distributor had approximately twenty sales representatives. The researcher gained access to two distributors made up of forty-three sales representatives for this study. These two sites contributed 34% of total distributor business while the rest of the nine distributors each carried merely 8% of the business. The two distributors were selected because they were not homogeneous. For example, the two were located in different parts of Thailand, and each had a different organizational goal and theme. One wanted to be the best selling distributor while the other wanted to be the most widely covered distributor. Though with different strategies, monthly objectives and tasks deployed were the same. The monthly objectives of the two distributors were to achieve sales target. Thus, they represented diverse sales representatives of this consumer product company. These sales organizations are Thai-speaking ones, so the content of the tool, the knowledge transfer, and interview were in Thai. The researcher back-translated the content, observation note, and interview scripts for this research. Names of the company, distributors, and the receivers have been changed to pseudonyms to ensure the confidentiality of the business.

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[1] Interview with channel leader, a consumer product company, 12th November 2009.

3.4 Research Design

This research is designed in such details that when data collection in each of the sites happens, the procedure is the same. An example of the letter of consent can be seen in Appendix C. Once access to the sites is gained, presenters are interviewed, information of the knowledge visualization tool used is collected, the content of the knowledge in the tool analyzed, knowledge transferred at the sites observed, and finally the receivers of knowledge are interviewed.

A presenter who uses the tool at the site is identified to establish the expectations he/she has in transferring knowledge. What information or knowledge needs to be transferred to the long-term memory of the receivers is identified during the interview. Then, field observation is conducted at the sites at duration of one day per site. Each observation takes place on the one day of the month designated for knowledge transfer. Observation notes are collected during observation. At the end of the transfer of knowledge, the receivers of knowledge are interviewed to test comprehension and if the expectations of the presenters are met and how the receivers think the knowledge visualization tool enhances their information processing. Data collection is then completed and ready for data analysis.

Properly designed field procedures are essential due to the nature of qualitative studies that occur within real-life context (Yin, 1994). The researcher lists the procedures needed to be followed in chronological order according to the methods of data collection, which are a) documentation, b) observation, and c) interview.

A field procedure check list is developed for use while in field so that no detail is omitted, and data collection could be complete. Devices used in field are

included in the check list so that the researcher does not forget anything that would jeopardize data collection. See the field procedure check list in Appendix E.

The concept of sensitizing framework of Patton (2002) is used as guided questions in the observation note template. These questions are:

1) What is the physical environment?

2) What is the social environment?

3) What are the historical perspectives of the site?

4) What are the planned program implementation activities and structured interactions?

5) What are the informal interactions and unplanned activities?

6) What is the receivers' special program language?

7) What is the nonverbal communication?

8) What are the unobtrusive indicators?

9) What are the documents, files, records, and artifacts used?

10) What are the things that do not happen?

11) Constructing nested and layered studies during fieldwork for intersecting and overlapping units of analysis

12) How does the researcher feel about each site?

The above are used as questions as guidelines in the field-note template so that the researcher had a frame of data collection while observing.

The interview questions for the presenters and the receivers of knowledge were semi-structured. This is so as to gain insight of how the electronic slide

presentation enhanced information processing. The questions for the presenters include:

1) What kinds of tools are used for knowledge transfer at the site?

2) How are the tools used?

3) What are the knowledge expectations for the receivers?

4) How do you make sure that knowledge expectations are understood and achieved by the receivers?

5) How do you think the tool attract and draw attention?

6) How do you retain receivers' attention while transferring knowledge?

7) How do you think the receivers memorize the knowledge expectations?

8) How do you think the tool helps turn knowledge into use?

9) What type of presenters do you think you are?

These questions are guides. Other questions could follow during interview to gain more insights and clarification as needed. Interview questions for the receivers of knowledge are as follows:

1) When do you start giving attention?

2) Can you recall all knowledge transferred today? What is the knowledge?

3) Is the knowledge transferred related to what you already knew?

4) Is the content easy to understand?

5) What can be improved about the tool, the content, and the presenters?

6) What are the things that distract you during knowledge transfer?

Besides the above questions, the researcher asks questions about knowledge expectations to test understanding and recall of the receivers of knowledge. This can include three to four questions according to the expectations of the presenters. The researcher notes down the answers and voice records the interview. The interviewees could listen to their voices and give consent after the interview is finished.

3.5 Unit of Analysis

The unit of analysis of this research is four presenters of knowledge and forty-three receivers of knowledge who are sales representatives of two distributors of a consumer products company in Thailand. These two distributors represent diverse sampling as assured by the channel leader of this company[2].

Units of analysis comprise individuals, groups, organizations, movements, institutions, countries, and so forth (Patton, 2002). The key issue in selecting and making decisions about the appropriate unit of analysis is to decide what it is one wants to be able to say something about at the end of the study (Patton, 2002). It depends greatly on what level of findings the researcher is looking for. If the researcher is not yet certain of the level, it is wise to collect data by using the smallest unit of analysis, such as the individual, because it is easier to aggregate the data than to disaggregate from the bigger unit to smaller detailed unit (Patton, 2002).

This research looks for a context in which a knowledge visualization tool is used to transfer knowledge to enhance cognition of the receivers of knowledge. In

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[2] Interview with channel leader, a consumer product company, 12th November 2009

this study, sales representatives are the individuals who receive knowledge via the knowledge visualization tool. The sales representatives that the researcher chooses belong to one of the leading consumer product companies in Thailand. This is the theory-sampling method as mentioned by Yin (1994). In this research the theoretical framework is established before data collection. The context of knowledge transfer is established in the framework, and the consumer product company selected could yield data collection. The sampling then matches the theories established. The electronic slide presentation used to transfer knowledge of the sales target, new products, promotions, and product display knowledge is delivered once a month because consumer products are fast-moving, so knowledge is consistently updated and transferred.

This research aims to explore and explain the use of the electronic slide presentation to enhance cognition of individual receivers of knowledge. Therefore, the units of analysis of this study are individual sales representatives, and multiple sample sites in a consumer product company. Multiple sites are important in generating theoretical replication for emergent theory (Yin, 1994). Multiple sites increase validity of the results of the research to theoretical replication. The results from one site can confirm or alter the theoretical framework established. The frame can then be altered according to the results and tested in others. If replication of results begins to occur in other sites according to the theories, then the emerging theories are confirmed. Diverse sites of distributors of a consumer product company are applied to either create contrasting or replicating results. Two distributors are selected which have diverse organizational culture. This selection is to create reliability and validity to the results. Regardless of diversity in sampling group, the results stay the same.

The name of the company and the identity of each participant remain unrevealed and confidential. The leader of the sales force mention that their consumer products' strength lay in its sales force and the way their product data is transferred, so they would like to remain anonymous in a competitive environment such as Thailand[3].

To address the query of the quantity sampling, Patton (2002) says that there are no rules for sample size in qualitative inquiry. In-depth information from a small number of people could be very valuable, especially if the cases are information rich (Patton, 2002). Patton (2002) cites Lincoln and Guba (1985) who recommend a sample selection to the point of redundancy. The sampling is terminated when no new information is forthcoming from new sampled units; thus redundancy is the primary criterion (Patton, 2002). In this case, there are forty-three sales representatives in four research sites. The results start to replicate in site three and four.

Section 3.6 represents the detailed data collection method.

3.6 Data Collection Method

This research employs a qualitative and exploratory approach to explore and explain the knowledge transfer by using knowledge visualization tools. The researcher starts with a research question which would be answered by a qualitative study approach. Qualitative studies are the preferred strategy when "how" or "why" questions are being asked and when the researcher has little control over events, and when the focus is on a phenomenon within a real-life context (Yin, 1994).

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[3] Interview with channel leader, of a consumer product company, 12th November 2009.

Research design and data collection are not built from scratch. According to *a priori* specification of construct by Eisenhardt (1989), having an initial framework can help shape the initial design of theory building research (Eisenhardt, 1989). An initial theoretical framework has been developed to frame the study and guide the qualitative study questions. Findings discovered extend this initial framework and create a theoretical contributed framework according to the findings. Data collection of this research has been designed to triangulate to increase the reliability of the data. Data collection methods employ in this research are: a) documentation, b) observation, and c) interview. Data collection is divided into three phases.

1. In phase one, the researcher interviews the key informants or the presenters of each sites and surveys the knowledge visualization tool used at each site, then analyze their content.

2. In phase two, the researcher observes knowledge transfer event at each site.

3. In phase three, the researcher conducts interviews with the receivers of knowledge.

Table 3.1 shows the research design, data collection, and expected results.

Table 3.1: Research Design and Data Collection

Phase	Actions	Aims	Methods
Phase 1	Interview key informants or presenters and collect data, information, knowledge that will be transferred in the form of document and tools used.	To find out what kind of data, information and knowledge to transfer and by what tools.	Interview and content analysis
Phase 2	Observe at research site.	To find out patterns or causes that can link visualization tools to information processing model and cognitive load theory.	Observation
Phase 3	Interview receivers of knowledge.	To discover insights of how the tool enhances information processing process	Interview

Source: Developed for this research

Methods employed in this research are elaborated in details as follows:

3.6.1 Documentation

Gestalt laws of presentation are used as a framework to analyze the content of the knowledge to find if there is any particular pattern of how the knowledge has been presented to the receivers. It is also used to find out if the content of knowledge has been presented according to the gestalt laws of presentation. (Details of gestalt laws are presented in Appendix B.) The content of the knowledge studied here is in the form of electronic slide presentation with twenty-two slides. The content is then reviewed and counted with regard to evidence of each gestalt law. Evidence is listed according to the gestalt laws of presentation: a) proximity, b) similarity, c) connectedness, d) continuity, e) symmetry, f) closure, g) relative size, and h) common fate. The researcher explains the concept of gestalt laws with details to the presenters

so that they understand and could give alignment to what is found in their content in the tool. After identifying evidence, the researcher then sends back the result of this content analysis to the four presenters to concur and align. None of the evidence is modified.

The next phase of data collection was the observation at the research sites.

3.6.2 Observation

The second phase of the study is to observe while the tool is being used with the receivers of knowledge. Observation is a great way in gaining insights from a real-life setting (Patton, 2002). In observing, the researcher does not participate in the event. The researcher introduces herself and informs the participants the objectives of coming to the sites. She acts as objectively and as removed as possible; she has a small corner observing from afar what goes on in the context and does not distract the people being observed. Observation took eight hours for site one, six hours for site two, and three hours for site three and four.

The researcher develops an observation note by using the conceptual and theoretical framework as a guide to collect data and evidence from the field. Details of observation notes are shared to the presenters for alignment before leaving the sites. Data collected in the observation notes is coded according to the theoretical framework for further analysis.

3.6.3 Interview

The interview is conducted with the presenters and the receivers of knowledge. The purpose of interviewing is to allow the researcher to get into the other person's perspective (Patton, 2002). The researcher uses prepared questions earlier

mentioned for interview. These questions are prepared by using the guide from the theoretical framework.

The researcher starts by informing the presenters and receivers of knowledge about how the interview scripts would be used and the pseudonym to conceal their identity. Permission to voice record is asked and the interview began. The researcher asks permission to take notes while interviewing. After the interview, the researcher then plays the voice record for alignment, and the interviewees are thanked for their participation. In site one and two, the receivers of knowledge are interviewed individually. A group interview is conducted for site three and four due to the time limited by the owners of the research sites and the large number of sales representatives in these two groups. There are six sales representatives in each of site one and two. There are fourteen sales representatives in site three and seventeen in site four. The interview takes no more than five minutes for the individual and no more than ten minutes for the groups. The researcher records individual interview, and the record is played back to each presenter and the receivers of knowledge together to align and concur on the message. None of the presenters modifies the records. Six out of forty-three receivers of knowledge modify the records. At the research sites of more than ten receivers of knowledge, the interview is structured and dictated. Therefore, the researcher distributes blank A4 sheets to all receivers of knowledge and dictates the interview questions, asking each receiver of knowledge to write their answers on that piece of paper. This way, receivers of knowledge gets to see and align with their answers before handing the paper to the researcher at the end of the interview session.

The researcher asks the presenters if a telephone interview could be conducted in case of unclear evidence of interview during data analysis. All presenters give consent. If there is a need to conduct a telephone interview with the receivers of knowledge, the researcher would go through the presenters first. This is because the turn-over rate of the sales representatives is high. Sales representatives change every two to three months. The researcher might not find the same sales representatives who give the interview working at the site anymore. The researcher would review the receivers' interview script before leaving the sites to make sure that no questions about interview answers arise after leaving the sites. Questions that are asked on the telephone with the presenters would be to understand why receivers of knowledge give such answers if any particular patterns in answering arise.

3.7 Data Analysis

In this qualitative study, the direction is to collect data in the context earlier stated. Data is analyzed according to the initial theoretical framework developed. The second phase is to do cross-site analysis to find more emerging findings or observations in each site.

As the aim of this study is to explore and explain how the tools enhance cognition, the explanation between the knowledge visualization tool and cognition has to be established. That could be achieved through pattern-matching and explanation building techniques. This study took pattern matching to match the theoretical framework initially built to answer the research questions. Explanation is built to discover findings from each of the data collection methods.

Matrices are applied to organize themes from textual data for simple analysis and interpretation. Codes are initially defined according to the theoretical framework. A tabulated worksheet is used to manage the matrix of data to discover and interpret different angles of results.

QSR NVivo 8 software is used in this research to organize observation note and interview transcriptions. It is used to generate codes and put empirical evidence under pre-determined and emerging themes and issues. The software is used to help organize data but not to analyze the data. The researcher uses the prior questions as the basis to organize and retrieve relevant data from the software. The data is then analyzed accordingly.

The data is analyzed according to the theoretical framework initially established. Evidence from each of the sites and from each data collection methods is used to answer each step of the "how" in information processing. Major findings arise from this analysis. After that, cross-site analysis is conducted to realize further findings and observations. From this analysis, academic contributions and business implications are summed up and reported.

3.8 Validity

This research strives to achieve a) construct, b) internal, and c) external validity. To achieve construct validity, multiple sources of evidence are used and they are a) documentation, b) observation, and c) interview.

Internal validity is achieved by careful attention to details in explanation building phase. No inappropriate inference is made to create any irrational causal links. This can be achieved by anticipating the overall positive and negative inferences before making any conclusions. In this research, internal validity is achieved with careful attention of the researcher in explaining the case without biases which can be seen throughout the research.

External validity of the qualitative study relies on analytical generalization, not statistical generalization (Yin, 1994). This can be achieved when a framework or a theory that is inductively derived from the study can be replicated in another study or in another site that is conducted. External validity in this study can be achieved when a framework or theory is derived from first individual site and is applicable to the next sites. A fatal flaw in doing qualitative studies is to conceive of statistical generalization as the method of generalization the results of the studies. They can only be generalized to analytical generalization (Yin, 1994). Bent Flyvbjerg (2006) also agrees that qualitative methods and case study research can be used for hypothesis testing not just building and can also be generalizing beyond particular cases studies (Flyvbjerg, 2006). For external validity, knowledge delivery model that is derived from the study, when applied, produced the replicating results in all the sites. Knowledge delivery model with slide presentation can be applied from academic to business field where the tool is widely used.

3.9 Reliability

To address the research questions, the research instrument design and data collection methods are carefully designed to improve the reliability of this research. The general way of approaching the reliability is to make as many steps as operational as possible and to conduct research as if someone are always looking (Yin, 1994). The protocol is a major tactic in increasing the reliability of qualitative study research and is intended to guide the researcher in carrying out the study.

The reliability of this research can be achieved by carefully laying down of the qualitative protocol and an interview guide. Empirical notes or a qualitative study database have to be carefully collected and kept in such a way that they can always be retrieved for audit and review. Empirical notes and interview scripts of this research are carefully kept and filed for review in the form of both hard and soft copies. Applying the same detailed protocol and procedures would yield the same results as happened in this research.

3.10 Conclusion

Chapter 3 provides details of methodology used in this research. It also explained the operationalisation of it. The method used is qualitative exploratory study with documentation, interview, and observation as instrument for data collection. QSR NVivo 8 and tabulated sheet are used to arrange data in a meaningful form for data analysis.

The presentation of this research is done in a narrative, story-telling style to first paint the picture of the sites entered for research. After that the analysis is

narrated according to the framework earlier created with the results to extend the framework into an inductively developed model.

Chapter 4 provides the setting of the research sites.

CHAPTER 4

VISUALIZING RESEARCH STAGE

This chapter describes each study site in details. This is the information derived from in-field observation. The chapter begins by describing the sampling groups and setting. An introduction of each site is given, and each site is described in the following areas: (a) sampling groups and setting, (b) introduction of each site, (c) physical environment, (d) social environment, (e) planned program implementation activities and structured interactions, (f) informal interactions and unplanned activities, (g) nonverbal communication, and (h) traits of the presenters. The characteristics and content of the tool is also elaborated here.

This research examined four study sites that consisted of a total of forty-three receivers of knowledge and four presenters from two distributors of a consumer product company. There were two groups from each distributor. These two groups from each site varied in the number of sales representatives in each group. There were six receivers in site one, six in site two, fourteen in site three, and seventeen in site four. This differentiation was to see whether small and big groups in two different distributors gave replicating or contrasting results.

Section 4.1 gives the description of sampling groups and setting. Section 4.2 explains characteristics and content of the tool. An introduction to study sites is elaborated in section .4.3.

4.1 Description of Sampling Groups and Setting

The sampling groups were sales representatives of a consumer product company. Once every month these sales representatives receive new knowledge about products, promotions, themes, and product displays. This knowledge is needed in order to complete monthly tasks and expectations. In transferring this knowledge, presenters use electronic slide presentation as a knowledge visualization tool. The presenters in each site are presenting and transferring knowledge. The receivers of knowledge are selling products in six different categories: (a) hair care, (b) skin care, (c) personal cleansing, (d) snack, (e) laundry, and (f) men's grooming.

The setting of knowledge transfer was in a meeting room ranging from eighteen to fifty square meters. The rooms were set in a meeting-like setting with tables ranging from two to four in the middle and chairs ranging from eight to twenty around them. All rooms were air-conditioned and well-lit. LCD projectors were used with screens at one wall. Computers were used to operate the electronic slide presentation. Each sales representative had a copy of the slide presentation in hard copy as reference. The hard copy was color-printed in A5 size and had the exact same look as the slide presentation on the screen with one slide presentation on each page. It was a two-sided print with twenty-two pages. Some sales representatives had laptops switched on during knowledge transfer, but none of them had a soft copy of the slide presentation. Table 4.1 shows details of each site: number of presenters, receivers of knowledge, meeting room size, knowledge content, and knowledge visualization tools used.

Table 4.1: Details of Sampling Groups

Site	No. of Presenter	No. of Receivers of Knowledge	Room's Size (sq. m.)	Knowledge Content in the tool	Tool used
1	1	6	40		
2	1	6	18	Sales target, new product, promotion, product display	Electronic slide presentation
3	1	14	50		
4	1	17	40		

Source: Developed for this research

Table 4.1 shows that there was a presenter for each site although the number of receivers of knowledge varied from n=6 to n=17. The size of the room was different except for sites one and four, which were the same because the knowledge transfer site was the same meeting room of the same distributor. Though sites two and three belong to the same distributor, knowledge transfer happened in different meeting rooms and sites. The knowledge content and knowledge visualization tool used is the same across all sites, well-known electronic slide presentation program.

Section 4.2 gives details of the characteristics and content of the tool.

4.2 Characteristics and Content of the Tool

The tool used in all four sites was the well-known electronic slide presentation, Powerpoint. The tool was shown on the big screen in front of all receivers of knowledge. To determine the knowledge content expected to be transferred, knowledge is first identified. The researcher did so by interviewing the presenters[4]. The interview with the presenters was semi-structured. Interview

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[4] Interview with the presenters of site one, two, three, and four, 30th January, 1st, 5th, and 8th February, 2010

questions were prepared but could be adjusted during the interview to gain more insights to answer each research question. The results of expectations are shown in Table 4.2.

Table 4.2: Knowledge Retrieval Expectations

	Knowledge Retrieval Expectation			
Site	**Sales target**	**New products**	**Promotion**	**Product display**
1	Y	Y	Y	Y
2	N/A	Y	Y	Y
3	N/A	Y	Y	Y
4	N/A	Y	Y	Y

Source: Developed for this research

In site one, the interview with the presenter took eight minutes twenty-three seconds. From the interview, the expectations were sales target, new products, promotion, and product display. The presenter expected the receivers of knowledge to retrieve all details of these four knowledge areas[5].

In site two, the interview with the presenter took five minutes twenty-one seconds. It took the researcher five minutes in sites three and four. From the interview, the expectations were new products, promotion, and product display. The presenters expected the receivers of knowledge to retrieve all details of the three knowledge areas[6]. Failure to retrieve complete details in the expectations would be considered an inability to recall that particular knowledge area altogether. These expectations were guidelines for individual interviews with the receivers of knowledge with regard to knowledge retrieval.

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[5] Interview with presenter of site one, 30th January 2010
[6] Interview with presenters of site two, three, and four, 1st, 5th, and 8th February 2010

The researcher interviewed the receivers of knowledge individually in site one and two. For site three and four, the researcher conducted a group interview in which the researcher distributed a blank sheet of paper to each receivers and the researcher reads out interview questions one by one and let the receivers write down the answers. After the knowledge transfer sessions, the researcher interviewed the receivers of knowledge. The interview was a semi-structured interview using the interview guideline questions established plus the knowledge retrieval expectation stated by the presenters of each site.

After the interview of each site, the researcher thoroughly looked at the interview scripts to see if the receivers of knowledge could retrieve knowledge as expected by the presenters. If the receivers of knowledge could retrieve all knowledge expected during the interview, it meant that 100% knowledge retrieval had been achieved. However, as the forgetting curve from Ebbinghaus (1913) was selected as the benchmark, knowledge retrieval at 70% after twenty minutes of knowledge transfer was acceptable and would be counted as successful knowledge transfer for that individual in that site (Ebbinghaus, 1913).

The first knowledge content was sales target. Sales target was the knowledge that contained only one page in the knowledge visualization tool. It contained primarily numbers. The number of elements of each knowledge was determined by the presenters themselves. They were the same for all sites because the knowledge elements were primarily determined by the company's central unit. The number of elements in this knowledge was two: i.e., total sales target of 18,200,000 baht; in addition, the individual seller or receiver of knowledge thus calculated for

their individual sales target right away: e.g., Seller A = 5,000,000 baht. Sales target
knowledge that the presenter expected the receivers of knowledge to recall had two
elements: (a) total sales target and (b) individual sales target. Figure 4.1 shows the
visual of sales target knowledge as shown on the knowledge visualization tool. This is
the actual slide. The site owners agreed to show this actual slide.

Figure 4.1: Sales Target Knowledge

Source: Actual slide presentation of site one

The second knowledge content was new product. New product was the
knowledge that contained eleven pages in the knowledge visualization tool. Slides
included pictures, numbers, and product features. The number of elements in this
knowledge was three: (a) Product x, (b) size 80 ml., (c) launch date, 8 Jan, 10. Product
features in texts were there for reference. New product knowledge that the presenters
expected the receivers of knowledge to retrieve has three elements: (a) brand, (b) size,
and (c) start-sell date. Example of the actual page cannot be shown here due to
confidentiality of the products. Figure 4.2 is what is similarly shown in new product
knowledge content.
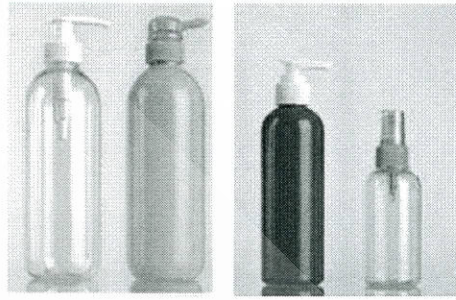
Product brand, available in 4 sizes, launch on 1 March 2010

Figure 4.2: New Product Knowledge Content

Source: Developed for this research

The third product knowledge was promotion. Promotion knowledge comprised of four slides in the knowledge visualization tool. They contained numbers, texts, and dates. The number of elements in this knowledge was eight: (a) Product x, (b) product variance x, (c) size 80 ml., (d) promotion period from Jan-Feb 10, (e) promotion for small or large stores, (f) percentage discount 15%, (g) selling price 39 baht, and (h) budget allocation 250,000 baht. Promotion knowledge that the presenters expected the receivers of knowledge to retrieve was all eight elements. Examples of the actual page cannot be shown here due to confidentiality of the promotion mechanics, but Table 4.3 shows similar knowledge content as shown on the tool.

Table 4.3: Promotion Knowledge Content

Brand	Variance	Size	Promotion Period	Promotion Channel	% Discount	Selling price	Budget allocation
Spark	Sparking white	100 ml.	1-31 March	Large store	15%	99	100,000

Source: Developed for this research

The fourth knowledge content was product display. Display was the knowledge that comprised four slides in the knowledge visualization tool. They contained only pictures. The number of elements in this knowledge was one, i.e., yellow soap. Product display knowledge that the presenters expected the receivers of knowledge to retrieve had only one element, which was the variance of the product to be displayed on the shelf. Example of the actual page cannot be shown here due to confidentiality of the products, but Figure 4.3 shows a similar visual of the display knowledge content.

The first and second shelf should be filed with yellow bottles

The third and forth shelf should be filed with white bottles
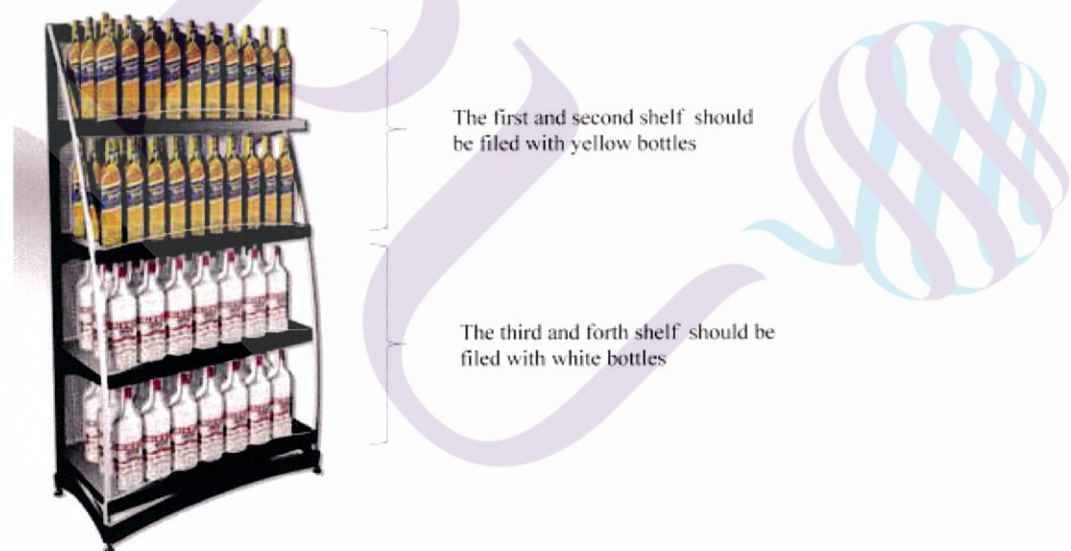
Figure 4.3: Display Knowledge Content
Source: Developed for this research

The rest of the slides had information about seller's incentives, next steps needed, and things to follow up.

4.3 An Introduction to the Study Sites

In the four sites of two distributors of the consumer product company, knowledge transferred was uniform from the central unit of this company. However, each distributor was to transfer knowledge on their own to each of the sales representative groups. Each sales force varied in size from n=6 to n=17 receivers. This section provides detailed descriptions of each sales group, explained in accordance with the methodology of qualitative study description as outlined by Patton (2002) and discussed in Chapter 2 and 3. This will include: (a) description of the physical environment, (b) description of social environment, (c) capturing historical perspectives, (d) describing planned program implementation activities and structured interactions, (e) observing informal interactions and unplanned activities, and (f) observing nonverbal communication. What will be added to Patton's (2002) framework are the traits of the presenters of each site.

In all sites, there were procedures that are repeated. The procedures were explained here to outline the flow before going into detailed description of each site.

1) The researcher had made an appointment with the presenters to meet thirty minutes prior to the knowledge transfer to have an interview to gain insights to address the research questions and to determine knowledge retrieval expectations so that the researcher could use as questions to test the receivers of knowledge afterwards.

2) The interview with each presenter took no more than ten minutes either in or outside the knowledge transfer sites.

3) Before the interview, the researcher explained the objectives of the study.

4) The researcher informed the interviewees that their names would not be revealed and the information gained was strictly for academic purpose.

5) The researcher also asked permission from all interviewees to use voice recorder. After getting the consent, the researcher proceeded with the interview. No one objected the use of voice recorder.

6) The presenter revealed what kind of knowledge visualization tool was used in transferring knowledge which was electronic slide presentations for all sites.

7) The researcher asked the presenter to explain how the tool was used during knowledge transfer.

8) Knowledge transfer expectations were revealed. Then, the rest of the questions were about how to enhance each of the seven steps of the information processing process which were getting receivers' attention, transferring knowledge via the tool, understanding knowledge, transferring knowledge to short-term memory, encoding knowledge, transferring knowledge to long-term memory, and retrieving knowledge.

9) After the interview, the researcher played back the recorder for the presenter to listen and align with the information.

10) Then the presenter led the researcher to the site.

11) The researcher sketched the appearance of the room where knowledge transfer took place so that a technical drawing could be done later to show identical images of the sites. The site owners did not allow any pictures to be taken so the drawing is necessary. The images do not show all details of the sites but provide the overall look and feel.

12) The observation lasted approximately three to eight hours in each site.

13) After the observation at the end of knowledge transfer, the researcher interviewed the receivers of knowledge.

14) Then, the researcher asked about how they think the tool enhanced the seven steps of information processing process and tested them against knowledge expectations of the presenters to see if the receivers could understand and retrieve the knowledge.

15) The voice recording was played back to the interviewees for concurrence. The field work procedure ended here.

Table 4.4 gave a summary of research conditions of each site.

Table 4.4: Summary of Research Conditions

Description of Conditions	Site 1	Site 2	Site 3	Site 4
Number of Presenter	1	1	1	1
Number of Receivers	6	6	14	17
Physical setting	40 square-metres' room, 8 tables, 14 chairs, 25 degrees celcius	18 square-metres' room, 3 tables, 20 chairs, 23 degrees celcius	50 square-metres' room, 8 tables, 14 chairs, 25 degrees celcius	40 square-metres' room, 8 tables, 24 chairs, 25 degrees celcius
Social environment	friendly	less friendly than site one	friendly	friendly
Planned program	existed	existed	existed	existed

Table 4.4: Summary of Research Conditions (continued)

Description of Conditions	Site 1	Site 2	Site 3	Site 4
Informal and unplanned activities	existed	existed	existed	existed
Special program language	existed	existed	existed	existed
Non-verbal communication	existed	existed	existed	existed
Traits of presenters	argumentativeness, extraversion, openness, agreeableness, conscientiousness	conscientiousness	conscientiousness	argumentativeness, openness, conscientiousness

Source: Developed for this research

4.3.1 Site One

4.3.1.1 Description of Physical Environment

The description of the physical environment gives the clear setting of the environment of each site including details of the meeting rooms that were used for knowledge transfer. This information is important in determining if the physical environment contributed noise or distraction or in any way disrupted or enhanced the transfer of knowledge.

Site one belonged to the first distributor and was fifty kilometers from Bangkok, located towards the southern part of Thailand. Because it was within driving distance, the researcher drove to this site early in the morning. This site took care of eight provinces of the central and southern regions of Thailand. The knowledge transfer was scheduled to be at 9 a.m. on 30th January 2010. The researcher was instructed to park at this entertainment complex. Next to the site was a coffee shop. The presenter had instructed the researcher that the interview should be conducted at the coffee shop before entering the site. The researcher met the presenter in front of the coffee shop.

The presenter was a 35-year-old man. He was dark and thin with a height of around 165 centimeters. He could communicate with clear articulation of language. He was wearing blue t-shirt with jeans. He was carrying a file folder in his right hand and he had a pen in his t-shirt pocket. There was a small room inside the coffee shop so he asked the owner if he could use that room for no more than twenty minutes. The owner said OK. The presenter and the researcher went into the room and started the interview. The researcher followed field work procedures. The interview took eight minutes twenty-three seconds in the coffee shop for site one. After the interview ended, the presenter led the researcher to the site.

Entering the site, the researcher saw a big sign of the site name in front of the site. Behind the sign, there were products unloading activities going on. There was a ten-wheeled truck full of products parked with its rear facing towards the warehouse ready for product unloading. Behind the parking lot was a warehouse office with four office tables for a warehouse manager and three warehouse assistants. This small office was air-conditioned. Right next to the warehouse office was the warehouse itself. The warehouse was full of products shelved by categories of products. There was a small aisle for people to walk through. This was actually not accessible to all individuals due to security and shrinkage issue. However, the researcher walked with the presenter who had the access. The warehouse's aisle led to a big office, a big meeting room, and a small meeting room. The presenter and the researcher entered the big meeting room which was where the knowledge transfer would take place. This showed that the big meeting room for knowledge transfer was set far apart from the busy working area, so it was unlikely that the product unloading activity would

distract knowledge transfer though there were many other variables that could add to this.

Figure 4.4 shows an identical, technical drawing of the room. The big meeting room was forty square meters. Some of the receivers of knowledge were already in the room. There was one door at the end of the room. When one entered through the door, one faced a wall where the screen was projected. Opposite the front wall was another wall filled with light-blue curtains. Behind the curtains were windows that occupied the top-half of the wall, looking to the management room which was transparent again through the big office. One side of the wall was painted white and was empty. The other side of the wall was filled with light blue curtains. Behind the curtains were windows overlooking the warehouse. There were couches placed against the wall on the left side of the room, and the researcher took a seat there and settled down.

The room was set for a meeting of the knowledge transfer. Eight white, foldable tables were arranged in an island like in the middle of the room. There were thirteen chairs (metal legs and synthetic leathered chairs). Receivers of knowledge were sitting facing each other in a meeting setting. Everyone had laptop computers switched on. The presenter had his computer connected to the LCD projector and projected the electronic slide presentation (knowledge visualization tool) on the screen. There were six neon lights spread evenly in the front, middle, and back of the room. Each was four feet long. One light at the front was off, but it allowed the screen's light to be brighter and more easily seen. There was one air conditioner. There was a drink kiosk at the back near the door and one small clock at the front.

There were two big speakers at the front but not used. One microphone was also present but not used. There were electric wires all under the tables. There were five couches alongside the walls. The room temperature was 25 degrees Celsius measuring from a watch that had a temperature measurement function. The room did not have any distinct smell. Windows and door were not opened. The room was air-conditioned. Figure 4.4 shows a technical drawing of the big meeting room of site one.

Figure 4.4: Image of Meeting Room of Site One

Source: Developed for this research

The knowledge transfer started at 9:50 a.m., 50 minutes later than scheduled. This was due to the billing and documentation process that each sales representative or receivers of knowledge took to review with financial officer before entering the knowledge transfer session, an acceptable delay that everyone in the room understood. Once each sales representative was done clearing all documentation, he or she came to sit in their seats facing at the presenter.

The knowledge transfer started when everyone was present in the room. For site one, there were six receivers of knowledge (one female and five male) and one presenter (male). The receivers of knowledge were sitting around the white meeting tables while the researcher was sitting on the couch alongside the wall. This ends the description of physical environment of site one. The next subsection covers the description of the social environment of site one.

4.3.1.2 Description of Social Environment

The description of the social environment gives perspective of the comforts of knowledge transfer in terms of the relationship between the presenter and the receivers of knowledge as well as the relationship among the receivers of knowledge themselves. From observation, the researcher witnessed different interactions in each site when the relationship was different. For example, receivers of knowledge tended to ask questions to understand knowledge more when they knew the presenters well. Below is the description of the social environment of site one.

Both presenter and receivers of knowledge seemed to know each other well observing from the talk they had. They kept talking till everyone was all in the room and was not doing any other things. The talk lasted around twenty minutes.

They asked each other about the dinner they had with their friends. They told each other about their kids. They showed pictures of their last vacation. They asked about details of the trip. They also asked each other about business results in each area to check if they were facing the same situation. The presenter joined the conversation while switching on his computer and the projector.

All were wearing jeans and t-shirts. They all had laptop computers, so they were all carrying laptop bags to put both computers and documents. They all were wearing slippers because they had to take off their shoes before entering the big meeting room.

Some of the receivers of knowledge brought out snacks and asked the rest to have a bite. Though there were many chairs, they sat next to each other and whispered about certain topics that the researcher could not hear. The social environment for site one was full of smiles and laughters. No one was in a bad mood that day observing from the facial expressions of each and the interaction they had towards each other.

In summary, the presenter and the receivers of knowledge seemed to know each other well, the atmosphere was friendly and jovial, and they had open conversation about both business and life.

4.3.1.3 Description of Planned Program Implementation Activities and Structured Interactions

The description of the planned program implementation activities and structured interactions of each site shows activities implemented according to schedule. It also shows the level of participation of the receivers of knowledge for

each planned activity. This will help determine later in the analysis about how each activity enhanced information processing.

In site one, knowledge transfer was planned, and the agenda was a recurring agenda that happened every month. The plan was to review business results for three hours and knowledge transfer for another three hours. The business review was conducted in the morning followed by one and a half hours' lunch break. The business review took long because each receiver of knowledge, or sales representative, had to review his or her own business individually. Knowledge transfer was conducted in the afternoon for three hours.

The participation was very high especially in the morning session of the business review. Each seller reviewed his/her business results. They revealed the business achievement or failure in each of their areas and gave reason to support business results. They went on one by one until all six were done. The presenter probed to understand issues in each area with receivers of knowledge. If a seller told him that the sales target in his/her area could not be achieved due to slow-moving sales, the presenter would ask how the seller knew it was like that. He asked if the seller knew the inventory level in the area. What was the inventory level at the earlier period? How much was bought in to top up the inventory? How much was sold out for the reviewed period? This was to probe if the issue was real. After the morning session of business review, there was a lunch break. The afternoon session was for knowledge transfer. There was participation and interaction from the receivers of knowledge. For example, where receivers of knowledge paid closest attention were the parts of the presentation that were full of pictures such as knowledge of new

products and product displays. Their body language communicated this greater interest: receivers raised their heads from their hard copies of knowledge and looked at the screen. The presenter purposefully asked questions to produce more understanding of the knowledge among the receivers of knowledge. The receivers of knowledge also asked questions to gain more understanding.

4.3.1.4 Description of Informal Interactions and Unplanned Activities

This section describes the informal interactions and unplanned activities of the sites. These could be useful in determining the social environment of the sites and noise that could happen during knowledge transfer.

For site one, during both the morning and afternoon sessions of business review and knowledge transfer, some informal interactions and unplanned activities occurred. In the morning, one receiver checked billing documents while the others were talking to each other. Some receivers of knowledge whispered to each other while reviewing the business. The sales manager (site owner) walked in and out of the room more than six times. At 11:18 a.m., the receivers of knowledge and the presenter started having snacks. The smell of snacks such as seaweed permeated the room. At first, male receivers of knowledge started eating seaweed, and once the others smelled it, they also started eating it, too. One receiver of knowledge talked about the award to go to Africa and could he exchange it for Korea. The receiver of knowledge sitting next to him said that if he did not want to go, give it to me instead. They chatted and laughed about it for one minute.

The unplanned activities that occurred in this site were that one receiver of knowledge got an award of being the best seller. The site owner came in to hand the

award. The rest of the receivers of knowledge congratulated him and teased him that he was the god of sales. Everyone laughed. The presenter stopped knowledge transfer to facilitate this unplanned activity. This activity was not in the told agenda so it was not planned for everyone but the site owner must have planned this activity to happen that day. This activity lasted for about five minutes. After the laughter died down, the presenter got the attention and resumed the knowledge transfer.

Another unplanned activity that occurred during knowledge transfer was the ringing of the phones. Phones of some receivers of knowledge were vibrating, and sometimes they answered the calls. The presenter had told the receivers of knowledge to put their phones to silent mode since the beginning of the meeting. Though the phone did not ring, it vibrated. Sometimes the receivers of knowledge took the calls. If the receivers of knowledge took the calls, the presenter would wait until the call was finished to resume the knowledge transfer.

4.3.1.5 Description of Nonverbal Communication

Nonverbal communication can both facilitate knowledge transfer and indicate noise happening during knowledge transfer. It also helps determine the relationship among people in the sites. The researcher describes nonverbal communication of site one below.

The nonverbal communication in site one existed throughout the knowledge transfer. The receivers of knowledge seemed to be sitting comfortably in their chairs with their backs rested. They all had pens in their hands ready to write on the hard copy. While transferring knowledge, the receivers of knowledge looked at

the hard copies of the tool that was distributed earlier and turned their heads up to look at the screen. Some of the receivers of knowledge yawned in the afternoon.

The receivers of knowledge looked at the presenter while transferring the knowledge of new products. All of the receivers of knowledge bounced their legs up and down while listening. They did not bounce their legs all the time but did that intermittently. They all held pens in their hands poised and ready to write throughout knowledge transfer.

The presenter moved around the room. Sometimes he sat and sometimes stood while transferring knowledge. The receivers of knowledge took notes while listening. They talked and made eye contact with the presenter to gain understanding of certain topics. They nodded their heads throughout knowledge transfer. They smiled and laughed when the presenter added humour to some of the topics. This ends the nonverbal communication of site one.

4.3.1.6 The Traits of the Presenter

The traits of the presenter are described here to show the differences of each presenter in the sites, as those differences are important to explain one of the research findings in Chapters 5 regarding the effect of presenters' traits on knowledge transfer.

The presenter of site one was a male with three service years. His position was a sales supervisor. He was the one transferring knowledge on a monthly basis to the receivers of knowledge. He could communicate with clear articulation of language. He knew exactly what was expected of his receivers of knowledge as told by him from the interview earlier. He looked confident and clear in answering all

questions without hesitant. He was open-minded because he listened to all objections during business reviews and knowledge transfer and he explained and resolved conflicts. Referring to presenters' traits reviewed, the presenter of site one was not a conversational narcissism. He did not talk about himself nor was he insensitive or nonresponsive. He did not use exaggerated gestures. He was argumentative because he argued against opposing belief of the seller that his business was not doing well. Rather the business was doing well but did not have enough products to sell because seller was not detailed enough to sell all available products. He did not show any communication anxiety. There was no trembling of the voice or avoidance to communicate. He did not show the neuroticism trait on the day of knowledge transfer. He smiled while speaking and the voice did not show any intensity. He was an extravert. He was assertive in making his points clear when asked questions. If the seller asked him for example, what color of soap should be on display, he would answer without hesitant that it would be white and gold. He was an open person because he reflected on questions, took in information, and expressed his thoughts independently. When a seller asked if she could replace a soap promotion with shampoo because her area still had high inventory of soap, he replied that she should use this promotion to push in more sales and reduce the inventory at the same time. He was an agreeable person. He tried to understand the situation of each seller. He saw that one seller squinted his eyes when looking at the screen. He asked if the seller could see the screen clearly. The seller said he could not so the presenter asked him to move forward and sat near the screen. He showed agreeableness trait by being sympathetic to that seller. He was a conscientious speaker because he showed to be well-organized with his laptop ready with the slide presentation opened. He had the

hard copy organized in a folder. He was punctual and he went through the tasks according to the agenda.

He used his voice to draw attention from the start. He checked if everyone could hear him clearly. He asked receivers of knowledge to turn their phones to silent mode. He repeated the expected knowledge to the receivers of knowledge twice. He asked questions to gain more understanding on the expected knowledge. The presenter stopped if one of the receivers of knowledge was on the phone. He added work-related humour to the knowledge to lighten up the environment such as please actually distribute the customers' samples to the customers and do not keep them at home because they are customers samples not home samples. He used eye contact to fix the attention. He also asked the receivers of knowledge to review the knowledge and used the knowledge to do business planning right after knowledge transfer. In summary, the presenter of site one had all positive traits of argumentativeness, extraversion, openness, agreeableness, conscientiousness.

For site one, the knowledge transfer environment was pleasant with enough room for everyone to sit comfortably. The presenter and the receivers knew each other. Knowledge transfer was an interactive session. Everyone was participating. The presenter followed through the agenda with one interruption from the sales manager. Nonverbal communication in the site was eye contact, head nodding, writing down notes, and yawning. The presenter did not have any negative traits according to the review in chapter two.

4.3.2 Site Two

4.3.2.1 Description of Physical Environment

The second distributor for site two was located in Bangkok along the
Chaophraya River. This site took care of the Bangkok metropolitan area. Because the
researcher resided in Bangkok, this site was within easy driving distance. The
researcher drove to this site early in the morning. The knowledge transfer was
scheduled to be at 10 a.m. on 1st February 2010. The field work lasted for one day.
The researcher met the presenter in one of the warehouses used for parking. The
presenter then led to the research site.

This site looked to be groups of warehoused buildings built together. The
presenter instructed the researcher to park the car in one of the warehouses. Inside this
warehouse-like building, there were five cars parked there. These cars belonged to the
site managers. There was nothing else around the warehouse except for cars and
trucks. Entering the site, the researcher did not see anything outstanding except for the
warehouse buildings. Each warehouse was used for different purposes. One was for
parking. The second was for products storage. Another was for office and meeting
rooms. The presenter asked the researcher to conduct the interview in the meeting
room. The interview took five minutes twenty-one seconds. The meeting room was
inside another warehouse next to the one for parking. The meeting room was built
into an actual shipping container. It was air-conditioned. The presenter led the
researcher into the room. The presenter was fair with a height of around 165
centimeters. She was 32 years old. She was wearing jeans and a white t-shirt. She did
not carry anything when meeting with the researcher. The researcher then followed

the field work procedures with the presenter. The researcher sat on a chair that did not have a back rest. The chair was placed against the wall on the right to put the researcher apart from the receivers of knowledge. The presenter sat next to the researcher during interview. When the interview finished, the presenter changed the seat to be in front of the room ready for the business review and knowledge transfer session. After the interview, the presenter and the researcher waited in the meeting room for the receivers of knowledge to enter for knowledge transfer. The receivers of knowledge entered into the room at the scheduled time which was 10 a.m. Some entered together, and some entered the room alone. They found their seats, sat down, and waited for the knowledge transfer session.

The meeting room was eighteen square meters. It was quite a small room to accommodate a lot of people. Though there were six receivers of knowledge, one presenter, and a researcher, other people not related to knowledge transfer session were also sitting in the room doing other activities. All together, there were fifteen people crowded in the room. There was one door at the end of the room. When one entered through the door, one faced a wall where the screen was projected.

In the meeting room of this site, there were three tables and twenty chairs. The chairs were mixed. Some were metal and some were plastic with no back rest. The tables were arranged in a meeting-like setting with chairs around the tables. There was very little room around the room to walk. All receivers of knowledge had laptop computers and switched them all on. There was one LCD projector projecting to the wall at the front. The air conditioner was on and at the front. There were four fluorescent lights. Three were on. One at the front was intentionally off due to the

slide projection. There were no windows. One wall opposite of the door was used for the slide show. The other two walls on the side had whiteboards installed. The wall on the left side had a multi-regional map of Thailand attached. There was a clock attached up on the map. A wall calendar was on this wall, too. Figure 4.5 shows the technical drawing of the meeting room of site two.

Figure 4.5: Image of Meeting Room of Site Two

Source: Developed for this research

The knowledge transfer started at 10 a.m. The knowledge transfer started when everyone was present in the room. There were six receivers of knowledge (sales

representatives) and one presenter. Four were female and two were male. The presenter was using an LCD projector and projected the slide presentation on the screen. There were neither speakers nor microphone. There were electric wires all under the tables. The wires were not shown in the image because the image was only an identical of the real image. The room temperature was 23 degrees Celsius measuring from a watch that had a temperature measurement function. The room was smell-free and air-conditioned. The temperature might have been too low observing from the receivers of knowledge tugging in their jackets.

The receivers of knowledge were sitting around the meeting tables while the researcher was sitting on a chair with no back rest. Some of the receivers of knowledge got chairs with no back rest as well, and they looked uneasy in the chairs after three hours of sitting in the meeting. The room had a low ceiling which was around three meters. Fifteen people in a small room made the environment so tight and uneasy. This ends the description of the physical environment of site two.

4.3.2.2 Description of Social Environment

There were four female and two male receivers of knowledge in site two. The presenter was also female. Both presenter and receivers of knowledge seemed to know each other but were not that close observing from the talk they had. They mainly asked each other about business results in each area to check if the situation was the same. They sometimes whispered to each other, but the researcher could not hear the content. Sometimes the room was quiet because no one talked to each other.

Both females and males were wearing jeans and t-shirts. They all had laptop computers, so they were all carrying laptop bags to put both computers and

documents. They all were wearing slippers because they had to take off their shoes before entering the big meeting room. The receivers of knowledge sat next to each other not because they were close but because the room was so crowded that they had to sit close to each other. The researcher judged the relationship based on the talk they had. Though they sat next to each other, they did not chit chat. They did not freely talk about their kids or talk about their vacations. They did not chat during knowledge transfer. Their arms did not touch though they were sitting close to each other. All were looking at their own computer screens.

The social environment for site two was serious. The receivers of knowledge made blank facial expressions, not showing any emotion. They all looked at their own computer screens and their hard copies of the tool.

In summary, the social environment of site two was not as pleasant as site one. The presenter and the receivers of knowledge were not close to each other observing from their topics of talk and their body language.

4.3.2.3 Description of Planned Program Implementation Activities and Structured Interactions

In site two, knowledge transfer was planned, and the agenda was a recurring agenda that happened every month. The plan was to review business results for two hours and knowledge transfer for another three hours. The business review was conducted in the morning followed by one and a half hours' lunch break. Knowledge transfer was conducted in the afternoon for three hours.

The participation in site two was very low for both morning and afternoon session. Each seller reviewed his/her business results. The presenter did not ask

questions to probe about the business results. The receivers of knowledge just kept talking about their business like they were reading the results from the book. The presenter looked at her computer screen. The researcher could not judge if she was listening or not because she did not seem to respond. There was no nodding of the head. After all the receivers reviewed their business results, everyone went for lunch. After lunch, the knowledge transfer session started. The presenter presented the knowledge. She opened each slide one by one and read texts from the slide. There were not many questions asked from the receivers. Once the receivers asked questions, the presenter did not answer. When the presenter asked questions, the receivers did not answer so the presenter just answered for them. There was little participation and interaction from the receivers of knowledge. The presenter purposefully asked questions to produce more understanding of the knowledge among the receivers of knowledge, but no one answered.

From observation, the parts where receivers of knowledge paid high attention were the parts that were full of pictures regarding knowledge of new products and products displays. They raised their heads from their computer screens and looked at the projected screen on the wall. However, they did not ask any questions or give comments.

4.3.2.4 Description of Informal Interactions and Unplanned Activities

During the morning and afternoon sessions of business review and knowledge transfer, there were some informal interactions and unplanned activities occurring in site two. In the morning, the sales manager (site owner) walked in and out of the room more than six times. In the afternoon when the knowledge transfer

was taking place, some receivers of knowledge asked the maid to bring in some drinks. One receiver of knowledge started whispering to the other about the new products for a while. Then, all the others joined in the discussion. There were phones ringing during the knowledge transfer. The receivers of knowledge took the calls. The presenter did not stop transferring the knowledge. Phones were not put in silent mode, so the ringing seemed to interrupt others. This could be seen from the reaction of the receivers when the phone rang. They turned their heads to see whose phone it was. The receivers of knowledge took the calls whenever they rang.

4.3.2.5 Description of Nonverbal Communication

The nonverbal communication in site two existed. The receivers of knowledge folded their arms in the afternoon due to the cold temperature in the room. Some held their palms to their chins while listening to the knowledge transfer. There was not much interaction. There was no eye contact between the presenter and the receivers of knowledge. The receivers of knowledge just looked at their own computer screens though there were no soft copies of the slide presentation in their computers. The presenter kept talking and looking at the screen without looking at how the receivers of knowledge progressed or reacted. The receivers remained serious. The presenter did not add any insights of knowledge in addition to the knowledge from the slide presentation.

4.3.2.6 The Traits of the Presenter

The presenter communicated with clear articulation of language. She knew what was expected of her receivers of knowledge but did not emphasize those

expectations during knowledge transfer. The researcher got the expectations from the interview with the presenter before the knowledge transfer.

Her voice was audible due to the size of the room. She checked if everyone could hear her clearly. She did not ask the receivers of knowledge to turn their phones to silent modes. She did not repeat the expected knowledge to the receivers of knowledge. Questions were asked to gain more understanding on the expected knowledge, but no one answered. The presenter did not stop if one of the receivers of knowledge was on the phone. She did not use eye contact to fix their attention. She just kept talking and transferring the knowledge.

The presenter in this site was a conversational narcissism. She was not responsive and she was insensitive to the receivers of knowledge. When the receivers asked questions, she did not answer. She did not stop to check if the receivers of knowledge followed what she was talking about. She did not show any argumentativeness due to the nature of knowledge transfer in site two was not interactive. Communication anxiety was shown in a way of avoiding to answer questions. She did not make eye contact. She showed neuroticism in such a way that she sometimes commented during knowledge transfer that the knowledge about promotion was not effective. She has negative feeling about the knowledge transferred. The promotion mechanic would not work. She did not show extraversion. Openness and agreeableness could not be judged because she did not show those traits. However, she showed conscientiousness because she completed the knowledge transfer according to the agenda. In summary, the presenter of site two showed one positive trait which was conscientiousness.

For site two, the knowledge transfer environment was serious. The room was packed with other people not related to knowledge transfer though they just sat there doing their work quietly. The presenter and the receivers knew each other but knowledge transfer was not interactive. The presenter followed through the agenda. Nonverbal communication in the site were folding arms, palm to the chin, no eye contact. The presenter showed traits of conversational narcissism, communication anxiety, neuroticism, and conscientious.

4.3.3 Site Three

4.3.3.1 Description of Physical Environment

Site three belonged to the second distributor in Bangkok. However, the knowledge transfer session was held on different premises. This site was located on Ramkhamhaeng Road on the east side of Bangkok. This site was within driving distance. The researcher drove to this site. The building was a stand-alone building with four levels. The knowledge transfer was scheduled to be at 10 a.m. on 5th February 2010. The field work lasted half a day at this site. It was a knowledge transfer session without business reviews because they have done business review separately on other day. The researcher did not attend the business review session because only the knowledge transfer session was focused in this research.

It was a fifteen minutes' drive because the site was near the researcher's residence. The researcher was instructed to park in front of the building. This site was situated in a small lane where the traffic was not busy. The parking area was not large, but there were not many cars parked there. The researcher met the presenter in front of the building before entering the building. The presenter of this site was female, 165

centimeters tall and 39 years old. Before the presenter and researcher entered, they took off their shoes before going up to the meeting room. There were more than twenty shoes scattered at the bottom of the stairs. The first floor of this site was packed with point-of-sales material. On the second floor was located the office where staff were sitting and working. The restroom was also on the second floor. The meeting room was located on the third floor. The presenter opened the door. It creaked loudly every time it moved.

The meeting room was fifty square meters. It was a big room to accommodate fourteen receivers of knowledge, a presenter, and one researcher. In the meeting room of this site, the room was set up like a study room with screen at the front and student desks. The four walls were clean and they were white. The presenter was sitting at the front with big table to place a laptop on. The room temperature was around 26 degrees Celsius. There was one door at the back and a glass door at the front leading to the balcony. The glass doors were covered with curtains half closed. The other glass door was not covered, and the light was shining in brightly. There were six fluorescent lights. Four were switched on, the other two at the front were off so that the screen could be seen more clearly. There were two speakers and two microphones, but they were not used. When the presenter spoke, the voice was not heard at the back of the room. However, the screen could be seen clearly. There were two air conditioners, and both were on. The interview was conducted in the meeting room before the receivers of knowledge came into the room. The researcher followed the procedure for the interview. The interview took five minutes. The presenter sat on the desk that was placed apart from all the student desks. This was placed against the wall on the right. The presenter sat next to the researcher for the interview. After that,

she moved to sit in a stool in front of the room to control electronic slide presentation and to transfer knowledge. The presenter and the researcher waited in the meeting room for the receivers of knowledge to enter for knowledge transfer after the interview. Figure 4.6 shows technical drawing of the meeting room of site three.

Figure 4.6: Image of Meeting Room of Site Three

Source: Developed for this research

The knowledge transfer started at 9:34 a.m. The knowledge transfer started when everyone was present in the room. There were fourteen receivers of knowledge (sales representatives), one presenter, and the researcher. The receivers of knowledge

were of two female and twelve were male. The presenter used an LCD projector and projected the slide presentation on the screen. The receivers of knowledge did not have laptops. They came in either together or alone and took their seats. The presenter distributed hard copies of the slide presentation. The receivers of knowledge were sitting on the student desks like in school. They all faced the screen as students do listening to the lecturers. They listened attentively and took notes on the hard copies of the tool. This ends the description of the physical environment of site three.

4.3.3.2 Description of Social Environment

There were two female and twelve male receivers of knowledge in site three. Both presenter and receivers of knowledge seemed to know each other well because they joked and teased about their personal lives. The rest of the receivers of knowledge seemed to know each other well because they chatted and smiled with each other. They did not sit far from each other not because of the size of the room but because they were close to each other and wanted to whisper the chat.

All were wearing jeans and uniform polo shirts. They all had bags carrying documents. They all were wearing slippers because they had to take off their shoes at the first floor. The receivers of knowledge chatted during the knowledge transfer because they were close to each other and because the voice of the presenter was not loud enough to hold their attention. The researcher tested the loudness by moving to sit in front and at the back. Those sitting at the front near the presenter listened attentively and took notes on the hard copies of the tool. Those sitting at the back, where the voice of the presenter could not reach, chatted. The receivers of knowledge formed cliques because they seemed to be sitting near each other and talked in small,

familiar groups. Different groups seemed to sit one chair apart to mark their territory. The door of the room creaked loudly every time someone opened it. Whenever someone went out of the room for rest room, the door creaked and everyone turned their heads to look at the door. The presenter did not stop transferring the knowledge during this door creaking.

In summary, the social environment of site three was a pleasant one. The presenter and the receivers of knowledge were close to each other. The receivers of knowledge were close to each other and formed themselves into small groups.

4.3.3.3 Description of Planned Program Implementation Activities and Structured Interactions

In site three, knowledge transfer was planned and the agenda was a recurring agenda that happened every month. The plan was to transfer knowledge alone for three hours. A monthly business review was not the main topic during knowledge transfer meetings because the large sales group would usually have had a daily business review with their supervisor already. The presenter followed the planned agenda and transferred knowledge until completion. The receivers listened attentively. Some wrote down some notes. The presenter sometimes asked questions to emphasize the knowledge but did not wait for answers. She went on with her scripts. She was reading the slide to the receivers. No further insights or knowledge was added. The receivers of knowledge seemed to pay attention to the part that had a lot of pictures. They all looked at the screen attentively when the presenter showed pictures of new products and displays.

4.3.3.4 Description of Informal Interactions and Unplanned Activities

During the knowledge transfer, some informal interactions and unplanned activities occurred. The receivers of knowledge put their phones to silent mode as told by the presenter. Some of them talked to the others when the voice of the presenter was not loud enough. Some of the receivers of knowledge went out of the room and opened the creaking door. Everyone always turned to the door and the knowledge transfer did not stop.

4.3.3.5 Description of Nonverbal Communication

The nonverbal communication in this site existed. There were not many interactions. There was no eye contact between the presenter and the receivers of knowledge. The receivers of knowledge just looked at their own hard copies of the tool and wrote something down. At 10:34 a.m., presenter and two other receivers of knowledge were discussing something not related to the knowledge transfer. The rest of the receivers of knowledge were waiting patiently for the transfer. Some stared blankly at the wall. Some were writing something. Some were putting their palms to their faces and staring blankly at the discussion. The discussion went on for five minutes and then the knowledge transfer continued.

4.3.3.6 The Traits of the Presenter

The presenter of site three were female with thirteen service years. Her position was sales supervisor. She was the one transferring knowledge to the receivers of knowledge. She communicated with clear articulation of language but with a very soft voice. She knew what was expected of the receivers of knowledge because she set the expectations before transferring knowledge but did not emphasize. The participation was quite low due to the voice of the presenter that was soft. The

presenter asked questions and the receivers of knowledge answered, but the presenter did not stop to listen to the answers.

Her voice was not audible due to the size of the room. She did not check if everyone could hear her clearly. The researcher sat at the back of the room at first and could not hear her voice, so she moved to the front and could hear clearly. The presenter did not repeat the expected knowledge to the receivers of knowledge. Questions were asked to gain more understanding on the expected knowledge and the receivers of knowledge answered, but the presenter did not listen. The presenter did not stop if one of the receivers of knowledge opened the creaking door to go out. She did not use eye contact to fix the attention.

The presenter of site three were showing conversational narcissism. She was not responsive to the receivers. She did not show argumentativeness, neuroticism, extraversion, openness, and agreeableness. The researcher could not judge whether they had these traits. They just did not show. She showed communication anxiety because she avoided communication. She just followed the agenda and transferred knowledge to its completion which showed the trait of conscientious.

The social environment of site three was pleasant. The receivers and the presenter knew each other and had been working with each other for more than ten years. The knowledge transfer for this site was a one-sided communication. The presenter just presented the knowledge without interaction from the receivers. Receivers at the back of the room were chatting during knowledge transfer. There was no eye contact from the presenters. The door was always creaking when opened. The

presenter showed the traits of conversational narcissism, communication anxiety, and conscientious.

4.3.4 Site Four

4.3.4.1 Description of Physical Environment

This site had the same location as the first site which was at the first distributor fifty kilometers far away from Bangkok. The meeting room used was the same big meeting room as in site one. The differences were the receivers of knowledge and the presenter. The description of the physical environment of site four is identical to site one with the exception that ten more chairs were added to the room. Figure 4.4 shows the technical drawing of meeting room of both site one and site four.

The knowledge transfer was scheduled to be at 11 a.m. on 8th February 2010. The presenter asked the researcher to conduct the interview in the big meeting room before the receivers of knowledge arrived. The presenter was a fair and thin man with a height of around 160 centimeters. He was 36 years old. He wore blue shirt and black pants. He carried hard copy of the tool in his hand when meeting the researcher. The researcher followed the procedure. After the interview, the presenter and the researcher waited in the meeting room for the receivers of knowledge to arrive. The interview took five minutes. The first receiver of knowledge arrived ten minutes after the interview. The receivers of knowledge either came together or alone. The researcher sat on the same couch she did when she was observing site one.

The knowledge transfer started at 11:00 a.m. The transfer started quite late because some of the receivers of knowledge were travelling from other provinces to the meeting place. The knowledge transfer started when everyone was present in the

room. Some came in together in group, and some came in alone. There were seventeen receivers of knowledge (sales representatives) and one presenter. Fifteen were female and two were male. The receivers of knowledge were sitting around the white meeting tables while the researcher was sitting on the couch alongside the wall. The receivers of knowledge were sitting facing each other in a conference meeting setting. The presenter was using an LCD projector and projected the slide presentation (knowledge visualization tool) on the screen. The room temperature on that day was 25 degrees Celsius measuring from a watch that had a temperature measurement function. The room was smell-free. It was air-conditioned. Next section explained the social environment of site four.

4.3.4.2 Description of Social Environment

There were fifteen female and two male receivers of knowledge in site four. The presenter was male. Both presenter and receivers of knowledge seemed to know each other well observing from the talk they had. They asked each other about their trip. They told each other about their children. They also asked each other about business results in each area to check if the situation was the same. Some of them were complaining about their customers asking them to stay and worked overtime. The presenter joined the conversation and probed the issue.

Both females and males were wearing jeans and uniform polo shirts. They were carrying bags for documents. They did not have laptop computers. They all were wearing slippers because they had to take off their shoes before entering the big meeting room.

Some of the receivers of knowledge brought out snacks and asked the others to have a bite. The room was big and fitted well for nineteen people including the presenter and the researcher. The receivers of knowledge sat next to each other and whispered about certain topics that the researcher could not hear. The social environment for site four was full of smiles and laughter. No one was in a bad mood that day observing from facial expressions of each.

4.3.4.3 Description of Planned Program Implementation Activities and Structured Interactions

In site four, knowledge transfer was planned, and the agenda recurred monthly. For the large sales group, business was reviewed on a daily basis, so the monthly meeting aimed for knowledge transferred only. The plan was to transfer the knowledge for three hours.

The participation was very high especially during the transfer that was full of pictures. The presenter purposefully asked questions to produce more understanding of the knowledge among the receivers of knowledge. The receivers of knowledge asked questions to gain more understanding. The presenter answered the questions.

From observation, the parts where receivers of knowledge paid high attention were the parts that were full of pictures and knowledge of new products and products displays. This part was full of interaction and attention.

4.3.4.4 Description of Informal Interactions and Unplanned Activities

During the knowledge transfer, some informal interactions and unplanned activities occurred. Some receivers of knowledge whispered to each other during the

knowledge transfer. The voice of the presenter was clearly audible, but he did not make eye contact to fix their attention.

The presenter told the receivers of knowledge to put their phones to silent mode. Some phones were vibrating, but the receivers of knowledge did not answer.

4.3.4.5 Description of Nonverbal Communication

Regarding nonverbal communication in site four, during knowledge transfer, the receivers of knowledge looked at the hard copies of the tool that were distributed earlier and turned their heads up to look at the screen.

The receivers of knowledge looked at the presenter while transferring the knowledge of new products. They all held pens in their hands throughout knowledge transfer. The presenter moved around the room. Sometimes he sat and sometimes stood while transferring knowledge. The receivers of knowledge took notes while listening. They nodded their heads throughout knowledge transfer. They asked questions to gain more understanding of the knowledge. The presenter also asked questions to trigger understanding. He waited for the receivers of knowledge to give answers and repeated the correct answers to other receivers of knowledge.

4.3.4.6 The Traits of the Presenter

The presenter of this site was a male with three service years. Though the number of service years was the same as the presenter from site one, this presenter was different from site one. His position was a sales supervisor. He was the one transferring knowledge on a monthly basis to the receivers of knowledge. He received the knowledge visualization tool from the central unit of the consumer product company and input sales target data that was relevant to his distributor. He used his

voice to draw attention from the start though sometimes his volume decreased. He checked periodically if everyone could hear him clearly.

The presenter in site four was argumentative. He gave his point of views when the receivers asked questions that contradict the knowledge transferred. When the receiver asked about the new product being similar to the existing one, he explained that it was a different one due to the different features that the product was offering. He was open to discussion and reflective. He has the openness trait. He has conscientious to see the tasks to completion. He followed the agenda and transferred knowledge until the end of the session. He did not show conversational narcissism, communication anxiety, neuroticism, or extraversion.

Site four had the same knowledge transfer site as site one. The room was big enough to fit all receivers of knowledge. Both presenter and receivers knew each other well observing from the talk they had. They talked about their holidays and weekends. Knowledge transfer at this site was an interactive session with questions and answers. The presenter followed the agenda and completed the knowledge transfer session. There was not much eye contact and there was other nonverbal communication at this site. The presenter showed three positive traits of argumentativeness, openness, and conscientiousness.

Setting of each site elaborated in this chapter gave detailed pictures of the field. These details were used in Chapter 5 to analyse how the knowledge was transferred to answer research questions. The qualitative explanation showed the difference of each sites. Though the knowledge and the tool transferred were identical, the setting, social environment, planned or unplanned activities and traits of

presenters were different. This would later be useful in analyzing this empirical data to derive to research findings shown in the next chapter.

Detailed descriptions and rough sketches of the sites were derived from in-field observation. Now that the settings of the sites have been carefully described and explained, Chapter 5 will cover results of detailed analysis from documentation, observation, and interview. The results and findings in Chapter 5 are based on the empirical observations presented in this chapter.

CHAPTER 5

RESULTS OF THE STUDY AND DISCUSSION

The purpose of this study is to explain how electronic slide presentation used to transfer knowledge enhances information processing. This can be achieved by using qualitative research approach with methods of data collection: documentation, observation and interview. Results of the research are discussed in this chapter.

This chapter presents the results of this research, from all methods of data collection. The analysis included all data collected from four study sites. The data from each site were analyzed as a whole and cross-analyzed.

The knowledge content was carefully analyzed in content analysis. The knowledge visualization tool was identified. The analysis was presented according to the theoretical framework established to find out how the knowledge visualization tool used to transfer knowledge in the sites enhanced information processing of the field sales force. The findings were explained step by step throughout the seven steps of the theoretical framework. Finally, additional findings were presented, and a modification of the theoretical framework was presented.

This chapter was divided into sections. Section 5.1 presented the data analysis according to the theoretical framework. Traits of presenter were presented in details in section 5.2. Section 5.3 concluded the chapter.

5.1 Data Analysis According to Theoretical Framework

According to priori specification of the construct by Eisenhardt (1989), having an initial framework could help shape the initial design of theory-building research. This research has been designed with the initial framework to shape inductive theory. Thus, the analysis was done by the initial framework established, shown in Figure 2.13.

The initial research question asked: How do knowledge visualization tools used in transferring knowledge enhance cognition from an aspect of information processing? After entering the research sites, it was clear that the knowledge visualization tool used in all the sites was electronic slide presentation. This tool was commonly known among the receivers of knowledge. The presenters knew how to manipulate the tool well, observed from each presenter's smooth operation of the tool while transferring knowledge. All presenters said that electronic slide presentation was a good tool for transferring knowledge[7]. The researcher asked the question during the interview about what tools the presenters used in transferring knowledge. All of them said they used electronic slide presentation, and they added that it was a good tool for them to transfer knowledge.

With the initial research question, seven sub-questions were raised in each step of the framework. Those questions were:

1. How does the presenter get attention from the receivers of knowledge in order to transfer knowledge?

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[7] Interview with all presenters at site one, two, three, and, four, 30th January 1st, 5th, and 8th February 2010 respectively

2. How is the knowledge transferred via knowledge visualization tool?

3. How do receivers of knowledge understand the knowledge?

4. How is the knowledge transferred to the short-term memory of the receivers of knowledge?

5. How is the knowledge encoded?

6. How is the knowledge transferred to the long-term memory of the receivers of knowledge?

7. How is the knowledge retrieved?

The researcher collected data from four sites to answer the main research questions and the sub-questions. The findings have inductively emerged from all data collection and produce a knowledge delivery model as presented in Figure 5.1.
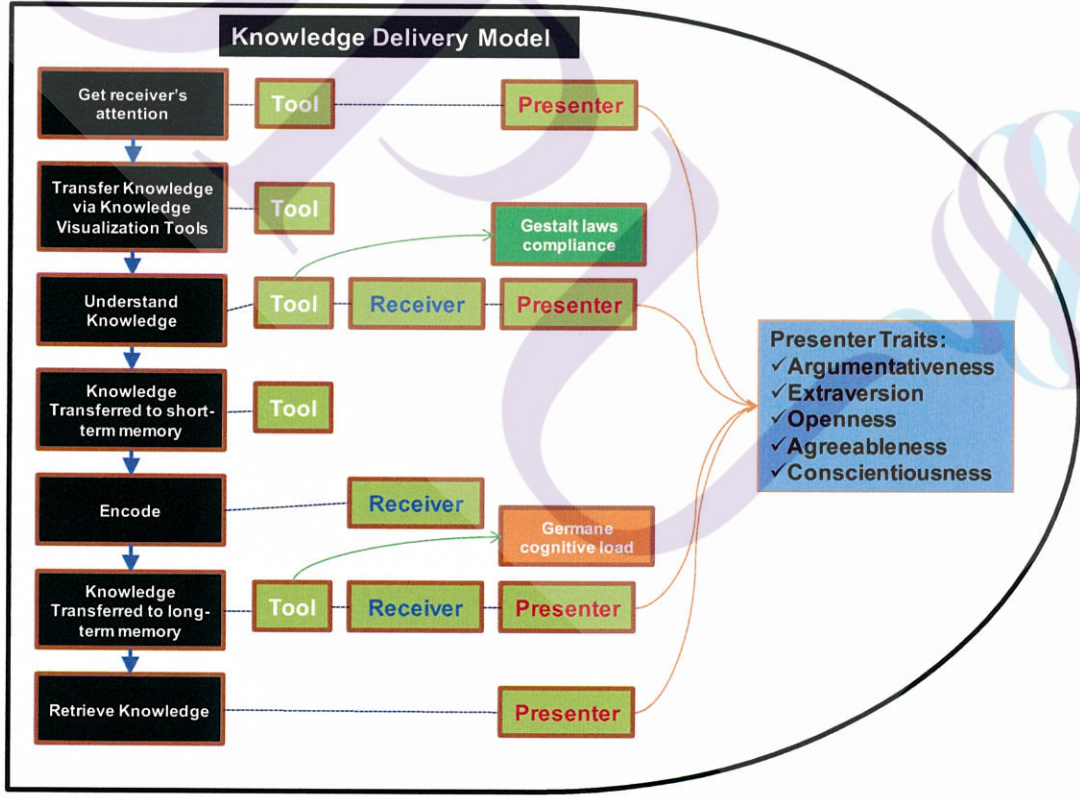
Figure 5.1: Knowledge Delivery Model
Source: Developed from empirical data and theories

This model represented the findings to the research questions of how electronic slide presentation used to transfer knowledge enhance information processing. There are seven steps in the framework which were: step 1 get receiver's attention, step 2 transfer knowledge via knowledge visualization tool, step 3 understand knowledge, step 4 knowledge transferred to short-term memory, step 5 encode, step 6 knowledge transferred to long-term memory, step 7 retrieve knowledge. The findings indicate that the tool is critical in the steps of transfer of knowledge and in transferring knowledge to short-term of memory. The model shows that the tool, the presenters, and the receivers enhance other steps of information processing. The model shows that gestalt laws of presentation and germane cognitive load in the content must be achieved in order to enhance receivers of knowledge's comprehension and long-term memory. Besides these findings, the traits of the presenters play critical part in enhancing attention, understanding, transferring knowledge to long-term memory, and knowledge retrieval.

With knowledge delivery model achieved, the researcher will exemplify research findings in each of the steps by the analysis by sites and cross analysis. The analysis is laid out step by step according to the seven steps in the initial framework developed to answer sub-questions asked. The first step to cover is 'get receivers' attention'.

5.1.1 Get Receivers' Attention

The first step in the theoretical framework that raises the sub-question to answer is how to get the receivers of knowledge attention, which is in line with the presentation step in the information processing model of McGuire (1978) as cited by

Belch & Belch (2004). In this first step, the tool helps get the attention with pictures, color, its content, its hard copy, and its being shown on screen. The presenter co-exists in enhancing information processing by eye contact, the voice, and the jokes. The evidence of this co-existence can be seen in Table 5.1.

Table 5.1 shows findings with evidences from observation, interviews, and documentation. Details of sources of evidence from each site and receivers of these findings can be found in Appendix F. From the findings, the researcher found not only that the knowledge visualization tool drew the attention of the receivers of knowledge, but also the presenters.

Table 5.1 Findings of How to Get Attention by Using the Tool and Presenter

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers	No. of Evidence from Content Analysis
Tool	The pictures of new products and displays on the tool.	4 [8]	4 [9]	3 [10]	4 [11]
	Color in the tool can get attention.	3 [12]	3 [13]	2 [14]	4 [15]
	The content of agenda and incentives on the tool.	2 [16]	None	8 [17]	None

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[8] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[9] Interview with all presenters at site one, two, three, and, four, 30th January 1st, 5th, and 8th February 2010 respectively
[10] Interview with receivers 12 of site three, receivers 1, 11, and 15 of site four, 30th January and 8th February 2010
[11] Content analysis of site one, two, three, and, four, 10th February 2010
[12] Observation of site two, three, and four, 1st, 5th, and 8th February 2010
[13] Interview with presenters of site two, three, and four , 1st, 5th, and 8th February 2010
[14] Interview with receivers 11 of site three, receivers 15 of site four, 5th and 8th February 2010
[15] Content analysis of site one, two, three, and, four, 10th February 2010
[16] Observation of site one and three, 30th January, 5th February 2010
[17] Interview with receivers 1,2,3 of site one, receivers 1,2,4,5 of site two, receivers 14 of site four, 30th January, 1st, and 8th February 2010

Table 5.1 Findings of How to Get Attention by Using the Tool and Presenter (continued)

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers	No. of Evidence from Content Analysis
Tool	Distribution of hard copies of the tool.	4 [18]	None	23 [19]	None
	The start of slide presentation on screen.	2 [20]	3 [21]	15 [22]	None
Presenter	Eye contact between presenters and sellers.	3 [23]	None	None	None
	The presenter raised the voice and said hello.	4 [24]	None	14 [25]	None
	The voice of the presenter is loud enough.	2 [26]	None	None	None
	The presenter added jokes to gain attention.	1 [27]	None	None	None

Source: Developed for this research

In getting the receivers' attention, both the tool and presenter are needed. The tool gains attention from the receivers by its appearance with pictures, color, and its content, while the presenter gains attention by being there, raising the voice, adding jokes, making eye contact, and saying something important to the receivers like incentives. However, the intensity of evidences shown in Table 5.1 shows that distributing the hard copy of the tool and the start of the slide presentation itself

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[18] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[19] Interview with receivers 2 and 5 of site one, receivers 1,2,3,5,7,9,10,11,12,13,14 of site three, receivers 2,7,9,10,11,12,13,14,16,17 of site four, 30th January, 5th and 8th February 2010
[20] Observation of site one, two, and three, 30th January and 5th February 2010
[21] Interview with presenter of site one, three, and four, 30th January, 5th and 8th February 2010
[22] Interview with receivers 2 and 3 of site one, receivers 3 of site two, receivers 6,10,13 of site three, receivers 1,2,4,5,8,10,11,15,17 of site four, 30th January, 1st, 5th, and 8th February 2010
[23] Observation of site one, two, and four, 30th January, 5th and 8th February 2010
[24] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[25] Interview with receivers 4 and 5 of site three, receivers 1,2,3,4,6,8,9,10,13,14,15,17 of site four, 5th and 8th February 2010
[26] Observation of site one and four, 30th January and 8th February 2010
[27] Observation of site one, 30th January 2010

gaining attention from the majority of the receivers. The presenter gains attention from the majority of the receivers by raising the voice and saying hello.

The tool and presenter complements each other due to evidences from site four from receivers 1, 3, 4, 8, 9, 10, 13, 14, 15, and 17 and from site three from receivers 3 and 5[28] stating about the co-existence of the tool and presenter in getting attention[29]. The receivers said, "Both the tool and presenter helped get attention." The researcher describes each finding one by one as follows.

5.1.1.1 Tool: The Pictures of New Products and Displays on the Tool

The first common finding from all data sources of data collection on how to get receivers' attention is by having pictures of new products and displays. There were pictures of new products and displays in the slide presentation. The researcher saw that these pictures caught attention, so this observation was recorded in the observation note of four sites[30]. The presenters of all sites stated that pictures could catch attention[31], and the receivers of knowledge from site three and four admitted that pictures did catch their attention[32]. Pictures that could catch attention in this study were pictures of new products. They contained the shape of the product bottle, tuft, or container. On its container, there was label describing product brand name, its variant, its special formula, and its size. Besides the pictures of new products, there were also pictures of product displays. Pictures of product displays showed product shelves and products on display. The presenters showed the pictures that contained the knowledge of which product items or formulas to be displayed on each shelf. This could catch

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[28] Interviewed with receivers of knowledge, 5th February 2010
[29] Interviewed with receivers of knowledge, 8th February 2010
[30] Observation of site one to four, 30th January, 1st, 5th, 8th February 2010
[31] Interview with the presenters, 30th January, 1st, 5th, 8th February 2010
[32] Interview with the receivers of knowledge, 5th, 8th February 2010

attention because not all products available would be on display. It would be only those fast-moving items or the ones that the company would like to focus. Figure 5.2 shown below is an example of the pictures shown in the tool. This is only a similar picture not the actual one on the slide presentation.
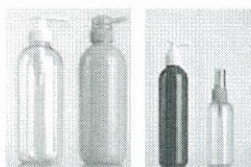
Figure 5.2: New Product Knowledge Content

Source: Developed for this research
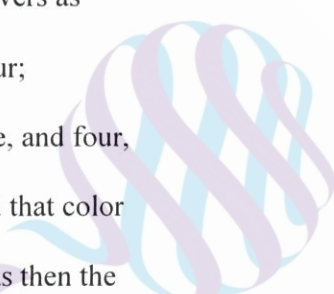
Earlier studies also stated that graphics had different functions to learning, and attracting attention was one of them (Anglin, Vaez, & Cunningham, 2004; Carney & Levin, 2002). Pictures of graphical representations can catch attention and function in different ways as being decorational pictures, representational pictures, organizational pictures, interpretational pictures, and transformational pictures (Levin, 1981). Levin further explained that decorational pictures were used to decorate the page and had little or no relationship to the text content. Representational pictures are used to support part or all of the text content. Organizational pictures provide useful framework or steps to the text content. Interpretational pictures help clarify difficult texts. Transformational pictures are used to help the recall of text information.

In getting attention of the receivers of knowledge in this research, pictures were used as both representational and transformational pictures to both attract

attention and improve knowledge retrieval. From a design standpoint, studies have shown what types of information pop out and attract attention. For example, Ware (2004) showed that objects that could be identified within ten milliseconds were preattentively processed. Ware (2004) further explained that features that were preattentively processed were categorized based on form, color, motion, and spatial position. Form consists of line orientation, line length, line width, line collinearity, size, curvature, spatial grouping, blur, added marks, and numerosity. Color consists of hue and intensity. Motion consists of flicker and direction of motion. Spatial position consists of 2D position, stereoscopic depth, and convex/concave shape from shading. In this case, the pictures and color in the knowledge visualization tool catered to the preattentive process of the receivers of knowledge and so attract attention.

5.1.1.2 Tool: Color in the Tool Can Get Attention

Color in the slide presentation could catch attention of the receivers as evidenced in the interview scripts of presenters from site two, three and four; receivers from site three and four; and in observation note of site two, three, and four, and in content analysis of slide presentation of all sites. Ware (2004) stated that color was one of the features that humans could process preattentively. Color was then the quality the receivers could catch and attend to. Figure 5.3 below shows an example of color being used in the tool that can catch attention.

The first and second shelf should be filed with yellow bottles

The third and forth shelf should be filed with white bottles
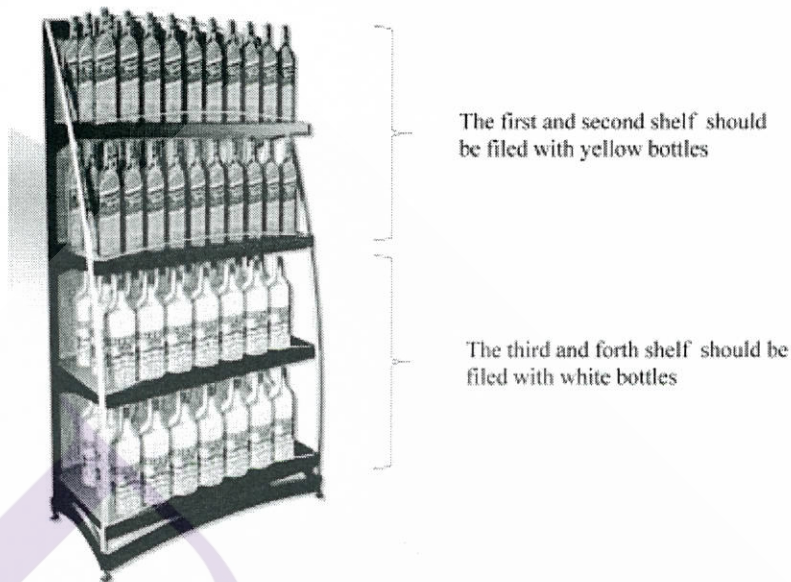
Figure 5.3: Product Display Knowledge Content

Source: Google search on 'pictures of product display'

Study on color saliency shows that red is the most salient color closely followed by yellow and green (Gelasca, Tomasic, & Ebrahimi, 2005). Red was the main color used in the electronic slide presentation of all sites[33].

5.1.1.3 Tool: The Content of Agenda and Incentives on the Tool

The receivers of knowledge from site one, two, and four stated that they paid attention when the agenda was shown on the slide presentation[34]. This followed the start of slide presentation. The presence of agenda could get attention because the receivers of knowledge would like to know what would go on during the day; what

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[33] Content analysis, 10th February 2010

[34] Interview with the receivers of knowledge of site one, two, and four, 30th January, 1st and 8th February 2010

knowledge would be transferred first and last. This confirmed a study done by Cohen (2006) stating that people decided which topic they wanted to be involved with. This was why the receivers diverted their attention to the agenda. Although the knowledge transfer was a recurring session that happened every month, the agenda sometimes slightly changed according to the upcoming topic.

The researcher observed that the topic shown in the slide presentation on the sellers' incentives could catch attention of all receivers from site one and three. Although the content was limited, the presenters of site one and three raised the topic of incentive, and it could catch attention evidenced from observation note[35]. The researcher observed that the receivers of knowledge raised their heads from their hard copies of the tool to look at either the screen or the presenter while "sellers' incentives" were discussed. They nodded their heads and asked questions to gain more understanding of the topic. The content in the tool that was beneficial to the receivers could catch attention. This is simply because people decided which topic they wanted to be involved in (Cohen, 2006), and the content that was beneficial to receivers of knowledge in this case was sellers' incentives.

5.1.1.4 Tool: Distribution of Hard Copies of the Tool

An action that marked the start of knowledge transfer, caught attention, and had been expressed by the receivers of knowledge was the distribution of the hard copy of the slide presentation. Observation note from four sites recorded this evidence as an attention catcher, and the receivers of knowledge from site one, three,

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[35] Observation of site one and three, 30th January, 5th February 2010

and four admitted that this action caught their attention[36]. When the presenter started to distribute the hard copies of the knowledge, the receivers of knowledge stopped doing other things and waited till they got the hard copies. Once they got them, they started going through the pages. This was again another topic or subject that the receivers were interested in knowing. They wanted to know what the content was so they paid attention and waited to get a copy. This confirmed the attention diversion study by Cohen (2006).

5.1.1.5 Tool: The Start of Slide Presentation on Screen

Besides the distribution of the hard copy of the slide presentation that marked the start of knowledge transfer, the start of slide presentation itself marked the start and caught attention at the same time. The researcher observed receivers of knowledge from site one and three turning their heads to the screen ready to receive knowledge[37]. The presenters from site one, three, and four stated that this event could catch attention[38]. The receivers of knowledge from all sites admitted that the start of slide presentation could actually catch their attention as well[39]. A study from Theeuwes (1992) showed that visuals were very important in gaining attention. The start of the slide show making the visual of the slide popped up on the screen and came into sight. This could then catch attention.

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[36] Interview with receivers of knowledge from site one, three, and four, 30th January, 5th and 8th February 2010
[37] Observation of site one and three, 30th January, 5th February 2010
[38] Interview with the presenters of site one, three, and four, 30th January, 5th and 8th February 2010
[39] Interview with the receivers of knowledge of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010

5.1.1.7 Presenter: Eye Contact between Presenters and Sellers

The researcher observed that eye contact between presenter and sellers could catch and hold attention as evidenced in the observation note of site one, two, and four[40]. The presenters used eye contact to hold attention of the receivers of knowledge. The presenters transferred knowledge and looked at the receivers one by one to hold attention. The eye contact motion with each of the receivers lasted for approximately one to two seconds. The receivers of knowledge were held by the eye contact so they did not perform any other acts except for listening and following the presenters. This confirmed a study done by Argyle and Dean (1965) about eye contact that this nonverbal communication was acted to seek attention and feedback on listeners' reaction (Argyle & Dean, 1965). The presenters would know if the receivers were listening by getting the eye contact back.

5.1.1.8 Presenter: Raised the Voice and Said Hello

Another event that could catch attention was the raising of the voice of the presenters saying 'hello'. The receivers of knowledge from site three and four said that this made them know that the presenters were ready to start the knowledge transfer and they should be paying attention[41]. The researcher observed that the receivers of knowledge acted in the manner of paying attention when the presenters raised their voice[42]. They all turned their heads to the presenters and accepted the greeting. This confirms the work done by Kahneman (1973) about attention and arousal. In his work, arousal would demand certain amount of attention(Kahneman,

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[40] Observation of site one, two, and four, 30th January, 5th and 8th February 2010
[41] Interview with the receivers of knowledge, 5th and 8th February 2010
[42] Observation of site one to four, 30th January, 1st, 5th, and 8th February 2010

1973). In this case, the voice of the presenter was acted as an arousal to the attention of the receivers.

5.1.1.9 Presenter: The Voice of the Presenter is Loud Enough

Another finding that could catch attention evidenced from observation notes was the audible voice of the presenters[43]. The voice of the presenters could hold attention if it was loud enough. The researcher observed that in site one and two the voices of the presenters were loud enough for all to hear. Everyone in the room nodded their heads in agreement. When they were asked questions, they raised their heads and looked at the presenters. Although they were not looking at the presenters all the time, they responded when needed. Comparing the voices of the presenters in sites three and four that were soft, the receivers of knowledge in site three and four, who sat far apart from the presenters, started talking to each other about other subjects rather than the knowledge transfer[44]. They were not paying attention but were doing other activities like reading their hard copies of knowledge or going through their other documents for the whole knowledge transfer session. The presenters did not look around to see these signs. They went on with knowledge transfer until the end. This could be referred back to Kahneman (1973) about attention and arousal. Arousal would demand attention. The voice of the presenters that were loud enough would act as a continuous arousal to the attention. The voice that was softer would stop to arouse and resulted in loss of attention.

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[43] Observation of site one and two, 30th January, 1st February 2010
[44] Observation of site three and four, 5th and 8th February 2010

5.1.1.10 Presenter: The Presenter Added Jokes to Gain Attention

Another finding from observation note of site one showed that the presenter added humour to the presentation of knowledge and so could gain attention of all receivers[45]. The humour used was the work-related humour that everyone could understand. When humour was added, every receiver of knowledge of site one joined in the laugh and added some of their jokes. Subsequently, they raised their heads and joined in the discussion. A study by Stock and Strapparava (2002) indicated that in an educational situation humor could be used by the teacher to catch students' attention but also to foster critical thinking. Humor allowed criticism to be smoothed, stress can be relieved and students can become more involved in joint classroom activities by the use of humor (Stock, Strapparava, & Nijholt, 2002). This applied to this study in such a way that humour used by the presenter could also catch attention and made the receivers of knowledge felt more involved in knowledge transfer session.

From these findings in the first step of the framework, the presenters also had a part in catching attention by raising their voice, having loud enough voice, making eye contact, and adding joke. The tool itself had parts in getting attention by having pictures of new products, color, and had content that interested the receivers.

The findings of how to get the attention of the receivers of knowledge has been elaborated in details with evidences. The researcher will present findings from cross-site analysis and draw out findings that have evidences from all sites and noting the findings that are different in Table 5.2. Table 5.2 shows findings that have been

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[45] Observation of site one, 30th January 2010

elaborated and 'Y' (yes), or 'N' (no) reference indicating the existence of that

evidence in each site.

Table 5.2: Cross-site Evidence of How to Get Attention

Factor		Evidences	Site 1	Site 2	Site 3	Site 4
how to get attention		The pictures of new products and displays on the tool.	Y	Y	Y	Y
	Tool	Distribution of hard copies of the tool.	Y	Y	Y	Y
		The start of slide presentation on the screen.	Y	Y	Y	Y
		The agenda and incentives on the screen.	Y	Y	Y	N
		Color can get attention.	N	Y	Y	Y
	Presenter	Eye contact between presenter and receivers.	Y	Y	N	Y
		The presenter raised the voice and said hello.	Y	Y	Y	Y
		The voice of the presenter is loud enough.	Y	Y	N	N
		The presenter added jokes to gain attention.	Y	N	N	N

Source: Developed for this research

From Table 5.2, in summary, findings that occurred in all sites were: the

pictures of new products and displays on the tool, distribution of hard copies of the

tool, the start of slide presentation on the screen, and the presenter raised the voice

and said hello. The cross-site evidences showed that both the tool and presenter

helped enhance attention. Receivers from site three and four admitted that both the

tool and presenter together caught their attention. Sub-section 5.1.2 presented findings

of the second step of the theoretical framework, which is transferring knowledge.

5.1.2 Transfer Knowledge via Knowledge Visualization Tools

The second step of the theoretical framework is transferring knowledge via the knowledge visualization tool. The results showed that in this step the tool had its part here in enhancing information processing process. In transferring knowledge, the tool alone acted as the vehicle of knowledge by using its hardware and software with consistent and attractive content. In this second step intrinsic cognitive load revealed its existence due to its being embedded in the knowledge content that was transferred to the receivers of knowledge; however, its effect had not surfaced here. Its effect surfaced in the last step of the framework, which was knowledge retrieval. The researcher will discuss the effects of intrinsic cognitive load in the last step. This section shows findings from all data collection methods; cross-site findings will follow. Detailed evidence of these findings can be found in Appendix G. Table 5.3 shows the findings of this step.

Table 5.3: Findings of How to Transfer Knowledge

Factor	Evidences	Number of Evidence from Observation	Number of Evidence from Presenters	Number of Evidence from Receivers
Tool	Using visual aids like computers.	4 [46]	1 [47]	1 [48]
	Using LCD projector.	4 [49]	3 [50]	None
	Using slide presentation.	4 [51]	4 [52]	13 [53]
	Using hard copies of the tool.	4 [54]	3 [55]	23 [56]

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[46] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[47] Interview with presenter of site one, 30th January 2010
[48] Interview with receivers 10 of site three, 5th February, 2010
[49] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[50] Interview with presenters of site one, three, and four, 30th January, 5th and 8th February 2010
[51] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[52] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th and 8th February 2010 respectively
[53] Interview with receivers 2,3 of site one, receivers 6,10,13 of site three, receivers 1,4,5,8,10,11,15,17 of site four, 30th January, 5th and 8th February 2010
[54] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[55] Interview with presenters one, two, and three, 30th January, 1st and 5th February 2010
[56] Interview with receivers 1,4,5 of site one, receivers 1,2,3,4,5,7,9,10,11,12,13,14 of site three, receivers 1,5,9,10,11,14,16,17 of site four, 30th January, 5th and 8th February 2010

Table 5.3: Findings of How to Transfer Knowledge (continued)

Factor	Evidences	Number of Evidence from Observation	Number of Evidence from Presenters	Number of Evidence from Receivers
	Using pictures.	4 [57]	2 [58]	1 [59]
	Using the same message on slide presentation and hard copy.	4 [60]	None	1 [61]

Source: Developed for this research

From observation, the evidence showed that computers, LCD projectors, slide presentation, hard copies of the tool, pictures, and the same message on slide presentation and hard copies helped transfer the knowledge[62]. The presenters stated that computers, LCD projectors, slide presentation, pictures, and hard copies of the tool helped in transferring knowledge[63]. The receivers of knowledge stated that computers, slide presentation, hard copies of the tool, pictures, and the same message on slide presentation and hard copies helped transfer the knowledge[64]. The intensity of evidences was from the receivers of knowledge from site one, three, and four saying that hard copies of the tool helped in transferring knowledge[65]. Presenters from all sites stated that the slide presentation helped in transferring knowledge[66]. The researcher discusses each finding as follows.

5.1.2.1 Tool: Using Computers, LCD Projector, Slide presentation, and Hard Copies of the Tool

The hardware used to transfer knowledge in all sites was a computer. It was used as a tool to maneuver the electronic slide presentation. The presenter was

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[57] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[58] Interview with presenters one and four, 30th January, 8th February, 2010
[59] Interview with receivers 12 of site three, 5th February 2010
[60] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[61] Interview with receivers 10 site three, 5th February 2010
[62] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[63] Interview with presenters, 30th January, 1st, 5th, and 8th February 2010
[64] Interview with receivers of knowledge, 30th January, 1st, 5th and 8th February 2010
[65] Interview with receivers of knowledge, 30th January, 5th and 8th February 2010
[66] Interview with presenters, 30th January, 1st, 5th, and 8th February 2010

the one managing the computer. The receivers were sitting and waiting to see the knowledge on screen. From observation, the presenters were familiar in using the computer. They knew which button to press and which slide presentation to open making operating all this smooth and did not become noise.

An LCD projector and large white display screen were other hardware used to present the slide presentation for all receivers to see. The presenters were more familiar with this hardware because they were the ones controlling it. The presenters switched on the computer and projector, plugged the cable in, and adjusted the image shown on the white screen.

Electronic slide presentation was used in all sites as a tool to transfer knowledge to the receivers. The receivers mentioned that using electronic slide presentation could help with the knowledge transfer. They said that the tool helped structure the knowledge and make it easy to understand[67].

A hard copy of the tool was distributed to all receivers of knowledge before the knowledge transfer started. They all used these hard copies as reference. They used them to take notes and write down some clarification for further understanding. One receiver in site one could not see the screen clearly due to his near-sighted issue so he referred to the hard copy of the tool[68]. The receivers of knowledge were also familiar with this replication of the tool because they used it as reference.

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[67] Interview with receivers of knowledge of site one, three, and four, 30th January, 5th and 8th February 2010
[68] Interview with receiver 5 of site one, 30th January 2010

Computers, LCD projector, slide presentation, and hard copies of the tool were used as visual aids in transferring knowledge. Eppler and Burkhard (2004) stated that in the field of knowledge visualization the use of visual representations was examined. With that examination the visual aids could help enhance the transfer of knowledge between at least two people. The hardware used in this study confirmed the statement of Eppler and Burkhard (2004) in enhancing the knowledge transfer.

5.1.2.2 Tool: Using Pictures

Pictures were mentioned as part of the tool to transfer knowledge as evidenced in presenter and participant interview and observation note. From the interview sessions with receivers of knowledge from site three[69], they said that pictures made it easier for them to understand texts. This confirmed the result of research by Levin (1981) saying that pictures helped clarify difficult text. In this research, pictures were used as both representational and transformational pictures to both attract attention and improve knowledge retrieval. Another study done by Rasch and Schotz (2009) says that in learning interactive or non-interactive pictures can be added to texts but the result is neither beneficial nor harmful for learning (Rasch & Schnotz, 2009).

5.1.2.3 Tool: Using the Same Message on Slide Presentation and Hard Copy

The content in the electronic slide presentation and hard copy was the same. This helped receivers of knowledge in transferring the knowledge, as the slide presentation caught the attention, and the hard copy was the reference that the

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[69] Interview with receiver 12 of knowledge of site three, 5th February 2010

receivers can refer to if they could not catch up with what the presenters were talking about and they could refer to it later after knowledge transfer. The hard copies of the tool made it easier to learn and understand. This confirmed a study done by Koriat (2008) with the finding that easily learned material could be easily understood.

In transferring knowledge, computers and LCD projectors acted as visual aids projecting the knowledge visualization tool, the electronic slide presentation. Color and content on the hard copy were the same as the content in slide presentation. The content of the knowledge was in the tool, and the presenter talked the receivers through using the tool as the main attraction. The presenter assisted in animating the tool, explaining and clarifying the knowledge.

The findings of how to transfer knowledge has been elaborated in details with evidence from all data collection. The researcher will present findings from cross-site analysis and draw out findings of all sites. Table 5.4 shows findings that have been elaborated; a 'Y' (yes) reference indicates the existence of that evidence in each site.

Table 5.4: Cross-site Evidence of How to Transfer Knowledge via Knowledge Visualization Tool

Factor	Evidences	Site 1	Site 2	Site 3	Site 4
How to transfer knowledge	Using computers.	Y	Y	Y	Y
Tool	Using LCD projector.	Y	Y	Y	Y
	Using slide presentation.	Y	Y	Y	Y
	Using hard copies of the tool.	Y	Y	Y	Y
	Using pictures.	Y	Y	Y	Y

Table 5.4: Cross-site Evidence of How to Transfer Knowledge via Knowledge Visualization Tool (continued)

Factor	Evidences	Site 1	Site 2	Site 3	Site 4
	Using the same message on slide presentation and hard copy.	Y	Y	Y	Y

Source: Developed for this research

Evidence from cross-site analysis showed that all findings were evidenced in all sites for how to transfer knowledge. This summarized the findings that computers, LCD projectors, slide presentation, hard copies, pictures, and same message on soft and hard copies were major parts in transferring knowledge via the knowledge visualization tool.

Section 5.1.3 presents findings in the next step of the theoretical framework, which is understanding knowledge.

5.1.3 Understand the Knowledge

The third step of theoretical framework answered the question of how the receivers of knowledge understand the knowledge. To understand, the tool, the receivers, and presenters had their parts. By understanding the knowledge in this third step, the study did not intend to probe into the receivers' brain to measure the level of understanding. In this step, the researcher asked each receivers of knowledge if they understood the knowledge being transferred to them via the interview. Twenty-five receivers of knowledge said that they understood the knowledge[70]. When asked what made them understood it, the answers were having presenter rechecking the understanding, having the same content in both slide and hard copies, having the

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[70] Interview with receivers of knowledge, 30th January, 1st, 5th, and 8th February 2010

presenter asking relevant questions about the knowledge. Findings from all data

collection methods are shown in Table 5.5. In this step, the tool and the presenters

took parts in enhancing information processing. The presenters rechecked the

understanding, and the receivers responded that they understood the knowledge. The

presenter asked questions to check understanding from time to time. The tool helped

in understanding by having consistent knowledge shown both on screen and in the

hard copy. Detailed evidence of each finding on how to understand the knowledge can

be found in Appendix H.

Table 5.5: Findings of How Receivers of Knowledge Understand the Knowledge Transferred?

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Tool	The content of slide presentation and hard copies is the same so it is easy to understand.	None	1 [71]	31 [72]
Receiver	The receivers were nodding the heads to show understanding.	4 [73]	None	None
	The receivers said that they understood the knowledge.	None	None	25 [74]
Presenter	The presenter rechecked the understanding.	2 [75]	1 [76]	2 [77]
	The presenter asked question to check understanding.	2 [78]	None	None

Source: Developed for this research

From observation, the researcher found out that the presenters asked if the

receivers understood the knowledge[79]. The receivers of knowledge nodded their heads

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[71] Interview with presenter of site two, 1st February 2010

[72] Interview with receivers 1,4,5,6 of site one, receivers 3,5 of site two, receivers 1,2,3,4,6,7,9,11,12,13 of site three, receivers 1,2,4,5,6,7,8,9,10,11,12,13,15,16,17 of site four, 30th January, 1st, 5th, and 8th February 2010

[73] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010 respectively

[74] Interview with receivers 1,2,4,5,6 of site one, receivers 1,2,5,6 of site two, receivers 5,10 of site three, receivers 1,2,4,7,8,9,10,11,12,13,14,15,16,17 of site four, 30th January, 1st, 5th, and 8th February 2010

[75] Observation of site one and two, 30th January, 1st February 2010

[76] Interview with presenter of site one, 30th January 2010

[77] Interview with receiver 6 of site one, receivers 10 of site three, 30th January, 5th February 2010

[78] Observation of site one and two, 30th January, 1st February 2010

[79] Observation site one and two, 30th January and 1st February 2010

while listening to show their comprehension[80]. The researcher also observed that the presenters asked relevant questions about knowledge to check understanding[81]. The presenter of site one stated that he rechecked understanding so he knew if the receivers of knowledge understood it[82]. The presenter of site two said that having the same content of knowledge in both slide presentation and hard copies could help in understanding knowledge[83]. Receivers of knowledge from site one and two stated that they understood the knowledge by having the presenter rechecked their understandings[84]. Receivers of all sites said that they understood the knowledge transferred and having the content which was the same in slide presentation and hard copies also helped them[85]. The sixth receivers of knowledge from site one said that both the tool and presenter helped in understanding the knowledge[86].

Each finding is explained one by one.

5.1.3.1 Tool: The Content of Slide Presentation and Hard Copies is the Same So It Is Easy to Understand

The receivers from all sites and the presenter from site two said that the knowledge was understood because the content in the slide presentation and the hard copy was the same, so it was easy to understand[87]. Content analysis further revealed that the tool contained gestalt laws of presentation so it was easy to understand and

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[80] Observation site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010
[81] Observation site one and two, 30th January and 1st February 2010
[82] Interview with presenter of site one, 30th January 2010
[83] Interview with presenter of site two, 1st February 2010
[84] Interview with receivers of knowledge site one and two, 30th January and 1st February 2010
[85] Interview with receivers of knowledge of site one, two, three and four, 30th January, 1st, 5th, and 8th February 2010 respectively
[86] Interview with receivers of knowledge of site one, 30th January 2010
[87] Interview with presenter and receivers of knowledge of four sites, 30th January, 1st, 5th, and 8th February 2010

the content was linked to existing knowledge. This finding also presents evidence of germane cognitive load. When the presenters and receivers of knowledge said the material was easy to understand, it meant that the content could link to their schemas, hence increasing germane cognitive load. This was like what Sweller (1988) said in his study that germane cognitive load happened when the learners could connect the knowledge learned with their existing knowledge. This was evidenced from the interview with receivers of knowledge in each site[88]. Another evidence to confirm the comprehensible quality of the tool was from content analysis discussed next.

Finding that could confirm that the receivers of knowledge understood the knowledge was the one from content analysis that showed the content of the knowledge in the electronic slide presentation complied with six out of eight gestalt laws to increase receivers' perception of the knowledge. Gestalt psychologists did not state that all eight laws needed to be complied.

Content analysis followed gestalt laws of presentation as a guide to analyze the content in the knowledge visualization tool used at each field work. The tool used at all sites was electronic slide presentation. The analysis was done manually by counting the frequency of each law in the tool. The researcher counted the frequency three times to get the same results. The results were confirmed by the presenters of each site with explanation of gestalt laws. Although the knowledge content was the same for all sites, the result of gestalt laws compliance was slightly different in each due to the visual that each site added to enhance the tool. The result of the analysis is shown in Table 5.6.

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[88] Interview with receivers of knowledge of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010

Table 5.6: Content Analysis of Slide Presentation

	Elements of Gestalt Law							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Site	No. of Proximity	No. of Similarity	No. of Connectedness	No. of Continuity	No. of Symmetry	No. of Closure	No. of Relative size	No. of Common fate
1	67	77	13	None	51	9	10	None
2	64	69	8	None	51	7	12	None
3	61	64	8	None	45	8	11	None
4	67	77	13	None	51	9	10	None

Source: Developed for this research

The result of the analysis showed that the content of the tool for all sites contained six out of eight gestalt laws. In each of the sites, the number of occurrences was different due to the deletion of graphic representation or line or change of color by each of the presenters.

First of all the law of proximity suggests that things that are closer together belong to one group. The content of the tool showed application of this law by using tables and frames to group content that belonged together in each slide instead of having just texts running in paragraphs.

The law of similarity suggests that the shapes of individual pattern elements can determine how they are grouped. In the content of the tool, shapes of products and their colors were used to determine that they were grouped together especially in the knowledge content of product display. Same products were put together side by side on the shelf to determine that they should be put together on which shelf.

The law of connectedness suggests that connecting objects by lines is very powerful way of expressing some relationship between them. In the content, lines were used to connect content that belonged or connected to each other. Pictures of products were connected by line pointing to their description.

Law of symmetry suggests that symmetry can provide powerful organizing principle. In the content, symmetry was used to emphasize texts or graphic indicating that they belonged to one group or be organized for certain subject. Product features were organized in a different symmetry than other information like its size, its fragrance to provide distinct and organizing power to the texts.

Law of closure suggests that humans tended to fill the gap when something is missing. In the content, product pictures were sometimes partly covered by price tag when put on display. The receivers, however, could still indicate that there was the whole product bottle behind the price tag.

Law of relative size suggests that smaller pattern is usually perceived as objects on a background. In the content, pictures of products were perceived placing on product shelf when placed on white background with black horizontal straight line.

Applying gestalt laws in the tool also resulted in no evidence of extraneous load, which is the load not inherent within the instruction, but is imposed by the instructional designer as they structure and present information (Sweller, 2009). The presenters or the receivers did not mention about the complexity of the design of the content in the slide presentation during interview[89]. This means that applying gestalt

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[89] Interview with presenters and receivers of knowledge from site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

laws to knowledge presentation can help reduce extraneous load while transferring knowledge. The receivers of knowledge were familiar with slide presentation used as a knowledge visualization tool because it was the tool that had always been used to transfer knowledge at the sites. This was because the findings achieved in content analysis that by complying with six out of eight gestalt laws of presentation, extraneous cognitive load in this research did not exist. This was further confirmed by findings and evidence from the empirical data that no existence of extraneous cognitive load has been mentioned or observed during interview and observation. In this step, extraneous cognitive load by Sweller (1988) has been omitted due to the alteration made from the results of the research by reducing extraneous cognitive load with gestalt laws of presentation as shown in Figure 5.4.
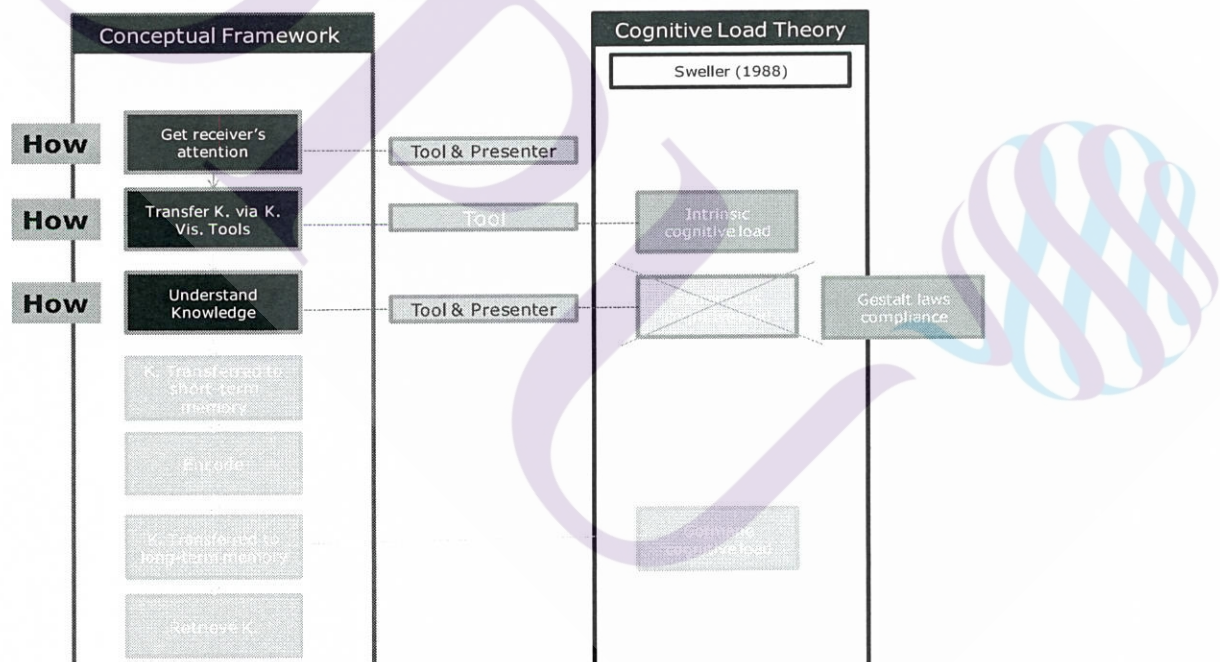

Figure 5.4: Alteration of Theoretical Framework

Source: Developed for this research

The tool had the same content as in the hard copy did not distract the receivers. When the researcher searched more to discover why the content was easy to understand, results revealed that content was complied with six gestalt laws. The laws helped eliminate extraneous cognitive load. Moreover, the knowledge content presented in the tool was the one that could relate to receivers' existing knowledge. This presents germane cognitive load to the receivers making the knowledge easy to understand.

5.1.3.2 Receiver: The Receivers Said that They Understood the Knowledge

When asked, the receivers of knowledge themselves told that they did understand the knowledge transferred. They added that they were familiar with the knowledge visualization tool and familiar with the flow of the knowledge, so they judged that they understood the knowledge[90]. Besides asking question if the receivers understood the knowledge, the researcher also tested their understanding against knowledge expectation by asking questions to check with the answers that were given by the presenters prior the interview. This resulted in knowledge retrieval rate of each site which will be shown later at the step of knowledge retrieval.

5.1.3.3 Receiver: The Receivers Are Nodding the Heads to Show Understanding

To show that the receivers of knowledge understood the knowledge transferred, they nodded their heads. This was evidenced from observation notes from

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[90] Interview with receivers of knowledge of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010 respectively

four sites[91]. This is one type of nonverbal communication to show agreement which can differ by culture (Littlejohn & Foss, 2005), but in Thailand nodding the heads shows agreement and understanding. However, the researcher also tested the understanding as earlier explained.

5.1.3.4 Presenter: The Presenter Rechecked the Understanding

As evidenced from the interview scripts of the presenters and the receivers of knowledge, and observation notes, knowledge was understood through the process of the presenters rechecking understanding with the receivers of knowledge. To explain, the presenters were acting as facilitators in bringing knowledge to comprehension. They were the ones who regularly checking by asking, 'Do you understand this knowledge?' The question was followed by another question of 'Please explain your understanding.' The knowledge would otherwise disappear once attention was diverted elsewhere if knowledge were not processed. This confirmed the work on level of processing by Craik and Lockhart (1972) who understood that knowledge was processed and transferred to another level of memory. By rechecking knowledge, the presenters gave the opportunity to the receivers to process the knowledge received to another level of memory. The tool could catch attention and so the receivers hold knowledge in their short-term memory until they processed their own knowledge by encoding it or the presenters asked questions to recheck understanding to encourage receivers to process the knowledge deeper and pushed knowledge towards long-term memory.

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[91] Observation of site one to four, 30th January, 1st, 5th, and 8th February 2010

5.1.3.5 Presenter: The Presenter Asked Question to Check Understanding

The presenter asked questions to check understanding of the receivers of knowledge. Understanding in this context was being able to relate to the knowledge transferred correctly e.g. what the sales target was and what the new products were. This differed from the previous rechecking understanding. When rechecking understanding, presenters asked if the receivers understood the knowledge. But when the presenters asked question to check understanding, they asked specific questions about the knowledge itself. The presenters could ask, for example, what the sales target was or what the new products were. This act took the receivers of knowledge to a deeper level of cognitive processing. This again confirmed the study by Craik and Lockhart (972) on the level of processing. The receivers of knowledge could understand the knowledge more and process knowledge to long-term memory when asked, and they reviewed their understanding. The questions asked were open-ended questions. The receivers of knowledge had to explain their understanding. The presenters did not ask all of the receivers. They randomly picked receivers to answer[92].

To summarize, for receivers of knowledge to understand knowledge, presenters, tool, receivers work together. The presenters instill knowledge into the receivers' mind. They ask questions to recheck understanding of the knowledge. The tool helps in presenting the same knowledge on screen and on the hard copy as reference. Gestalt laws are complied to reduce extraneous cognitive load. Moreover, the content of the tool and hard copies aligns and further increases the level of

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[92] Observation of site one and two, 30th January and 1st February 2010

understanding, thus increasing germane cognitive load. The receivers open up their minds and takes in the knowledge.

Table 5.7 shows cross-site analysis of how to understand the knowledge. Findings that have evidences of all sites are shown, and the differences in findings among sites are discussed. Table 5.7 shows either 'Y' (yes) or 'N' (no), indicating the existence or non-existence of evidence in each site.

Table 5.7: Cross-site Evidence of How to Understand the Knowledge

Factor		Evidences	Site 1	Site 2	Site 3	Site 4
How to understand the knowledge	Presenter and Receiver	The presenters rechecked the understanding.	Y	Y	N	Y
		The receivers said that they understood the knowledge.	Y	Y	Y	Y
		The receivers are nodding the heads to show understanding.	Y	Y	Y	Y
		The presenter asked question to check understanding.	Y	Y	N	N
	Tool	The content of slide presentation and hard copies is the same so it is easy to understand.	Y	Y	Y	Y

Source: Developed for this research

Evidences that occurred in all sites of how to understand the knowledge were the receivers said that they understood the knowledge, the content of slide presentation and hard copies is the same so it is easy to understand, and the receivers

are nodding the heads to show understanding. Cross-site analysis shows that the receivers and the tool have parts in the step of understanding the knowledge. The content that complies with gestalt laws will eliminate extraneous cognitive load that can interfere understanding. Knowledge content that can be linked to existing knowledge will be easy to understand to the receivers.

Section 5.1.4 presents findings of the fourth step of the framework, which is how the knowledge is transferred to the short-term memory of the receivers of knowledge.

5.1.4 Knowledge Transferred to Short-term Memory

In this fourth step of the framework, findings from all data collection methods were presented. The findings show that the tool alone enhances this step. The tool itself, colorful content, and pictures help process knowledge into the receivers' short-term memory.

Table 5.8 below shows detailed findings. Evidence of each finding source can be found in Appendix I.

Table 5.8: Findings of How Knowledge Is Transferred to the Short-term Memory of the Receivers of Knowledge?

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Tool	Content that was colorful.	4 [93]	4 [94]	3 [95]
	Content with many pictures.	None	3 [96]	2 [97]
	Electronic slide presentation.	4 [98]	1 [99]	6 [100]

Source: Developed for this research

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[93] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010
[94] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010
[95] Interview with receivers 10, 15, 17 of site four, 8th February 2010
[96] Interview with presenters site one, three, and four, 30th January, 5th, 8th February 2010
[97] Interview with receivers 15 and 17 of site four, 8th February 2010
[98] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010
[99] Interview with presenter of site three, 5th February 2010
[100] Interview with receivers 3,4,8,10,15,16 of site four, 8th February 2010

Here again in transferring knowledge into short-term memory, the tool played important role by providing colorful content with lots of pictures and dynamic slide presentation. Observation from all sites showed that colorful content and electronic slide presentation could hold knowledge in short-term memory[101]. Presenters from all sites said that colorful content could help transferring knowledge into short-term memory[102]. Presenters from site one, three, and four said that having lots of pictures could help[103]. Presenter from site three stated that slide presentation could help transfer knowledge to short-term memory[104]. Receivers of site four said that having colorful content, many pictures, and using slide presentation could help transfer knowledge to their short-term memory[105]. Each finding is explained one by one as follows.

5.1.4.1 Tool: Content that Was Colorful

Knowledge was transferred to the short-term memory of the receivers of knowledge by having colorful content that attracted attention and held the knowledge in short-term memory. The observation note also captured this factor, and both the presenters and the receivers of knowledge mentioned that the colorful content helped transfer knowledge to short-term memory. According to Goldstein (2005), information selected by attention was transferred to temporary storage in short-term memory. In this study, the receivers of knowledge selected colorful content of the knowledge and transferred the content to temporary storage in short-term memory.

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[101] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010 respectively
[102] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010
[103] Interview with presenters of site one, three, and four, 30th January, 5th, and 8th February 2010
[104] Interview with presenter of site three, 5th February 2010
[105] Interview with receivers of knowledge of site four, 8th February 2010

5.1.4.2 Tool: Content with Many Pictures

Pictures were also mentioned as one of the factors to bring knowledge into the receivers' short-term memory as evidenced by the presenters' and the receivers' interview scripts. Pictures had a similar effect as color as to be selected into attention of the receivers. Once the pictures were selected to attention, it was held in memory. The receivers of knowledge registered pictures in their attention and held the information in their short-term memory (Goldstein, 2005).

5.1.4.3 Tool: Electronic Slide Presentation

Electronic slide presentation was the tool to bring knowledge into the receivers' short-term memory as evidenced in presenter interview scripts, the observation note, and receivers' interview scripts. From observation, slide presentation was the knowledge visualization tool that contained colorful content and pictures that could hold attention and transfer the information to the short-term memory of the receivers of knowledge.

The knowledge visualization tool had a major role in transferring the knowledge into receivers' short-term memory by having pictures, color, and knowledge that connects to prior knowledge. These findings of how knowledge was transferred to short-term memory related to the findings of Neath and Surprenant (2003), who claimed that short-term memories could be stored as images. In this study, color, pictures, and words that were familiar were focused and stored in short-term memory. The receivers of knowledge selected to give attention to the content that had color and pictures in it according to Goldstein's (2005) study then transferred the images to short-term memory. Color and pictures in the slide presentation made
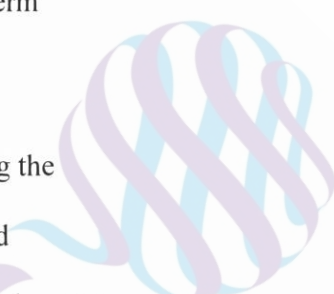
the receivers of knowledge select to give attention and then transfer the information or knowledge into their short-term memory (Goldstein, 2005).

Cross-site findings are shown next in Table 5.9. 'Y' shows the existence of evidence, while 'N' shows non-existence.

Table 5.9: Cross-site Evidence of How to Transfer Knowledge to Short-term Memory

	Factor	Evidences	Site 1	Site 2	Site 3	Site 4
How to transfer knowledge to short-term memory	Tool	Content was colorful.	Y	Y	Y	Y
		Content with many pictures.	Y	N	Y	Y
		Electronic slide presentation.	Y	Y	Y	Y

Source: Developed for this research

Evidences that occurred in four sites were: content that was colorful and electronic slide presentation. The tool has major role in transferring knowledge to short-term memory resulting from cross-site references as discussed. Section 5.1.5 presents the findings in the fifth step of the framework, which is how the knowledge is encoded.

5.1.5 Encode

In the fifth step of theoretical framework, findings showed that the receivers of knowledge were the ones responsible for the encoding of the knowledge. The evidence from all data collection methods showed that the knowledge was encoded when the receivers of knowledge take notes, summarize the knowledge

learned and memorize the content. Table 5.10 below shows these findings. Detailed evidence of each finding is elaborated in Appendix J.

Table 5.10: Findings of How Knowledge Is Encoded

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Receivers	Taking notes.	4 [106]	1 [107]	1 [108]
	Summarizing the knowledge learned.	None	1 [109]	1 [110]
	Memorizing the content.	None	None	6 [111]

Source: Developed for this research

In encoding, only the receivers have a role here. The receivers encode by memorizing text from the tools, taking notes, and summarizing the knowledge. From observation of all sites, the receivers of knowledge took notes while receiving knowledge[112]. The presenter and receiver from site one said that the receivers encoded the knowledge by taking notes and summarizing the knowledge learned[113]. Receivers of knowledge from site one and two memorized the knowledge learned in order to encode[114]. The finding is discussed one by one as follows:

5.1.5.1 Receiver: Taking Notes

Knowledge was encoded by the receivers of knowledge taking notes either in the hard copy or in their own paper notes as evidenced by the observation note

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[106] Observation of site one, two, three, and four, 30th January, 1st, 5th, and 8th February 2010
[107] Interview with presenter of site one, 30th January 2010
[108] Interview with receiver 5 of site one, 30th January 2010
[109] Interview with presenter of site one, 30th January 2010
[110] Interview with receiver 2 of site one, 30th January 2010
[111] Interview with receivers 3,4,5,6, of site one, receivers 2 and 5 of site two, 30th January, 1st February 2010
[112] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010
[113] Interview with presenter and receivers of knowledge of site one, 30th January 2010
[114] Interview with receivers of knowledge from site one and two, 30th January and 1st February 2010

from all sites, and presenter and receivers interview scripts. From observation, the researcher saw that receivers of knowledge took notes while receiving knowledge. A study done by Makany, Kemp, and Dror (2008) shows that it is important to use cognitively compatible note-taking techniques (Makany, Kemp, & Dror, 2008). The study identifies the cognitive mechanisms behind effective note-taking and knowledge representation. Using note-taking enables deeper understanding and more integrated knowledge management (Makany, et al., 2008).

5.1.5.2 Receiver: Summarizing the Knowledge Learned

Another way that knowledge was encoded was through summarizing the knowledge learned by the receivers themselves, as evidenced in presenters' and receivers' interview scripts. When summarizing, the receivers organize knowledge into chunks. These chunks are easily managed by memory. Memory is more manageable if one boils down the paragraphs to one or two important terms or ideas (Coon & Mitterer, 2002).

5.1.5.3 Receiver: Memorizing the Content

The receivers' interview revealed that memorizing the knowledge learned was another way to encode the knowledge. When one memorizes something, one learns it so that it is perfectly known (Goldstein, 2005). Knowledge was in the short-term memory of the receivers of knowledge before they encoded it by memorizing it. Memorizing is rehearsing the knowledge so that they know it by heart. The more times a short-term memory is rehearsed, the greater chance it is that the knowledge will be stored in long-term memory (Goldstein, 2005).

In encoding, the receivers of knowledge took notes, summarized and memorized the knowledge learned as tested during interview. Details of how the receivers were tested, were explained in chapter 3. Humans encode knowledge by recoding, rehearsing, organizing, and constructing (Coon & Mitterer, 2002). By taking notes and summarizing the knowledge, the receivers of knowledge both recode, rehearse, and organize the knowledge. Memorizing the knowledge is rehearsing it so that the receivers of knowledge can remember it. The presenters in site one and four aided in the process of memorizing because they asked questions in relation to the previous slides to instill knowledge into receivers' memory[115].

Next, evidence of cross-site findings was presented of how to encode knowledge. Table 5.11 below shows the findings.

Table 5.11 Cross-site Evidence of How to Encode the Knowledge

Factor		Evidences	Site 1	Site 2	Site 3	Site 4
How to encode knowledge	Receiver	Taking notes.	Y	Y	Y	Y
		Summarizing the knowledge learned.	Y	N	N	N
		Memorizing the content.	Y	Y	N	N

Source: Developed for this research

Evidence that was common in all sites was taking notes.

Section 5.1.6 presents the findings in the sixth step of the framework, which is transferring knowledge to the long-term memory of the receivers of knowledge.

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[115] Observation of site one and four, 30th January and 8th February 2010

5.1.6 Knowledge Transferred to Long-term Memory

This section describes how the knowledge is transferred to long-term memory of the receivers of knowledge. Long-term memory is where knowledge is categorized in the brain. Findings in this step show that the tool, presenter, and receivers of knowledge have roles in enhancing knowledge transfer to long-term memory. Germane cognitive load is enhanced here because the content of the knowledge has connection with the receivers' schemas. Schemas refer to the meaning of sales target, knowledge about consumer products, knowledge about the types of promotions, and knowledge about the types of displays. Knowledge elements of each knowledge type can connect to the known schemas and thus make sense to the receivers of knowledge. Before going into details of evidences of this step, the researcher would like to exemplify the complexity of knowledge content first. That is because the complexity of knowledge content can affect the transfer of knowledge to long-term memory. The next section will capture that.

5.1.6.1 The Complexity of Knowledge Content

The complexity of the knowledge is judged by elements of knowledge in each knowledge contents. The elements of knowledge in each knowledge content are different. The complexity in each content can lead to a cognitive load which is intrinsic load – the complexity of the learning material and the number of elements that the learner must attend to understand the learning material.

Sweller (1994) observed that when the elements of knowledge could be learned in isolation, they could be described as having low element interactivity. The low element interactivity knowledge is easily learned. When following up with the

presenters of all sites in a subsequent telephone interview on 11 April 2011[116], the researcher confirmed that sales target and product display content had low element interactivity. The content can be learned in isolation. The receivers of knowledge can either learn the total sales target or the individual target. They do not need both knowledge elements to learn about the sales target. For product display, there was only one element, which was the product variance that could be learned in isolation. Thus, sales target and product display had low element interactivity. These two elements of knowledge did not impose intrinsic cognitive load to the receivers of knowledge.

Considering the intrinsic cognitive load, the characteristics of each knowledge will be further explained. After getting the consent to enter research sites, the researcher collected knowledge content from each site and found that the content of knowledge transferred in each site was very similar. The main knowledge content was the same; only additional knowledge that was site-specific was different such as the details of incentive that each seller will be getting for that particular period. Because the additional knowledge of each site was not the knowledge that the presenters expected for knowledge retrieval, they will not be discussed. There were in total four knowledge content that were the same for all sites: sales target, new products, promotions, and product displays.

Table 5.12 shows details of knowledge content including its characteristics of being texts or pictures, then number of pages, and number of elements in each knowledge. Knowledge elements were determined by the presenters. These were the

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[116] Telephone interview with presenters of site one, two, three, and four, 11 April 2011

elements that receivers of knowledge had to be able to retrieve after knowledge transfer. Knowledge content used for all sites was the same, so Table 5.14 represents knowledge content of all sites[117].

Table 5.12: Knowledge Content

Knowledge Content	Characteristics	Number of pages	Number of knowledge elements
Sales target	Numbers	1	2
New product	pictures, numbers	11	3
Promotion	numbers, texts	4	8
Display	pictures	4	1

Source: Developed for this research

However, high element interactivity or connectedness occurs when a knowledge cannot be learned without also learning the connections between a large number of elements (Sweller, 1994). In this research, presenters, after interviewed, identified that the knowledge of new products and promotions cannot be learned without connectedness of knowledge elements[118]. Sweller (1994) added that high element interactivity required all elements to be learned so that a task could be executed. In this research, receivers of knowledge needed to learn all the elements of new products and promotions in order to be able to execute a task, which in this case was selling. Regarding the knowledge of promotions, the receivers needed to learn all eight elements: brand of product, variance, size, price, discount percentage, budget allocation, type of store, and period of promotion to be able to sell to all stores.

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[117] Content analysis of site one to four, 10th February, 2010
[118] Telephone interview with presenters of site one, two, three, and four, 11 April 2011

Regarding the knowledge of new products, the receivers needed to know all three elements, which were brand, size, and start-sell date to be able to sell.

From the content analysis, the existence of high element interactivity knowledge caused intrinsic cognitive load to happen, which could interfere with knowledge transfer and information processing of the receivers of knowledge. The results from knowledge retrieval from the interview scripts of the receivers of knowledge showed that low element interactivity knowledge had higher retrieval rate than high element interactivity[119]. Element interactivity is dependent on both the complexity of the material and the learners' expertise (Artino, 2008). With this high element interactivity, the results showed that promotion knowledge had the least percentage of knowledge retrieval. Table 5.13 shows the results.

Table 5.13: Knowledge Retrieval Rate by Knowledge by Site

Element Interactivity	Knowledge	Characteristics	No. of pages	No. of knowledge elements	Number of receivers retrieving knowledge			
					site 1 (n=6)	site 2 (n=6)	site 3 (n=14)	site 4 (n=17)
Low	Sales target	Number	1	2	6	n/a	n/a	n/a
High	New products	pictures, number	11	3	4	3	7	16
High	Promotion	numbers, texts	4	8	2	None	None	2
Low	Display	pictures	4	1	5	6	14	15

Source: Developed for this research

Promotion knowledge had the highest element interactivity between each element of knowledge, resulting in high intrinsic cognitive load that could interfere

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[119] Interview with receivers of knowledge of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

with the learning of the receivers of knowledge. Promotion knowledge that the presenters expected the receivers of knowledge to recall had all eight elements. Knowing each of the elements alone did not create meaning to the receivers of knowledge. All eight elements needed to interact with each other. High element interactivity resulted in only two of receivers of knowledge from site one and four being able to retrieve this knowledge and none could retrieve from site two and three[120]. Display knowledge has low element interactivity resulting in almost all receivers of knowledge from all sites being able to retrieve the knowledge. Sales target knowledge also had low element interactivity and was the knowledge expected by site one only. The result was that all receivers of knowledge in site one were able to retrieve this knowledge. Study from Cowan (2001) revealed that young adults could only take up to four objects at one limited time (Cowan, 2001). Olsson and Poom (2005) revealed more definitive results saying that people can recall three objects with long-term memory relevancy and one object with long-term memory irrelevancy. The finding of new products had high element interactivity knowledge but had higher retrieval rate than promotion. This finding extends the study of Olsson and Poom (2005) who found that familiar knowledge can be taken up to three objects to get higher retrieval rate (Ebbinghaus, 1913).

New products knowledge that was transferred during the time of this study were products of existing brands with an item extension only e.g. one brand of shampoo has seven formulas in the market and the company introduces the eighth, so the receivers of knowledge knew the brand and had familiar knowledge about the

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[120] Interview with receivers of knowledge from site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

brand already. Unfamiliar knowledge such as promotion (which was renewed every month) could be taken up to one object, which was up to brand level only and not to the promotion details. This finding was confirmed through the interview script of receivers of knowledge[121].

With knowledge retrieval rate that differed in each sites, the researcher analysed to determine the factor for transferring knowledge to long-term memory. The evidences showed that the tool, the presenter, and the receivers had their parts. Detailed evidence of these findings can be found in Appendix K. Findings from all sites are shown in Table 5.14 below.

Table 5.14: Findings of How Knowledge Is Transferred to Long-term Memory

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Tool	The tool had content that linked to schemas.	4 [122]	4 [123]	None
Presenter	The presenter repeated the knowledge.	1 [124]	4 [125]	3 [126]
	The presenter showed slide presentation twice.	1 [127]	None	None
	The presenter asked questions to repeat knowledge.	1 [128]	None	None
	The presenter speaks according to the flow in the tool.	1 [129]	None	None

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[121] Interview with receivers 1 and 3 of site one, receivers 1 and 13 of site four, 30th January, 8th February 2010

[122] Observation and interview of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

[123] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

[124] Observation of site one, 30th January 2010

[125] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

[126] Interview with receivers 3,6 of site one and receiver 10 of site three, 30th January, 5th February 2010

[127] Observation of site one, 30th January 2010

[128] Observation of site one, 30th January 2010

[129] Observation of site four, 8th February 2010

Table 5.14: Findings of How Knowledge Is Transferred to Long-term Memory (continued)

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Receiver	The receivers reviewed the knowledge themselves.	None	2 [130]	10 [131]
	The receivers asked to gain more understanding.	1 [132]	None	None

Source: Developed for this research

In transferring knowledge to long-term memory, the content of the tool that can link to the schemas of receivers of knowledge can help evidenced from observation and interview with presenters of all sites[133]. Observation of site one, which had the highest retrieval rate, showed that the presenter repeating the knowledge, showing slide presentation twice and asking relevant questions about knowledge could enhance the process[134]. Presenters of all sites stated that repeating the knowledge to the receivers could help transferring knowledge to their long-term memory[135]. Receivers of knowledge from site one and three also agreed that repeated knowledge by the presenters help enhanced long-term memory[136]. Observation of site four showed that the presenter speaking according to the flow and the receivers asking questions could help in transferring knowledge to long-term memory[137]. Evidences from observation of site four and interview with presenter of site three and four showed that the tool, the presenters, and the receivers of knowledge had parts in

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[130] Interview with presenters of site three and four, 5th and 8th February 2010

[131] Interview with receivers 4 of site one, receivers 14 of site three, receivers 2,6,8,10,11,13,14,17 of site four, 30th January, 5th and 8th February 2010

[132] Observation of site four, 8th February 2010

[133] Observation and interview of site one to four, 30th January, 1st, 5th, 8th February 2010

[134] Observation of site one, 30th January 2010

[135] Interview with presenters of site one to four, 30th January, 1st, 5th, 8th February 2010

[136] Interview with receivers of knowledge of site one and three, 30th January and 5th February 2010

[137] Observation of site four, 8th February 2010

transferring knowledge to long-term memory[138]. The intensity of the evidence lies in the receivers reviewing the knowledge themselves to transfer the knowledge into long-term memory. The researcher discusses the findings one by one as follows:

5.1.6.2 Tool: The Tool Had Content that Linked to Schemas

Observation and interview with presenter showed that knowledge content in the tool helped in transferring knowledge into long-term memory. This was because the knowledge was something the receivers were familiar with and had schemas for, helping increase their germane cognitive load. Sweller (1988) said that germane cognitive load happened when learners can connect the knowledge learned with their existing knowledge. The receivers of knowledge in this study could connect the knowledge learned to their existing knowledge of products, displays, and promotion.

5.1.6.3 Presenter: The Presenter Repeated the Knowledge

Knowledge was transferred to long-term memory for later use by the presenters, verbally repeating the knowledge to the receivers as evidenced in observation notes, presenters themselves, and from the receivers' interview scripts. Whether the presenters knew it or not that short-term memory needed rehearsal in order for the knowledge to be passed to long-term memory, they enhanced the information processing of the receivers of knowledge by repeating the knowledge. Goldstein (2005) found that the more times short-term memory was rehearsed, the greater its chances of being stored in long-term memory.

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[138] Observation of site four and interview with presenters of site three and four, 5th and 8th February 2010

5.1.6.4 Presenter: The Presenter Showed Slide Presentation Twice

The presenters purposely showed the slide presentation twice to instill the knowledge into the receivers' long-term memory as evidenced from observation notes. The whole slide presentation contained twenty-two slides. The researcher searched through observation note of site one which had highest knowledge retrieval rate to see what the presenter did differently to cause this. This is because presenter is the different factor each sites has. The presenter of site one showed the slides that contain knowledge of sales target, new products, products display, and promotion twice[139]. This was not just the mere showing of the slide presentation. The presenter showed the slide presentation again, repeated the knowledge, and asked questions so that the receivers of knowledge gained more understanding. This is, again, to confirm Goldstein (2005) study that the more knowledge is repeated or rehearsed, the greater chance of it entering long-term memory.

5.1.6.5 Presenter: The Presenter Asked Questions to Repeat Knowledge

The presenters reviewed material and asked questions about knowledge to repeat and check if the knowledge was transferred to receivers' long-term memory, as evidenced in observation notes. Asking questions so that receivers of knowledge gain more understanding is called elaborative rehearsal by Toyota and Kikuchi (2005). Elaborative rehearsal links new information to memories that are already in long-term memory. One remembers more with elaboration, extension, and reflection of knowledge (Toyota & Kikuchi, 2005).

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[139] Observation of site one, 30th January 2010

5.1.6.6 Presenter: The Presenter Spoke according to the Flow in the Tool

The presenter followed the flow in the slide presentation to not confuse and interrupt the receivers. The slide presentation was opened one by one after another not jumping from page one to page ten so that the receivers could follow. The receivers of knowledge had hard copies of the slide in their hands and they followed the screen and turned the page of the hard copies together while receiving knowledge. This confirmed the study by Koriat (2008) that easily learned and followed knowledge could be easily understood. When the receivers understood, they would start the encode and transfer knowledge to long-term memory.

5.1.6.7 Receiver: The Receivers Reviewed the Knowledge Themselves

After the knowledge transfer, the receivers reviewed the knowledge learned themselves to pass the knowledge into their long-term memory as evidenced in the receivers' interview scripts[140]. This had the same effect as the method mentioned earlier by having presenters asking questions to review understanding. In this scenario, the receivers of knowledge themselves reviewed the knowledge and created the elaborative rehearsal effect (Toyota & Kikuchi, 2005).

5.1.6.8 Receiver: The Receivers Asked to Gain More Understanding

It was observed that receivers of knowledge asked questions to clarify the unclear points and to help transfer knowledge to long-term memory in site four. This technique is another way to create the elaborative rehearsal effect as mentioned by Toyota and Kikuchi (2005) by the receivers of knowledge. They related what they

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[140] Interview with receivers of site two, three, and four, 1st, 5th, and 8th February 2010

learned into what they had already learned and passed the knowledge into their long-term memory.

In summary, the tool, presenters, and receivers of knowledge played roles in transferring knowledge into the receivers' long-term memory. The tool had content that connected to the receivers' prior knowledge. The presenters rechecked receivers' understanding and repeated the knowledge. The receivers asked questions to clarify their understanding. Knowledge that was important and meaningful to the receivers would be transferred to long-term memory (Coon & Mitterer, 2002). Finally, rehearsing the knowledge created the elaborative rehearsal effect by asking questions and reviewing the knowledge learned, further facilitating knowledge passing into long-term memory (Toyota & Kikuchi, 2005); Goldstein, 2005).

Table 5.15 shows cross-site evidence of how to transfer knowledge to long-term memory. Two findings occurred across four sites.

Table 5.15: Cross-site Evidence of How to Transfer Knowledge to Long-term Memory of the Receiver of Knowledge

	Factor	Evidences	Site 1	Site 2	Site 3	Site 4
How to transfer knowledge to long-term memory	Tool	The tool had content that linked to schemas.	Y	Y	Y	Y
	Presenter	The presenter repeated the knowledge.	Y	Y	Y	Y
		The presenter showed slide presentation twice.	Y	N	N	N
		The presenter asked questions to repeat knowledge.	Y	N	N	N
		The presenter speaks according to the flow in the tool.	N	N	N	Y
	Receiver	The participants reviewed the knowledge themselves.	N	Y	Y	Y
		The participants asked to gain more understanding.	N	N	N	Y

Source: Developed for this research

Findings that occurred in all four sites were: the tool had content that links to schemas and the presenter repeated the knowledge. The tool and presenter had their parts in transferring knowledge to long-term memory evidenced from cross-site analysis.

Section 5.1.7 describes the last step of the theoretical framework, which is how the knowledge is retrieved.

5.1.7 Retrieve Knowledge

The section completes all steps of the theoretical framework and modifies it following the analysis of the findings. Knowledge retrieval rate has been captured in the step 6. This last step will show the retrieval ability of the receivers according to the factor discovered. This step will determine what factor has influence in knowledge retrieval. Evidences showed that the presenters had a major role in retrieving the knowledge. The interview with receivers of knowledge provided data to answer the research question and revealed the knowledge retrieval ability of each receiver of knowledge. The forgetting curve (Ebbinghaus, 1913) was used as a benchmark in identifying if each receiver of knowledge could retrieve 70% of the knowledge after twenty minutes of knowledge transfer. The result showed that site one was the only site showing a significant knowledge retrieval result: In site one, if receivers of knowledge could retrieve all four knowledge types, which were sales target, new products, promotion, and display, they achieve 100% knowledge retrieval rate[141]. In site two to four, the receivers of knowledge had to retrieve three knowledge types to

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[141] Interview with presenter of site one, 30th January 2010

achieve 100%[142]. The result of knowledge retrieval was distinct. See Table 5.16 for details of knowledge retrieval result.

Table 5.16: Number of Receivers Able to Retrieve Knowledge According to Ebbinghaus (1913) Forgetting Curve

	Site 1 N=6	Site 2 N=6	Site 3 N=14	Site 4 N=17
Receivers retrieving knowledge	4[143]	None	None	1[144]

Source: Developed for this research

For site one, four receivers of knowledge out of six could retrieve more than 70% of knowledge after twenty minutes. Site two and three had significant result showing none of the receivers of knowledge being able to retrieve knowledge after twenty minutes of knowledge transfer. Site four showed that one receiver out of seventeen could retrieve 70% of knowledge after twenty minutes. The different factors in each of the sites were: (a) number of receivers in each site, (b) trait of presenters, (c) location, (d) meeting room environment. These factors followed the communication model that consisted of sender, message, receiver, and noise. The tool was not one of the factors here because they were the same for all sites. Number of receivers could not evidently be one of the factors because the pattern was not obvious. Site two and three had huge difference in the number of receivers but could not achieve beyond the forgetting curve. Site one and two had the same number of receivers which were $N = 6$ but the knowledge retrieval result was different. Site three and four had higher number of receivers which were $N = 14$ and $N = 17$, but site four

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[142] Interview with presenters of site two to four, 1st, 5th, and 8th February 2010
[143] Interview with receivers 1,2,3,4 of site 1, 30th January 2010
[144] Interview with receiver 13 of site 4, 8th February 2010

which had higher number of receivers could still have one receiver of knowledge achieving knowledge retrieval result while in site three result was none.

Ebbinghaus (1913) stated in his research that after twenty minutes of receiving knowledge, one could recall 70% of the knowledge learned. Another study done in 1913 by Strong also found a similar result (Strong, 1913). Ebbinghaus (1913) introduced the forgetting curve to show memory in correlation with time passed. From the forgetting curve, memory fades in a matter of time if there is no recall and no repetition of learning. The forgetting curve is shown in Figure 5.5.
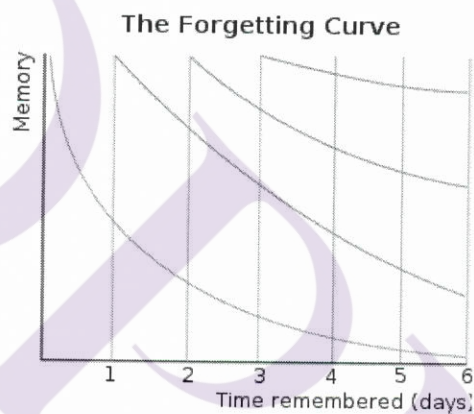
Figure 5.5: The Forgetting Curve

Source: Ebbinghaus (1913)

The location and the meeting room environment were the factors that were different but the observation and interview scripts did not pose any evidences as being the noise that could interfere with knowledge retrieval. The next factor that was different was presenters. From the finding, there was a relevancy and correlation between knowledge retrieval rate and the traits of the presenters, which would be discussed in details in section 5.2.

Evidences showed that the presenters had a major role in retrieving the knowledge. Table 5.17 shows findings and evidences. It showed that the presenters were the ones asking questions to check knowledge retrieval and asking the receivers of knowledge to do planning with the knowledge received. Detailed evidence of this last step can be viewed in Appendix L.

Table 5.17: Findings of How Knowledge Is Retrieved

Factor	Evidences	No. of Evidence from Observation	No. of Evidence from Presenters	No. of Evidence from Receivers
Presenter	The presenter asked questions to check knowledge retrieval.	4 [145]	4 [146]	None
	The presenter asked the receivers to do planning according to the knowledge received.	1 [147]	1 [148]	None

Source: Developed for this research

5.1.7.1 Presenter: The Presenter Asked Questions to Check Knowledge Retrieval

The knowledge was retrieved when the presenters asked questions about the knowledge and the receivers answered. The presenters of each site asked questions about knowledge to see if the receivers of knowledge could retrieve the knowledge. If the knowledge was not retrieved correctly, the presenters corrected and repeated the knowledge.

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[145] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010
[146] Interview with presenters of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010
[147] Observation of site one, 30th January 2010
[148] Interview with presenter of site one, 30th January 2010

5.1.7.2 Presenter: The Presenter Asked the Receivers to do Planning according to the Knowledge Received

Another finding was that the presenter asked the receivers of knowledge to do business planning with the knowledge received. In this way the receivers of knowledge could retrieve the knowledge under the presenter's supervision.

The knowledge was retrieved by the presenters asking the receivers of knowledge to answer questions about the knowledge and do business planning with the knowledge received. Table 5.18 shows evidence of findings in all sites.

Table 5.18: Cross-site Evidence of How to Retrieve Knowledge

	Factor	Evidences	Site 1	Site 2	Site 3	Site 4
How to retrieve knowledge	Presenter	The presenter asked questions to check knowledge retrieval.	Y	Y	Y	Y
		The presenter asked the participants to do planning according to the knowledge received.	Y	N	N	N

Source: Developed for this research

From the evidence, the finding that occurred in all sites was: the presenter asked questions to check knowledge retrieval. In order to determine how the receivers retrieved knowledge, the presenters played a big part. However, knowledge retrieval needs to be qualified in each site to discover the knowledge retrieval rate.

To sum up, data analysis has shown that gestalt laws of presentation applying in this research can reduce extraneous cognitive load, and element

interactivity can interfere with information processing, revealing from knowledge retrieval rate in each type of knowledge that has different level of element interactivity. It has also shown that knowledge element of more than seven coupled with its nature of being high element interactivity can interfere knowledge retrieval while knowledge with high element interactivity but with familiar knowledge elements of optimal of three can result in higher retrieval rate.

From data collection, the last finding that is significant and worth discussing concerns the traits of the presenters that differ among sites. The researcher analyzed the characteristics and traits of the presenter in each site. Details are discussed in Section 5.2.

5.2 Traits of the Presenters

As can be seen from the findings in each step of the theoretical framework, the presenters also enhanced knowledge transfer and information processing of the receivers of knowledge, and their traits had effects. From the observation note, the researcher found that each presenter was different in their traits as seen in Table 5.19[149].

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[149] Observation, 30th January, 1st, 5th, and 8th February 2010

Table 5.19: Presenters' Traits

Presenters' Traits	Site 1	Site 2	Site 3	Site 4
Argumentativeness	Y	N	N	Y
Recheck understanding	Y	N	N	N
Emphasize knowledge	Y	N	N	Y
Encourage interaction by asking for participants perspective	Y	N	N	Y
Ask questions	Y	Y	Y	Y
Expect answers to questions	Y	N	N	Y
Extraversion	Y	N	N	N
Add jokes	Y	N	N	N
Smile	Y	N	Y	Y
Openness	Y	N	N	Y
Link knowledge to real-life situation	Y	N	N	Y
Loud enough voice	Y	Y	N	N
Eye contact	Y	Y	N	Y
Agreeableness	Y	N	N	N
Conscientious	Y	Y	Y	Y
Business planning for knowledge retrieval	Y	N	N	N

Source: Developed for this research

Each of the characteristic under each trait has been discussed in chapter 4 and in details of each finding in this chapter. These traits are related to the trait-factor models by Digman (1990) and trait of argumentativeness from Littlejohn and Foss (2005). The five factors include: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Factors that the presenters possessed were argumentativeness, extraversion, openness, agreeableness, and conscientiousness. Under each of the trait, there are details of characteristics that the presenters showed. The presenter in site one had all the characteristics: loud enough voice, maintained constant eye contact, rechecked understanding, emphasized knowledge by talking about it many times, encouraged interactions by asking perspectives from the receivers, asked questions about the knowledge, expected answers to the questions asked, added jokes to light up the situation, linked knowledge to real-life situation, was in a good mood with smile,

and encouraged knowledge retrieval by asking the receivers of knowledge to do business planning using the knowledge transferred. For site four, the presenter had eye contact, emphasized knowledge, encouraged interaction, asked questions and expected answers, linked knowledge to real-life situation, and smiled. Site one and four were the two sites that had receivers of knowledge being able to retrieve 70% of knowledge after twenty minutes. There were characteristics and traits of the presenters that these two sites had in common. The presenters from site one and four had argumentativeness, openness, and conscientiousness. Their characteristics that were the same were eye contact. They emphasized knowledge and encouraged interaction. They asked questions and expected answers. They linked knowledge to real-life situation and smiled.

Each step of the theoretical framework was reviewed to find that these characteristics and traits reside in different steps: getting receivers' attention, understanding the knowledge, transferring knowledge to long-term memory, and retrieving the knowledge

From the finding, it is obvious that the differences in the characteristics and traits of each presenter especially in getting attention, understanding knowledge, transferring knowledge to long-term memory, and retrieving knowledge cater to the different rate of knowledge retrieval of site one and four. This revealed the observation of the importance of these presenters' traits in steps of information processing[150]. Section 5.3 summarizes the findings and discussion of this study.

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[150] Observation of site one, two, three, and four, 30th January, 1st, 5th, 8th February 2010

5.3 Conclusion

This qualitative study answered the research questions of how the knowledge visualization tool enhances information processing with the findings about the tool, the presenters, and the receivers of knowledge coordinating in each of the different steps in the framework initially created. The finding extends the framework in distinctive ways resulting knowledge delivery model initially presented at the beginning of this chapter. These findings are crucial in developing knowledge visualization tools to enhance information processing especially for transferring knowledge and to enter short-term memory of the receivers. The result reveals that the tool alone could enhance information processing process in the step of transferring knowledge and getting knowledge into short-term memory. The presenter alone enhances the step of knowledge retrieval. The receiver of knowledge has sole responsibility of encoding knowledge. The tool and the presenters together helped enhance information processing process in the step of getting receivers' attention and understanding knowledge. The tool, the presenters, and the receivers of knowledge together help enhance the step of understanding and transferring knowledge into long-term memory. The tool then should be developed in such a way that it is complied to gestalt laws so that it can enhance perception, be the aid to transfer knowledge, has content that can enter short-term memory. Presenters who transfer knowledge should be aware of the traits and characteristics they should hold to enhance attention, comprehension, long-term memory, and knowledge retrieval. Those important traits are argumentative, extraversion, openness, agreeableness, and conscientiousness. Moreover, receivers of knowledge should be aware of enhancements in the process of encoding the knowledge. The whole knowledge transfer process will then be fully

enhanced through careful coordination of the knowledge visualization tool, the

presenter and the receivers of knowledge.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE STUDY

Knowledge transfer to enhance information processing by the use of a knowledge visualization tool was thoroughly examined throughout this research in the context of a field sales force of a consumer product company. This research has successfully answered the research questions of how electronic slide presentation enhances the information processing of the field sales force and what other factors are enhancing the process.

The theoretical framework was built upon an information processing model, cognitive load theory and information processing theory. This research discovered that the tool is not the only factor driving information processing. The presenters and the receivers of knowledge also play their roles in enhancing and completing the information processing. The theoretical frameworks are extended according to the findings to an empirically emerged knowledge delivery model that was shown in Chapter 5, Figure 5.1.

This final chapter concludes this research by reviewing the research process, its findings, and future studies. The chapter begins with the revisit of research process, reveal of the research gap and question. Then the chapter continues by recalling distinctive findings in the theoretical frameworks. The academic

contribution is described, followed by business implications. Issues for future research are covered. Finally, the chapter ends with concluding remarks.

6.1 Revisiting the Research Process: Gap, Research Questions, and Methodology

The literature review in Chapter 2 revealed a research gap that emerged from the three areas of knowledge transfer, knowledge visualization, and cognition.

6.1.1 Research Gap and Research Questions

Review of studies, done in the field of knowledge transfer and knowledge visualization, revealed the gap for further study. Eppler (2007) identified that knowledge transfer problems could occur in an organization, which posed opportunity for future research. There has been research to develop knowledge visualization tools to overcome the issues found in Eppler's (2007) research. However, there has not been a study exploring the knowledge transfer by means of knowledge visualization tools that enhance information processing of the receivers of knowledge. Many knowledge visualization tools have been developed, but no studies have shown that these tools can enhance knowledge transfer process up to the level that the receivers of knowledge could memorize the knowledge and retrieve it for further use. Kerren et al. (2007) in "Workshop Report: Information Visualization – Human-centered Issues in Visual Representation, Interaction, and Evaluation" stated that there was a lack of human-centric approaches to visualization. Workshop participants agreed that too much information visualization research is focused on creating evocative visuals with relatively little regard to user needs and tasks. There is an actual need for research that focuses on user needs and tasks. From literature review and studies done, it seems that

knowledge visualization tools could increase performance, improve communication, and reduce misinterpretation. The literature revealed that there was insufficient knowledge and data to explain how a knowledge visualization tool used to transfer knowledge enhanced information processing. This gap was explored and explained in a qualitative study of a field sales force of a consumer product company. The gap in literature was in three major fields – knowledge transfer, knowledge visualization, and cognition, so the aim of this study was to explain how the knowledge visualization tools used to transfer knowledge enhanced cognition as in information processing system. This research aimed to address the following research questions:

1) How does electronic slide presentation, used to transfer knowledge, enhance cognition from the aspect of information processing?

2) What are other factors that can enhance cognition?

The above two research questions have been answered with the knowledge deliver model that empirically emerged.

6.1.2 Methodology

The research employed an exploratory qualitative study approach to address the research questions. This is the method that could best answer the 'how' in research questions. Chapter 3 explained this in details. Data collection methods selected were documentation, observation, and interview. Content analysis was used to thoroughly examine the content of knowledge and instructional design of the tool against gestalt laws of presentation. Interview questions for presenters and receivers were carefully created according to the theoretical framework and research sub-questions. The interview was a semi-structured one. Observation note template was

created prior entering research sites. Field work protocol was carefully followed so that details were not left out. Knowledge transfer sessions were closely observed. The receivers of knowledge in site one and two were interviewed individually while site three and four were in group to explain how the tool enhanced the information processing system and to learn more about how knowledge was retrieved. The interview was re-conducted once the researcher needed more insights to fulfill the analysis. All data from observation notes were arranged in QSR NVivo 8 and tabulated sheets and analyzed to answer the research questions. Data were analysed according to the theoretical framework initially created. Research sub-questions were answered in each of the steps of the theoretical framework. Discussion against existing theories and findings were carried out. Conclusion was made after that.

6.2 Recalling Findings and Discussions

This research has used the empirical data for analysis and discussions to derive to the knowledge delivery model as a major finding. There are seven steps in delivering knowledge. They are: 1) get receivers' attention, 2) transfer knowledge, 3) understand knowledge, 4) transfer knowledge to short-term memory, 5) encode, 6) transfer knowledge to long-term memory, 7) retrieve knowledge. The model explained and answered research questions. Refer to the model in Figure 5.1 in chapter 5. This model will serve as a guide for successful knowledge delivery. It can be applied in academic and business sectors or any knowledge transfer environment. The model is a holistic model that synergizes the tool, the sender, receiver, and learning. It elaborates the 'how' in each of the information processing steps that will

deliver knowledge to long-term memory to be retrieved for later use. The following details summarize the findings:

To transfer knowledge, the tool, the presenters and the receivers of knowledge had active roles. The tool alone could not enhance the complete information processing process. The presenters and receivers of knowledge also had active roles in different steps of knowledge delivery.

The result revealed that the tool alone could enhance information processing process in the step of transferring knowledge and getting knowledge into short-term memory. The presenter alone enhanced the step of knowledge retrieval. The receiver of knowledge had sole responsibility of encoding knowledge. The tool had to be complied with gestalt laws to reduce extraneous cognitive load of the receivers. Content analysis revealed that high element interactivity knowledge of optimal of three knowledge elements could still be transferred and did not create intrinsic cognitive load.

The tool and the presenters together helped enhance information processing process in the step of getting receivers' attention and understanding knowledge. The tool, the presenters, and the receivers of knowledge together helped enhance the step of transferring knowledge into long-term memory.

In order for the presenters to help enhance information processing process of the receivers, they needed to have specific traits which are argumentativeness, openness, agreeableness, extraversion, and conscientiousness.

With these findings, academic and business contributions are elaborated in section 6.3 and 6.4.

6.3 Theoretical Contributions

This research contributes to academic knowledge in the areas of knowledge visualization, knowledge transfer and delivery, and psychology in the aspect of cognition. With regard to knowledge visualization, this research has contributed its findings from an instructional design standpoint. Tools need to be designed in such a way that they encourage the audience to achieve visualization. Past research has shown that knowledge visualization tools can be perceived as beneficial and can encourage recall (Burkhard & Meier, 2004, 2005; Eppler, 2006). A research done by Tuvi-Arad and Blonder (2010) states that Chemistry teacher learning new chemistry concept can have a deeper understanding of the subject when visualization tool is used as a mean (Tuvi-Arad & Blonder, 2010). Another research by Oliver (2012) also states that visualization tools can increase understanding in students and are favorably considered by educators. However, they are difficult to evaluate, both from the interactive point of view, and the learning outcomes (Oliver, 2012).This research has shown that knowledge visualization is crucial in different steps in the information processing of the receivers. Knowledge visualization should be user-centric, not just in the realm of making the tool beneficial to the users, but realizing that the tool is important in certain steps of learning though not all. To explain further, the tool has to be created in such a way that it caters to the learning of its users. The use of color and pictures and gestalt laws of presentation has proved to be efficient in

enhancing learning of the audience. Past research focused on developing complex tool to transfer knowledge (Eriksson & Hauer, 2004; Eppler, 2006; Keller, 2006). From observation and interview, those constructing instructional materials usually ignore the fact of applying instructional design rules to a simple tool that already exists.

Regarding knowledge transfer and delivery, this research has contributed to a complete theoretical model of knowledge delivery. Past research showed knowledge transfer in such a way from creating to disseminating (Nonaka, 1995; Alavi & Leidner, 2001; Hau & Evangelista, 2007). The findings of this research revealed that in order to transfer and deliver knowledge to the end-users and make them use that knowledge to complete the task, their information processing has to be complete. By completing the process, the tools, the presenters, and the receivers of knowledge themselves have to be aware of the parts they are taking in each step of the process to instill knowledge into their long-term memory in order to be able to retrieve for later use. The tool alone cannot complete the process. Neither can the presenter or the receivers of knowledge.

In the psychology field, this research has contributed to the study of cognition in the aspect of information processing. The information processing process that has been established in earlier research indicated that the human mind processes information similar to the way that computers do (Huitt, 2000). This research found that in the information processing of human minds, it takes the tool, the presenters, and the receivers of knowledge to complete seven steps of processing information into knowledge. Another contribution of this research is in the cognitive load theory which is still in the field of psychology. This research has confirmed that to reduce

extraneous cognitive load, gestalt laws of presentation should be applied to even a simple tool like electronic slide presentation. It confirmed that high element interactivity knowledge of no more than three knowledge elements do not create cognitive load and can still be learned.

All these findings contribute to the literature in the fields of knowledge management, visual representation, and cognition.

6.4 Business Implications

These research findings present valuable business implications, especially in the aspect of human resources and sales. Organizations that promote learning can apply these findings and make use of the knowledge delivery model in order to transfer necessary knowledge efficiently. The tool found in this research, which is electronic slide presentation, is a common tool used in many organizations. Personnel who use it now know that applying gestalt laws of presentation can help in delivering knowledge across and not add unnecessary cognitive load. This can be very useful to human resources, especially in developing training materials.

The finding about the traits of the presenters can be applied to trainers of the organizations or those disseminating knowledge within the broader organization. They would know how to act to drive knowledge to the receivers. They would know exactly when to play a critical role and how to emphasize the knowledge chunk that they want the receivers to remember. Repeating the knowledge and checking understanding are ways to ensure that knowledge is transferred to long-term memory.

Traits that a presenter should have are argumentativeness, extraversion, openness, agreeableness, and conscientiousness.

The receivers of knowledge in the organization would know that they have an important role in encoding knowledge into their own brains. Whenever the receivers are listening to anything, they have to be responsible for their own learning in encoding it. In sales organizations in which new and updated knowledge is delivered every month, different types of knowledge need different treatment. Knowledge that has lots of pictures and colors are easy to be transferred. Knowledge that has only texts and has many elements combined together such as promotion details needs to be rehearsed and practiced many times in order to be remembered. If promotion is important, then sellers know that it is worth taking time to rehearse and practice in planning and selling it.

6.5 Limitation of the Research

This research is an exploratory qualitative research. This approach of research work is best suited to answer research question of 'how'. Findings reported here are empirical. It results in a theoretically contributed knowledge delivery model. The knowledge delivery model derived can be generalized, applied, and replicated in other knowledge transfer contexts to enhance information processing. However, the limitation of this research is the generalizable nature of qualitative study. The findings cannot be generalized statistically but it can be generalized conceptually and theoretically. The researcher was allowed to enter four out of eleven sites. Though the manager said that four sites were representing huge business contribution, the

researcher might have gained more insights if allowed to enter more. The results gained from this research are in inductive nature to support the research objectives. If more cases were to be conducted and make it experiment in nature, it might have catered to a negative or a counterfactual evidence that might have brought the result into other direction. The timing of the knowledge transfer was a limitation to the point that it only happened once a month. The owners of the site did not allow photo taking during field work. To visualize the research site, the researcher had to use the sketch. The names of the presenters and receivers had to be concealed. The content and pictures of knowledge could not be revealed due to the confidentiality of the business. Despite all the limitations, the empirical data gathered is sufficed to emerge into a knowledge delivery model.

6.6 Future Research

Potential future research should study the characteristics and traits of the receivers of knowledge, the decrease of the effect of high element interactivity, and identifying what type of knowledge needs which type of gestalt laws of presentation. Moreover, a broader range of learners in the same or different context in a quantitative approach might yield interesting result. A controlled experiment with different variables in traits of presenter, tools, and noise and distraction can also be studied.

This research has identified the traits of the presenters to be able to enhance the information processing but has not extended to the traits of the receivers of knowledge. The traits of the receivers if studied would be important in telling the

receivers how they should act to learn best and how the presenters can encourage that behavior.

The findings from this research should be used to extend to other research when knowledge is transferred online. A question may arise if the knowledge delivery model can still apply to online learning with tutor presence or interaction. Future research can confirm if the same information processing can be used in online learning or whether a different process is needed.

This research has pointed out the importance in applying gestalt laws of presentation to the tool. However, future research indicating which type of knowledge requires which type of gestalt laws would be very useful for developing an even more efficient tool to transfer knowledge.

6.7 Concluding Remarks

How the information processing process is enhanced is studied thoroughly in this study. The knowledge visualization tool alone could not complete the process. It has its role in getting attention and transferring knowledge to short-term memory. The tool must be complied with gestalt laws of presentation to reduce cognitive load. Gestalt laws are the basic laws of presentation that are usually ignored when designing the tool. This study has shown that if the laws are complied, extraneous cognitive load can be reduced.

The study also reveals that it takes other factors to complete the process. The presenters and the receivers of knowledge have their parts as well. The presenters

can get attention, help the receivers understand the knowledge, transfer it to long-term memory, and help receivers retrieve it. It takes certain characteristics and traits of the presenters to be able to enhance those steps and make knowledge retrieval high. The receivers are responsible for their own knowledge encoding.

With these findings, the research gap is fulfilled. The tool can be designed in such a way that it will not create cognitive load to the receivers. The presenters need to adopt certain characteristics and traits to be effective. The receivers are aware of their own knowledge encoding. Knowledge transfer of similar context can adopt the knowledge delivery model for ultimate knowledge transfer result.
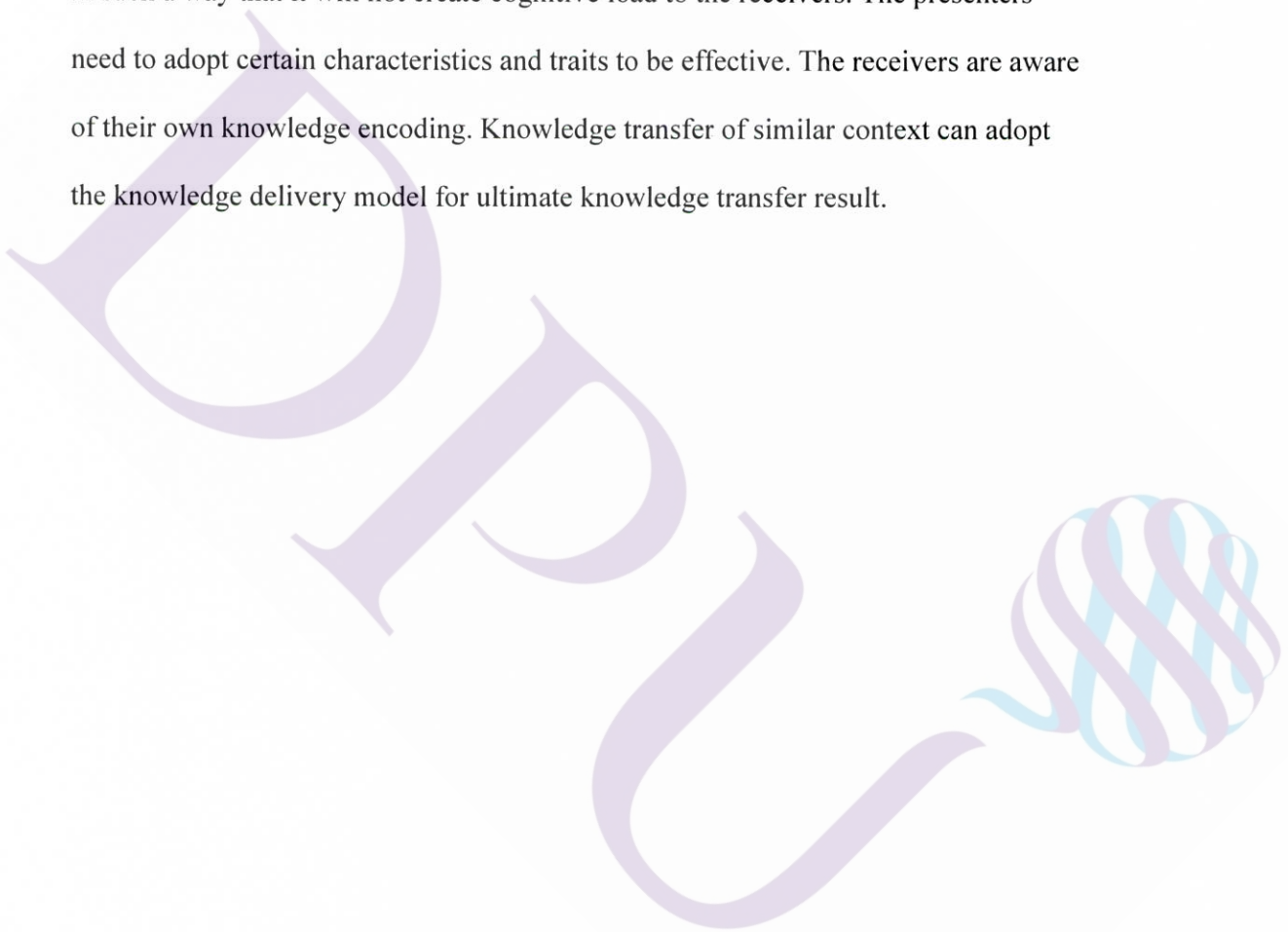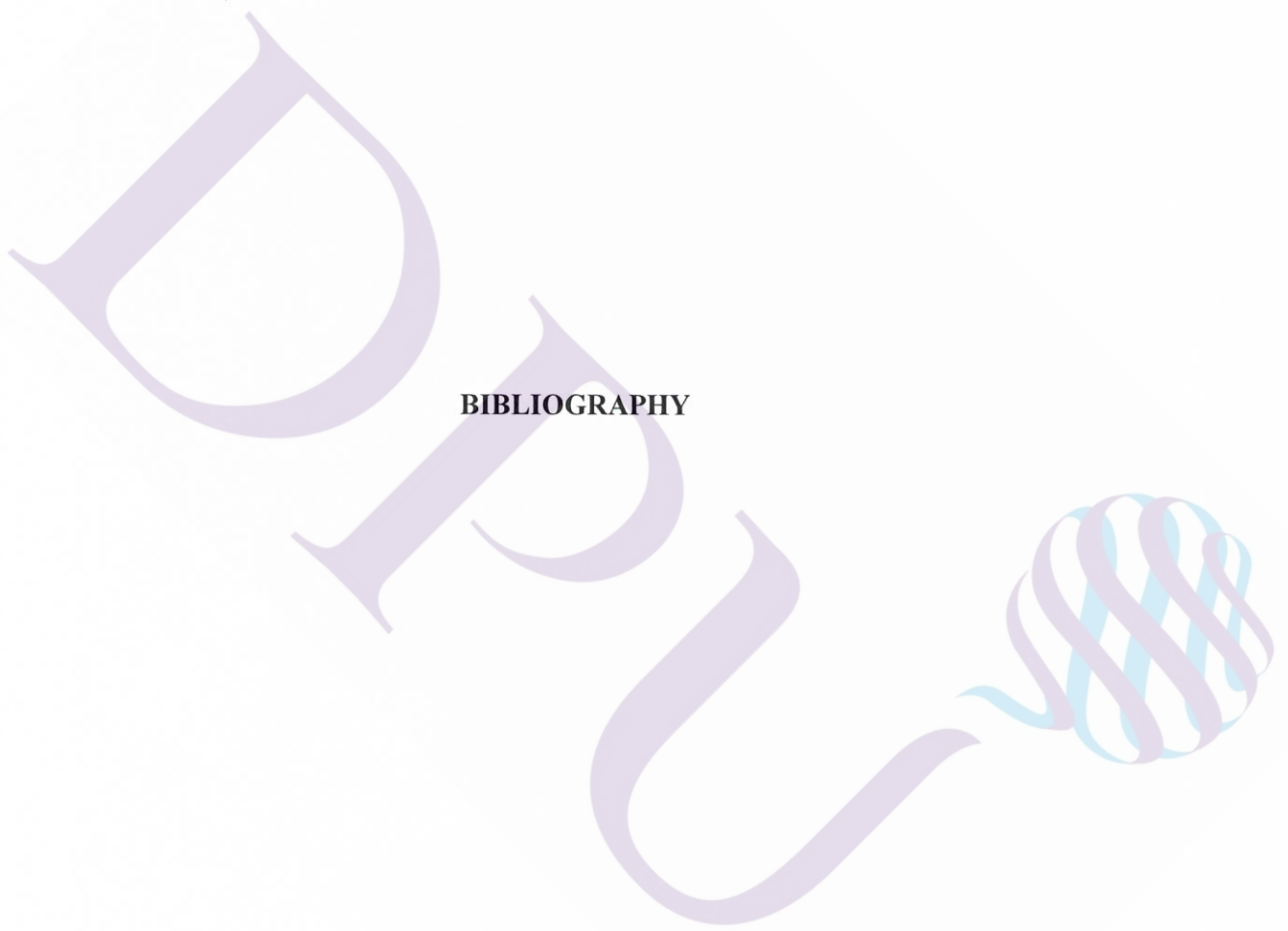
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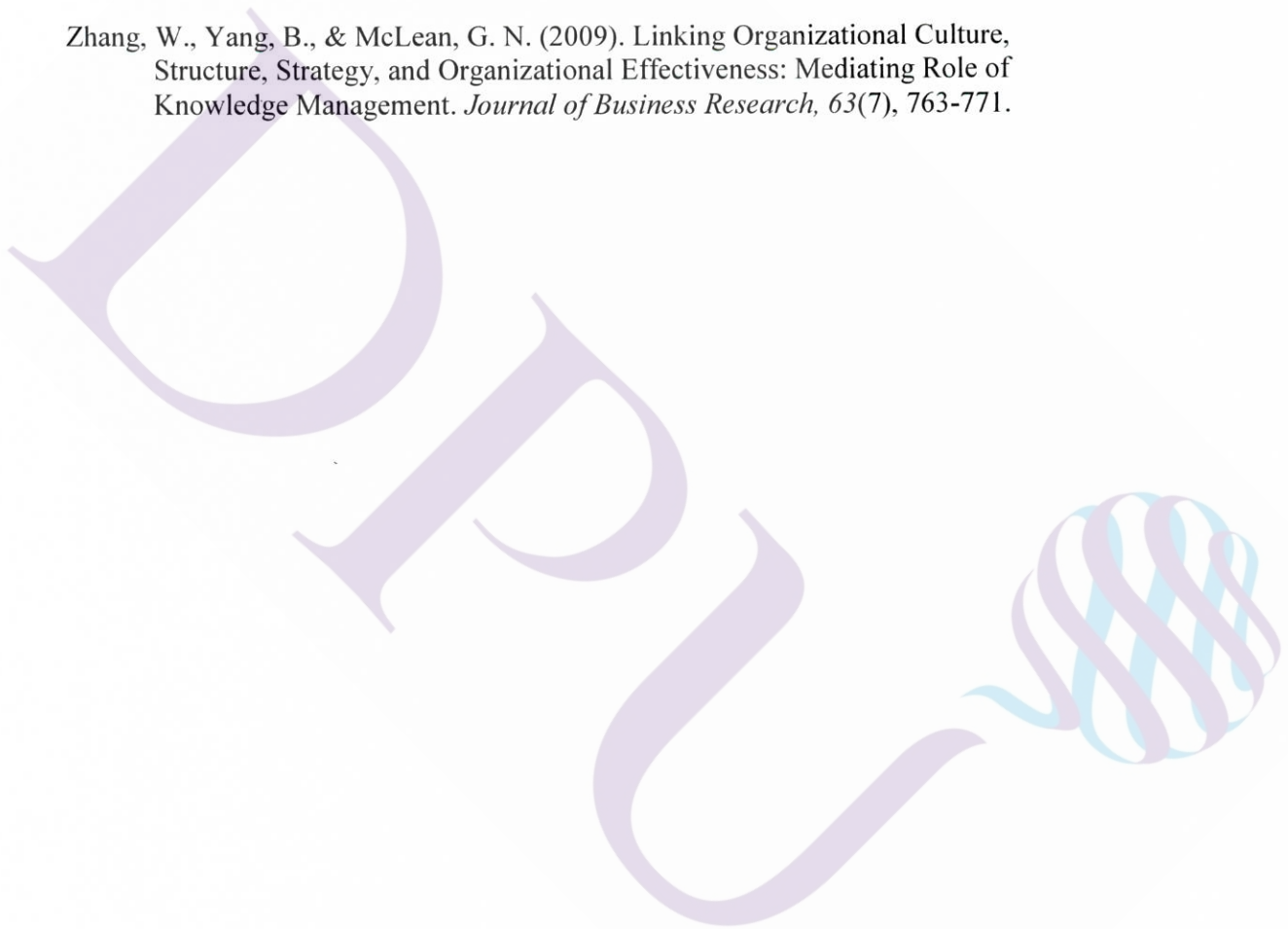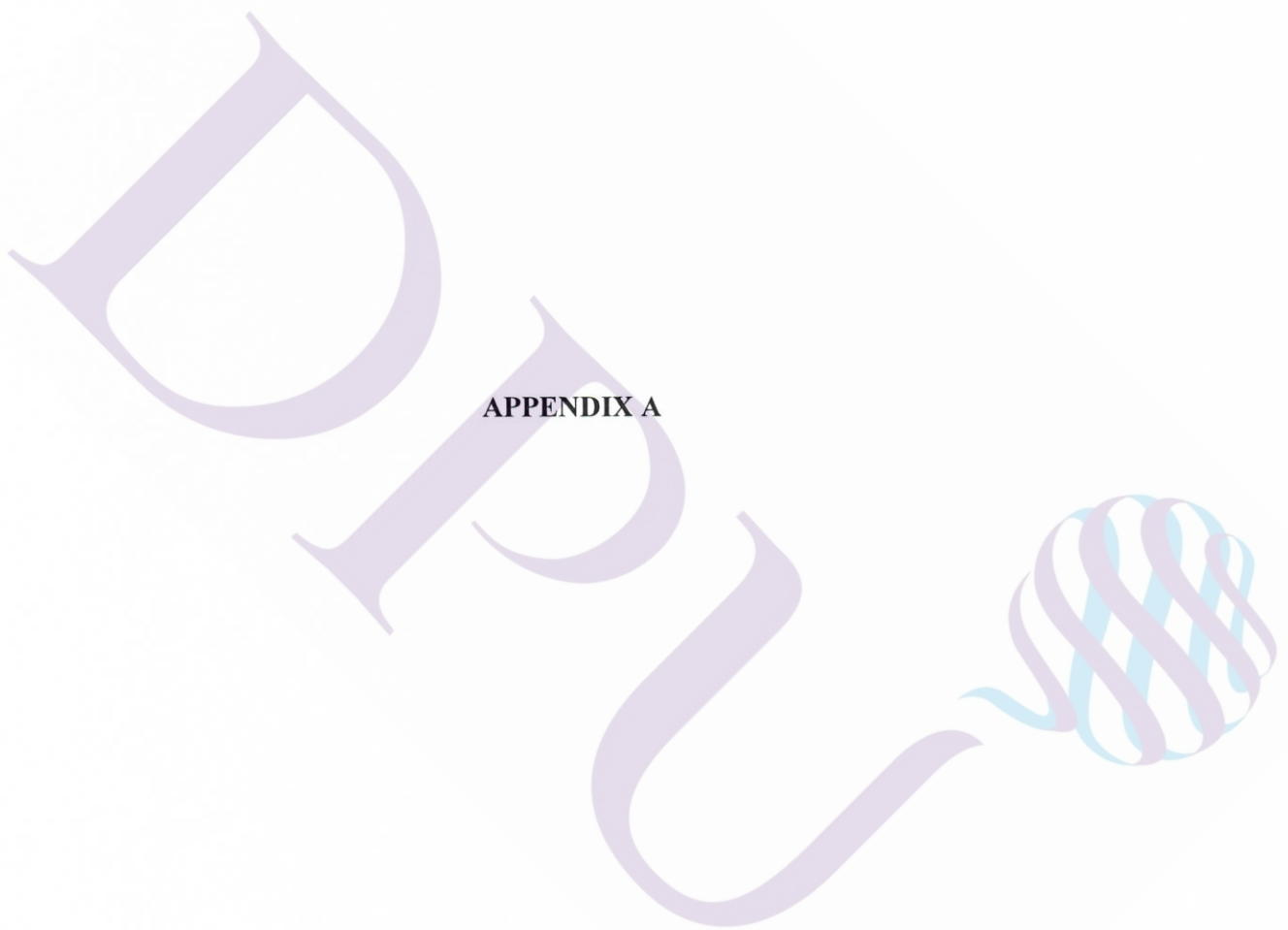
APPENDIX A

Knowledge Visualization Tools

a) Heuristic Sketches

b) Conceptual Diagrams

c) Visual Metaphors

Position A

BATNA~A~

Position B

BATNA
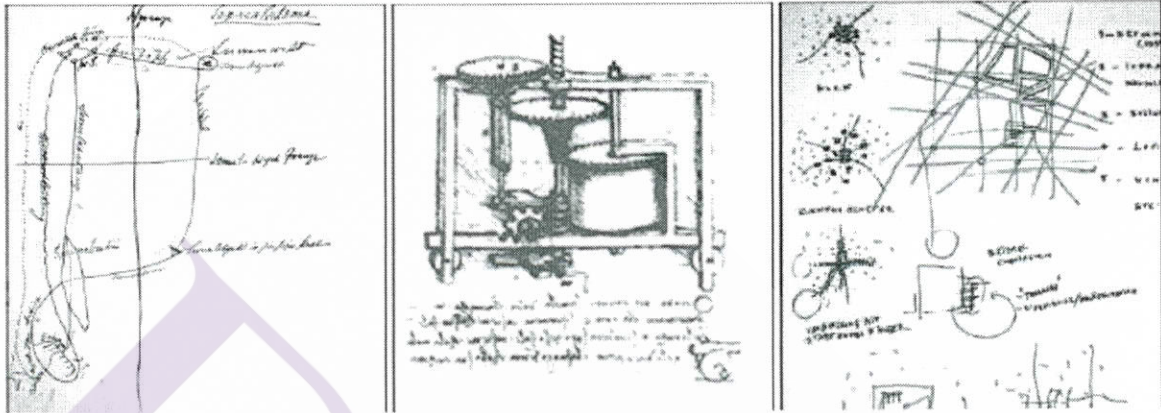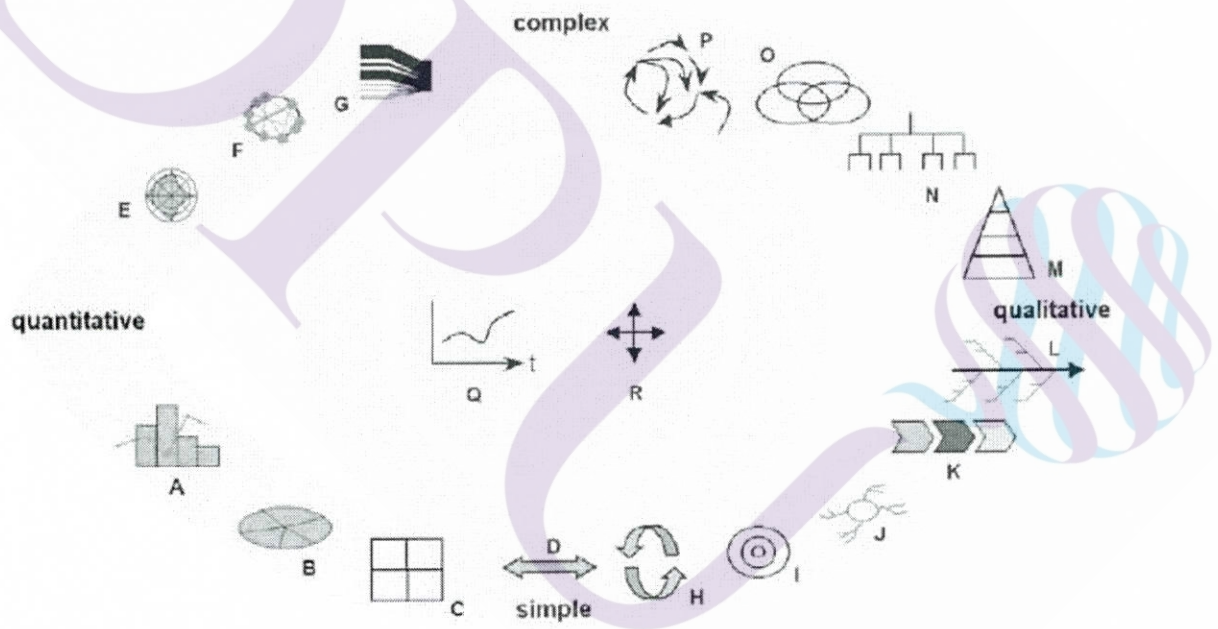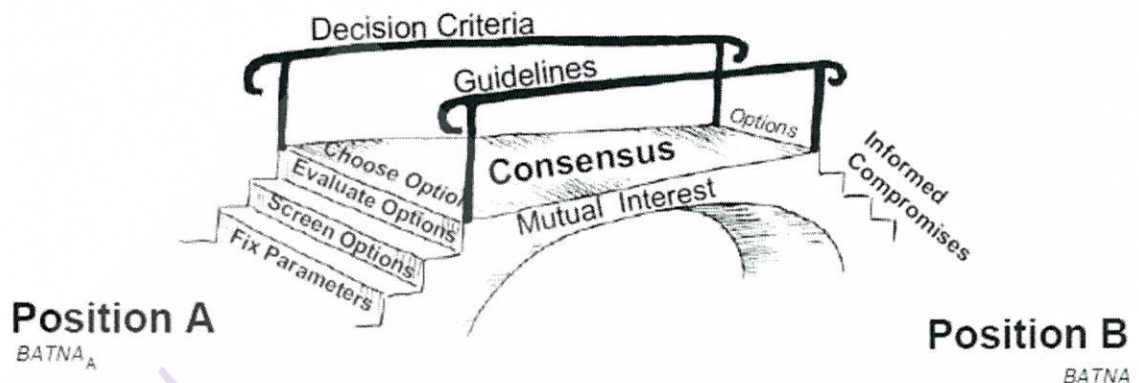
d) Knowledge Animations
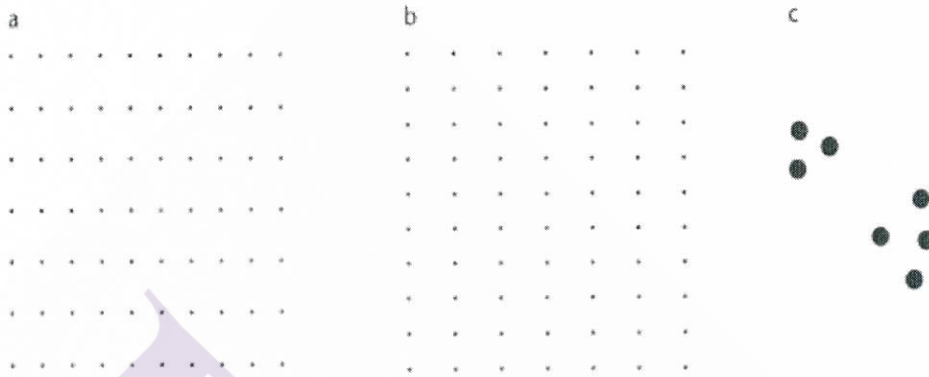
e) Knowledge Maps
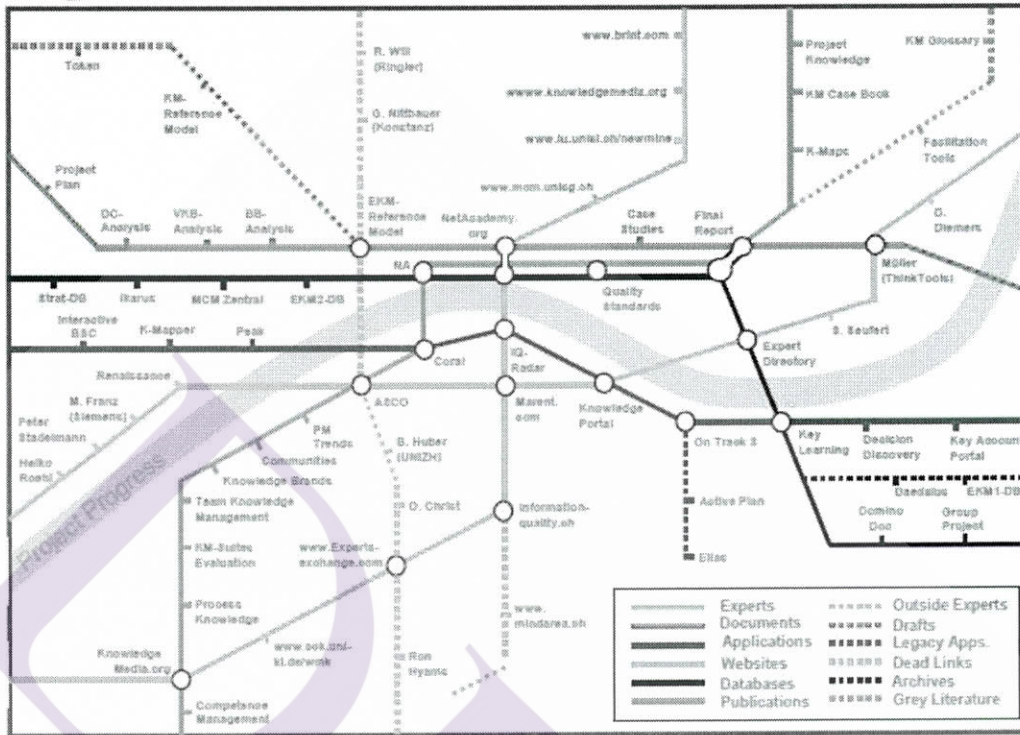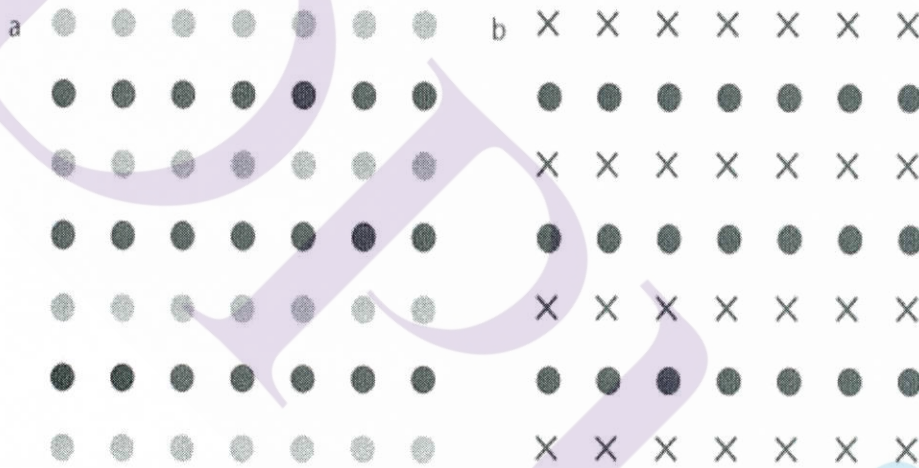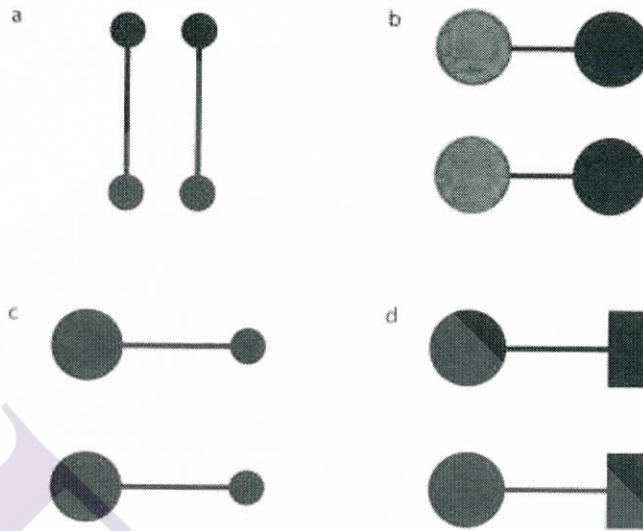

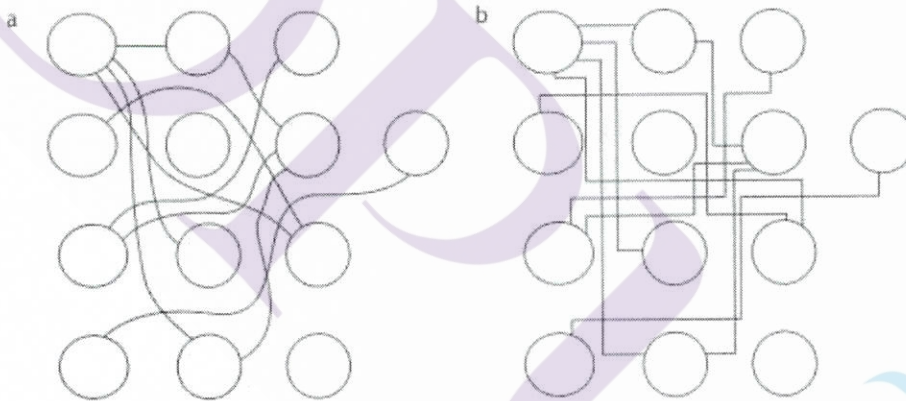**f) Scientific Charts**
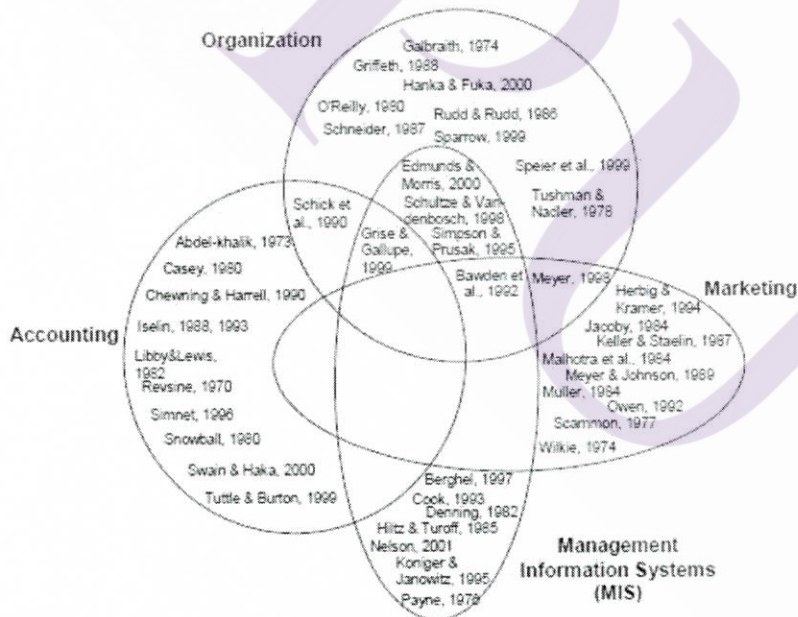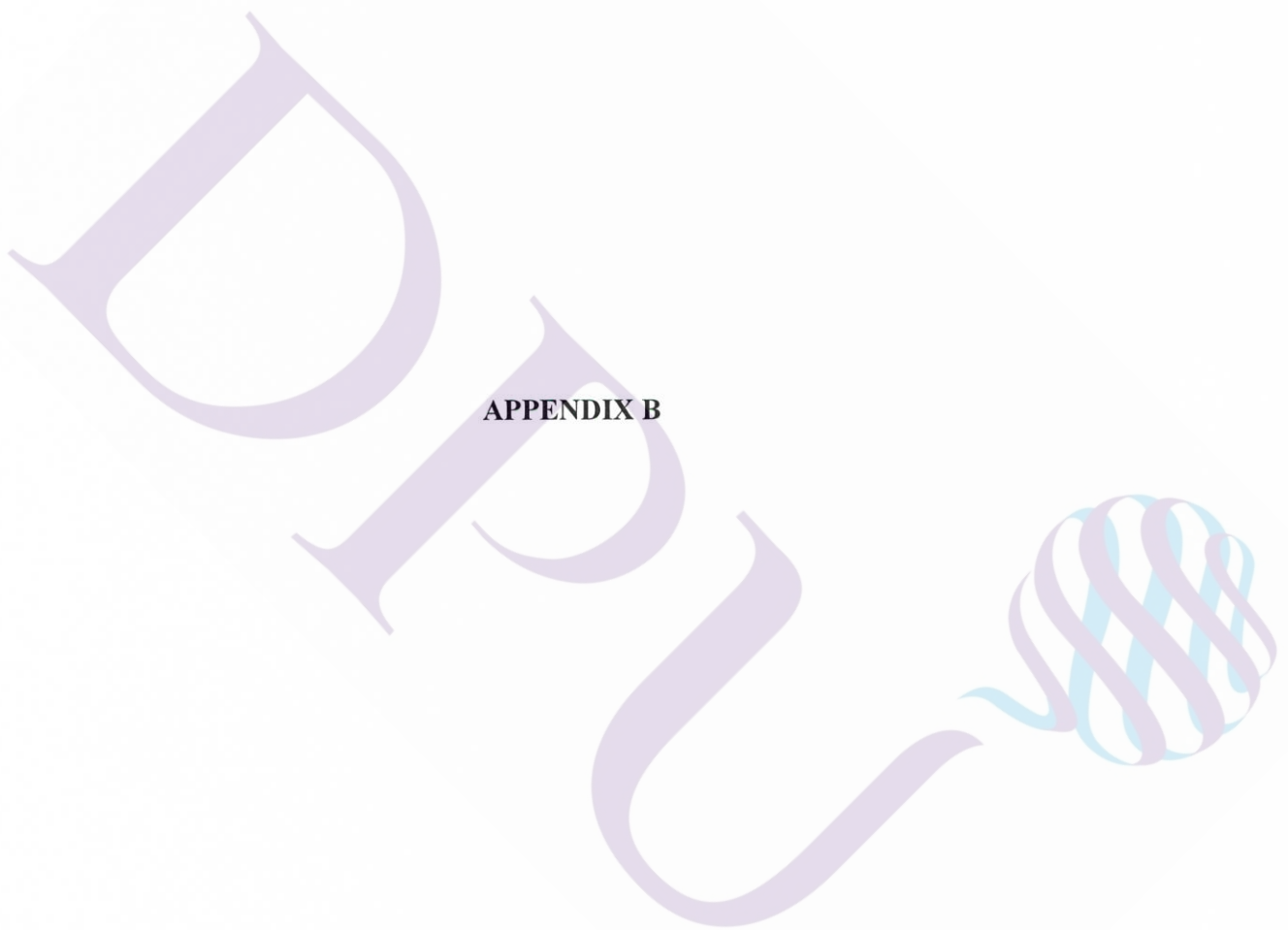
APPENDIX B

Gestalt Laws

1. Proximity: things grouped close together are also perceptually grouped.


2. Similarity: similar elements and shaped tend to be grouped together.

3. Connectedness: connecting things together is a very powerful way of indicating that there is some relationship between them.
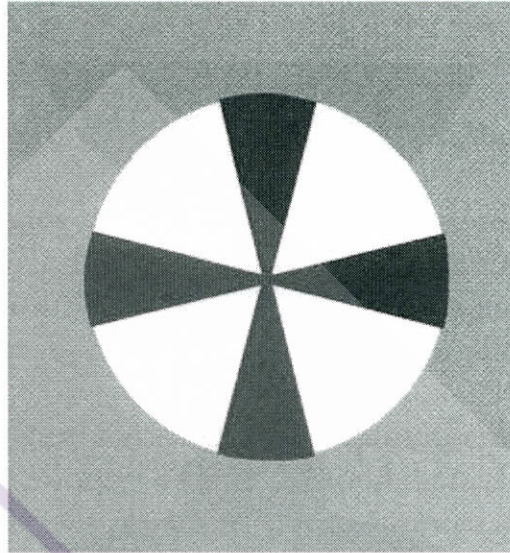

4. Continuity: humans seem to recognize things that are linked together smoothly and continuously rather than things that are connected by lines that abruptly change in direction.
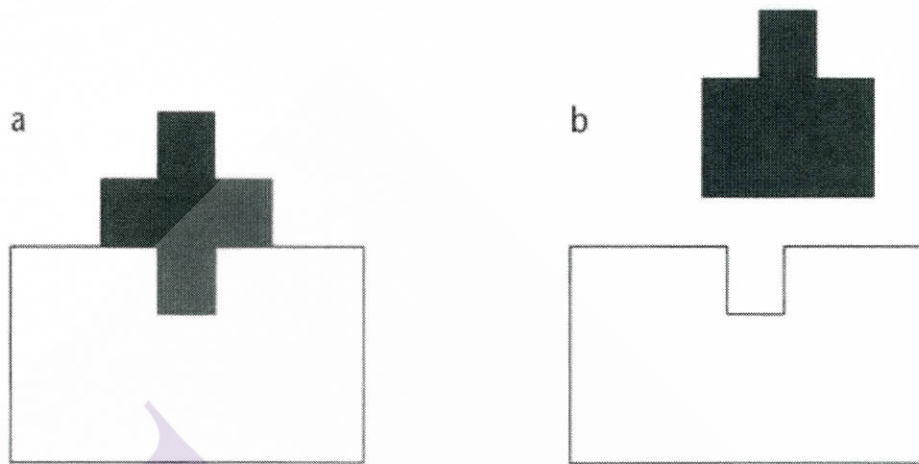
5. Symmetry: this can provide powerful organizing construct.
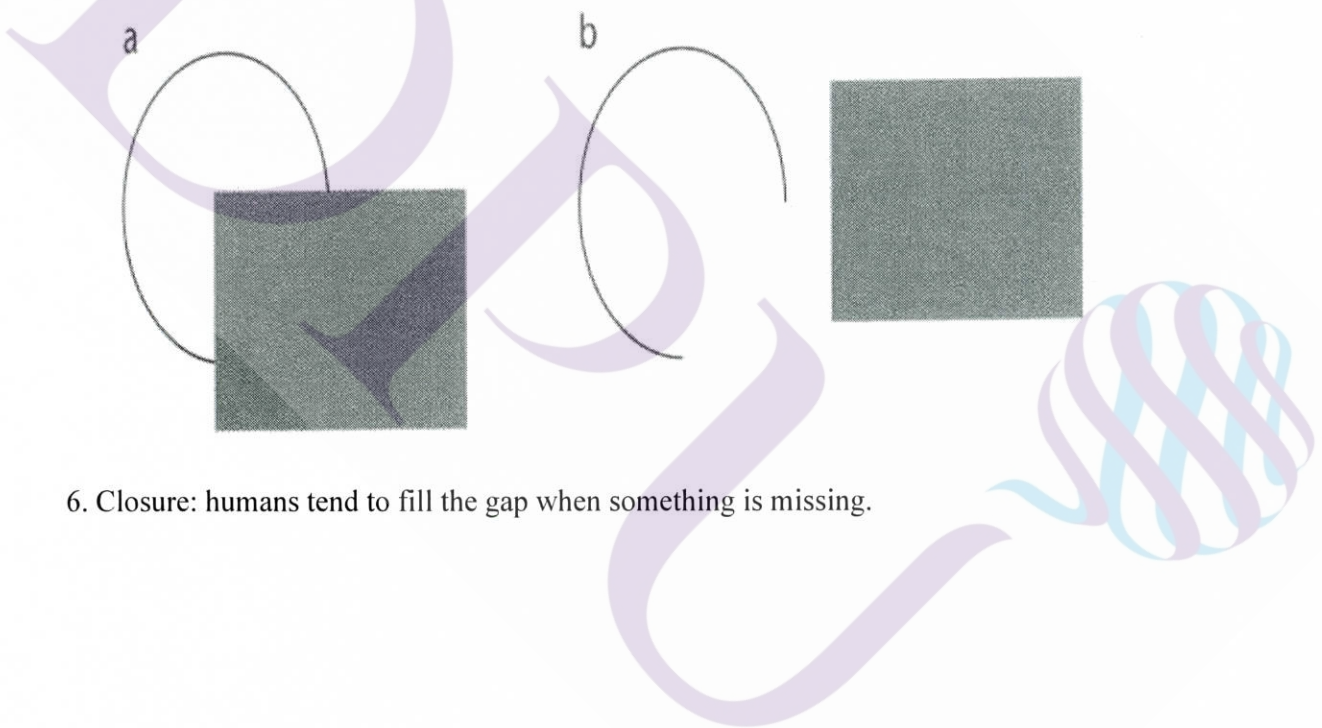
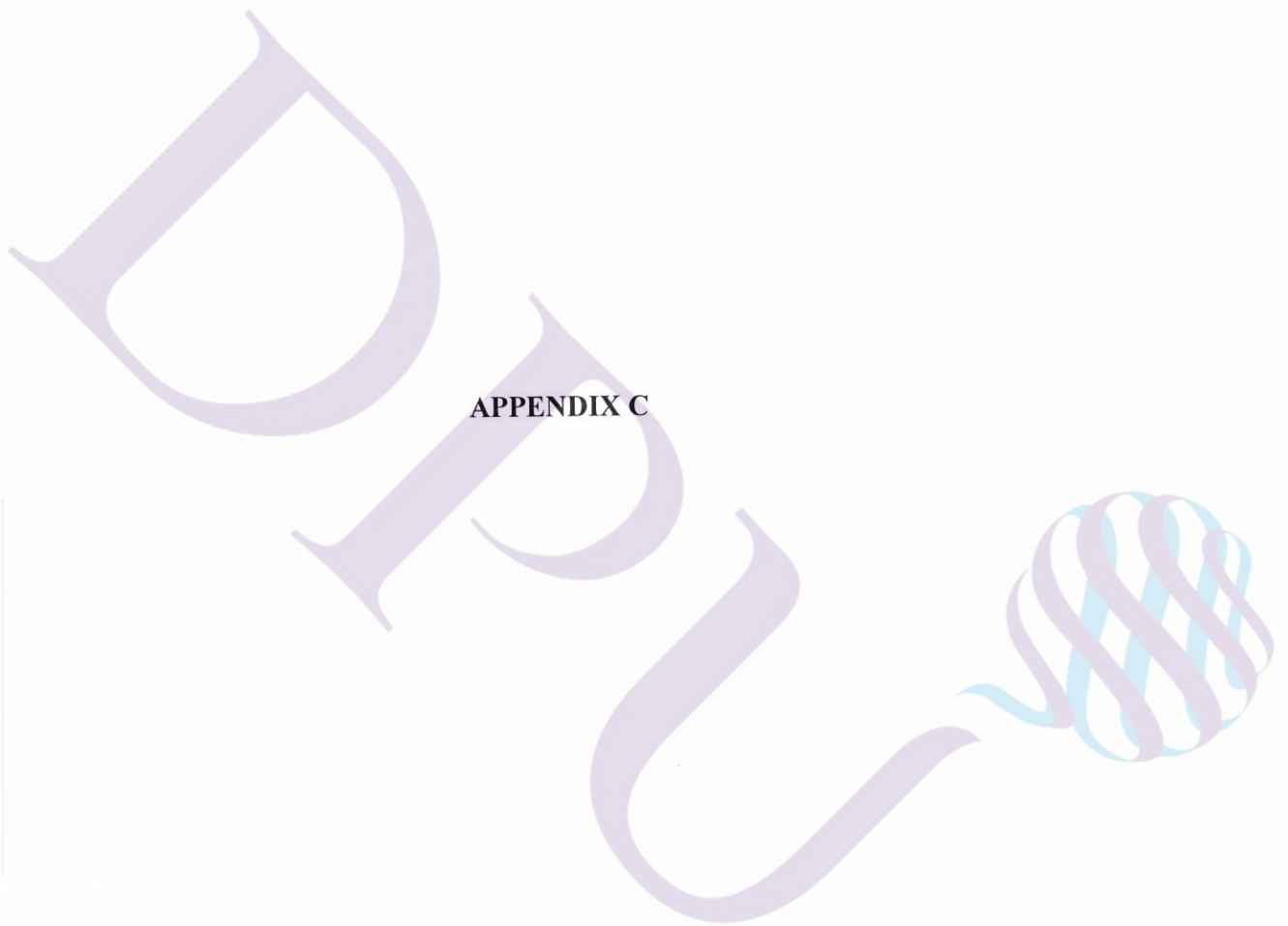6. Closure: humans tend to fill the gap when something is missing.

7. Relative size: smaller components of a pattern tend to be perceived something small when they can actually be something big being covered partially by something smaller.

8. Common fate: elements that are moving in the same direction seem to be perceived as a collective unit.

APPENDIX C

Letter of Consent

Ms. Daranee Delorme

DPU International College
Dhurakij Pundit University
6th Floor, Building 6
110/1-4 Prachachuen Road
Laksi, Bangkok 10210, Thailand

23 January 2010

Mr. Site owner

Distributor x

Dear Mr. Site owner

I would like to arrange to enter distributor sites under your responsibility which are SMK, BKC, and CBR during Jan-Mar 10 canvass period as part of a PhD study that I am conducting on **knowledge transfer** in the a consumer product company.

The objective of my study is to investigate how the use of knowledge visualization tools enhances cognition of sales representatives. The outcome of this study is likely to give the answers to how knowledge visualization tools can help enhance cognition so that users of the tools can make more effective use of them. Developers of the tools know how to develop them to fit with users and a framework or a theoretical concept can be emerged.

By way of background on myself, I am a PhD student at DPUIC (Dhurakij Pundit University International College). I wish to emphasise that I am **NOT** seeking any information that might be regarded as commercially confidential – instead, all names that are used will be changed to pseudonyms to remain confidential. Only the findings will be published for public benefits.

If you wish to confirm my bona fides, I know that my supervisors, Ajarn Sawitree Sutthijakra (PhD Lecturer at DPU) and Ajarn Adshariya Agsornintara (Director of

Programme Management at NECTEC), will be happy to discuss the purpose of my research with you.

In exchange for your valuable resources, I will be happy to provide you with a summary of my study as soon as it is completed.

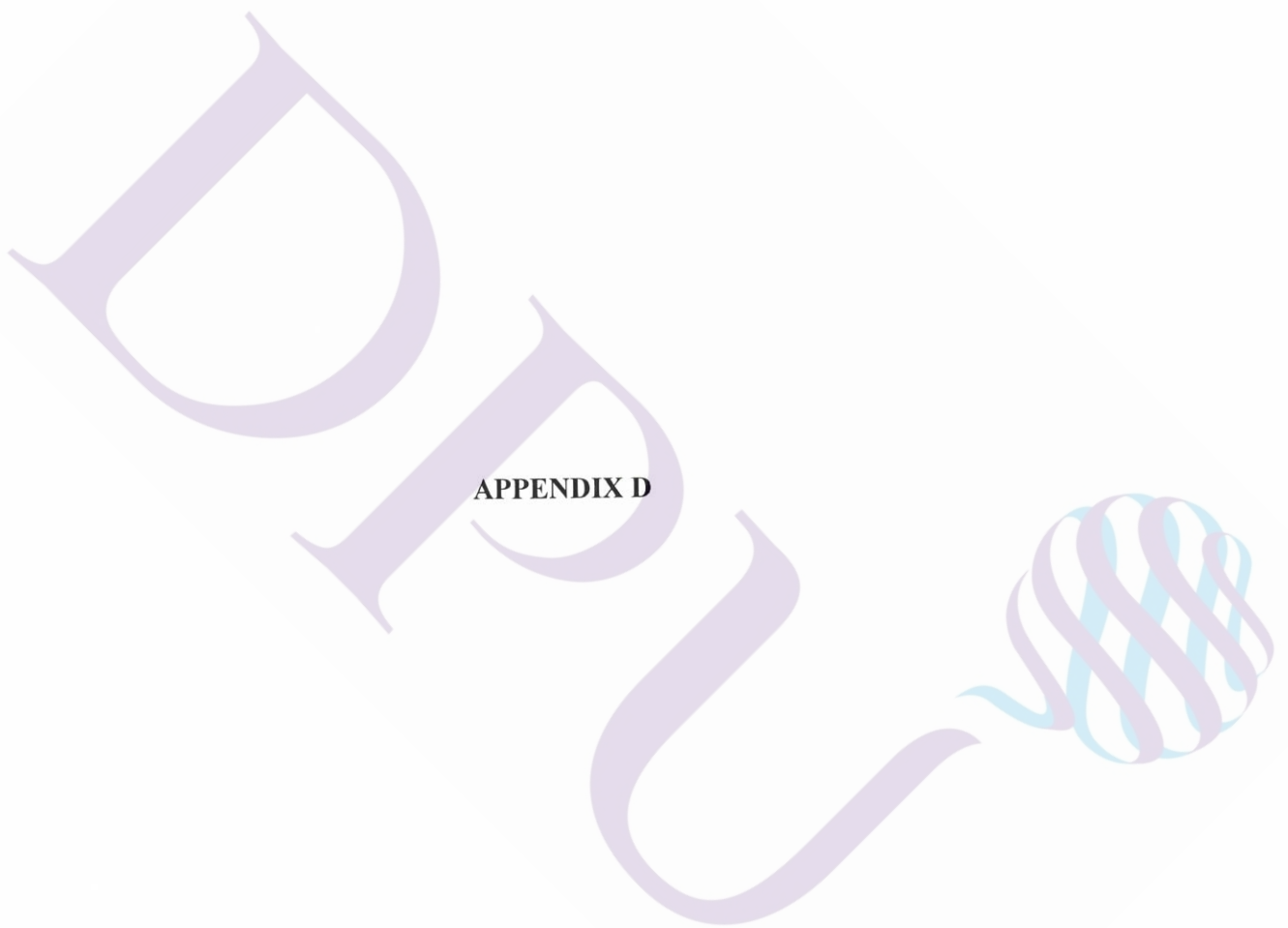If you have any questions about the study please do not hesitate to ask me.

Yours sincerely,

Daranee Delorme

Tel: 081-9122203

Email: annedaranee@hotmail.com

APPENDIX D

Observation Note Template

General Information of the case

Site No.	
Date	
Time	
Place	
Key informant	
How many people?	

Physical setting of the case

How big is the place?	
What is the setting of the room?	
What is the temperature?	
How's the lighting?	
Any drink station?	
What furniture's used?	
What color is the place?	
Any windows?	
How many doors?	
Does the room have any smell?	
Is the room well-aired?	
What sound system is being used?	
Can the voice be heard by all?	
Any electrical devices avail in the room?	

Social environment of the case

How the people dress?	
What kind of bags they use?	
What kind of shoes?	
What devices they use?	
Do they know each other?	
Does the key informant know everyone?	
What do they talk about?	

Historical perspective of the case

How long does this distributor be in operation?	
What is the service year of the sales rep?	
What is the service year of the key informant?	
What is the business result?	

Planned program

What's the agenda?	
Do all know about the agenda before?	
Which program gets the majority of the attention?	
What's the duration of each program?	
What's the nature of each program?	

Informal and unplanned activities

Any informal activities occur?	
How do people react to the informal activities?	
Any unplanned activities occur?	
How do people react to the unplanned activities?	

Special program language of the case

Any jargons used?	
Does everyone understand?	

Insights and feeling of the observer of the case

What insights does the observer gain?	
How does the observer feel today?	
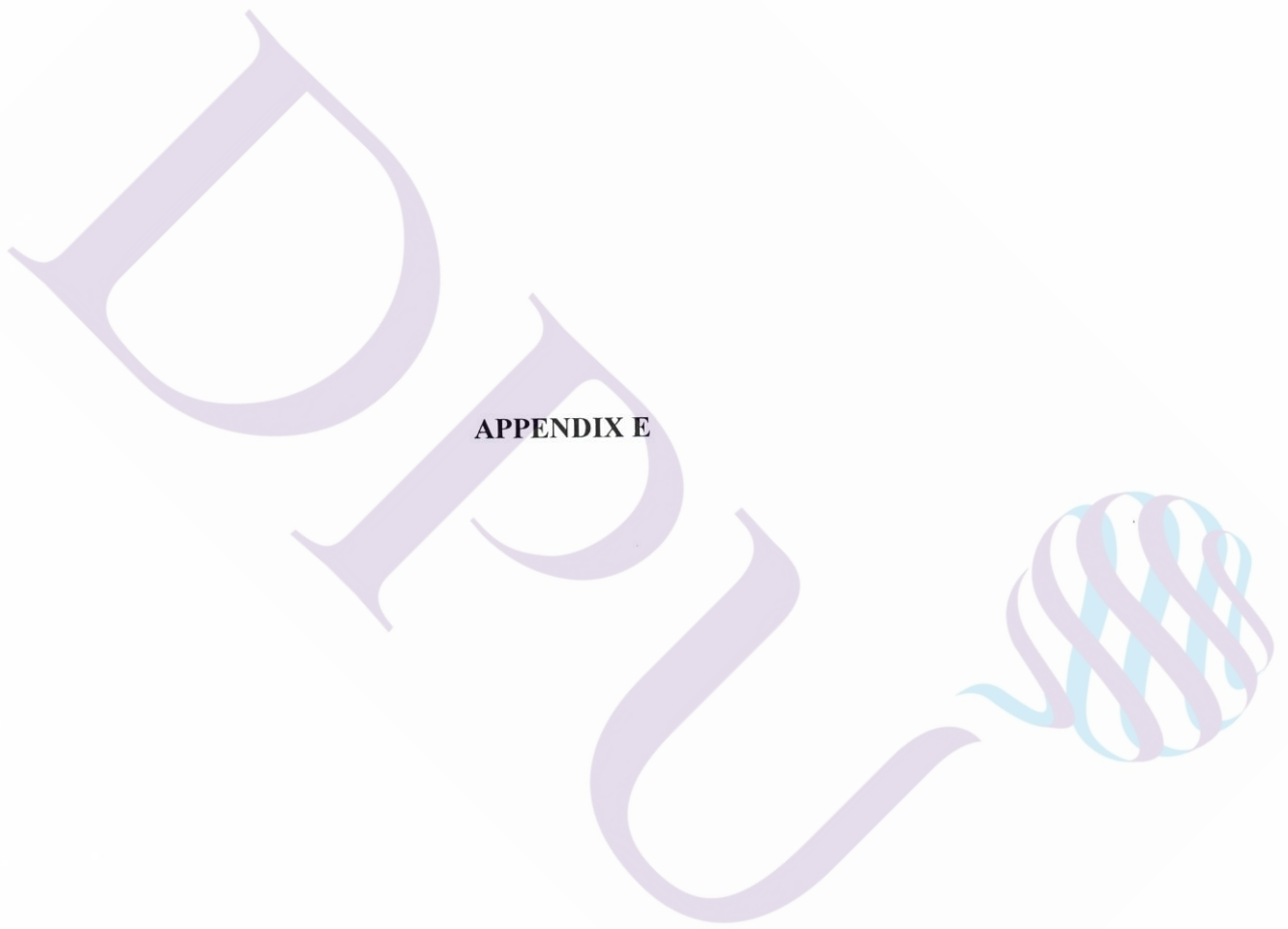
APPENDIX E

Site No................

Date..............

Field Procedure Check List

Needed Devices

- ☐ Field procedure checklist
- ☐ Observation note
- ☐ Voice recorders
- ☐ Extra batteries
- ☐ Computer
- ☐ Extra pens
- ☐ Copies of interview questions
- ☐ Digital camera
- ☐ Paper for note taking

APPENDIX F

How to get receivers' attention?

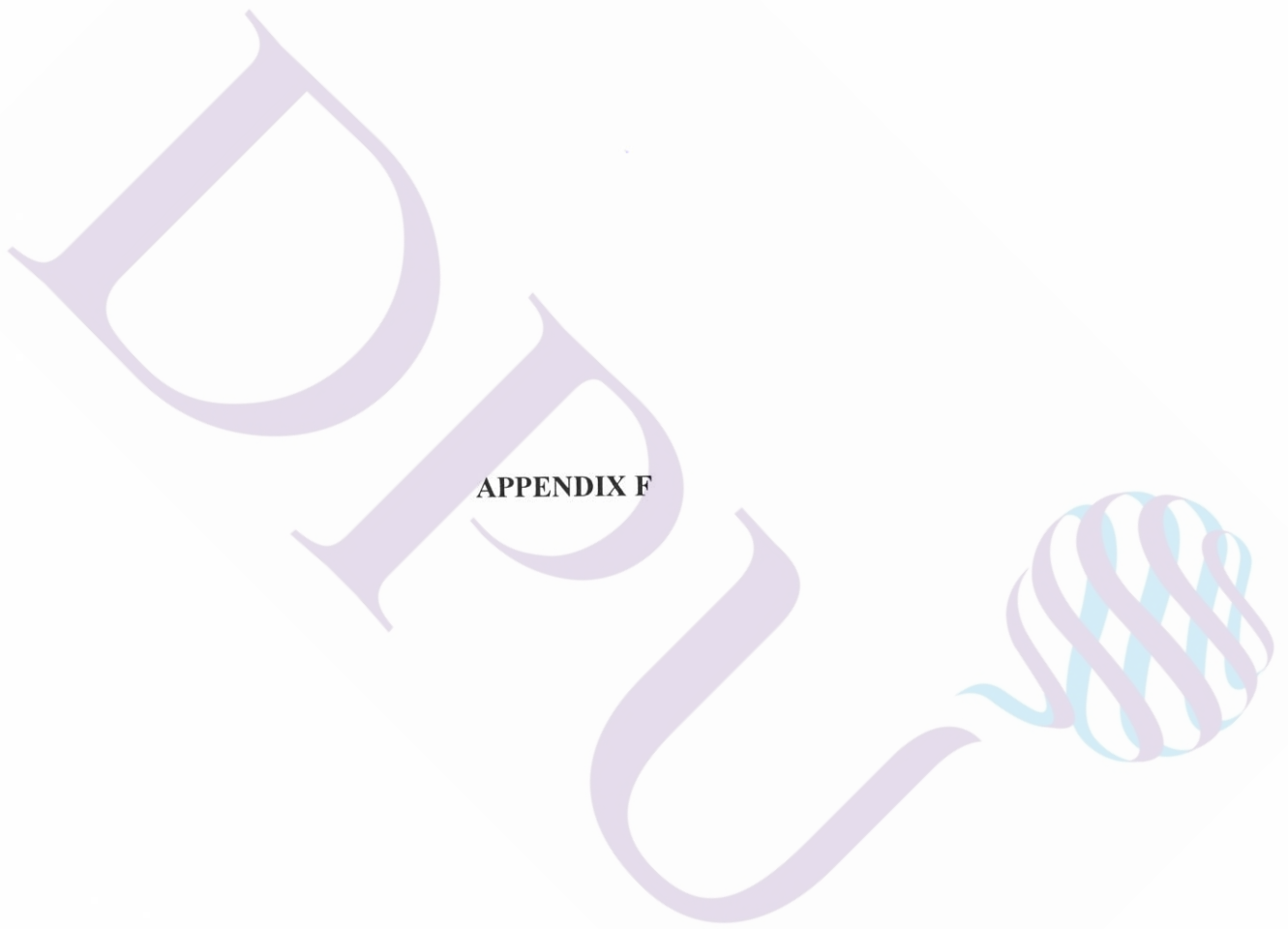| Evidence 1	Sources
"The pictures of new products and displays."	observation note of Site No.1 presenter of Site No.1 observation note Site No.2 presenter of Site No.2 observation note site No.3 presenter of Site No.3 participantNo.11 in site No.4 participantNo.15 in site No.4 participant No.1 in Site No.4 observation note Site No.4 presenter in Site No.4 participant No.12 Site No.3 content analysis site 1-4
Evidence 2	**Sources**
"Sellers' incentives"	observation note of Site No.1 observation note of Site No.3
Evidence 3	**Sources**
"Distribution of hard copies of the tool"	observation note of Site No.1 ParticipantNo.2 in Site No.1 Participant No.5 in site No.1 Observation note of site No.2 Observation note of site No.3 Participant No.10 in site No.4 Participant No.11 in site No.4 Participant No.12 in site No.4 Participant No.13 in site No.4 ParticipantNo.14 in site No.4 ParticipantNo.16 in site No.4 ParticipantNo.17 in site No.4 ParticipantNo.2 in site No.4 ParticipantNo.7 in site No.4 ParticipantNo.9 in site No.4 observation note of Site No.4 participantNo.1 in Site No.3 participantNo.10 in Site No.3 participantNo.11 in Site No.3 participantNo.12 in Site No.3 participantNo.13 in Site No.3 participantNo.14 in Site No.3 participantNo.2 in Site No.3 participantNo.4 in Site No.3 participantNo.5 in Site No.3 participantNo.7 in Site No.3 participantNo.9 in Site No.3
Evidence 4	**Sources**
"Eye contact between speaker and sellers"	observation note of Site No.1 observation note of Site No.2 observation note of Site No.4

Evidence 5	Sources
"Started slide presentation"	observation note of Site No.1 presenter of Site No.1 ParticipantNo.2 in Site No.1 ParticipantNo.3 in Site No.1 ParticipantNo.3 in Site No.2 Presenter of Site No.3 Observation note of Site No.3 ParticipantNo.1 in Site No.4 ParticipantNo.10 in site No.4 ParticipantNo.11 in site No.4 ParticipantNo.15 in site No.4 ParticipantNo.17 in site No.4 ParticipantNo.4 in site No.4 ParticipantNo.2 in site No.4 ParticipantNo.5 in site No.4 ParticipantNo.8 in site No.4 Presenter in Site No.4 ParticipantNo.10 in Site No.3 participantNo.13 in Site No.3 participantNo.6 in Site No.3
Evidence 6	**Sources**
"The speaker raised the voice and said hello"	observation note of Site No.1 observation note of Site No.2 observation note of Site No.3 observation note of Site No.4 participantNo.1 in Site No.4 ParticipantNo.10 in site No.4 ParticipantNo.13 in site No.4 ParticipantNo.14 in site No.4 ParticipantNo.15 in site No.4 ParticipantNo.17 in site No.4 ParticipantNo.2 in site No.4 ParticipantNo.3 in site No.4 ParticipantNo.4 in site No.4 ParticipantNo.6 in site No.4 ParticipantNo.8 in site No.4 ParticipantNo.9 in site No.4 participantNo.4 in Site No.3 participantNo.5 in Site No.3
Evidence 7	**Sources**
"The voice of the speaker is loud enough"	observation note of Site No.1 observation note of Site No.2
Evidence 8	**Sources**
"The speaker added jokes to gain attention"	observation note of Site No.1

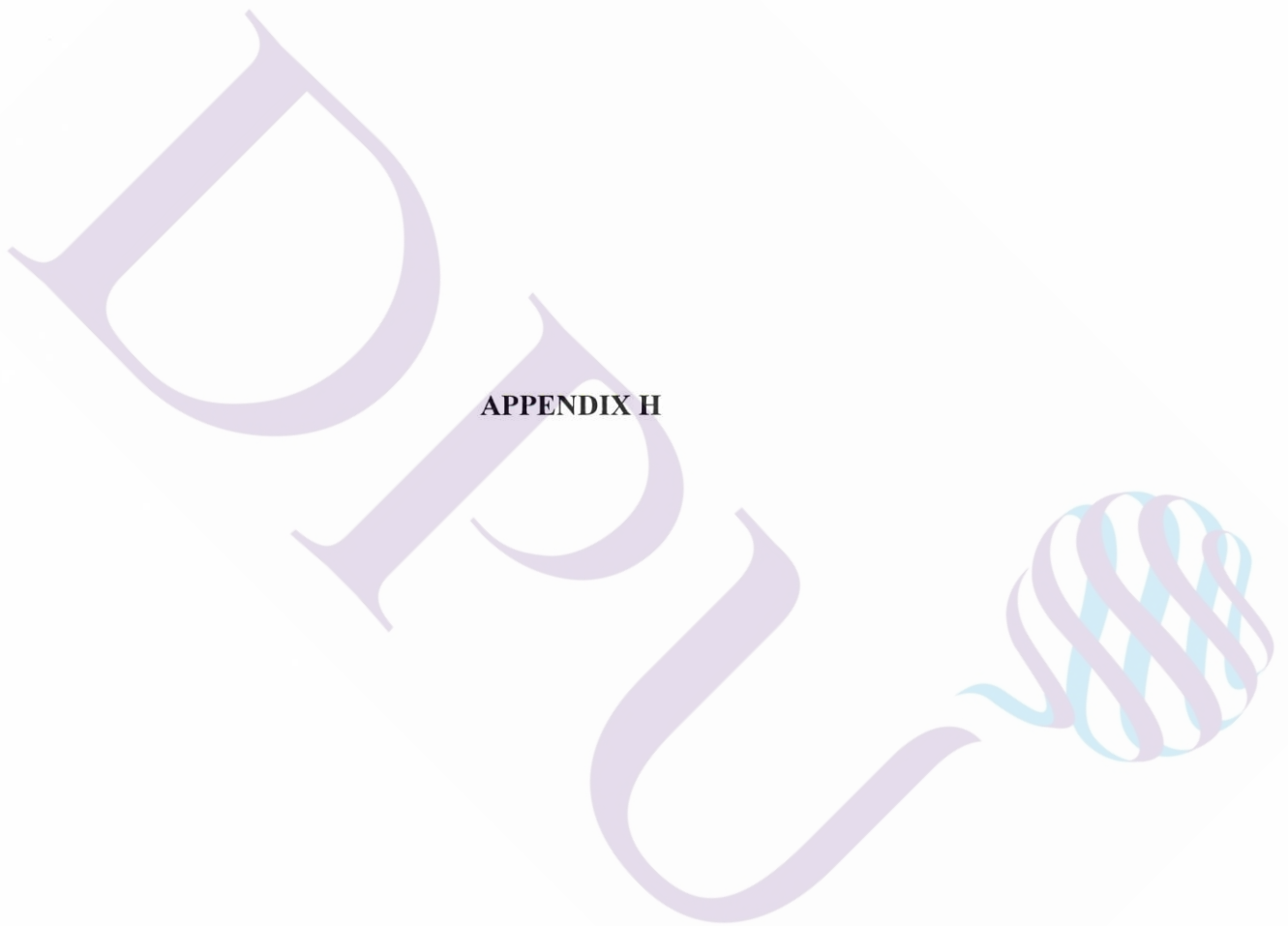| Evidence 9	Sources
"The speaker showed the agenda"	ParticipantNo.1 in Site No.1 ParticipantNo.2 in Site No.1 ParticipantNo.3 in Site No.1 ParticipantNo.1 in Site No.2 ParticipantNo.2 in Site No.2 ParticipantNo.4 in Site No.2 ParticipantNo.5 in Site No.2 ParticipantNo.12 in site No.4
Evidence 10	**References**
"All receivers are present and ready"	ParticipantNo.4 in Site No.1 ParticipantNo.1 in Site No.2 ParticipantNo.6 in site No.4 ParticipantNo.7 in site No.4
Evidence 11	**Sources**
"Color can get attention"	Presenter in Site No.2 Observation note of Site No.2 Presenter of Site No.3 Observation note of Site No.3 ParticipantNo.15 in site No.4 Presenter in Site No.4 observation note of Site No.4 participantNo.11 in Site No.3 content analysis

APPENDIX G

How to transfer knowledge?

Evidence 1	Sources
"Using computers."	observation note of Site No.1 Presenter of Site No.1 observation note of Site No.2 observation note of Site No.3 observation note of Site No.4 participantNo.10 in Site No.3
Evidence 2	**Sources**
"Using LCD projector"	observation note of Site No.1 Presenter of Site No.1 observation note of Site No.2 presenter of Site No.3 observation note of Site No.3 observation note of Site No.4 presenter of Site No.4
Evidence 3	**Sources**
"Using slide presentation"	observation note of Site No.1 Presenter of Site No.1 ParticipantNo.2 of Site No.1 Presenter of Site No.2 ParticipantNo.3 of Site No.2 Observation note of Site No.2 Presenter of Site No.3 observation note of Site No.3 participantNo.1 in Site No.4 participantNo.10 in Site No.4 participantNo.11 in Site No.4 participantNo.15 in Site No.4 participantNo.17 in Site No.4 participantNo.4 in Site No.4 participantNo.5 in Site No.4 participantNo.8 in Site No.4 presenter of Site No.4 observation note of Site No.4 participantNo.10 in Site No.3 participantNo.13 in Site No.3 participantNo.6 in Site No.3

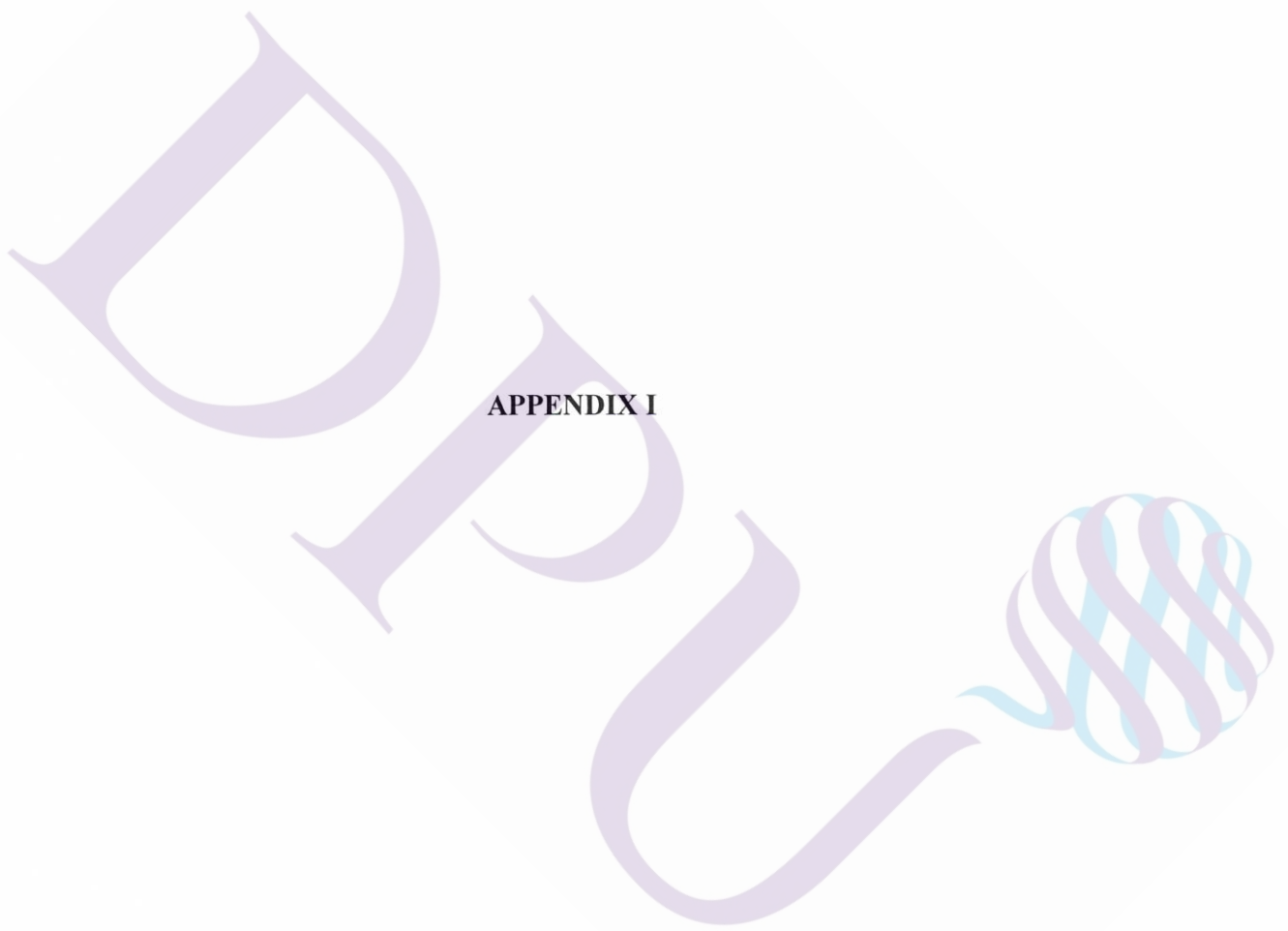| Evidence 4	Sources
"Using hard copies of the tool"	Observation note of Site No.1 Presenter of Site No.1 ParticipantNo.1 of casNo.1 ParticipantNo.4 of casNo.1 ParticipantNo.5 of casNo.1 Presenter of Site No.2 Observation note of Site No.2 Presenter of Site No.3 observation note of Site No.3 participantNo.1 in Site No.4 participantNo.10 in Site No.4 participantNo.11 in Site No.4 participantNo.14 in Site No.4 participantNo.16 in Site No.4 participantNo.17 in Site No.4 participantNo.5 in Site No.4 participantNo.9 in Site No.4 presenter of Site No.4 observation note of Site No.4 participantNo.1 in Site No.3 participantNo.10 in Site No.3 participantNo.11 in Site No.3 participantNo.12 in Site No.3 participantNo.13 in Site No.3 participantNo.14 in Site No.3 participantNo.2 in Site No.3 participantNo.3 in Site No.3 participantNo.4 in Site No.3 participantNo.5 in Site No.3 participantNo.7 in Site No.3 participantNo.9 in Site No.3
Evidence 5	**Sources**
"Using pictures"	Presenter of Site No.1 observation note of Site No.1 observation note of Site No.2 observation note of Site No.3 observation note of Site No.4 presenter of Site No.4 participantNo.12 in Site No.3
Evidence 6	**Sources**
"Using the same message on slide presentation and hard copy."	Observation note of Site No.1 Observation note of Site No.2 Observation note of Site No.3 Observation note of Site No.4 ParticipantNo.10 in Site No.3

APPENDIX H

How did receivers understand the knowledge?

Evidence 1	Sources
"The speaker rechecked the understanding."	Presenter of Site No.1 ParticipantNo.6 in Site No.1 Observation note of Site No.2 Observation note of Site No.1 ParticipantNo.10 in Site No.3
Evidence 2	**Sources**
The sellers said that they understood the knowledge.	ParticipantNo.1 in Site No.1 ParticipantNo.2 in Site No.1 ParticipantNo.4 in Site No.1 ParticipantNo.5 in Site No.1 ParticipantNo.6 in Site No.1 ParticipantNo.1 in Site No.2 ParticipantNo.2 in Site No.2 ParticipantNo.5 in Site No.2 ParticipantNo.6 in Site No.2 ParticipantNo.1 in Site No.4 ParticipantNo.10 in Site No.4 ParticipantNo.11 in Site No.4 ParticipantNo.12 in Site No.4 ParticipantNo.13 in Site No.4 ParticipantNo.14 in Site No.4 ParticipantNo.15 in Site No.4 ParticipantNo.16 in Site No.4 ParticipantNo.17 in Site No.4 ParticipantNo.2 in Site No.4 ParticipantNo.4 in Site No.4 ParticipantNo.7 in Site No.4 ParticipantNo.8 in Site No.4 ParticipantNo.9 in Site No.4 ParticipantNo.10 in Site No.3 ParticipantNo.5 in Site No.3

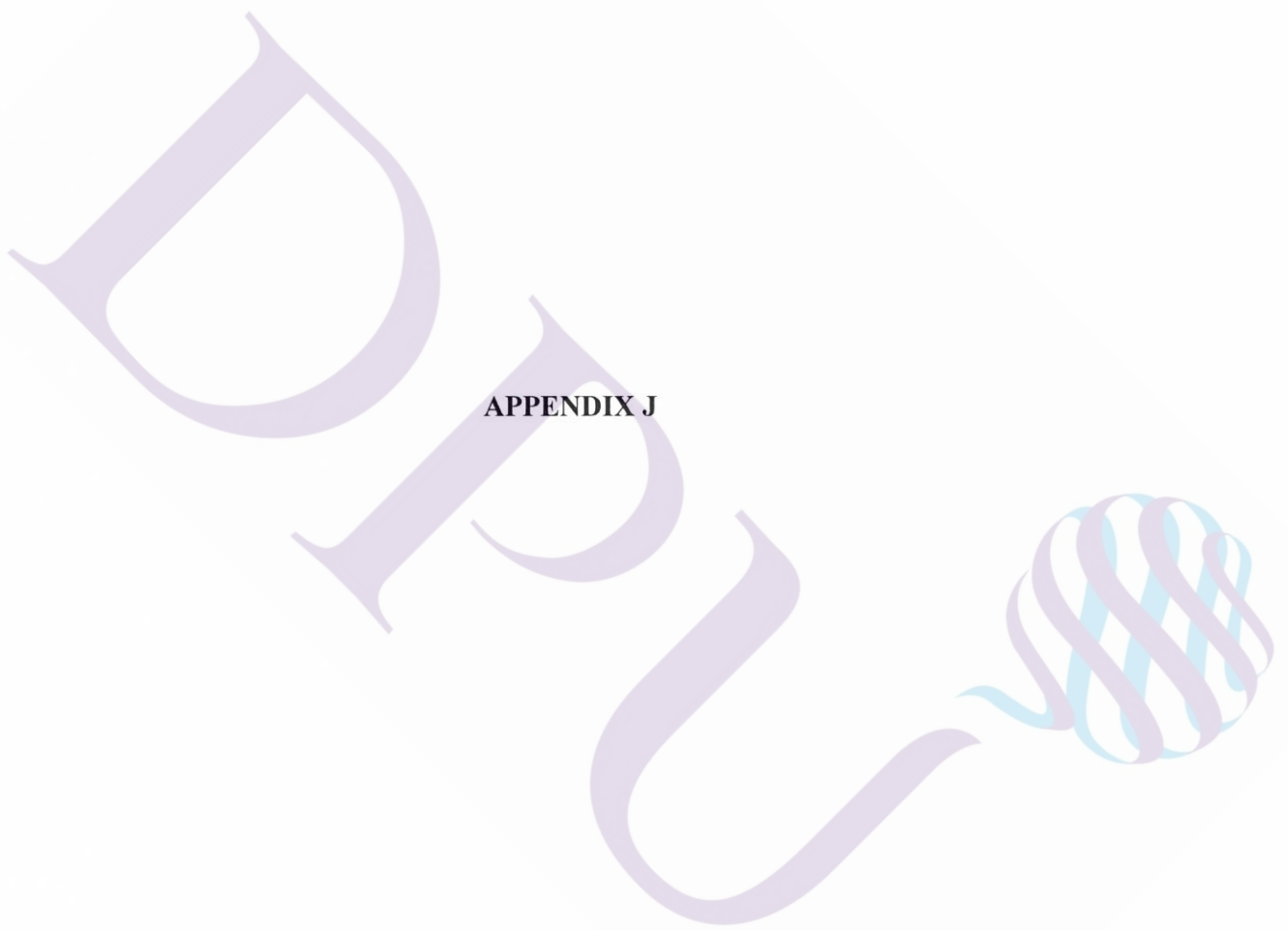| Evidence 3	Sources
"The content of slide presentation and hard copies is the same so it is easy to understand."	ParticipantNo.2 in Site No.1 ParticipantNo.4 in Site No.1 ParticipantNo.5 in Site No.1 ParticipantNo.6 in Site No.1 Presenter of Site No.2 ParticipantNo.3 in Site No.2 ParticipantNo.5 in Site No.2 ParticipantNo.1 in Site No.4 ParticipantNo.10 in Site No.4 ParticipantNo.11 in Site No.4 ParticipantNo.12 in Site No.4 ParticipantNo.13 in Site No.4 ParticipantNo.15 in Site No.4 ParticipantNo.16 in Site No.4 ParticipantNo.17 in Site No.4 ParticipantNo.2 in Site No.4 ParticipantNo.4 in Site No.4 ParticipantNo.5 in Site No.4 ParticipantNo.6 in Site No.4 ParticipantNo.7 in Site No.4 ParticipantNo.8 in Site No.4 ParticipantNo.9 in Site No.4 ParticipantNo.1 in Site No.3 ParticipantNo.11 in Site No.3 ParticipantNo.12 in Site No.3 ParticipantNo.13 in Site No.3 ParticipantNo.2 in Site No.3 ParticipantNo.3 in Site No.3 ParticipantNo.4 in Site No.3 ParticipantNo.6 in Site No.3 ParticipantNo.7 in Site No.3 ParticipantNo.9 in Site No.3
Evidence 4	**Sources**
"The receivers are nodding the heads to show understanding."	Observation note of Site No.1 Observation note of Site No.2 Observation note of Site No.3 Observation note of Site No.4
Evidence 5	**Sources**
"The speaker asked question to check understanding."	Observation note of Site No.1 Observation note of Site No.2

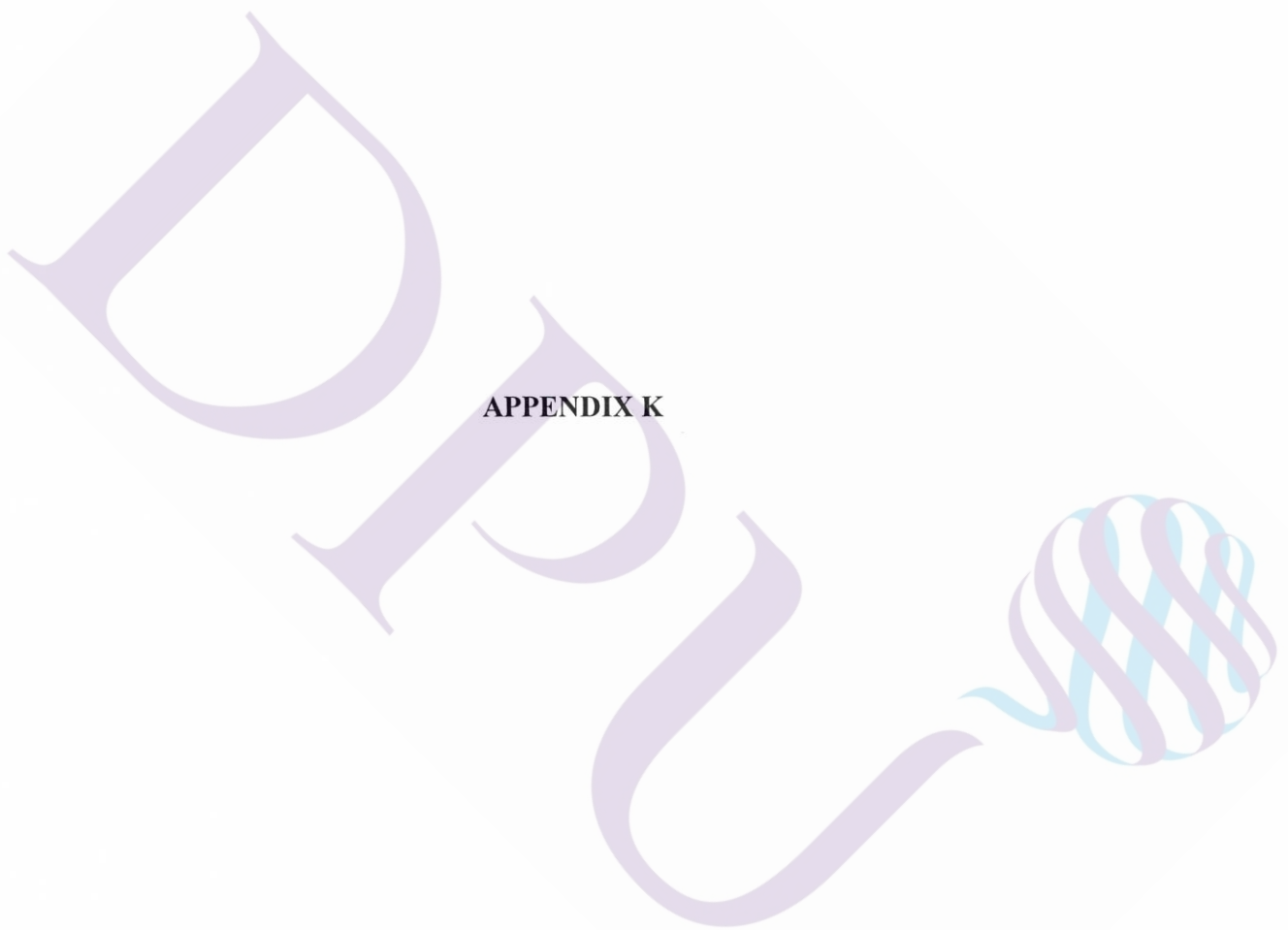**APPENDIX I**

How was the knowledge transferred to short-term memory?

Evidence 1	Sources
"Colorful content."	Observation note of Site No.1 Presenter of Site No.1 Presenter of Site No.2 Presenter of Site No.3 Observation note of Site No.2 Observation note of Site No.3 ParticipantNo.10 in Site No.4 ParticipantNo.15 in Site No.4 ParticipantNo.17 in Site No.4 Presenter of Site No.4 Observation note of Site No.4
Evidence 2	**Sources**
"Many pictures."	Presenter of Site No.1 Presenter of Site No.3 ParticipantNo.15 in Site No.4 ParticipantNo.17 in Site No.4 Presenter of Site No.4
Evidence 3	**Sources**
"Using slide presentation."	Presenter of Site No.3 Observation note of Site No.1 Observation note of Site No.2 Observation note of Site No.3 Observation note of Site No.4 ParticipantNo.10 in Site No.4 Participant No.15 in Site No.4 Participant No.17 in Site No.4 ParticipantNo.3 in Site No.4 ParticipantNo.4 in Site No.4 ParticipantNo.8 in Site No.4

APPENDIX J

How was the knowledge encoded?

Evidence 1	Sources
"Taking notes."	Observation note of Site No.1
	Presenter of Site No.1
	ParticipantNo.5 in Site No.1
	Observation note of Site No.2
	Observation note of Site No.3
	Observation note of Site No.4
Evidence 2	**Sources**
"Summarizing the knowledge learned."	Presenter of Site No.1
	ParticipantNo.2 in Site No.1
Evidence 3	**Sources**
"Memorizing the content."	ParticipantNo.6 in Site No.1
	ParticipantNo.3 in Site No.1
	ParticipantNo.4 in Site No.1
	ParticipantNo.5 in Site No.1
	ParticipantNo.2 in Site No.2
	ParticipantNo.5 in Site No.2

APPENDIX K

How was the knowledge transferred to long-term memory?

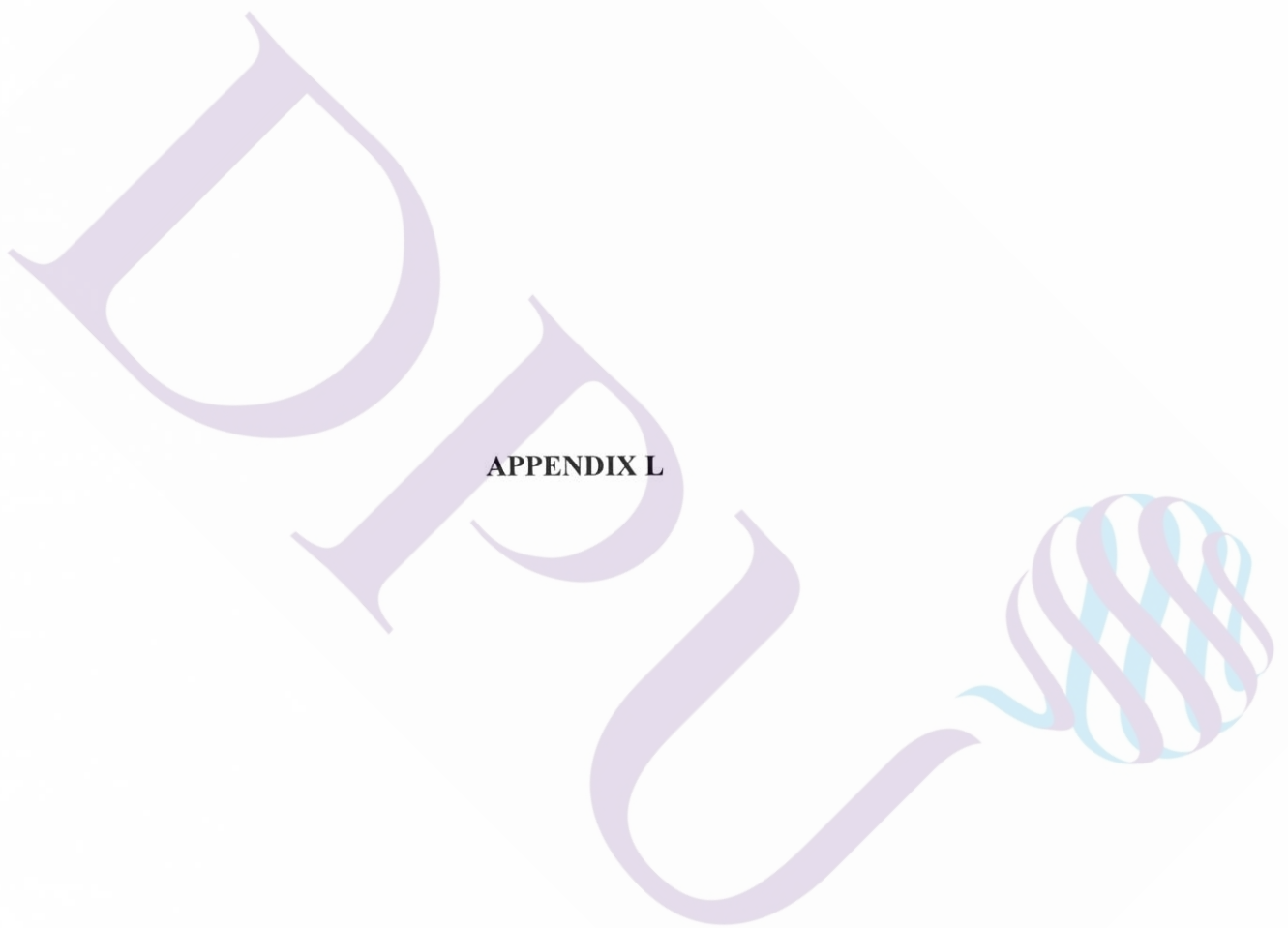| Evidence 1	Sources
"Having content that is linked to schema."	Observation note of Site No.1 Observation note of Site No.2 Observation note of Site No.3 Observation note of Site No.4 Presenter of Site No.1 Presenter of Site No.2 Presenter of Site No.3 Presenter of Site No.4
Evidence 2	**Sources**
"The speaker repeated the knowledge."	Observation note of Site No.1 Presenter of Site No.1 ParticipantNo.3 in Site No.1 ParticipantNo.6 in Site No.1 Presenter of Site No.2 Presenter of Site No.3 Presenter of Site No.4 ParticipantNo.10 in Site No.3
Evidence 3	**Sources**
"The speaker showed slide presentation twice."	Observation note of Site No.1
Evidence 4	**Sources**
"The speaker asked questions to repeat knowledge."	Observation note of Site No.1
Evidence 5	**Sources**
"The receivers reviewed the knowledge themselves."	ParticipantNo.4 in Site No.2 Presenter of Site No.3 ParticipantNo.10 in Site No.4 ParticipantNo.11 in Site No.4 ParticipantNo.13 in Site No.4 ParticipantNo.14 in Site No.4 ParticipantNo.17 in Site No.4 ParticipantNo.2 in Site No.4 ParticipantNo.6 in Site No.4 ParticipantNo.8 in Site No.4 Presenter of Site No.4 ParticipantNo.14 in Site No.3
Evidence 6	**Sources**
"The speaker speaks according to the flow in the tool."	Observation note of Site No.4

Evidence 7	Sources
"The receivers asked to gain more understanding."	Observation note of Site No.4

APPENDIX L

How was the knowledge retrieved?

Evidence 1	Sources
"The speaker asked questions to check knowledge retrieval."	Observation note of Site No.1 Observation note of Site No.2 Observation note of Site No.3 Observation note of Site No.4 Presenter of Site No.1 Presenter of Site No.2 Presenter of Site No.3 Presenter of Site No.4
Evidence 2	**Sources**
"The speaker asked the receivers to do planning according to the knowledge received."	Observation note of Site No.1 Presenter of Site No.1

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