Knowledge Creation in Innovative Projects: Comparison between the Planning and Implementation Phases using Multiple Case Studies

International Business

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Abstract

Objectives

During the past two decades, there have been intensive discussions around knowledge management. One of the most cited models is suggested by Nonaka and his colleagues (e.g., Nonaka & Takeuchi, 1995; and Nonaka et al., 2008). They focus on *knowledge creation*, and suggest a perspective that knowledge is created dynamically. Most cases in knowledge creation research are shown with respect to projects for innovation, as knowledge creation research is historically related to innovation research. However, the two fields have not been integrated with each other. This research works toward further integration between two research fields, by analyzing a process of innovation from the perspective of knowledge creation theory. In particular, this research divides the process associated with an innovative project into the planning phase and the implementation phase, and analyzes the distinctions between the two phases using Nonaka's theory.

Methodology

As the literature relative to the topic is limited, this research adopts a theory building approach, in which theory is developed through a continuous loop between proposition and testing. Then, this research sets out initial propositions about the topic, and tests them through empirical study. Multiple case studies are selected as the research method. Six cases are extracted in following three companies: Valio Oy, Fujitsu Services Oy, and Rautakirja Oy.

Findings

As a result of the research, some differences are identified between the project planning phase and the project implementation phase. Especially in the planning phase, opportunities about innovation are recognized by individuals subjectively, and the opportunities are articulated in organizations. Because the process is different from the Nonaka-proposed spiral process within teams in the implementation phase, it requires a new process specific model. As a result, the thesis concludes with a second set of propositions, which will be tested in future research.

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1. Introduction

1.1 Background and Research Problem

Knowledge Management as a Fashionable Concept?

Today's business world is marked by expanding global markets, tough international competition, and fast economic and technological developments. To get a competitive advantage and survive in such a complicated situation, companies try not only to manage their resources with clear strategies, but also to develop innovation which breaks deadlocks. For developing innovation, they especially focus on *knowledge* as a lifeblood of innovation.

During the past two decades, there have been intensive discussions around *knowledge management*. Knowledge has become the driving force in the current economy, and it is considered an essential source of competitive advantage (Krogh, 1998; McAdam & McCreedy, 1999; Krogh, Nonaka & Nishiguchi, 2000; Nonaka & Peltokorpi, 2006; Jakubik, 2007). Scholars and observers from inter-disciplines e.g., sociology, economics, and management science agree that a transformation has occurred: *knowledge is at centre stage* (Davenport et al., 1998). In fact, there is extensive literature about knowledge, and there are many companies which adopt knowledge management. Prusak (2001) describes that such a wide interest for knowledge management is the result of rapid progress in information technology, globalization and a rising awareness of the commercial value of organizational knowledge (Spender & Scherer, 2007, p.5).

One of the most famous models about knowledge management is a spiral process that Nonaka & Takeuchi (1995) suggested. In this model, knowledge is created through conversions between tacit knowledge and explicit knowledge (details about this model are explained at Chapters 2 and 3). Many practitioners, scholars, consultants and also students speak about *tacit/explicit knowledge*, *spiral model*, and *ba* (which means space in Japanese). Especially, practitioners have been absorbed in developing various ba to convert knowledge. When I worked in a retail company for a year, I observed an

internal project relative to knowledge management. In the project, the members set up various kinds of face-to-face meetings, in which employees discuss about their work together. They have also created cyber space to share information. In addition, when I worked in a consulting firm for eight years, I took part in quite many projects that were more or less related to knowledge management. In those projects, our team analyzed the clients' business processes and networks, and rebuilt them in the view of information flow and knowledge flow. For example, we set up a cyber space, in which employees could share information about their customers and markets.

Nowadays, knowledge management has seemingly captured the imagination of practitioners, as well as scholars, of business administration (Alvesson & Kärreman, 2001). Proponents of knowledge management are well known to be aware of the faddish and fashionable characteristics of some management ideas (Alvesson & Kärreman, 2001, p.995; Spender & Scherer, 2007, p.5).

Knowledge Creation as a Dynamic Theory
According to Nonaka and his colleagues, practitioners tend to depend on information systems, when they practice knowledge management (Nonaka et al., 2008, p.1). However, it turns out to be painfully ineffective, if not a downright failure (Nonaka et al., 2008, p.1). They suggest that knowledge management is identified in the context of a "dynamic theory" rather than static one (Nonaka et al., 2008). This parallels the idea of Schumpeter's innovation theory (1919). In this perspective, knowledge is created subjectively by an individual's uniqueness (Nonaka & Takeuchi, 1995). The individual, as a corporate entrepreneur, is the "creator" of knowledge and the organization is the "amplifier" of knowledge. The organization supports creative individuals and provides the context for them to create knowledge dynamically (Nonaka & Takeuchi, 1995). Because this perspective emphasizes knowledge creation rather than knowledge exchange, scholars (e.g., Nonaka & Takeuchi, 1995; Krogh, 1998; Akbar, 2003; Mitchell & Boyle, 2010) often use the term *knowledge creation* to specify the perspective in knowledge management research.

Furthermore, this perspective emphasizes the importance of balancing between subjectivity and objectivity (Nonaka & Peltokorpi, 2006). According to the suggestion, scholars and practitioners have to take care of individual's subjective view of knowledge as well as the objective structure of organizational system, if they follow the perspective of Nonaka' model. However, practitioners and scholars often forget that knowledge is dynamic and is beyond objective perspective (Nonaka & Peltokorpi, 2006).

On the basis of this perspective, Nonaka and his colleagues revised their knowledge creation model. In the new model, they emphasize the importance of *practice*, as well as *dialogue, vision, objectives, ba, knowledge assets* and *environment*, through which individuals think of subjective ideas (Nonaka et al., 2008). Contradictions that cannot be resolved solely by logical analysis are synthesized through *practice*. In addition, one's subjective experience grows through *practice*. It means that employees create knowledge subjectively through practice, as well as dialogue in *ba*. This suggestion is particularly intelligible to researchers and practitioners.

Towards Further Development of Nonaka's Model

In this research, I would like to challenge for contribution to further development of Nonaka's model about knowledge creation. On the basis of his perspective, it is required to recognize knowledge creation in the context of dynamic context, represented by innovation (Nonaka, 1994, Nonaka & Toyama, 2002). In fact, most cases in the literature about knowledge creation are related to innovation, e.g., internationalization, new product/service development, and organizational change (Nonaka & Takeuchi, 1995; Nonaka et al., 2008; Krogh, 1998). In those cases, employees create knowledge dynamically towards developing innovation in a project, which is called an *innovative project* in this research. In those innovative projects, knowledge creation is shown to be like the engine driving the innovativeness.

Towards further development of this model, it is necessary to attempt to explain my "subjective" doubt about it[1]. Here, I question whether the model can completely cover all the activities of knowledge creation in innovation. To add to the model, I divide the innovative projects into two phases: *project planning phase* and *project implementation phase*. In the planning phase, employees create initial ideas about an innovation and plan projects. In the implementation phase, employees launch the project practically, on the basis of the project plan. When reviewing the existing literature about knowledge creation, it becomes clear that most cases are about the implementation phase. It means that knowledge creation research is focused mainly on the implementation phase, rather than the planning phase.

For example, consider the famous "Home Bakery" case at Matsushita Electronic Industrial Co., Ltd., in Nonaka & Takeuchi (1995). In the case, knowledge creation was shown in the Home Bakery development project, in accordance with Nonaka's theory. The project team faced many problems, and overcame them through practice (e.g., building prototypes) and discussions both within the team and with other divisions. Knowledge creation in the project was led by corporate vision (*Home Electronics*) and enabling conditions. We can understand that the project was developed successfully through continuous knowledge creation. On the other hand, in the case, the descriptions about the project planning phase are limited. Though the background of the project was described in the book, we cannot understand enough about how the company planned the project at the early stage of the innovation process.

Of course, it is possible to mention that knowledge creation in the planning phase also follows Nonaka's model. In fact, a few cases about the planning phase are shown in Nonaka & Takeuchi (1995). However, as a counterproposal, I attempt to question that knowledge creation in planning phase may be different from in implementation phase.

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[1] Here, author's personal belief through personal experience is shown, in order to lead research problem. Strauss and Corbin (1990) describe that there are several sources of researchable problems: (1) the suggested or assigned research problem; (2) the technical problem; and (3) personal and professional experience. According to them, it is not necessarily true that choosing a research problem through the personal experience may seem hazardous.

According to the theory, innovation is developed by entrepreneurs, instead of managers (Schumpeter, 1934). In existing companies, corporate entrepreneurs recognize and exploit opportunities to create future goods and services in the absence of current markets. Companies never develop innovation without catching those ideas in the planning phase. However, an innovative idea is not always caught by systematic marketing research[2], and it requires subjective belief. Then, it is natural to think that knowledge creation is required in the planning phase, as well as the implementation phase. Knowledge about new opportunities is created by corporate entrepreneurs subjectively, and it is amplified in organizations.

Furthermore, the planning phase has specific characteristics. Firstly, in the phase, employees cannot get feedback through practice, because they usually recognize opportunities which are not implemented in existing market. This knowledge creation is not a practical but rather an imaginary work. Secondly, this opportunity recognition very much depends on individuals. No one has a right answer about it. No one can verify it enough. Is the imaginary and chaotic knowledge about new opportunities created in a spiral process? Can practitioners create the chaotic ideas about business opportunity systematically by just only setting face-to-face meetings and enhancing the creative atmosphere? In my personal experience, the view is too optimistic.

As a result, I have a "subjective doubt" that there is a type of knowledge creation, which is not covered by Nonaka's model, in innovative projects. Though Nonaka's model is suitable for the implementation phase in innovation, it may not be suitable for the planning phase, which requires special recognition of a new business opportunity.

1.2 Research Question and Objectives

On the basis of the background and research problem, this research focuses on knowledge creation. Especially, this research focuses on differences between the project

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[2] For example, Burgelman (1983) shows a notable model, in which *autonomous strategic behavior loop* is interacted with traditional *induced strategic behavior loop*. According to him, autonomous strategic behavior takes shape outside of current strategic behavior, and introduces new categories for the definition of opportunities.

planning phase and project implementation phase in innovative projects.

Here, it is necessary to express the topic in a clear research question: *what is the difference in knowledge creation between the planning phase and the implementation phase in innovative projects?*[3] (See Figure 1.) Especially, this research follows a theory suggested by Nonaka and his colleagues. In their work, the theory is not specified for specific industries, activities or countries. Therefore, this research question also does not focus on a specific industry or a specific activity or a specific country.

Figure 1. Research Question
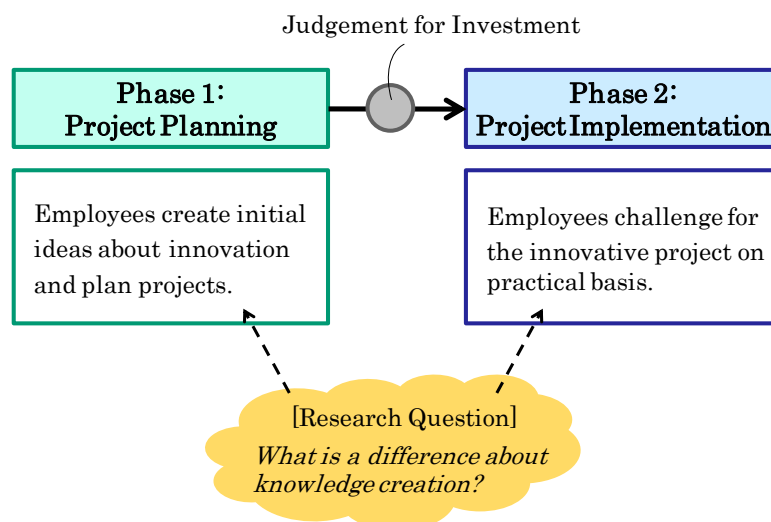
Finding an answer to the research question will challenge the integration between knowledge creation research and innovation research. Historically, knowledge creation research has been hand in hand with innovation research. The two fields are related each other in a dynamic theory. In fact, innovation researchers mention the importance of knowledge, while knowledge creation researchers analyze knowledge in innovative projects. However, those have not been integrated carefully (Popadiuk & Choo, 2006), and each field has specific theories, researchers and academic journals.

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[3] Firstly, this research set the following research question: "How is knowledge created at the planning phase in an innovative project?" However, when the question was addressed, it was useful to compare between the planning phase and the implementation phase. Then, the suggested comparative question was set finally.

This research challenges for the integration of the two research fields. Here, the innovation process is analyzed in the view of one of the notable knowledge creation theories, with careful literature reviews about knowledge creation and innovation. It is an underlying objective in this research.

1.3 Research Design (Summary)

Because literature which focuses on the specific topic is quite limited, this research requires a "theory building approach" in order to answer the research question (Figure 2). For building a theory, it is effective to set *initial propositions* for the topic. The *initial propositions* are tested through empirical research. After that, the *initial propositions* are revised as *second propositions*. Then, the *second propositions* are revised through a second set of empirical studies. Through this continuous loop between setting propositions and doing empirical studies, the theory around the research question is built up gradually. The gradual building of an explanation is similar to the process of refining a set of ideas (Yin, 1994). As Strauss & Corbin (1990) describe, it is constant interplay between proposing and checking[4]. In this research, initial propositions are set and tested by first empirical study. Then, in conclusion, second propositions are set.

Figure 2. Theory Building Approach in This Research

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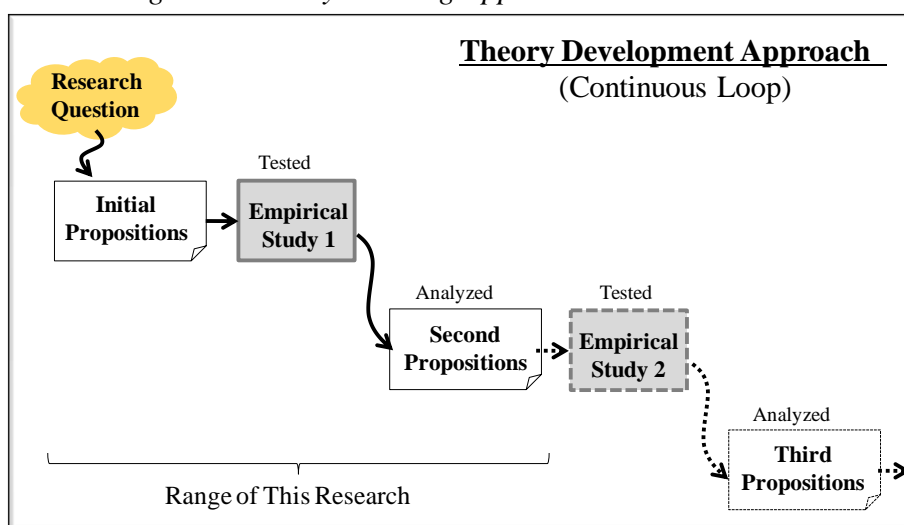
[4] Nonaka and his colleagues have also built up theories about knowledge creation for a long time. They started the research about this topic in 1980's and built up theories gradually through loops between proposing and checking.

Furthermore, this research uses *case study research* as the basis of Empirical study 1. Especially, six cases of innovative projects are selected. Through those case studies, the initial propositions are tested and revised. Details about research design are explained in Chapter 4.

1.4 Structure

This research is composed of six chapters, in addition to Chapter 1. Each chapter has a specific role in the process of a *theory building approach*.

Firstly, the research question is reinforced by analyzing its background through literature review in Chapter 2. Because this research focuses on some complicated words like *knowledge* and *innovation*, it is necessary to relate those words to the research question and set the question in an academic context carefully. Then, in Chapter 3, initial propositions about the research question are set. Through reviewing the literature relative to project management, innovative project and corporate entrepreneurship, readers can understand how initial propositions are set in this thesis. In Chapter 4, an outline of the empirical research is explained. The research design includes research philosophy, research methodology, analysis strategy, data collection strategy, and research quality. On the basis of the research design, case study research is implemented. In Chapter 5, details about six different cases are described. Then, those cases are discussed and analyzed in Chapter 6. Through the analysis, initial propositions are revised as second propositions. Finally, in Chapter 7, conclusions are described. The following figure (Figure 3) captures the research structure.

Figure 3. Research Structure
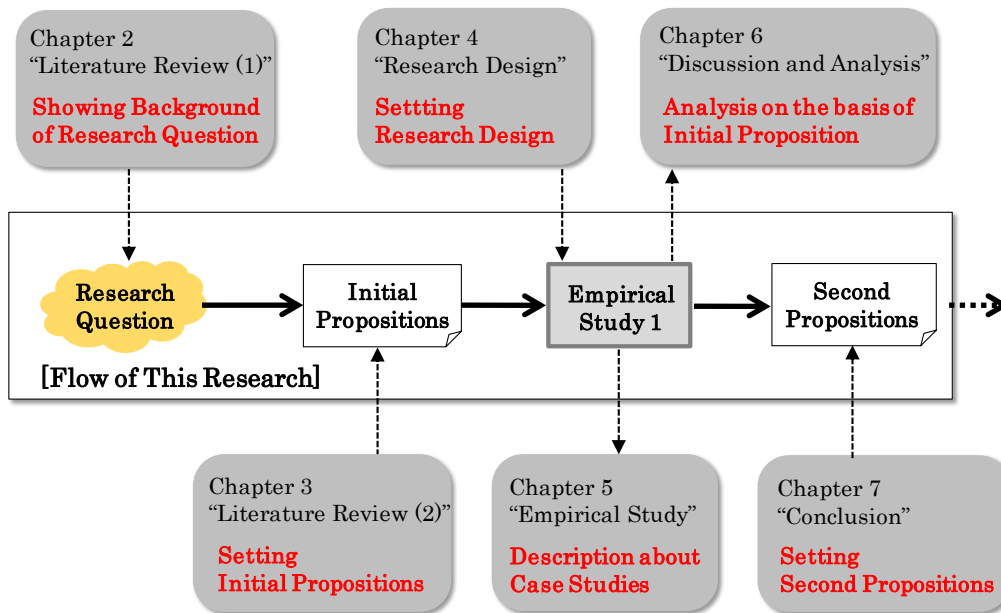
1.5 Definition

Knowledge

Knowledge is defined as *dynamic human/social process of justifying personal belief towards the truth* (Nonaka et al., 2008, p.11). Knowledge is created by people in their interactions with each other and the environment. It is a process in which the individual's subjective thoughts are justified through social interaction with others and the environment, to become objective truth.

Knowledge is externalized as knowledge assets, which include patents, licenses, databases, documents, and other so-called knowledge capital, as well as skills, social capital, organizational structures, systems and organizational routines and cultures. (Nonaka et al., 2008, p42)

Knowledge Management

Knowledge management is defined as *an organizational or administrative process and discipline to manage knowledge effectively to get competitive advantage*. The definition of knowledge management is explained in Chapter 2.2.1.

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Knowledge Creation

Knowledge creation is defined as *the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services and systems* (Nonaka & Takeuchi, 1995, p.3). In this research, knowledge creation also refers to a perspective in knowledge management research.

Innovation

Innovation is defined as *the generation, development and adaption of novel ideas on the part of the firm* (Damanpour, 1991, p.556).

In detail, innovation consists of both invention and practical commercialization (e.g., Fagerberg, 2006).In addition, innovation includes not only new product development based on technology but also other category, e.g., new process development, new organization development, new market development (e.g., Schumpeter, 1934). Lastly, innovation is new within the firm, rather than within the industry (e.g., Johannessen et al., 2001). It is thus possible to say that this research identifies the term broadly.

Project

A project is defined as *a temporary endeavor undertaken to achieve a goal* (Project Management Institute, 2004)

Innovative Project

An innovative project is defined as *an internal project which develops innovation*. It is distinguished from a project-based business. On the basis of the definition and identification about innovation, it includes internationalization projects, new product/service development projects, and process development projects.

2. Literature Review (1) Background of Research Question

This chapter shows the academic context, up to the research question that has been defined in Chapter 1.2 (Figure 4). Firstly, the literature about knowledge is reviewed (in Chapter 2.1). Because knowledge is a rather complicated word, it is necessary to understand it carefully, in the context of various research fields. Then, the literature about knowledge management is reviewed (in Chapter 2.2). As it is related to the context of knowledge, knowledge management is also a "mixed bag" with various kinds of models (Nonaka & Peltokorpi, 2006). Here, the knowledge management literature is divided into two main perspectives, and especially knowledge creation is focused on and reviewed (in Chapter 2.3).

Figure 4. Image of Chapter 2
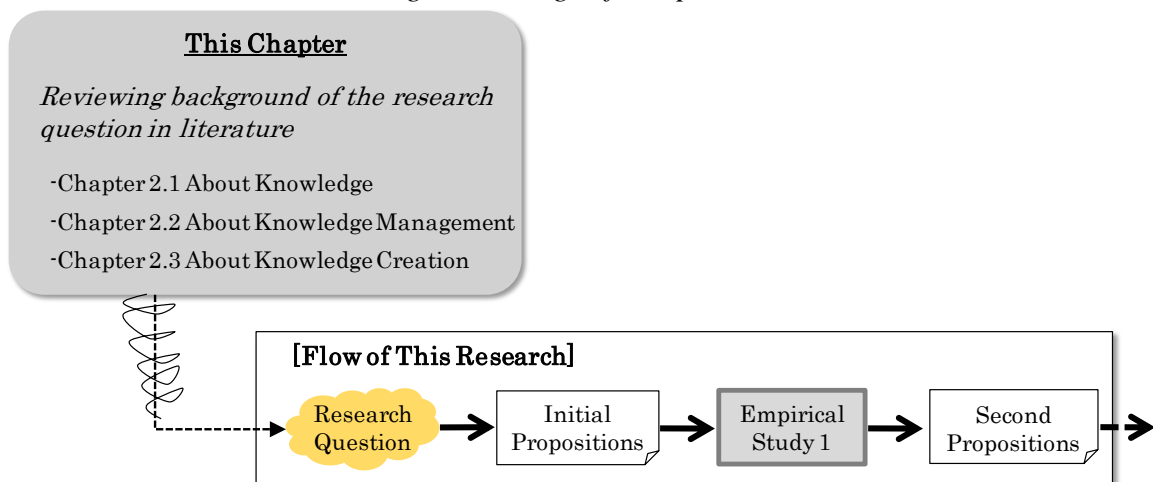
2.1 About Knowledge

Knowledge is not a new word, but a topic that has been discussed in various disciplines for a long time. Especially, philosophy and economics were centers of discussion. Here, the literature relative to "knowledge" is reviewed in these two fields: philosophy (in Chapter 2.1.1) and economics (in Chapter 2.1.2). Then, the literature in the field of management theory is reviewed (Chapter 2.1.3). Reviewing literature gives deep insights for analyzing knowledge management.

2.1.1 Knowledge in Philosophy

Some notable scholars (e.g., Krogh et al., 1994; Nonaka & Takeuchi, 1995; Spender, 1996; 1998; Krogh, 1998) analyze knowledge management in the context of philosophy. Especially, two branches of philosophy deal with knowledge strongly. The first one is *epistemology*, which investigates the origin and nature of knowledge (Spender, 1998). It is the study of foundations upon which human knowledge stands. In addition, it is a coherent foundation whose examination reveals both the possibilities and the limitations imposed on the types of knowledge that it can support (Spender, 1998). The second one is *ontology*, which is concerned with the levels of knowledge creating entities. In those two fields, various scholars have suggested various identifications, and those have formed a philosophical history about knowledge.

At first, the history of Western philosophy since the ancient Greek period can be seen as the process of searching for an answer to the question *what is knowledge?* (Nonaka & Takeuchi, 1995). The first philosophical attempt to define knowledge in Plato's *Meno, Phaedo, and Theaetetus* described knowledge as "justified true belief" (Nonaka & Takeuchi, 1995, p.23). According to Plato, the physical world is a mere shadow of the perfect world of "ideas". Human beings aspire toward the eternal, unchanging and perfect "ideas" that cannot be known through sensory perception but only pure reason. On the other hand, Aristotle criticized Plato's idea, and thought that knowledge of forms is always occasioned by sensory perception (Nonaka & Takeuchi, 1995). The Platonic and Aristotelian views were inherited, and established two mainstreams in epistemology: rationalism and empiricism. Rationalism has roots in ideas of Rene Descartes, a continental rationalist. It argues that knowledge can be attained deductively by appealing to mental constructs such as concepts, laws or theories. According to rationalists, there exists a priori knowledge that does not need to be justified by sensory experience. In addition, sone of the famous thinking of Descartes is dualistic theory (Cartesian split) between mind and body (Ryle, 1949). On the other hand, empiricism has roots in the ideas of John Locke, one of its founders. This view contends that knowledge is derived inductively from particular sensory experience. Scholars of

empiricism argue that only experience can provide the mind with ideas (Nonaka & Takeuchi, 1995).

Then, the history of Western philosophy in the past two centuries can be seen as an unsuccessful effort to overcome Cartesian dualism: between subject (the knower) and object (the known), and between mind and body (Nonaka & Takeuchi, 1995). Firstly, the two streams of rationalism and empiricism were brought together by the eighteenth-century German philosopher Immanuel Kant (Nonaka & Takeuchi, 1995). He argued that knowledge arises only when both the logical thinking of rationalism and sensory experience of empiricism work together. Then, George W. F. Hegel also tried to combine two streams, and argued that knowledge begins with sensory perception, which becomes more subjective and rational through a dialectic purification of the senses and at last reaches the stage of self-knowledge of the "Absolute Spirit" (Russell, 1961, p704). Karl Marx argued that perception is an interaction between the knower (subject) and the known (object). In the pursuit of knowledge, both subject and object are in a continual and dialectic process of mutual adaptation (Russell, 1961, p.749). Furthermore, pragmatists, for example, Peirce, James, and Dewey also synthesized between rationalism and empiricism. James (1950, p.1221) argued that human knowledge is indeed of two types: "knowledge about" and "knowledge of acquaintance". James argued that the interaction of the two types of knowledge is the pragmatist's notion of the scientific method (Nonaka & Takeuchi, 1995).

Michael Polanyi's idea, "indwelling", is also relative to this dichotomy. Nonaka & Takeuchi (1995) use Polanyi's famous distinction between tacit knowledge and explicit knowledge. According to Polanyi, tacit knowledge is personal, context-specific, and hard to formalize and communicate, while explicit knowledge is transmittable in formal, systematic language. In addition, Polanyi (1966) argued that all knowledge involves a tacit dimension. He employs the term 'tacit' to refer to the unarticulated elements of human knowledge (Miller, 2008, p.937). According to him, all knowledge is either tacit or rooted in tacit knowledge, and a wholly explicit knowledge is unthinkable (Polanyi,

1969, p.144). Polanyi contended that human beings create knowledge by involving themselves with objects, that is, through self-involvement and commitment, or what Polanyi calls "indwelling" (Nonaka & Takeuchi, 1995, p.60). This is in contrast with traditional epistemology, in which knowledge derives from the separation of the subject and the object of perception.

As Spender (1996) concluded, the point here is not to try to resolve these debates, but to observe that knowledge is a highly contentious concept, far too problematic to explain it without a clear statement of the epistemology which gives it meaning. At least, we can understand that one of the issues in philosophy is the dichotomy between subject and object. In the field of philosophy, knowledge is recognized in some different kinds of perspectives. This difference is followed by scholars in the field of the "modern" knowledge management.

2.1.2 Knowledge in Economics

The next field of interest is economics. It is natural to focus on economic theories, because management theory has traditionally been much influenced by them. In addition, nowadays, knowledge has become one of the central topics among economists and politicians. For, as pinpointed by Metcalfe (2004), all economies are knowledge based and could not be otherwise. The knowledge economy[5] is a dominant economic force in today's world and many economic and other policies have arisen in relation to it.

Neoclassical economists, represented by Alfred Marshall and Leon Walras, tend to equate knowledge with codified knowledge or information (Nonaka, 2005, p5; Quéré,

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[5] The notion of the knowledge economy made a decisive entry into policy discourses when the Organization for Economic Co-operation and Development (OECD) published *The Knowledge-based Economy* (1996). It defines knowledge-based economies as "economies which are directly based on the production, distribution and use of knowledge and information" (OECD, 1996, p.7). In this document, the knowledge-based economy functions as the overarching term that encompasses variant and related notions of the information society, network society, and learning economy. Policy-makers around the world have developed policies that fuse various ideas about the relationship between knowledge, information, learning, the economy, and society. Knowledge economy and associated discourses have become powerful levers and drivers of policy in such international and supranational bodies as the OECD (2004) and the European Commission (2003).

2008). On the other hand, the Austrian School of Economics[6], represented by Frederich von Hayek, and Joseph A. Schumpeter paid further attention to knowledge in economic affairs.

Frederich von Hayek, one of the notable Austrian economists, extracted knowledge as a key of his idea, when he explains the problem of rational economic order. He describes followings in his early article *The Use of knowledge in Society* (1945, p.519):

> *The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate "given" resources –if "given" is taken to mean given to a single mind which deliberately solves the problem set by these "data."*

In this article, he emphasizes that scientific knowledge is not the sum of all knowledge. It means that for the realization of equilibrium as conceptualized in orthodox theory, there must be a coincidence of the objective real facts of the economy and subjective knowledge of human subjects. The central theme of Hayek's "knowledge" arguments is that authorities cannot effectively manage all of the knowledge necessary for successful economic planning because such knowledge is by its very nature fragmented, dispersed, ever changing, and ultimately subjective. Knowledge, as Hayek (1935, p.85) puts it, is "not given to anyone in its totality" but is "dispersed among many people". The knowledge required for economic decision-making 'never exist in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess' (Hayek, 1935, p.77).

Joseph A. Schumpeter, an Austrian economist, tried to introduce the concept of

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[6] Austrian School of Economics, founded by Carl Menger in 1887, was profoundly pro-free market economy, and anti-Socialism and against the concept of the planned economy. Menger's initial exertions influenced many brilliant philosophers and economists to continue and develop his line of thought. One of the most prominent minds that Menger influenced was Joseph A. Schumpeter who was also a close friend of the Drucker family (Kiessling and Richey, 2004, p.1271).

entrepreneurs into the set-up of neoclassical economics and the Walrasian System in his early article *Theorie der wirschaftichen Entwicklung* (1911). In the preface to the Japanese edition (1937, p.166) of this article, Schumpeter very clearly stated his ambition as an economic scientist:

> *There must be a purely economic theory of economic change which does not merely rely on external factors propelling the economic system from one equilibrium to another. It is such a theory that I have tried to build.*

A theory of economic change is needed, Schumpeter argues, because Walrasian general equilibrium thinking can only explain the "stationary process", i.e., the circular flow of resources in an existing economic system. Still, Schumpeter uses this idea as the starting-point of his dynamic analysis, as it shows how a capitalist economy would behave in the absence of what he sees as its most essential feature: constant evolution. According to Schumpeter, the main force that brings about structural change is the "perennial gale of creative destruction" (Schumpeter, 1942, pp.83-84). This process refers to the waves of innovative activity that hit the economic system in different points of time, resulting in the destruction of the old economic structure and the creation of a new one. Thus, Schumpeter (1934) introduced the concept of innovations, that cover following five areas: (i) the introduction of a new good or a new quality of a good; (ii) the introduction of a new method of production, including a new way of handling a commodity commercially; (iii) the opening of a new market; (iv) the conquest of a newsource of supply of raw material or intermediate input; and (v) the carrying out of a new organisation of industry (Schumpeter, 1934, p.66). According to Schumpeter, an entrepreneur is more than the neoclassical homo economicus. Innovation is not a result of rational decision-making, but a creative pioneering process characterized by environmental uncertainty, personal imagination and expectations. As entrepreneurs innovate rather than invent, they are "first movers", a position rendering them temporary monopoly power with associated potential for huge monopoly profits. When Hayek (1935, p.85) criticized Walrasian economics by identifying knowledge as "not given to anyone in its totality" but "dispersed among many people", Schumpeter also criticized it and moreover suggested a new idea about economic change which occurs at

the process of entrepreneur's innovative activity, a combination of new knowledge. Hayek admired Schumpeter's contribution toward a clear illustration of one of the methodological differences which Hayek had in mind (Hayek, 1945).

Flitz Machlup, an Austrian economist, made the concept of knowledge economy in his famous book *The Production and Distribution of Knowledge in the United States* (1962). Machlup was the first to measure knowledge as a broad concept, while other measurements were concerned with the production of scientific knowledge. He argued that there are other types of knowledge in addition to scientific knowledge, as Hayek had described in his article (1945), and described that there is also knowledge of an "unproductive" type for which society allocates resources: schools, books, radio and television. Also organizations rely more and more on "brain work" of various sorts: besides the researchers, designers, and planners, quite naturally executives, the secretaries, and all the transmitters come into focus (Machlup, 1962, p.7). He emphasized that knowledge was an important component of the economy, but does not completely respond to an economic logic.

In conclusion, "knowledge" appears as a key term in some important economic arguments. Some economists, e.g., Hayek and Schumpeter, focus on knowledge and in building up their original thought about economic change. One of the key ideas is innovation, which means new combination of existing resources including knowledge. Though this thought was underestimated at the time, it was influential among economists who were interested in evolutionary theory and economic development. Later, innovation, entrepreneurial activity, creative destruction and knowledge become central terms in economics.

2.1.3 Management Theory and Knowledge

Some scholars take the idea of knowledge and innovation into business management. From the 1980s, it is followed by the topic of "knowledge management" which pertains to how to manage knowledge in a firm.

A notable scholar, who developed thought in the view of firm theory, is Edith P. Penrose, a student of Machlup. She focused on the growth of individual firms in her notable book *The Theory of the Growth of the Firm* (1959). Penrose reinvented the ideas of Schumpeter and Marshall, and founded what has later evolved into the resource-based view and the dynamic capabilities of firms approach in modern microeconomics. Rather than emphasizing market structure, she highlighted firms' heterogeneity and proposed that the unique assets and capabilities of a firm are important, giving rise to imperfect competition and the attainment of super-normal profits. For Penrose, every firm is unique and the uniqueness derives from a distinction between resources and the services of those resources. Specifically, it is not resources themselves that are the "inputs" in the production process, but only the services that the resources can render (Penrose, 1959, p.25). In addition, she emphasized that productive services are potentially dynamic. The services associated with resources are related to the unique experience, teamwork, and purposes of each enterprise. Then she emphasized that "the generation of new productive services is a knowledge-creating process, the very process of operation and of expansion intimately associated with the process by which knowledge is increased" (Penrose, 1959, p.56). As a result, Penrose proposed that a firm's rate of growth is limited by the growth of knowledge within it.

Later, Penrose's idea has been credited by scholars espousing the resource-based view of the firm, which is one of the core topics in strategic management (Rugman & Verbeke, 2002, p.771). In fact, some pioneers of the resource-based view cited Penrose (1959) in their articles, including Wernerfelt (1984, p.171):

> *The idea of looking back at firms as a broader set of resources goes back to the seminal work Penrose (1959), but, apart from Rubin (1973), has received relatively little formal attention.*

Wernerfelt (1984) explored the usefulness of analyzing firms from the resource side rather than from the product side. This view is similar to Rumelt (1984) and Barney (1986, 1991). Barney (1991) compared the resource-based view with environmental

models that were a mainstream of strategic management, and analyzed the linkage between strategic resources and firm's competitive advantage, proposing four indicators of the potential of firm's resources to generate sustained competitive advantage: value, rareness, imitability and substitutability (Barney, 1991)[7]. In these articles, knowledge is identified as one of the strategic resources. This view developed to ideas about core competence (e.g. Prahalad & Hamel, 1990), dynamic capabilities (e.g. Teece, et al., 1997; Eisenhardt & Martin, 2000), and also "knowledge management" (e.g. Nonaka & Takeuchi, 1995; Grant, 1996).

Peter F. Drucker, often recognized as the father of management, is also one of the early thinkers who noticed a sign of great social change with knowledge. Drucker's father and Schumpeter were close friends, which gave Drucker continual direct access to the master Austrian School of economist (Drucker, 1997). In 1954, Drucker wrote the seminal "Practice of Management," in which he popularized the idea of Management by Objectives (MBO)[8]. In addition, Drucker also identified knowledge as a key aspect. According to him, success in competitive firms is the result of differentiation, and the source of this differentiation is the specific and distinct knowledge possessed by a group of people within a firm (Drucker, 1964). This is similar to Austrian School economists' idea (Kiessling & Richey, 2004). Then, he began discussing one of his significant concepts, "knowledge worker", in *The Effective Executive* (Drucker, 1966). This means a worker whose value is in his or her knowledge[9]. Furthermore, in his book *Post-Capitalist Society* (Drucker, 1993), he explained about the "knowledge society", in which the basic economic resource is no longer capital, natural resources or labor, but rather knowledge. The knowledge worker and the knowledge society become recurring themes throughout Drucker's work. Furthermore, Drucker also focused on innovation, entrepreneurship and change. He built on Schumpeter's articles, and he suggested seven

[7] He described that the resource-based view substitutes two alternate assumptions in analyzing sources of competitive advantage. The first is that firms may be heterogeneous with respect to the strategic resources they control. The second is that these resources may not be perfectly mobile across firms, and thus heterogeneity can be long lasting (Barney, 1991).
[8] In this book, he pointed out the manager's activity trap: managers become so focused on what they are doing that they forget why they are doing it. Then he emphasized the importance of setting objectives and then breaking these down into more specific goals or key results (Drucker, 1954).
[9] He explained in detail the emergence of knowledge workers as the single largest group of workers in "The age of discontinuity" (1968). According to him, managers have to learn how to engage workers' minds, rather than simply control their hands. This approach is a direct challenge to supporters of Taylor's stopwatch theories (Micklethwait and Wooldridge, 1996, pp.151).

sources for firm's innovative activity in *Innovation and Entrepreneurship*: the unexpected; the incongruity; innovation based on process need; demographics; changes in perception, mood, and meaning; new knowledge, both scientific and nonscientific (Drucker, 1985, pp.31-32).

Another topic which is related to knowledge in the view of firm is "learning", especially "organizational learning". Drucker also emphasized the importance of "learning" for knowledge workers to create innovation (Srinivasan, 2007). Organizational learning could be often addressed in context of knowledge management (Bennet & Bennet, 2003), and it is, at least, true that knowledge and learning go hand in hand. Organizational learning has been popular as a recent theory dating from the 1960s, after some pioneers, for example Cyert & March (1963) and Argyris & Schön (1978), founded the concept. Cyert & March (1963) suggested the idea of the firm as an adaptive political coalition, between different individuals and groups of individuals in the firm, each having different goals and hence the possibility of conflict of interest (Augier, 2004). This idea is on the basis of their fundamental idea shared with Herbert Simon. Later, March & Olson (1976) added this idea to social psychological factors and cognitive structures, and identified organizational learning as learning cycle that includes subjective interpretations of reality (Pawlowsky, 2001, p.67). Other pioneers are Argyris & Schön (1978), who identified organizational learning as the detection and correction of error (Senge, 2003, p.7). They built up models of single-loop learning and double-loop learning (Argyris & Schön, 1978). Senge (1990) described that even the 'excellent' companies may be performing at only a mediocre level, and that these companies also have learning disabilities. He suggested five disciplines in order to overcome the difficulties: system thinking, personal mastery, mental models, shared vision and team learning. Senge's idea about learning disability and five disciplines are cited in some articles of knowledge management[10].

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[10] For example, Nonaka and Takeuchi (1995, p.45) recognized that Senge's practical model of organizational learning has some affinity with their theory of knowledge creation, though they also criticized the model because Senge did not argue the view of knowledge.

In conclusion, thoughts that economists created were followed by firm's strategic management. The literature became a foundation of the research field about knowledge management.

2.2 About Knowledge Management

As mentioned in Chapter 2.1, knowledge is discussed in various academic fields, and then, this discussion is succeeded in the management field. Since the 1980s, as knowledge became one of the hot topics in management theory, "knowledge management" has been gradually identified as a research field. In this field, scholars focus on knowledge specially and research how organizations can manage knowledge effectively to get a competitive advantage.

2.2.1 Definition of Knowledge Management

There are many kinds of definition about knowledge management[11]. From the beginning, the word *management* itself has several meanings, depending on the context and purpose of the literature. McFarland (1979, p.5) describes four important uses of the word *management*: organizational or administrative process; a science, discipline, or art; the group of individuals running an organization; an occupational career. When knowledge management is defined in this thesis, management is used in terms of the first two usages: organizational or administrative process and discipline. Hence, knowledge management is defined here as "an organizational or administrative process and discipline to manage knowledge effectively to get competitive advantage".

In addition, McAdam & McCreedy (1999) suggest three common characteristics of the literature about knowledge management. Firstly, knowledge management is seen as relating to both theory and practice. Secondly, the definitions are not predicated on information technology (IT). IT remains a useful enabler rather than a central tenet at

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[11] For example, Quintas et al. (1997, p.387) define knowledge management as "the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities". Brooking (1997) defines it as "the activity which is concerned with strategy and tactics to manage human centered assets". O'Dell and Jackson (1998, p.4) define it as "conscious strategy of getting the right knowledge to the right people at the right time and helping them".

the heart of knowledge management. Thirdly, people and learning issues are central to knowledge management. The vast majority of the existing literature on knowledge management covers these three related issues.

Furthermore, it is also common to define knowledge management by showing activities included in knowledge management. For example, Allard (2003) defines knowledge management as following five activities: knowledge acquisition, knowledge internalization, knowledge selection, knowledge externalization, and knowledge generation. Nielsen (2006) also indicates eight activities: knowledge creation, knowledge acquisition, capturing and articulating knowledge, knowledge assembly, knowledge sharing, knowledge integration, knowledge leverage, knowledge application and exploration. Then, he outlines flows of these activities as a model. Though these ramifications enable scholars and practitioners to recognize knowledge management clearly, there is not enough integrated definition about each activity among the literature.

2.2.2 Theory of Knowledge Management

Theory is defined by Gill & Johnson (1997, p.178) as "a formation regarding the cause and effect relationships between two or more variables, which may or may not have been tested". Hair et al. (2003) describe that theory is a set of systematically related statements, including some law-like generalizations that can be tested empirically. According to them, both theory and practice are inseparable with each other because business hopes to use theory to do a better job of explaining and predicting. During two decades, scholars built up theory of knowledge management theories that include categorizations of knowledge and processes of knowledge management.

The categorizations of knowledge show how knowledge is categorized in the context of knowledge management. One of the useful typologies is between explicit knowledge and tacit knowledge, on the basis of Polanyi (1966). As mentioned, Nonaka & Takeuchi (1995) describe that tacit knowledge means personal, context-specific, and hard to

formalize and communicate, while explicit knowledge means transmittable in formal, systematic language. Hedlund & Nonaka (1993) describe one of the famous categorizations (Figure 5). It assumes there are four different levels of agents in organizations: individual, group, organization and inter-organizational domain. Then, this model divides two types of knowledge: articulated knowledge and tacit knowledge, on the basis of Polanyi's dichotomy. Then, they suggest the importance of integration between individual and organizational knowledge. Posing the group as an intermediate level allows a more fine-grained look at what goes on within the organization (Hedlund, 1994, p.75).

Figure 5. Knowledge Categorization

	Individual	*Group*	*Organization*	*Interorganizational Domain*
Articulated Knowledge /Information	Knowledge calculus	Quality circle's documented analysis of its performance	Organizational chart	Supplier's patents and documented practices
Tacit Knowledge /Information	Cross-cultural negotioation skills	Team coordination in complex work	Corporate culture	Customer's attitudes to products and expectations

Source: Hedlund & Nonaka, 1993

Kogut & Zander (1992) also describe similar categorization, though there are some differences. Their model also sets a level of agent: individual, group, organization, and network. They also divide two types of knowledge: information and know-how. Spender (1996) describes simpler categorization (Figure 6).

Figure 6. Different Types of Organizational Knowledge

	Individual	*Social*
Explicit	Conscious	Objectified
Implicit	Automatic	Collective

Source: Spender, 1996

The process of knowledge management shows how knowledge is managed effectively in organizations. Kogut & Zander (1992) describe an original process model. This static portrait is the basis by which they explore how knowledge may be recombined through internal and external learning (1992). They set "combinative capabilities" and "organizing and technological opportunities" at the center of the model. According to them, an important limitation to the capability of developing new skills is the opportunity (or potential) in the organizing principles and technologies for further exploitation. On the other hand, Nonaka and his colleagues build up the SECI model, which shows processes of knowledge creation including objective practice and subjective humanity. This model is explained in Chapter 2.3.

Generally, these models can support scholars and practitioners in understanding complicated theories and structures. However, Alvesson & Wallmott suggest that models must be treated with caution (McAdam & McCreedy, 1999). According to them, models are useful so long as they are critiqued to understand the underlying assumptions embedded by the model's founder, rather than accepting them as objective representations of reality.

2.2.3 Two Perspectives in Knowledge Management

As is shown in the definition and theory of knowledge management, knowledge management is a "mixed-bag" of "idealistic theories". This characteristic depends on historical context around thoughts of knowledge, especially in the field of economics, management and philosophy. The "mixed-bags" is reviewed by some literature (e.g., Mårtensson, 2000; Kakabadse et al., 2003; Small & Sage, 2006; Nonaka & Peltokorpi, 2006). According to those scholars, knowledge management is too broad to discuss as a common topic. Some scholars (Tsoukas, 1996; Krogh, 1998; Spender, 1998; Nonaka & Peltokorpi, 2006) review literature about knowledge management in the view of a philosophical perspective. As reviewed in Chapter 2.1, various philosophers have suggested identifications about the nature of knowledge (in epistemology) and the entity of knowledge (in ontology). The philosophical perspectives are succeeded in the

literature of knowledge management.

According to the scholars, the main perspectives are "positivist" and "interpretative" (Nonaka & Peltokorpi, 2006)[12]. Because those philosophical perspectives are deeply complicated and disputable, it is difficult to mention them simply. However, it is possible to describe that two perspectives are related to "knowledge exchange" and "knowledge creation" (Nonaka & Peltokorpi, 2006). This means that "positivist" scholars usually identify knowledge management as "knowledge creation", while "interpretative scholars" usually identify it as "knowledge creation". While "knowledge exchange" and "knowledge creation" are identified as two processes in knowledge management by some scholars, here those two are identified as two perspectives in knowledge management. Of course, it is impossible to suggest which perspective is totally better than the other.

Knowledge Exchange as a Positivist Perspective

The "positivist" perspective is the most firmly established and well known (Krogh, 1998)[13]. The prevailing Anglo-Saxon academic conventions are largely driven by positivist notions (Spender, 1998). Generally, the positivist position is that knowledge deals with the things 'out there' for which we can gain positive evidence. It is inherently objectifying, separating the knower from the known (Spender, 1998). It is based on the view that there are objective facts about the world that do not depend on interpretation or even the pressure of any person (Nonaka & Peltokorpi, 2006, p.75).

The "positivist" scholars identify knowledge as objective "representations" of the world that consists of a number of objects or events, and the key task of the brain (or any cognitive system) was to represent or model these as accurately as possible (Krogh,

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[12] Krogh (1998) also focuses on the perspective of knowledge creation. He also classifies knowledge management into two major perspectives: "cognitivist perspective" and "constructionist perspective". This classification is similar to Nonaka's one cited in this thesis (Chapter 3.3). Krogh's "cognitivist perspective" is similar to Nonaka's "positivist perspective", while Krogh's "constructionist perspective" is similar to Nonaka's "interpretative perspective". Then, he mainly emphasizes the importance of "constructionist perspective", which focuses on knowledge creation rather than knowledge exchange.
[13] With few exceptions (e.g.. Nelson and Winter, 1982; Spender, 1989; Nonaka and Takeuchi, 1995; Scherer and Dowling, 1995) organizational theorists have constrained their theorizing by adopting a positivist theory of knowledge (Spender, 1996).

1998, p.134). In addition, the "positivist" scholars are dualistic and conform to the rules of formal logic. Due to the Cartesian body-mind split, knowledge is separate and independent from human (Nonaka & Peltokorpi, 2006, p.75). According to the "positivist" scholars, knowledge is universal; two cognitive systems should achieve the same representations of the same object or event. Then, they describe humans through methodological individualism through which humans act in social entities as cognitive machines.

In the field of knowledge management, scholars who build on the resource-based view (e.g., Barney, 1991; Conner & Prahalad, 1996) tend to hold this perspective (Nonaka & Peltokorpi, 2006). In addition, scholars, who focus on knowledge exchange and knowledge sharing also tend to hold this perspective (e.g., Pan et al., 2001; Garrett & Caldwell, 2002; Erickson et al., 2003; Huysman & Wit, 2004; Voelpel, Malte & Davenport, 2005; Hansen et al., 2005). These scholars analyze how knowledge is exchanged and shared by internal networks and information technology with a systemic view. Though some of them emphasize the importance of creativity, a greater emphasis is placed on knowledge exchange rather than on knowledge creation (Nonaka & Peltokorpi, 2006).

Knowledge Creation as an Interpretative Perspective

Scholars of "interpretative philosophy" criticizes that knowledge cannot be understood as an objective entity. It is impossible for humans to attain objective social knowledge existing separately from subjectivity (Nonaka & Peltokorpi, 2006, p.75). Interpretative philosophy-influenced scholars (e.g. Spender, 1996; Tsoukas, 1996) identify knowledge as "justified true belief"[14]. In this identification, human's "beliefs" and "justification" are emphasized as well as "truth" (Nonaka & Takeuchi, 1995, p.58). Thus, knowledge is not universal, and scholars do not pay attention to comparing various representations. Knowledge resides in bodies and is closely tied to senses and previous experiences

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[14] Nonaka & Takeuchi (1995, p.23) use this definition on the basis of Plato's *Meno, Phaedo, and Theaetetus*.

(Krogh, 1998)[15].

In the field of knowledge management, scholars of "interpretative philosophy" (e.g. Spender, 1996; Tsoukas, 1996) focus on knowledge creation. According to them, knowledge is created by an individual's uniqueness, and organizations support these creative individuals or provide contexts for them to create knowledge. This means that knowledge creation is not identified as a "static issue", but a "dynamic" issue, as developed by Hayek, Schumpeter and Drucker.

2.2.4 A Perspective in This Thesis

As mentioned, it is possible to divide the literature about knowledge management into two perspectives: knowledge exchange (as a positivist perspective) and knowledge creation (as an interpretative perspective). Because this research also focuses on knowledge management, a perspective should be defined specially. This research mainly selects knowledge creation, rather than knowledge exchange.

Knowledge is identified "justified true belief", rather than "representation". Knowledge is not universal, but depends on individual's sense and previous experience. This recognizes individual uniqueness. According to this identification about knowledge, individuals can create new knowledge. This means that knowledge is created not by organizations but by individuals (e.g., Kogut & Zander, 1992, 1996). The individual is the "creator" of knowledge and the organization is the "amplifier" of knowledge (Nonaka & Takeuchi, 1995). The organization supports creative individuals or provides contents for them to create knowledge. Hence, organizational collective knowledge is not simply sum of individual knowledge but a result of synergies, combinations and recombinations of the individual knowledge (Fiol & Lyles, 1985; Krogh & Roos, 1995).

As Nonaka & Peltokorpi (2006) described, interpretative philosophy theory is often

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[15] Scholars describe humans as intentional components of communities (Brown & Duguid, 2001; Tsoukas, 1996). They allow humans to have idiosyncratic dreams, values and wishes. For them, social entities are processual organisms in which communities-of-practice type arrangements are used to combine and create knowledge.

criticized for its soft approaches by positivists. Subjective accounts lack precision and can provide little more to practitioners beyond detailed thick descriptions. In this research, knowledge creation should be reinforced through clear explanations. It means that this research adopts positivism fundamentally, though the perspective for knowledge is interpretative philosophy. It leads to a balance between objectivity and subjectivity.

Furthermore, knowledge creation is recognized as a dynamic theory with some other theories (Spender, 1996; Nonaka & Toyama, 2007). Firstly, this parallels the ideas of "innovation" and "corporate entrepreneurship" in that both focus on the individual's uniqueness. In the process of developing innovation, corporate entrepreneurs create new knowledge in an organization. Secondly, this parallels the idea of "organizational learning" and "dynamic capabilities" in that both focus on the organization's capability to foster knowledge creation. Organizational learning is one of the important factors for effective knowledge creation in an organization. Routines, including organizational learning, are identified as dynamic capabilities.

2.3 About Knowledge Creation

As developed in Chapter 2.2, this thesis analyzes knowledge management from the perspective of knowledge creation. This chapter follows the perspective and reviews the literature about knowledge creation.

2.3.1 Literature about Knowledge Creation

Some knowledge management scholars focus especially on knowledge creation (e.g., Nonaka, 1994; Nonaka & Takeuchi, 1995; Spender, 1996; Krogh, 1998; Choo & Bontis, 2002; Mitchell & Boyle, 2010). In this research, Nonaka's theory is, especially, followed as a basic foundation.

Nonaka's Theory

Among the notable frontrunner in this field is Ikujiro Nonaka, who keeps this

perspective in their articles (Nonaka & Takeuchi, 1995; Nonaka & Konno, 1998; Nonaka & Toyama, 2007; Nonaka et al., 2008). As shown in Nonaka & Peltokorpi (2006), Nonaka and his colleagues have kept the perspective which aimed at integration between subjectivity and objectivity. In fact, the perspective set in the previous chapter is quite similar to their suggestion. They also identify knowledge as "justified true belief", and emphasize the individual's creation and the organization's amplification. This is described as follows in Nonaka & Takeuchi (1995, p.59)

> *Let us start with the ontological dimension. In a strict sense, knowledge is created only by individuals. An organization cannot create knowledge without individuals. The organization supports creative individuals or provides contexts for them to create knowledge. Organizational knowledge creation, therefore, should be understood as a process that "organizationally" amplifies the knowledge created by individuals and crystallizes it as a part of the knowledge network of the organization.*

According to them, knowledge creation is defined as "the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services and systems" (Nonaka & Takeuchi, 1995, p.3).

Then, they propose their famous spiral process model, called the SECI model (Figure 7). In this model, knowledge creation occurs through four conversion modes: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit) and internalization (explicit to tacit). Socialization is the process of sharing tacit knowledge of individuals. Sharing experience is a key to understanding others' ways of thinking and feeling. Externalization requires the articulation of tacit knowledge and its translation into forms that can be understood by others. Individuals transcend the inner- and outer-boundaries of the self in dialogue. Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. Diffusing fragmentary knowledge is the key to this conversion mode. Internalization means the conversion of newly created explicit knowledge into tacit knowledge of individuals. Learning by doing, training and exercises are important to embodying explicit

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knowledge.

Figure 7. Modes of Knowledge Creation

Dialogue

Socialization (Tacit to Tacit)	**Externalization** (Tacit to Explicit)
(Explicit to Tacit) **Internalization**	(Explicit to Explicit) **Combination**

Field Building

Linking
Explicit Knowledge

Learning by Doing
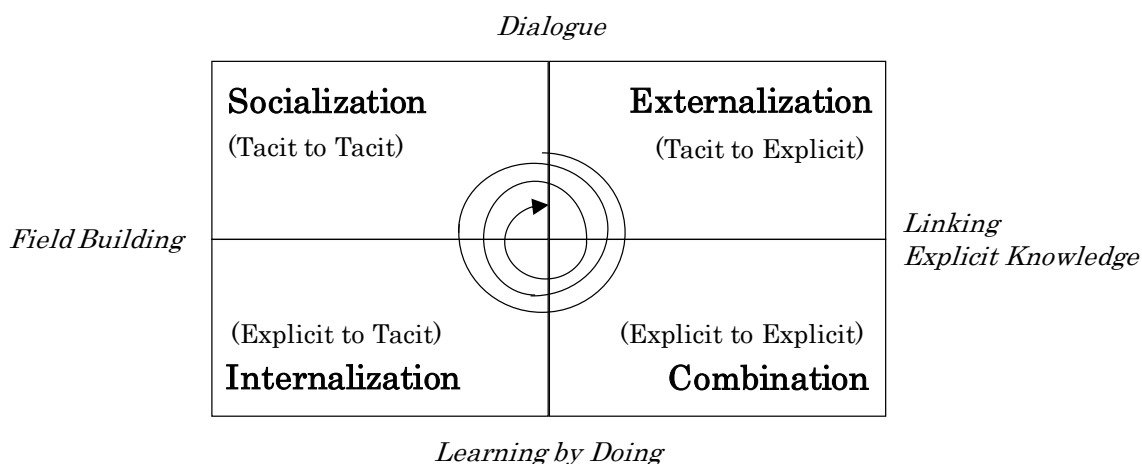
Source: Nonaka & Takeuchi, 1995

In including tacit knowledge, this SECI model describes a dynamic process of self transcendence. The individuals or teams go beyond their restricted knowledge to promote the dynamics of knowledge creation within an organization (Nonaka et al., 1998, p.674). In addition, Nonaka and his colleagues propose a concept of "ba" (which means place in Japanese). Ba is a place where information is given meaning through interpretation to become knowledge, and new knowledge is created out of existing knowledge through the change of the meanings and the contexts (Nonaka et al., 2001). Ba provides the energy, quality and places to perform the individual knowledge conversions and to move along the knowledge spiral (Nonaka & Toyama, 2002, p.1001). Because knowledge creation occurs in all phases of business activities at all industries, Nonaka and his colleagues do not focus on any specific activities. This model is so clear and intelligible that many scholars and practitioners refer to it. In fact, Nonaka & Takeuchi (1995) is the most cited document of all literature about knowledge management during 1998-2002 and 2003-2007 (Ma & Yu, 2010, pp.178-179).

In addition, Nonaka & Takeuchi (1995) emphasize the importance of environments to create knowledge. As is mentioned, they emphasize that new knowledge is created not by organizations but by individuals. Then, Nonaka & Takeuchi (1995) suggest that the

role of the organization in the organization knowledge creation process is to provide the proper context for facilitating group activities as well as the creation and accumulation of knowledge at the individual level. Then, they propose five conditions required at the organizational level: intention; autonomy; fluctuation and creative chaos; redundancy; and requisite Variety (Nonaka & Takeuchi, 1995, pp.74-83). These are called "enabling conditions". Then, they suggest the role of middle manager who provides synthesis for the two extreme ends of the dichotomy: top managers and front-line employees. Middle managers have to keep enabling conditions, which foster individual creation, amplify new knowledge and control the knowledge.

Furthermore, Nonaka and his colleagues revised their theory (Figure 8). In the new theory, they show a model of a knowledge-creating firm, where knowledge is created through dynamic interaction with the environment (Nonaka et al., 2008). The model consists of seven basic components: *knowledge vision, driving objectives, dialogue*, *practice*, *ba*, *knowledge assets*, and the *environment* (Nonaka et al., 2008). *Knowledge vision*, which is based on the company's aesthetic value of truth, goodness and beauty, defines the kind of future that the company imagines for itself and determines the collective ideal mission and domain. *Driving objectives* means a concrete concept, goal, or action standard that connects the knowledge vision to the knowledge-creation process. It is the engine that drives the entire organization. *Practice* and *dialogue* are powerful methods in the SECI process, as a dialectic of thought and action. *Knowledge assets* include patents, licenses, databases, documents, skills, organizational structures, systems, organizational routines and cultures. *Environment* is an ecosystem which exists across organizational boundaries, e.g., customers, suppliers, and universities.

Figure 8. A Process Model of the Knowledge-based firm
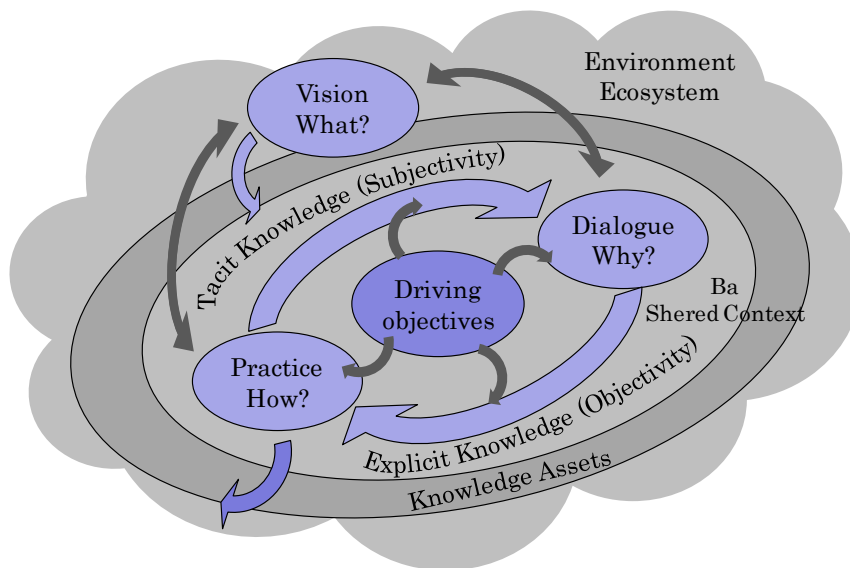
On the other hand, the model is criticized with respect to some points. One of the disputes is whether this is universal model or Japanese-specific model. Some scholars (e.g., Holden, 2002; Glisby & Holden, 2003) emphasize that this SECI models is quite related to Japanese culture, though it is identified as a universal model. In fact, Nonaka & Takeuchi (1995) mentioned the characteristics of Japanese culture, and relationship between the culture and Japanese knowledge creation. In addition, they analyze mainly Japanese companies. However, it is difficult to identify the model as a Japanese-specific one. Firstly, Nonaka & Takeuchi also aimed at formalizing a generic model of organizational knowledge creation, rather than Japanese specific model (e.g., Nonaka et al., 1998; Nonaka & Toyama, 2002). Secondly, in his later articles, Nonaka revised his model without explanations about Japanese specific culture. Thirdly, the model has been used to analyze many companies other than Japanese by researchers all over the world. This suggests that the model is generally identified as a universal theory about knowledge creation model. In this research, the model is identified as a universally applicable model.

Other Theoretical Research

There is much other literature which focuses on knowledge creation. Some scholars follow the model of Nonaka and his colleagues, and develop theory on the basis of the SECI model and its five enabling conditions. For example, Senoo et al. (2007) focus on the concept of "ba". In this work, they propose a practical framework for the design and measure of active "ba". Moreno-Luzon & Lloria (2007) focus on the five enabling conditions, and develop details by using a sample of Spanish firms.

In addition, others focus on judgments for created knowledge. Because resources are limited in a company, managers cannot always invest in all challenges. They have to judge whether they should invest or not. For example, Chen & Edgintin (2005) develop a model based on economic and organization theory for assessing organizational value with regard to investing for knowledge creation.

Furthermore, other researchers have developed empirical studies about knowledge creation. Krogh (1998) also analyzes knowledge creation with a key term, "care", which gives rise to mutual trust, active empathy, access to help, lenience in judgment, and courage in organizations. Then he suggests ways in which management can cultivate care: incentive systems; mentoring programs; trust, openness, and courage as explicitly stated values; training programs in care-based behavior, project debriefings and other forms of learning-oriented conversations; and social events. These aspects are shown in a case study of Unilever.

Kulkki (1997) analyzes knowledge creation, especially in multinational corporations, considering how the firms create knowledge through actions in the international and global marketplace. Especially, she focuses on the role of actions and experiences in knowledge creation process, and she analyzes three Finnish companies as case studies.

Coulson-Thomas (2000) also analyzes 69 organizations by interviews and observations in the view of knowledge creation, especially organizational training. Then he suggests that many organizations have failed to establish a system of knowledge creation, and

there is enormous potential for improvement. Hänninen & Kauranen (2006) focus on cross-functional knowledge creation in product development. They especially suggest a product-concept model, which includes technology, end-user, brand, and business logic. Then they analyze it in the practical case of Suunto, a Finnish large manufacturer.

Those scholars in the field of knowledge creation research usually build up theories for all business activities. New knowledge is able to be created in all business activities in all industries. Then, researchers about knowledge creation do not usually set any specific limitations to industries and business activities[16].

2.3.2 Common Characteristics in the Literature

The literature that describes knowledge creation has some common characteristics.

Knowledge Creation in Innovation

Firstly, most cases suggested in the literature analyze knowledge creation in a process of innovation[17]. As well as knowledge, innovation is one of the most complicated terms. The literature on innovation is large and diverse. Therefore, here, it is necessary to set a definition and understandings about the term.

As is mentioned in Chapter 2, Schumpeter defines innovation as *the carrying out of new combinations of new or existing knowledge and resource*. When identifying the term more fully, researchers usually focus on the distinction between invention and innovation. For example, Fagerberg (2006, pp.4-12) distinguishes invention as "the first occurrence of an idea for a new product or process", and innovation as "the first attempt

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[16] Nonaka & Takeuchi (1995) deal with various kinds of industries, e.g., automobile industry, food industry, retail industry, IT industry and electronics industry.

[17] Case studies of knowledge creation are classified into radical innovation and incremental innovation. Scholars often classify innovations by how radical they are compared to current technologies. From this perspective, continuous improvement is often characterized as "incremental" or "marginal innovations", as opposed to "radical" innovations. According to some scholars (e.g., Rice et al., 1998; Leifer et al., 2001; McDermott and O'Connor, 2002), incremental innovations are typically minor improvements or extensions to existing products/services and processes, radical innovations, while radical innovations involve the development or application of significantly new technologies or products to markets that are either non-existent or require dramatic behavior changes to existing markets. For example, radical innovation is described in Nonaka & Takeuchi (1995). In the literature, there are cases Honda and Matsushita, in which knowledge is created in product development. Krogh (1998) also describes a case of radical innovation in Unilever's product development project and supply chain project. On the other hand, we can also see cases of incremental innovation. For example, Nonaka et al. (1998) show a case of continuous improvement in Seven Eleven Japan, a Japanese retailer, and describe how the company establishes spiral knowledge system.

to carry out into practice". In other words, innovation consists of both invention and practical commercialization. This research follows this understanding about innovation.

In addition, while some scholars focus on new product development especially based on technology, others identify innovation more broadly. For example, Schumpeter (1934) classified innovation into the following five: the introduction of a new good, the introduction of a new method of production, the opening of a new market, the conquest of a new source of supply of raw materials or half-manufactured goods, and the carrying out of the new organization of any industry. This research follows the broad definition about innovation.

Furthermore, most widely-used definitions about innovation focus on novelty and newness (Johannessen et al., 2001). For example, Damanpour (1991, p.556) defines innovation as *the generation, development, and adaption of novel ideas on the part of the firm*. Zaltman et al (1973, p.10) also defines innovation as *any idea, practice, or material artifact perceived to be new by the relevant unit of adoption*. As newness is a factor to distinguish innovation from any other activities, important questions are "how new?" and "new to whom?" Johannessen et al., (2001) discuss the topic, and they suggest that there are the following two kinds of identification about newness: newness to the company (within-firm innovation) and newness to the market (industry-level innovation). This research focuses on the within-firm innovation, which means that innovation is new in the firm, rather than in the industry. On the basis of this identification, most cases in the knowledge creation literature are about innovation.

Knowledge and innovation go hand in hand, as shown in Chapter 2.1. Both are in dynamic theory, which was developed by Hayek, Schumpeter and Drucker. Knowledge creation fuels innovation (Nonaka & Takeuchi, 1995). The process by which new knowledge is created within organizations becomes the cornerstone of innovative activities (Nonaka & Takeuchi, 1995). Therefore, it is natural that knowledge creation is analyzed in a process of innovation.

Knowledge Creation in Innovative Projects

Secondly, in the literature about knowledge creation, innovation is usually developed in a project, which means a temporary endeavor undertaken to achieve a goal (Project Management Institute, 2004). Here, a project which develops innovation is specially called an *innovative project*[18]. This is distinguished from and project-based business.

Thirdly, the literature about knowledge creation tends to focus on *project implementation* in the innovative projects. In order to make the characteristic clear, this research divides a total process of the innovative projects into two phases: *project planning* and *project implementation*[19]. In the project planning phase, a project has not been established yet. Managers analyze the objective, scope, required resource, schedule, and expected outcome. Then, they write a project plan and propose it. After this phase, top managers evaluate the project plan, and they judge whether to establish the project. In the project implementation phase, an approved project is executed practically on the basis of a project plan. A project team is organized and controlled by project managers. This division for innovative projects is similar to Schultz et al. (1987). Some scholars (e.g., Souder & Moenaert, 1992; Schulze & Hoegl, 2006) also divide new product development project into two phases: concept phase and development phase. This is also similar to the classification between the project planning phase and the project implementation phase.

There are any other process models about innovative projects. For example, Cooper (2001) divides innovation into five stages: preliminary investigation stage; detailed investigation stage; development stage; testing and validation stage; and full product and market launch stage (Figure 9). In the model, the first two stages are included in the

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[18] Some scholars (e.g., Hoegl & Parboteeah, 2006; Dean & Kuratko, 2009) also use the word "innovative project" which indicates a project relative to innovation.
[19] One of the project management models, which is recognized and accepted as a universal standard, is Project Management Institute (2004): *A Guide to the Project Management Body of Knowledge*. In this guide, project management process is made up of five processes: *project initiating process, project planning process, project executing process, project monitoring & controlling process* and *project closing process*. The first two processes are included in project planning phase, while latter three processes are included in project implementation phase.

planning phase, because those are before judgment about developing a project. Then, the other three stages are included in the implementation phase.

Figure 9. Stage Model of Innovation
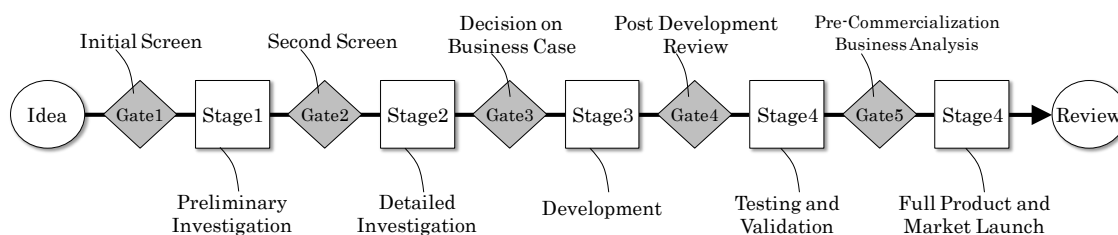
Source: Cooper, 1997

According to the two-phase model, most cases in knowledge creation research focus on the project implementation phase, rather than the project planning phase. That is to say, in these cases, a project has been already planned and approved. Researchers analyze how project members create knowledge towards planned objectives. For example, there is Honda's case in Nonaka (1991). In the case, a project team developed a distinctive urban car called *Honda City*. The team members created new points of views through dialogue and discussion. This dialogue could involve considerable conflict and disagreement, but it was precisely such conflict that pushed employees to question existing premises and to make sense of their experience in a new way. This case is about the project implementation phase, because the project had already been established by top management's decision. Nonaka & Takeuchi (1995) describe that top management charged the team with vague instructions that made project members create ideas. However, they do not provide any descriptions about how top management decided on the establishment of the project, as well as how the project was planned[20].

This research aims to shed light on knowledge creation in the project planning phase, through comparison between the project planning phase and the project implementation phase in the view of knowledge creation. As defined in Chapter 1, a research question

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[20] Some might identify that this case is about the planning phase. The difficulty of identification about phase is discussed in Chapter 7.4. Here, the Honda's case is identified as implementation phase, because there is not any description about project planning and investment.

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driving this research is ***what is the difference in knowledge creation between the planning phase and the implementation phase in innovative projects?*** The research question is discussed more towards setting initial propositions in the next chapter.

3. Literature Review (2) Toward Setting an Initial Proposition

Because there is not enough theory about the research question, it is necessary to use a theory-building approach for addressing it (details are explained in Chapter 4). In a theory building approach, researchers make initial propositions, which have not been validated yet. The initial propositions are tested and revised through empirical studies (Yin, 1994). In this chapter, initial propositions are set through review of relative the literature (see Figure 10).

Figure 10. Image of Chapter 3
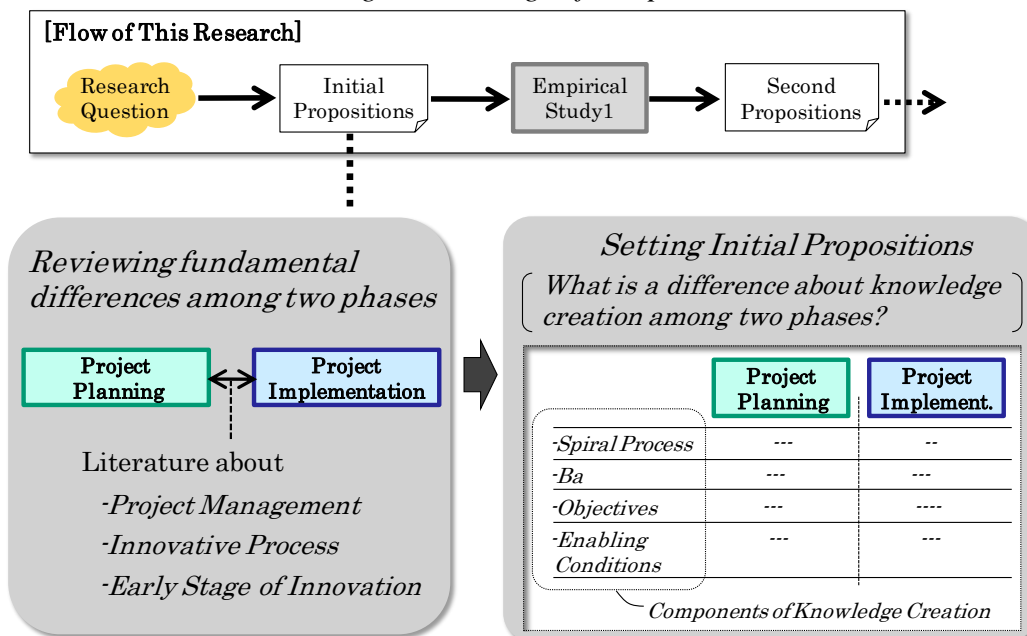
Firstly, literature which describes differences between the two phases are reviewed (in Chapter 3.1). One of the relevant research fields is *project management*. The literature shows fundamental differences between the project planning phase and the project implementation phase. The other relative research field is *innovation process*. The literature shows differences in the view of innovation. Secondly, literature which especially focuses on an early stage in innovation is reviewed (in Chapter 3.2). Literature about *front end innovation, corporate entrepreneurship, and opportunity recognition* are discussed.

On the basis of those literature reviews, initial propositions are set (in Chapter 3.3).

Differences between two phases are reconsidered in the context of four components about knowledge creation: *spiral process*, *ba*, *objectives* and *enabling conditions*.

3.1 Literature Reviews about Differences between Two Phases

Here, literature, which describes differences among the project planning phase and the project implementation phase, are reviewed.

3.1.1 Literature on Project Management Research

Project management is defined as the "managerial activities needed to lead a project to a successful end" (Shenhar & Dvir, 2007). It is a specialized management approach to planning and controling projects under a strong single point of responsibility (Burke, 1992).

Literature in the field of project management shows differences between the planning and implementation phases. Project Management Institute (2004), which publishes *A Guide to the Project Management Body of Knowledge (PMBOK)*, shows fundamental tasks required in each phase (Table 1). According to it, the main task in the project planning phase includes development of project management plan, collection of resources, definition of scope, creation of work breakdown structure, estimation of activity resources and durations, determination of budget, plan of quality, human resource, communication, risk, and procurement. On the other hand, the main task in the implementation phase includes direction of project execution, quality assurance, development of project team, management of project team, distribution of information, management of stakeholder expectations, and conduction of procurement.

Table 1. Characteristics of Two Phases

	Project Planning Phase	Project Implementation Phase
Main Task	-Develop Project Management Plan -Collect Requirements -Define Scope -Create WBS -Estimate Activity Resources -Estimate Activity Durations -Develop Schedule and Cost -Determine Budget -Plan Quality -Develop Human Resource Plan -Plan Communications -Plan Risk Management -Plan Procurements	-Direct and Manage Project Execution -Perform Quality Assurance -Develop Project Team -Manage Project Team -Distribute Information -Manage Stakeholder Expectations -Conduct Procurement

Source: Project Management Institute, 2004

In addition to the functional differences, some project management scholars analyze details about differences between the two phases. Schultz et al. (1987) suggest that this classification between the planning phase and the implementation phase is parallel to the distinction between strategy and tactics in the strategic management literature, e.g., Anthony (1965) and Steiner (1969). Then, they propose a sample of 10 issues that have differing implications for project management when approached from either strategic planning or tactical operation (Table 2). First difference is about *level of conduct*. This refers to the level within the organization at which the project activities are performed and issues are addressed. The project planning is addressed at the highest levels in the organization. On the other hand, the project implementation is concerned more with mid- to lower-level managers who receive instructions and are expected to carry them out. Second difference is about *assessment*. In the planning phase, managers have to assess the plan subjectively, while they have to assess the project with less subjective values in the implementation phase. Third difference is about *nature of problem*. In the planning phase, nature of problem is unstructured, while it is structured in the implementation phase. Fourth difference is about information. In the planning phase, large amount of information is required and some information is acquired externally. On the other hand, in implementation phase, required information is internal and specific. Fifth difference is about time horizon. In the project management, the time horizons

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may be a special concern. Projects, by their very definitions, have specific, foreseeable beginnings and ends and are often of relatively limited duration. In the planning phase, time horizon is long term, while in the implementation phase, it is short term. Sixth difference is about completeness. The planning phase covers the entire scope of the organization, while the implementation phase is concerned only with the sub-organizational unit involved. Seventh different is about reference. This involves the source or origin of the activity considered. To illustrate, strategic plans originate at higher organizational levels based on initially conceived goals and used for the project. On the other hand, tactical activities in the implementation phase have a limited reference. Eighth difference is about level of detail. Strategic factors in the planning phase often involve general outlines of the goals. Mission is broadly conceptualized and even schedules and plans remain tentative in the early stages. Tactical project implementation becomes much more narrowly focused, or specific to the particular problem faced. Ninth difference is about ease of evaluation. In the planning phase, it is difficult to evaluate the results due to its generality. In the implementation phase, evaluation is easier. Last difference is about point of view. In the planning phase, important view is at corporate-level, while in the implementation phase, it is at functional-level.

Table 2. Comparison between Two Phases

	Strategic Planning (Project Planning Phase)	Tactical Operation (Project Implementation Phase)
(1)Level of Conduct	Top management	Middle/Lower management
(2)Assessment	Greater subjectivity used at strategic use	Less use of subjective values
(3)Nature of Problem	Unstructured, one at a time	More structured and repetitive
(4)Information Needs	Large amount of information needed	Need for intentionally generated, specific information
(5)Time Horizon	Long-term	Short-term and more constant
(6)Completeness	Covers the entire scope of the organization	Concerned only with the sub-organizational unit involved
(7)Reference	The source of all planning in the organization is original	Done in pursuit of strategic plans
(8)Level of Detail	Broad and general	Narrow and problem specific
(9)Ease of Evaluation	Difficult, because of generality	Easier, because of specificity
(10)Point of View	Corporate	Functional

Source: Schultz et al., 1987

3.1.2 Literature in Innovation Process

Next, it is necessary to analyze the two phases, especially in the context of innovative projects. As mentioned, the innovative projects means a project which aims for development of radical innovation.

During the 1950s and 1960s, it was assumed that technological innovation was developed through a linear process. Especially, the process model of "technology push" and "market pull", which was specific to technology was discussed mainly. Then, Kline & Rosenberg (1986) developed the so-called chain-link model of innovation (Figure 11). In this model, innovation process is divided into following five steps: potential market; invent and produce analytic design; detailed design and test; redesign and produce; and distribute and market. During this sequential process, multiple sources of knowledge are used and side-links to research all along the central chain are utilized.

Figure 11. Chain Link Model of Innovation
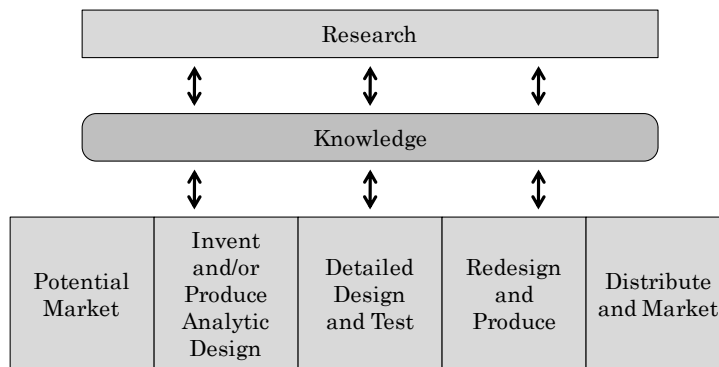
Source: Kline & Rosenberg, 1986

Theories on the organizational adoption of innovations have generally tended to focus on a two-stage model, which is similar to this research's two phases. In the model, the planning phase is often called *initiation stage*, while the implementation phase is called *implementation stage* or *development stage*. Some research shows this two-stage process can be readily extended to the process of technological product innovation in the firm. The research by Johne (1984) indicates that active and less active product innovator firms differ strongly with regard to the organizational structuring of the initiation and implementation stage. The studies of Souder (1987) and Cooper &

Kleinschmidt (1986) highlight the impact of the up-front activities.

Souder & Moenaert (1992) also follow this two-stage model. They analyze the two stages in the view of *variability* and *analyzability* (Figure 12). The variability of the task refers to the number of exceptions encountered in its execution, while the analyzability of the task refers to the extent to which there are known procedures that specify the sequence of steps to be followed in performing a particular task. The two factors constructed a four-fold table: non-routine tasks (analyzability low, variability high), craft (analyzability low, variability low), engineering (analyzability high, variability high), and routine-task (analyzability high, variability low). According to Souder & Moenaert (1992), the planning phase of an innovation is usually characterized by high variability and low analyzability. In this phase, as more information is uncovered, the variability is expected to decrease and the analyzability will increase. Then, the implementation phase of an innovation is usually characterized by low variability and high analyzability.

Figure 12. Two Stage Model
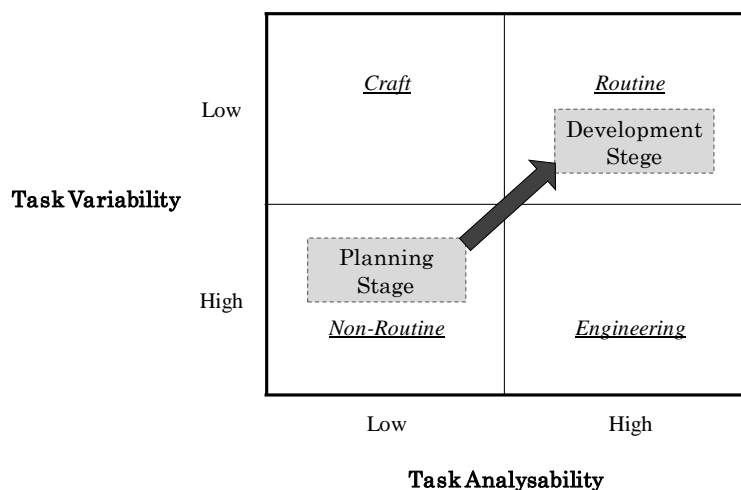
Source: Souder & Moenaert, 1992

Schulze & Hoegl (2006) analyze the two phases in innovative projects, in the view of knowledge creation. They distinguish product development project into two phases: the concept phase and the development phase. It is similar to the classification between the planning phase and the implementation phase. Initial product ideas are developed into product specifications in the concept phase, while the actual technical development

work is carried out in the development phase. Then, they analyze the relationship between the two phases and four knowledge creation modes in SECI model. In the beginning, they established some hypotheses. According to the hypotheses, both socialization and combination during concept phase are positively related to success, as are both internalization and externalization during development phase. As a result of the questionnaire research for 33 companies, they found out that socialization during the concept phase and combination during this development phase are positively related to new product success. On the other hand, they found out that externalization during the concept phase as well as socialization and internalization during the development phase are negatively related to new product success.

3.2 Literature Reviews about Planning Phase

As mentioned, research about knowledge creation tends to focus on the project implementation phase, rather than the project planning phase (e.g., Nonaka & Takeuchi, 1995, Nonaka et al., 2008). Then, the present research is contributing to the existing literature by examining the project planning phase in innovation carefully. Here, following two characteristics of the planning phase are reviewed: *front end innovation* and *opportunity recognition*.

3.2.1 Literature about Front End of Innovation

A number of studies has focused on the importance of the *front end of innovation* in the overall success of the new product development project (Cooper, 1988; Gupta & Wilemon, 1990; Murphy & Kumar, 1997; Poskela & Martinsuo, 2009). Some scholars (e.g., Koen et al., 2002) use the term *fuzzy front end* because unknowable and uncontrollable factors dominate this phase. Recent findings have revealed that the major problem for established firms lies not in the radical technology creation phase, but in advancing these technologies toward the commercialization (Christensen & Bower, 1996; Tushman & O'Reilly, 1996; Rice et al., 2001). Particularly, at the front end of the radical innovation lifecycle, it is difficult to envisage the development path and to have confidence that the chosen path will lead to dominance in an industry (Quinn, 1985).

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For diminishing the gap, technology is recognized as an opportunity. This opportunity recognition is not a specific to technological development but a common characteristic in innovation projects.

Koen et al., (2001) describe that the front end of innovation presents one of the greatest opportunities for improving the overall innovation process. Then, they suggest a model about the front end of innovation (Figure 13). In the model, there are five key elements comprising the innovation: *opportunity identification*, *opportunity analysis*, *idea genesis, idea selection*, and *concept and technology development* (Koen et al., 2001). *Opportunity identification* is where the organization, by design or default, identifies the opportunities that the company might want to pursue. *Opportunity analysis* means translating opportunity identification into specific business and technology opportunities and making early technology and market assessments. *Idea genesis* represents an evolutionary process in which ideas are built upon, torn down, combined, reshaped, modified, and upgraded. *Idea selection* is choosing which ideas to pursue in order to achieve the most business value. *Concept and technology development* involves the development of a business case based on estimates of market potential, customer needs, investment requirements, competitor assessments, technology unknowns and overall project risk. In addition, the five elements are driven by an engine or "bull's eye" which leadership and culture of the organization fuel (Koen et al., 2001).

Figure 13. The New Concept Development Model
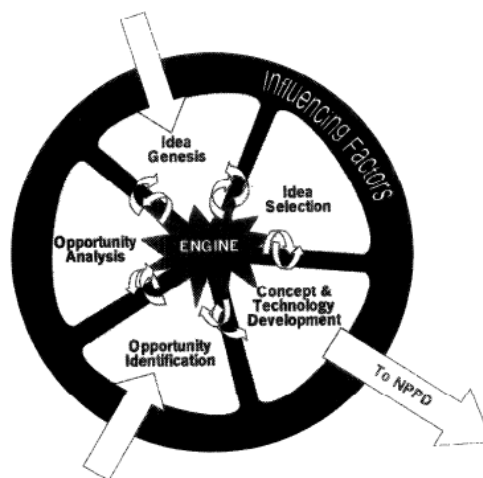
Source: Koen et al., 2001

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3.2.2 Literature about Corporate Entrepreneurship

Researchers in the field of corporate entrepreneurship[21] also discuss about the early stage of innovation. Scholars (e.g., Peterson & Berger, 1971; Burgelman, 1983; Kanter, 1985; Zahra, 1991), who followed a context of Schumpeterian innovative theory, focus on entrepreneurial activities in the large company. The importance of corporate entrepreneurship for successful organizational performance and renewal has been the subject of interest in the literature over the past three decades (Zahara, Nielsen & Bogner, 1999, p.169). For example, Burgelman (1983) suggests that diversity in an existing firm results from autonomous strategic behavior, and shows a notable model, in which *autonomous strategic behavior loop* is interacted with traditional *induced strategic behavior loop*[22].

As Burgelman (1983) mentions, one of the important topics in the field of entrepreneurship and corporate entrepreneurship is *opportunity recognition*. Such an opportunity recognition results from what Penrose (1968) has called *the pool of unused resources existing at any given moment in the firm's development*. Kirzner (1979) also emphasizes the importance of alertness to opportunities as the foundation of all entrepreneurial activity, internal as well as external. This *opportunity recognition* is similar to *opportunity identification* in Koen's fuzzy front end model

According to Venkataraman (1997), the entrepreneurial opportunity consists of a set of ideas, beliefs and actions that enable the creation of future goods and services in the absence of current markets for them. O´Conner & Rice (2001) also focus on the opportunity recognition in established firm. According to them, the opportunity recognition for the radical innovation is highly dependent on individual initiative and

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[21] Scholars use many different terms to refer to different aspects of corporate entrepreneurship: intrapreneurship (e.g., Kuratko et al., 1990), internal corporate entrepreneurship (e.g., Schollhammer, 1982), corporate ventures (Ellis and Taylor, 1987; MacMillan et al., 1986), and, internal corporate venturing (e.g., Zajac, Golden and Shortell, 1991). In this thesis, the term "corporate entrepreneurship" is used.

[22] According to Burgelman (1983), autonomous strategic behavior takes shape outside of current strategic behavior, and introduces new categories for the definition of opportunities. Then, he suggests how corporate managers assess entrepreneurial proposals about opportunities from a strategic managerial perspective.

capacity, rather than routine practices and procedures of the company (O´Conner & Rice, 2001). The opportunity recognition can be characterized as reactive or proactive. On the one hand, individuals may be alert and ready to react to ideas and information that have the potential to become an opportunity. On the other hand, through their own initiative or via a challenge from a superior, they may take on the responsibility of searching through the organization for ideas that can be developed into opportunities for significant new products or businesses (O´Conner & Rice, 2001).

3.2.3 Literature about Opportunity Recognition

Researchers about *front end of innovation* and *corporate entrepreneurship* discuss an early stage in an innovative project. One of the key characteristics is opportunity recognition. Some scholars discuss about how organizations can enhance the capability of the opportunity recognition.

Scholars emphasize that opportunity recognition depends on individual capability. Yu (2001) and Shane (2000) emphasize that opportunity recognition by corporate entrepreneurs is clearly determined by entrepreneurial alertness and intuition. Kirzner (1973) also suggest that a corporate entrepreneur is able to recognize an opportunity that has been previously overlooked. Corporate entrepreneurs have an entrepreneurial lens acting as a filter (Shaw et al. 2005). Ardichvili & Cardozo (2000) describe that corporate entrepreneurs recognize opportunities as they occur, rather than purposefully searching for them.

On the other hand, they also emphasize that opportunity recognition depends on organizational capability. O´Conner & Rice (2001) suggest some factors which improve organizational capability for opportunity recognition. Organizations can build enabling activities into mechanisms to increase the probability that opportunity recognition will occur. Firstly, O´Conner & Rice (2001) suggest the importance of *external networks* e.g., research labs, universities, think tanks, world-renowned scholars. Interactions with those external resources may stimulate the recognition of a number of opportunities.

Ardichvili & Cardozo (2000) also suggest that opportunity recognition includes a wide social network and prior knowledge of markets and problems. Secondly, O´Conner & Rice (2001) suggest the importance of *internal networks*, especially informal ones. As there are many kinds of people who hold unique experiences and ideas in organizations, internal networks may stimulate opportunity recognition. The suggestion includes three broad organizational factors, each of which includes several specific elements: organizational motivation, management practices and resources. Thirdly, O´Conner & Rice (2001) suggest the importance of *call to action*. Managers can establish a context to encourage idea generation and opportunity recognition.

The organizational capability for opportunity recognition is also discussed in the field of psychology. Many psychological researchers focus on creativity at the individual and organizational levels. Osborn (1963) proposes a technique called brainstorming, which has become a widely used technique for opportunity recognition. Csikszentmihalyi (1988, 1990) developed a systems view of creativity that seeks to describe the social processes through which specific actions come to be defined as creative[23]. Amabile (1988) also focused on work environment, and built up componential theory of creativity and innovation in organization. In addition, some could argue that the most critical feature that distinguishes organizational contexts from other domains of creative action is the common frames of thought and action held by organizational actors (Weick, 1979). These common frames of habitual thought and action narrow the range of likely behaviors an organization member will enact in familiar organizational settings (Gioia & Poole, 1984). Those are analyzed as organizational culture by Schein (1985).

3.3 Initial Proposition

Here, on the basis of the literature review, initial propositions are created related to the

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[23] He presented three interrelated subsystems: the person, the field (defined as those people who populate and affect the structure of a domain) and the domain (defined as the rules, language, customary practices, etc., a recognized area of action) that together contribute to the occurrence of a creative act. Fields and domains represent the situation or context that influences individuals' actions. The person serves as a solo source of variation and change introduced to a field. The people who compose the field and personify the domain serve to select and retail creative acts that subsequently elaborate the domain. This evolutionary metaphor that emphasizes variation, selection and retention processes also have been effectively employed by other creativity researchers, most notably Campbell (1960), Simonton (1988) and Staw (1990).

research question: *what is the difference in knowledge creation between the planning phase and the implementation phase in innovative projects?* As this research builds on Nonaka's knowledge creation theory, the initial propositions are extracted pertaining to the following four factors: *spiral process*, *ba*, *knowledge vision/objectives*, and *enabling condition*. These are discussed extensively in Nonaka's work. It does not mean that the four factors are completely sufficient for answering the research question. Rather, they are just propositions at the starting point of the research. The propositions should be revised through empirical study. Each proposition is on the basis of the above-mentioned literature reviews about fundamental differences between the two phases.

3.3.1 Proposition about Spiral Process

Spiral process is a process model suggested by Nonaka & Takeuchi (1995). In this process, knowledge is created through conversion between tacit knowledge and explicit knowledge. This process takes place within an expanding community of interaction, which crosses intra- and inter-organizational levels and boundaries.

In the implementation phase, each project member creates knowledge by her/himself and amplifies it through practice and dialogue with other members. This process is viewed as a spiral because it includes some particular characteristics. Firstly, this process is done not by an individual but by multiple members. Secondly, those members share common practices and dialogue each other. Thirdly, those members progress the project continuously towards common objectives, e.g., new product/service, and new market. In this process, knowledge created by each member is specific and practice-based. On the other hand, in the planning phase, a project has not been established yet. Each person, especially the corporate entrepreneur, is alert to new business opportunities by himself/herself individually. After recognizing an opportunity, he/she plans a project to implement it. Knowledge creation is created by idea-based analysis without practice. This planning phase is really subjective, unstructured action, while the implementation phase is less subjective and structured (Schultz et al., 1987).

Hence, I set a proposition that knowledge creation in the planning phase is does not follow a spiral process. The process is more random, rather than spiral.

> *Proposition 1: Knowledge creation in the planning phase does not follow a spiral model, while knowledge creation in the implementation phase does follow a spiral model.*

I will test the proposition in the present study. However, it depends on each researcher's interpretation whether a process is spiral or not. Therefore, it is necessary to set a clear criterion for the judgment, for strengthening the validity of the studies. In this research, a process is identified as a spiral if it includes following three characteristics of Nonaka's spiral process: the process is done in a team, the process includes continuous dialogue and practice, and the team shares common objectives.

3.3.2 Proposition about Ba

One of the key factors of the process is ba, which information is given meaning through interpretation to become knowledge, and new knowledge is created out of the existing stock through the change of the meanings and the contexts (Nonaka et al., 2001). Ba can emerge among individuals, in working groups, project teams, informal circles, temporary meetings, in virtual space such as email groups, and at the frontline in contact with customer.

In the implementation phase, knowledge is mainly created in each project team, though external people also sometimes link to the team. Then, ba is usually established intentionally, on the basis of project plan. For example, project managers set a regular project meeting, a practical trial, or a fixed cyber space to share information. Ba is intentionally set because of the characteristics of this phase: low variability and high analyzability (Souder & Moenaert, 1992). On the other hand, in the planning phase, ba is not always established intentionally, because there is less of a clear direction. Hence, I can set a proposition that ba is more likely to be established by accident in the planning phase. Various networks are required to increase the probability that opportunity will occur, e.g., attendance at periodic conferences and brown bag lunches with professional

scholars (O´Conner & Rice, 2001).

> *Proposition 2: In the planning phase, ba is established by accident, while in the implementation phase, ba is established by design.*

This proposition also requires a clear criterion in order to strength validity. In this research, a ba is judged as designed if it is planned in advance with clear objectives.

3.3.3 Proposition about Objectives

Nonaka et al. (2008) extract factors relative to corporate objectives. First one is knowledge vision, which defines the kind of future that the company imagines for itself and determines the collective ideal mission and domain. Second one is driving objectives that mean a concrete concept, goal, or action standard. This is the engine that drives the entire organization. Nonaka et al. (2008) emphasize that the two factors are engines that lead effective knowledge creation.

According to Schulz et al. (1987), the planning phase requires corporate view and covers the entire scope of the organization, while the implementation phase requires functional view and is concerned with sub-organizational units. In the implementation phase, a clear and functional project objective has been hopefully set in a project plan. The intention usually means original goals of the project. On the other hand, in the planning phase, there is not usually the clear goal. Ultimate intention is a contribution to the company. As a result of those contexts, the following proposition is proposed:

> *Proposition 3: In the planning phase, the important objective is a company-level goal. In the implementation phase, the important objective is a project-level goal.*

This proposition also requires a clear criterion in order to strengthen validity. Hence, an important objective is identified when an objective is emphasized by interviewees in open discussions. This means that I cannot test the propositions if interviewees do not mention about it. This judgment includes limitations for the validity, because it depends on the interview's progress[24].

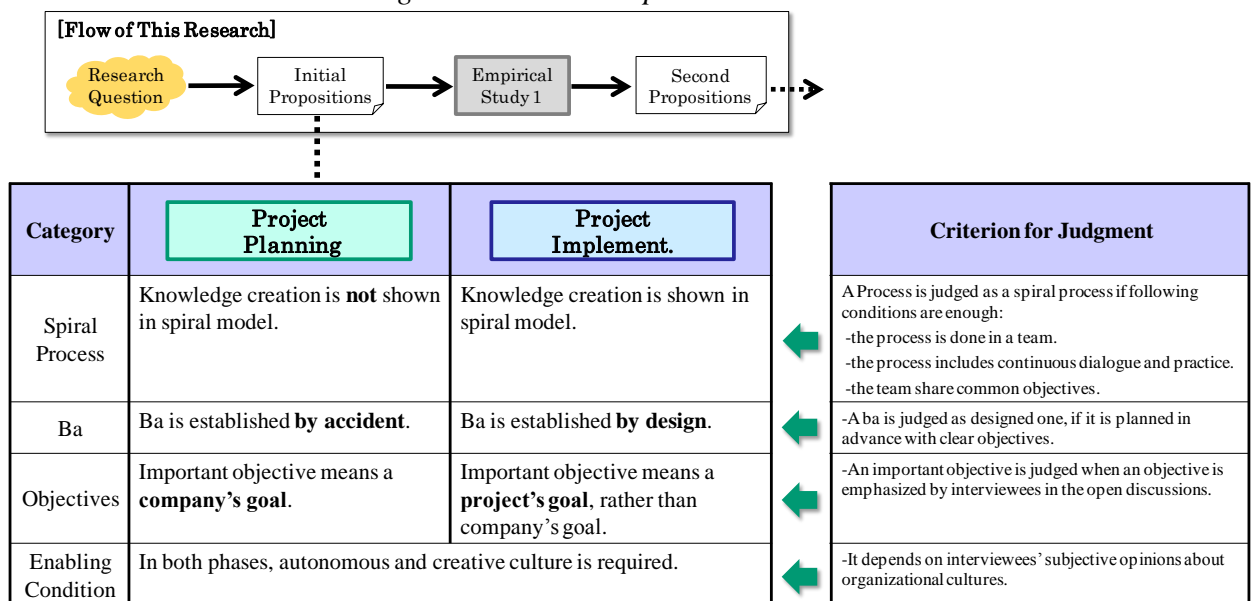[24] The limitation is described again in Chapter 7.3.

3.3.4 Proposition about Enabling Condition

An enabling condition is one that supports effective knowledge creation in organizations. This includes fostering individual creation of new knowledge, amplifying new knowledge through organizational learning, and controlling new knowledge. This is shown as factors that have been frequently studied as forces behind knowledge creation, and have a close connection with organizational design (Lloria, 2007, p.677). Nonaka & Takeuchi (1995) suggest five factors: *autonomy*, *intention*, *fluctuation and creative chaos*, *redundancy*, and *requisite variety*. This research focuses on *autonomy* and *creative chaos* in them. In literature reviews, I could not find out any differences about the enabling conditions between the planning and the implementation phase. Both phases require the enabling conditions. Hence, a following proposition is proposed:

Proposition 4: In both phases, autonomous and creative culture is required.

This proposition also requires a clear criterion in order to strengthen validity. In this research, it depends on interviewees' subjective opinions about organizational cultures in the companies. This judgment also includes limitations for the validity, because it depends on the interviewee's position and interpretation[25]. The initial propositions are summarized in a following figure.

Figure 14. Initial Propositions

Category	Project Planning	Project Implement.	Criterion for Judgment
Spiral Process	Knowledge creation is **not** shown in spiral model.	Knowledge creation is shown in spiral model.	A Process is judged as a spiral process if following conditions are enough: -the process is done in a team. -the process includes continuous dialogue and practice. -the team share common objectives.
Ba	Ba is established **by accident**.	Ba is established **by design**.	-A ba is judged as designed one, if it is planned in advance with clear objectives.
Objectives	Important objective means a **company's goal**.	Important objective means a **project's goal**, rather than company's goal.	-An important objective is judged when an objective is emphasized by interviewees in the open discussions.
Enabling Condition	In both phases, autonomous and creative culture is required.		-It depends on interviewees' subjective opinions about organizational cultures.

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[25] The limitation is described again in Chapter 7.3.

4. Research Design

This chapter provides a description of the research design, which means basic directions or a recipe for carrying out scientific research. Because this research is motivated by a desire to better understand some business-related phenomena, it is identified as basic business research. As Chia (2002) describes, we have to recognize that the management research is also a type of knowledge creation activity which may be compared to any manufacturing process where the type of technology employed (philosophical orientation) and the method of production adopted (research methodology), as well as the raw material used (experience and established knowledge), together with the operator's capabilities (researcher's competence), ultimately determine the quality and reliability of the product itself.

The research design shows how the defined research question is addressed in this research. Here, the research design is composed of following five factors: *research philosophy*, *research methodology*, *data collection strategy, data analysis strategy* and *validity and reliability*.

4.1 Research Philosophy

In scientific research, it is necessary to validate how new knowledge is recognized as true knowledge. This validation is strongly dependent on a philosophy about the identification of knowledge and reality. Research orientations are inextricably linked to philosophical preferences which are, in turn, influenced by the embedded collective histories and cultural traditions within which our own individual identities have emerged (Chia, 2002). In Chapter 2, it is described how philosophy is important in dealing with the complicated term "knowledge". The description can be applied to the management research, which is also one of the knowledge creation activities.

There are many kinds of classifications about research philosophy. One of the traditional classifications is between *positivism* and *interpretivism*, which is mentioned in Chapter 2.3. In the beginning, this thesis fundamentally follows a *positivist* approach.

In the field of business research, positivism tends to be dominant (Chia, 2002). Fundamentally, this research also adapts positivism.

4.2 Research Methodology

4.2.1 Case Study Research

Research methodology should be decided on the basis of research question. Yin (1994) shows the relationship between methodology and research question's type. This research selects a *case study research* rather than *survey research*, *experimental research* and *historical research*, for three reasons[26]. First reason is that case study research is usually considered the most appropriate "in the early stage of research on a topic or when a fresh perspective is needed" (Eisenhardt, 1989, pp.548-49). This research needs to include, more or less, a fresh perspective, because literature around the topic is limited. Second reason is that case study research is of particular value for research when the environment is messy (Harrison, 2002). It is possible to say that this research is conducted under a messy environment, because it deals with knowledge, a complicated word. Third reason is that many scholars, which analyzed knowledge creation, have selected case study research (e.g., Nonaka & Takeuchi, 1995; Kulkki, 1996; Krogh, 1998; Nonaka et al., 2008).

In case study researches, there are two kinds of approaches in view of the time horizon: *longitudinal* and *cross-sectional*. Here, a *cross-sectional approach* is selected.

In addition, as a related but important note, the case study research should not be confused with *qualitative research* (Schwartz & Jacobs, 1979; Strauss & Corbin, 1990; and Yin, 1994). There are both *qualitative research* and *quantitative research* in case study research. In this thesis, *qualitative research* is selected, because this thesis aims to build theory. According to Mintzberg (1979), it is the anecdotal data that enable us to do the building, for while systematic data create the foundation for our theories.

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[26] Yin (1994) shows the relationship between methodology and research question's type. According to his suggestion, this research had better choose a survey study research rather than case study research, because this research focuses mainly on *what* question about contemporary set of events over which the investigator has little or no control. However, this research selects case study research, because of other three reasons described.

Producing generalizations out of a case study is difficult due to the nature of case study (Stake, 1995). The fundamental idea behind a case study is to produce in-depth insights that at best yield tendencies. However, Yin (1994) mentioned that this difficulty is not only for case study research but also for survey research and any other research. According to him, case study research, like any other research, is generalizable to theoretical propositions and not to populations and universe. In this sense, the case study research does not represent a "sample", and the investigator's goal is to expand and generalize theories (analytical generalization) and not to enumerate frequencies (statistical generalization) (Yin, 1994). Creative insight often arises from the juxtaposition of contradictory or paradoxical evidence (Cameron & Quinn, 1988). According to Eisenhardt (1989), building theory from case studies centers directly on this kind of juxtaposition. That is, attempt to reconcile evidence across cases, types of data, and different investigators, and between cases and literature increases the likelihood of creative reframing into a new theoretical vision.

4.2.2 Theory Building Approach

According to Eisenhardt (1989), case study research can be used to accomplish various aims: to provide description (e.g., Kidder, 1982), test theory (e.g., Pinfield, 1986), or generate theory (e.g., Gersick, 1988). This research selects the last aim, which is called *theory building approach*. Because there is not enough theory to answer the defined research question, it is, more or less, required to challenge for the *theory building approach* from case study research. This approach has been discussed in the literature[27].

4.3 Analysis Strategy

In case study research, there are several kinds of analysis strategies, e.g., pattern-matching, explanation-building, time-series analysis, and program logic model. As there is not enough theory about the topic of this research, it is difficult to select

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[27] For example, Glaser and Strauss (1967) detailed a comparative method for developing grounded theory. Yin (1994) also described the design of case study research, and Miles and Huberman (1984) codified a series of procedures for analyzing qualitative data. Then, Eisenhardt (1989) also suggested how to build theory from case study research. In this research, the literature is reviewed as fundamental principles of case study.

pattern-matching. Instead, explanation-building is selected in this research, because this research focuses on theory-building approach.

In the explanation-building approach, the final explanation may not have been fully stipulated at the beginning of a study and therefore differs in this respect from the pattern-matching approaches. Rather, the case study evidence is examined, theoretical positions are revised, and the evidence is examined once again from a new perspective, in this iterative mode. The gradual building of an explanation is similar to the process of refining a set of ideas (Yin, 1994). Eisenhardt (1989) also shows same recognition. According to her, though early identification of the research question and possible constructs are helpful, it is equally important to recognize that both are tentative in this type of research. In the beginning, researchers should formulate a research question and possibly specify some potentially important variables, with some reference to extant literature (Eisenhardt, 1989). Here, the variables are made on the basis of propositions. Though the propositions are not validated, they should be set. In this research, the initial propositions for research question have been already set in Chapter 3. Then, following empirical research, the initial propositions are discussed again and revised towards a final conclusion. Researchers should avoid thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process (Eisenhardt, 1989).

The analysis of case study material is not a clear linear process (Waddington, 2004). The exact focus and argument of this research were first unclear, but they gradually became focused and gelled up when traveling iteratively between data, theory, and methodology. Eisenhardt (1989) also suggests that overlapping data analysis with data collection is required in a process of building theory. According to her, a key feature of theory-building case research is the freedom to make adjustments during the data collection process. This research therefore required shifting research mode between induction and deduction. As Strauss & Corbin (1990) describe, it is constant interplay

between proposing and checking[28].

Figure 15. Theory Building Approach in This Research (Reuse)
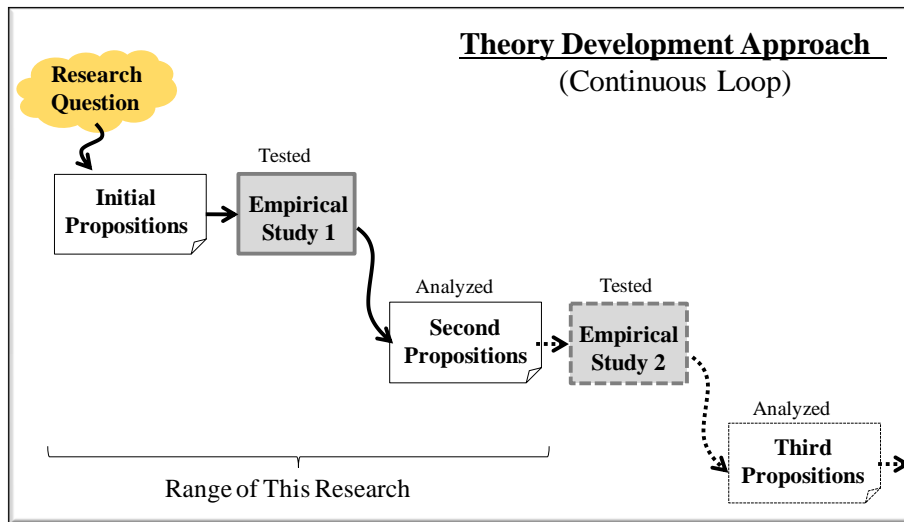
4.4 Data Collection Strategy

4.4.1 Case Selection

In case study research, there are single-case and multiple-case approaches. Here, multiple-case study is selected, for two reasons. Firstly, multiple-case study is useful for a theory building approach. Through analyzing cases continuously, researchers can gain more extensive insights. Secondly, multiple-case study can strengthen external validity through replication.

One of the important issues is selecting cases. Eisenhardt (1989) suggests alternative ways to select case companies. She mentioned that cases should be chosen for theoretical, not statistical reasons. In this thesis, the case companies are chosen by following theoretical reasons. Firstly, the selected case companies are large, rather than medium-sized and small companies. Because this thesis focuses on internal system/environment about innovative projects, it is required to analyze the internal system/environment clearly. Generally, internal systems/environments are established in a large company more clearly than in a small or medium-sized company. Secondly, case

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[28] Nonaka and his colleagues have also built up theories about knowledge creation for a long time. They started the research about this topic in 1980s and built up theories gradually through loops between proposing and checking.

companies are selected without any limitations about industries. It means that this research does not focus on a specific industry. This follows literature in which knowledge creation is analyzed in a universal model without any industry limitations. For example, Nonaka et al. (2008) deal with various kinds of companies, e.g., automobile industry, food industry, retailers, electronic industry and parts industry. Of course, it is required to mention industrial characteristics in each case. As Pettigrew (1988) noted, given the limited number of cases which can usually be studied, it makes sense to choose cases such as extreme situations and polar types. On the basis of those reasons, following three companies are chosen: *Valio Oy*, *Fujitsu Services Oy* and *Rautakirja Oy*. All three companies are large companies with more than 1000 employees. *Valio Oy* is in food industry, *Fujitsu Services Oy* is in IT service industry, and *Rautakirja Oy* is in retail industry[29]. Though those are not extreme cases, they are at least diverse cases.

In addition to selection of companies, it is important to select *innovative projects* in each company. As is identified in this research, innovation includes not only new product development based on technology but also any other activities, e.g., new market development, new organizational development, and new process development. In addition, innovation activity is new within the firm, rather than within the industry. With explanation about innovation and some examples, the case companies chose representative/recent case projects by themselves. All cases are identified as successful projects in case companies. List of cases is shown in Table 3.

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[29] In the beginning, more than 30 Finnish companies were selected as candidates. Then, those companies were approached by a researcher through email and telephone. As a result, Valio, Fujitsu Services and Rautakirja offered opportunities for empirical research.

Table 3. List of Cases

Case No.	Company	Project Type	Project Example
Case (1)	Valio Oy	Product/Service Development	A project which developed a functional milk product, *Zero Lactose*.
Case (2)	Valio Oy	Market Development	A project which developed foreign market, especially a South American Country.
Case (3)	Fujitsu Services Oy	Process Development	A project which challenged for adaptation of *Lean Management* internally.
Case (4)	Fujitsu Services Oy	Product/Service Development	A project which developed new IT services.
Case (5)	Rautakirja Oy	Produce/Service Development	A project which developed new concept of Kiosk operations. It is called *Sampo Project*.
Case (6)	Rautakirja Oy	Product/Service Development	A project which developed a new payment service in kiosk.

4.4.2 Source of evidence

Yin (1994) suggests that it is required to use as many sources as possible in case studies. He shows six different types of sources, and he mentions the strengths and weaknesses of each. In this research, interview and documentation are selected as sources of evidence.

Interviews are an essential source of case study evidence because most case studies are about human affairs. Most commonly, case study interviews are of an open-ended nature, in which key respondents are asked about the facts of a matter as well as for their opinions about events (Yin, 1994). According to Arksey and Knight (1999), there are three types of interviews: structured, semi-structured, and unstructured. Because this research uses theory-building approach, it is required to get information openly through conversations. On the other hand, it is also required to lead the conversation to the research topic effectively, because this research deals with a complicated topic: knowledge creation in innovative projects. As a result, this research adopts semi-structured interviews. O' Leary (2004) noted that the semi-structured interview is neither fully fixed nor fully free, and perhaps best seen as flexible. Interviewers generally start with some defined questioning plan, but pursue a more conversational style of interview that may see questions answered in an order more natural to the flow of conversation. They may also start with a few defined questions but the interviewer is ready to pursue any interesting tangents that may develop.

4.4.3 Procedure of Each Case

Each case study proceeds in three steps: preparation, interview and documentation.

Preparation

According to Yin (1994), one of the effective preparations for a case study research is to make a *case study protocol*. The protocol contains the instrument, but also contains the procedures and general rules that should be followed in using the instrument. In this research, an interviewer makes a case study protocol, which includes overview of the case study, filed procedures, and interview questions.

It is difficult to ask interviewees about a research question directly, because the research question includes unclear words, e.g., knowledge creation and innovative project. Therefore, interview questions are made separately, in order to get enough answers through open conversations.

Interview

All interviewees are top/middle managers. Then, all interviews are done in face-to-face meetings, and in English. The list of interviewees is shown in Table 4.

Table 4. List of Interviewees

Case No.	Company	Interviewee	Interviewee's Position
Case (1)	Valio Oy	Mr. Matti Harju	Vice President in R&D Department
Case (2)	Valio Oy	Mr. Kalle Leporanta	Export Manager in Innovative Concepts and Technologies Department
Case (3)	Fujitsu Services Oy	Ms. Mervi Uppa	Development Director in Core Service Department
Case (4)	Fujitsu Services Oy	Mr. Hemminki Sääksjärvi	Director in Solutions Group
Case (5)	Rautakirja Oy	Ms. Johanna Salminen	Chain Manager in Sales Department
Case (5)	Rautakirja Oy	Mr. Kalvar Kase	Sales Manager in International Sales Department
Case (6)	Rautakirja Oy	Ms. Marika Relander	Business Controller

In addition, all interviews are recorded electronically, as well as in interviewer's notebook. Within a week after each interview, an interview note is made and sent to

each interviewee. Then, the interview note is checked and revised. In the interview, interviewees are asked for permission to use contents of interview, name of company and name of interviewee. These are permitted in all cases.

Documentation

After interview, an interviewer gathers details about case companies and case projects. Main source of the documentation is websites, brochures and articles.

4.5 Validity and Reliability

In order to demonstrate trustworthiness of the research it is important to evaluate the quality. According to Yin (1994), the four tests have been commonly used to establish the quality of any empirical social research: *construct validity, internal validity, external validity* and *reliability* (Yin. 1994).

Construct validity means *establishing correct operational measures for the concepts being studied* (Yin, 1994, p.34). This first issue is especially problematic in case study research. People who have been critical of case studies often point to the fact that a case study investigator fails to develop a sufficiently operational set of measures and that subjective judgments are used to collect the data (Yin, 1994). For increasing the construct validity, Yin (1994) shows three kinds of tactics: the use of multiple sources of evidence; the establishment of a chain of evidence; and having the draft case study report reviewed by key informants. Firstly, this research uses multiple sources of evidence: interview and documentation (Yin, 1994). Those evidences are mixed in descriptions about cases. Secondly, a chain of evidence is a principle which allows readers of to follow the derivation of any evidence from initial research questions to ultimate case study conclusions. In this research, cases are described by citing specific documents and interviews, in accordance with initial propositions. Then, the descriptions are analyzed logically towards the conclusion. Therefore, a chain of evidence is kept enough. Thirdly, a draft case study report is written down in each case, and the draft is reviewed by each interviewee.

Internal validity means *establishing a causal relationship whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships* (Yin, 1994, p.35). Numerous threats to validity have been identified, mainly dealing with spurious effects (Yin, 1994). According to Yin (1994), one way of addressing internal validity is using analytical tactics. This research uses explanation-building approach as an analytical tactic. In addition, it is difficult to judge initial propositions objectively, because the propositions are dependent on researchers' interpretations. For strengthening the validity, this research set a clear criterion for judgment about each proposition.

External validity means that *establishing the domain to which a study's findings can be generated* (Yin, 1994, pp.35-36). Critics typically state that single cases offer a poor basis for generalizing. However, case studies rely on analytical generalization, rather than statistical generalization. In analytical generalization, the investigator is striving to generalize a particular set of results to some broader theory (Yin, 1994). A theory must be tested through replications of the findings in second or third researches. It is mentioned clearly that the research should be discussed again and again continuously with dialogue and practice towards building a theory, because it experiences only one cycle in this study. In addition, as Eisenhardt (1989) argues, cross-case analysis can act as a basis of analytical generalization. This research adopts the cross-case analysis.

Reliability means the *demonstrating that the operations of a study can be repeated with the same results*. Collis (2003) describes that the reliability means the repeatability in research findings. The objective is to be sure that, if a later investigator followed exactly the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at similar findings and conclusions (Yin. 1994). This research use case study protocol, which is a major tactic in increasing reliability. It contains the procedures and general rules that should be followed in using the instrument.

5. Case Study

This chapter presents the empirical evidence gathered from the field. Key observations and other illustrative pieces of data are presented, as well as the organizational context, are presented and described, so that the empirical material can be later analyzed and theoretically interpreted in sufficient depth.

In each case, firstly, a focused project type and case project are described. Secondly, the project planning phase and the project implementation phase in the case project are described separately. Thirdly, the differences between two phases are described, in accordance with four initial propositions.

5.1 Case (1) Product Development Project in Valio Oy

5.1.1 Description about Project

Valio Oy is the biggest milk processor in Finland, the market leader in all key dairy product groups in Finland, and a world class pioneer as the developer of functional foods. Valio is owned by Finnish dairy farmers. Valio produces various kinds of milk product, e.g., milk, yoghurt, cheese, butter, functional products[30], and whey powder.

In Valio, there are mainly four types of projects which are concerned with new product development (Table 5). First type is *minor-change project*, in which products are changed a little bit by marketing department, e.g., development of new taste. Second type is *product development project*, in which new products are developed by marketing department. Third type is *process development project*, in which process in factories is improved in the view of high-quality efficiency. Fourth type is *strategic research project*, in which new opportunity is analyzed by R&D department through research. Strategic research project takes about three years.

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[30] Functional milk is a special milk which carries qualities that advance health, increase well-being or decrease the risk of specific illnesses, as well as beneficial nutritional composition. In Valio Oy, there are four kinds of main functional milk: Gefilus, Lactose-free milk, HYLA and Valio Evolus (Valio's official website: http://www.valio.fi/portal/page/portal/valiocom).

Table 5. Types of Product Development Project in Valio

Types of Project	Abstract	Department
Minor-change project	Products is changed a little bit, e.g., development of new taste.	Marketing
Product development project	New products are developed.	Marketing
Process development project	Process in factories is improved, in the view of high-quality and efficiency.	Production
Strategic research project	New opportunity is analyzed through research.	R&D

In terms of these projects, this thesis focuses on new product development in *strategic research project* and in *product development project*. Generally, product development project starts after strategic research project. In both projects, there is a preliminary research before implementation. Both projects are finally judged by managers. It means that ideas for product development are recognized and planned at preliminary research in strategic planning phase. Hence, it is possible to identify that preliminary survey in strategic planning project is "project planning phase", while other part of strategic planning project and whole product development project are "project implementation phase". Figure 16 shows the identification of the two phases.

Figure 16. Flow of Product Development in Valio Oy
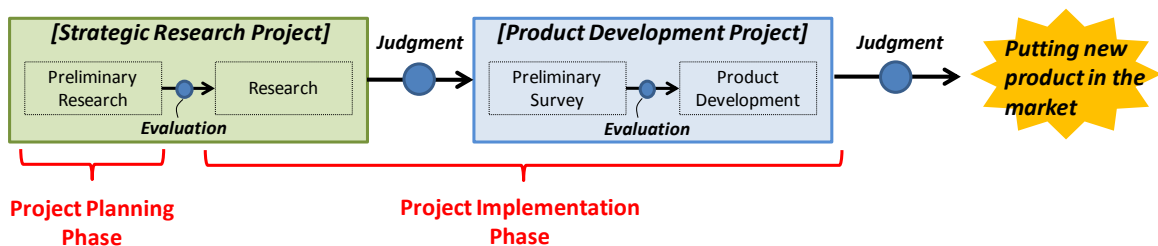
5.1.2 Description about Project Planning Phase

In the project planning phase, there is a special group which deals with new technology. They are responsible for the new opportunity. Some members are specialists in the field of dairy, but others are specialists on other fields, e.g., chemistry. Most members are not senior researchers but young researchers. Though senior researchers can create ideas on the basis of enough experience, managers hope that young researchers can create good

ideas by themselves. The group can create ideas autonomously not only in their office but also in cafés and other locations. They also sometimes adapt ideas from personnel's master's theses[31].

In the planning phase, members have to consider not only technology but also necessary resources and market conditions. They also consider the possibility of relationship with Tekes and universities. It is important to judge whether they should collaborate with Tekes. Though they can get money from Tekes, they cannot implement project flexibly with Tekes funding.

After careful internal discussion, the group makes a list of new ideas, and discusses them with managers. The managers give some comments about the ideas. Management group of R&D department judges the ideas. Team members also choose some ideas which they want to go forward by themselves. In addition, the team, which creates the best idea in the group can get extra holiday in the following year.

5.1.3 Project Implementation Phase

One of the typical cases of produce development project is about a functional milk product, *Zero Lactose*. The milk product is lactose-free and has a genuine milk taste.

Valio started research about Zero Lactose in 1980s. However, Valio could not put it in the market for a long time, because marketing research showed that it was too early to put the products in the market.

Through this product development project, the team faced many problems. Firstly, taste of the product was problematic. When Zero Lactose was developed for the first time, taste was too sweet. It was because only glucose was left in the milk as a result of hydrolyzing lactose. For resolving the problem, they modified the products continuously. At first, they divorced lactose from milk specifically. As a result of this method, the

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[31] Valio sometimes employs students, who have written master's thesis for the company. It is a good way for Valio to keep good human resources. Dr. Harju also has researched in Valio, when he was university student.

taste was not sweet, but like water. It was not enough taste, and they have to change again. They hydrolyzed half of lactose away, and later they hydrolyzed rest of it. Furthermore, they adjust the taste through enough tests. As a result of those improvements, Zero Lactose could get a good taste.

Secondly, they had to show that the lactose was free in a product. When Zero Lactose was developed, public officers asked them to show enough evidences about lactose free. However, Valio did not have enough analytical method to show it. For solving the problem, the team developed a new analytical method to demonstrate free lactose.

In 2001, Valio decided to sell *Zero Lactose*, though expectation for it was quite low. In fact, managers forecasted that they would sell 1 million liters of it for a year. However, they sold 1 million liters during first three months. Nowadays, Valio sells more than 50 million liters of it for a year globally, and *Zero Lactose* becomes one of the Valio's competitive advantages in world daily market. Image of this case is shown in Figure 17.

Figure 17. Case (1) Product Development Project in Valio Oy
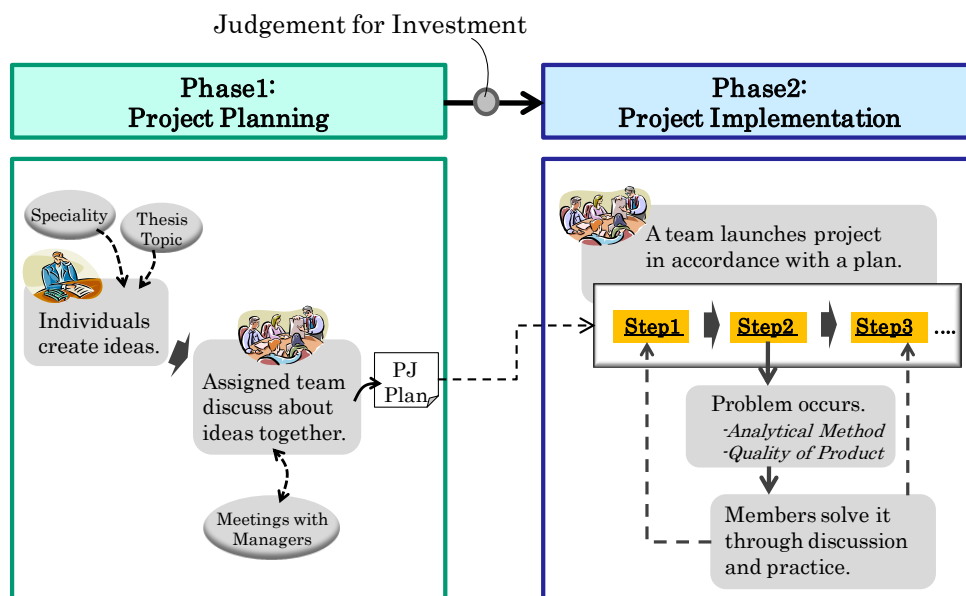
5.1.4 Comparison among Two Phases

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On the basis of four initial propositions suggested in Chapter 3.3, two phases are compared. Each proposition is judged in accordance with a clear criterion which is set in Chapter 3.3.

Proposition 1 is about spiral process in knowledge creation. It proposed that *knowledge creation in the planning phase does not follow a spiral model, while knowledge creation in the implementation phase does follow a spiral model*. In the case of Valio's product development, a special group is established to recognize opportunities and plan projects. Each member of the group recognizes ideas about new product individually. Then, the members continuously discuss about the ideas in meetings. Though they cannot get feedback through practice, they can create knowledge through internal dialogue with sharing a common goal: making an effective project plan. It is possible to judge that the process is spiral, because the task includes three characteristics of spiral process. In the implementation phase, the project members have to challenge for practical problems. Through development of many prototypes, they could create new knowledge on the basis of practice. When the prototypes were not enough, project members discussed a lot. The practice and dialogue leads a spiral process in implementation phase. It is also possible to judge that the process is spiral, because the task includes three characteristics of spiral process. In addition, knowledge creation is idea-based in the planning phase and it is mainly practice-based in the implementation phase.

Proposition 2 is about ba in knowledge creation. It proposed that *ba is established by accident in the planning phase, while ba is established by design in the implementation phase.* In the project planning phase, a special group sets meetings to continuously discuss together. In addition, the group sometimes includes managers in the meetings and gets feedback from them. Those meetings are usually designed intentionally in advance, as a process of knowledge creation. It means that ba is established in the planning phase by design rather than by accident. Furthermore, it is important to mention that the meetings are not for opportunity recognition but for screening and amplification of ideas. Here, first ideas are not created in the designed ba. In

implementation phase, project members develop new product practically. In the process, they held project meetings, meetings with politicians, meetings with customers. Those are usually set on the basis of project plan. Those ba are set intentionally.

Proposition 3 is about objectives in knowledge creation. It proposed that *the important objective is a company-level goal in the planning phase, while the important objective is a project-level goal in the implementation phase*. In the interview, an interviewee mentioned that there is a clear strategy which emphasizes the importance of functional food. However, it is difficult to identify which phase is mainly influenced by the corporate strategy.

Proposition 4 is about enabling conditions in knowledge creation. It proposed that *autonomous and creative culture is required in both phases*. In a case of Valio, interviewees feel that Valio has quite open and free atmosphere[32]. According to an interviewee, all employees in R&D departments know all research projects, and they can help each other.

5.2 Case (2) Internationalization Project in Valio Oy
5.2.1 Description about Project
Valio is international company and develops more than 60 foreign markets. Sales in foreign markets represent one third of all sales in Valio. Subsidiaries are in Belgium, Estonia, Sweden, Russia, United States and China.

There are following three kinds of internationalization (Table 6). First type is selling consumer products in foreign country by subsidiaries. In this case, products are usually Valio brand. Second type is selling industrial products in foreign country by subsidiaries. Third type is licensing. In the case, Valio provides foreign licensees know-how, technology and trademark.

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[32] One characteristics of Valio is that most of all employees have worked in Valio for a long time. They rarely change their job to other companies, because Valio is a leading company in Finnish dairy industry. In addition, strong competitors in Europe are far away from Finland. Then, employees can open information without risks of information leakage.

Table 6. Types of International Business in Valio Oy

Types of International Business		Abstract
Internationalization by subsidiaries	Consumer Product	Valio's subsidiary develops consumer market with Valio brand.
	Industrial Product	Valio's subsidiary develops industrial market, e.g., local food companies.
Licensing		Valio provides licensees know-how, technology and trademark.

5.2.2 Description about Project Planning Phase

Project planning is divided into three patterns. Firstly, idea is proposed by Valio's subsidiary, e.g., Valio Sweden. Secondly, idea is proposed by consumer's suggestion. Thirdly, idea is proposed in the head office.

In the case of head office, managers sometimes set an informal meeting for brainstorming. Various kinds of people, e.g., R&D, marketing, and subsidiary staff, take part in the meeting, and talk together for discussing ideas about internationalization. Those people usually follow different information each other. Sometimes they can extract successful examples, and copy it to other projects. In addition, there are two external consultants in management board. They propose topic about internationalization in the board. Then, those plans are, generally, judged by management group of internationalization. In a case of large project, company's top management group judges plans.

5.2.3 Description about Project Implementation Phase

One of the recent cases of internationalization is to develop into a South American country.

At first, some customers asked a local company in the country to deal with Valio's products. Then, the local company contacted Valio, in February 2010. The company had

known Valio for more than ten years, but it had not contacted Valio yet. Then, Valio started negotiations with the company. In August 2010, Valio came to an agreement with the South American company. In the process of this project, some problems occurred. First problem was about agreement. There were differences between Valio's suggestion and licensee's one. The company proposed to get some exclusive rights. For this problem, project members could solve problem through continuous negotiation. The project members sometimes get useful information from local agents and also from Finpro, a Finnish public office. In addition, head offices have improved subsidiary's sales activity very much. Secondly, some minor change is required in products. However, it is difficult to get immediate help from R&D department. For the problem, project members can get helps of R&D department finally, because they usually keep enough communication with R&D department. Image of this case is shown in Figure 18.

Figure 18. Case (2) Internationalization Project in Valio Oy
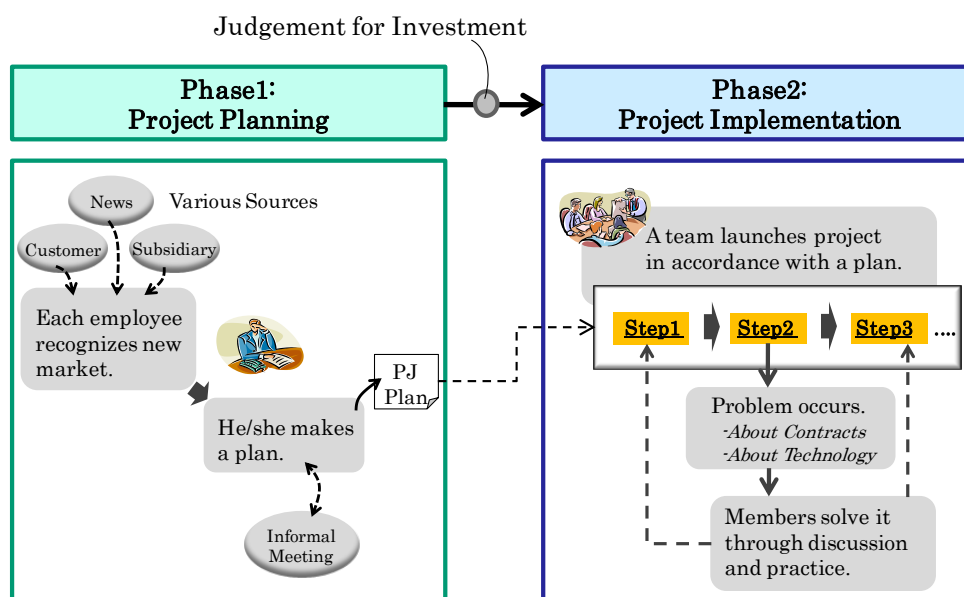
5.2.4 Comparison among Two Phases

On the basis of four initial propositions suggested in Chapter 3.4, two phases are compared. Each proposition is judged in accordance with a clear basis which is set in Chapter 3.3.

Proposition 1 is about spiral process in knowledge creation. In the planning phase, employees check information by themselves and notice opportunities individually. The task is not judged as a spiral process, because it is individual task. Then employees discuss together about the opportunities in informal meetings towards a common goal: screening ideas for internationalizations. It is possible to judge that the process is spiral, because the task includes three characteristics of spiral process. In implementation phase, project members faced practical problems and overcome them together continuously towards achievement of project goals. It is possible to judge that the process is spiral.

Proposition 2 is about ba in knowledge creation. In a case of Valio's internationalization, there are various ways of the opportunity recognition. Customer's request and subsidiary's opinion are submitted by accident. In addition, managers sometimes establish informal meetings by design in the planning phase. It means that ba is established in the planning phase both by design and by accident. On the other hand, in implementation phase, some meetings, e.g., with subsidiaries, local partners, distributers and Finpro, are set on the basis of project plan. It means that ba is mainly established by design.

Proposition 3 is about objectives in knowledge creation. An interviewee mentioned that main target for internationalization is suggested by top managers. Employees can focus on specific areas when they plan development for foreign market. Hence, the important objective in the planning phase is judged as a company's goal. In this case, it was difficult to judge about objectives in implementation phase from the interview.

Proposition 4 is about enabling conditions in knowledge creation. In the case of Valio, interviewees feel that Valio has quite an open and free atmosphere.

In addition, the interviewee mentioned the following about the difference:

In the planning phase, it is important to gather enough information about competitors, market condition, customers and potential partners. However, market is always changing. Then, in implementation phase, members have to understand the change and adapt it flexibly through practices.

5.3 Case (3) Organizational Change Project in Fujitsu Services Oy

5.3.1 Description about Project

Fujitsu Services is a part of the global Fujitsu Group, a leading provider of ICT-based business solutions for the global marketplace. Finnish operations are in Nordic networks. Roots of this company reach to the electronics division of Nokia. In Finland and the Baltic countries, nearly 2,800 people work in this company.

In this interview, one of the large internal projects, called Lean Program, is the focus. Fujitsu Services has preceded Lean Program as a project of organizational change since 2008. As the program is very important for the company, the board of Lean Program is whole of country's management boards. By development of Lean Program, Fujitsu Services has to improve its efficiency continuously, because the market of IT Services is under heavy competition now.

5.3.2 Description about Project Planning Phase

Idea of Lean Program was introduced by Fujitsu UK, which had already adopted a lot of tools of Lean Management. Then, managing directors in Fujitsu Services Oy in Finland decided that they should investigate it further and also should establish a project for Lean Program.

There is a method of a development project approval. Firstly, employees make project proposals, which include a content, scope, benefit, cost and risk. Each business unit puts those proposals together, and submits its proposals for top management. Proposers explain their plans to top management. Top managers discuss about all proposals, and combine them in a roadmap at company level. This process is usually done once a

month. Then, top managers judge proposals. When proposals are approved by them, a project manager is appointed in each project. The manager makes an actual plan. In addition, management group and steering group, who take care of the project, are set.

### 5.3.3 Description about Project Implementation Phase

In this project, the team of Lean Program deployed some tools. After pilot projects, the team decided to deploy the tools. They had to urge 70 teams to adopt tools in ordinary works. It was quite successful in the end. Though there were about half a dozen teams who have not used tools, those teams have already scheduled time to adopt tools. A project member was assigned in each division. The member was representatives of each division, and they reported about the project to their directors regularly.

The project faced problems. Firstly, they needed to complete the task in very strict schedule for all teams. They needed somebody who help the teams and to support them in using tools. However, it was difficult to keep first schedule practically and they had to re-schedule it third times. For example, during Easter Holiday, they could not advance the project enough, because most of all employees took a vacation. For the problem, the project team let all teams to commit timetable for adopting tools by themselves. As they had to keep the timetable, the project could finalize objectives on time. Second problem is that they could not answer questions which were asked by employees. Because lean management in service industry was new challenge, it was required to overcome many difficulties. For second problem, the project team assigned members who could create ideas positively towards overcoming difficulties. In fact, most of all project members were creative, and they could discuss continuously. Thirdly, employees tended to think that deployment of the tools were bad idea, because they had to change their existing working styles. It was a typical problem in organizational change project. For the problem, the project team had to explain benefits that employees could get from deployment of tools again and again. It was required to work with patience. Fourthly, there were also some technical problems, for example installation of whiteboards and preparation of magnetic buttons. For the problem, the project team

decided to compromise on the matters, because those problems are tiny in the project.

According to the interviewee, one of the successful factors in this project is that they did not use external resources unless they could understand them. If members could not understand something by themselves, they could not explain it to employees. Image of this case is shown in Figure 19.

Figure 19. Case (3) Organizational Change Project in Fujitsu Services Oy
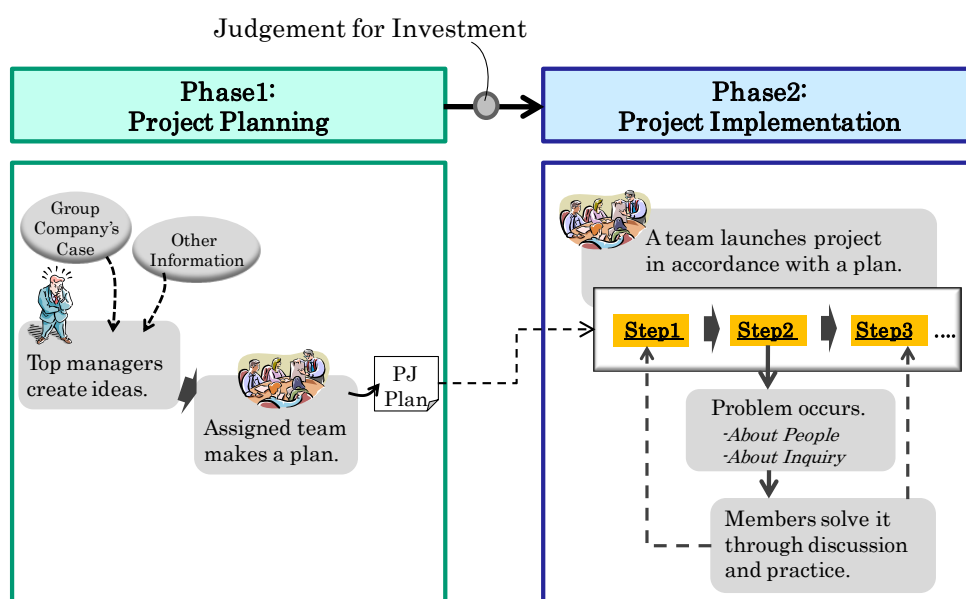
5.3.4 Comparison among Two Phases

On the basis of four initial propositions suggested in Chapter 3.3, two phases are compared.

Proposition 1 is about spiral process in knowledge creation. In the case of Fujitsu's organizational change, opportunity was recognized by a top manager. Then, assigned team discussed and planned a project. Through continuous discussion, knowledge is created gradually towards common objectives: making an effective plan for a project. It is possible to judge that the team task is at a spiral process. In implementation phase, project members faced practical problems and overcome them together continuously. It is also possible to judge that the implementation phase is also at a spiral process.

Proposition 2 is about ba in knowledge creation. In the case of Fujitsu's Lean Program, we can identify two kinds of ba in the planning phase. First one is where top managers recognized the opportunity through watching Fujitsu UK's example. Because this was top managers' subjective recognition, it is possible to mention that the ba is really accidental rather than designed intentionally. Second one is that assigned project manager made a project proposal. Interviewee emphasized that proposers have to have faith in them. On the other hand, in the implementation phase, there are various ba. Firstly, there are project meetings. Because background of each project member is various, discussion in the meeting is effective to create and amplify knowledge. In addition, there are meetings with employees. In the meeting, project members externalized the concept, value and practice of Lean Program, and explain them to employees. Those are established by design on the basis of project plan.

Proposition 3 is about objectives in knowledge creation. In a case of Fujitsu's Lean Program, an interviewee mentioned that top managers recognized the importance of the project. It is natural to judge that the planning task is closely related to corporate objectives. Then, the interviewee mentioned that project members tried to achieve project goals in implementation phase. It means that implementation task is related to project objectives strongly.

Proposition 4 is about enabling conditions in knowledge creation. In a case of Fujitsu, interviewees feel that Fujitsu Finland has quite open and free atmosphere. According to her, employees are expected to do their best, and they can decide how to do their tasks by themselves as long as they keep promises. As employees can keep freedom, they have to come up to high expectations.

5.4 Case (4) Service Development Project in Fujitsu Services Oy

5.4.1 Description about Project

In Fujitsu Services, there are many kinds of projects, which include customer projects

and internal projects. This interview focuses on aninternal project, especially, service development project.

In this interview, we focus on a project, in which new features are developed in one of the core services of Fujitsu Finland. In 2007, a first project to improve the core services was launched. Following the project, a large project to create new features in the core services was established in April 2009. This project is now on the way, and will be completed at the end of 2010.

5.4.2 Description about Project Planning Phase

Employees, who recognize new opportunity about existing services and new services, propose project plans. In the case of project, top managers decided to establish new project by themselves. Though the core services were in leading position in the market, they were facing more and more competition. Hence, top managers identified the importance of developing new features in the core services.

In addition, there is a normal method of a project approval. Firstly, employees make project proposals, which include a content, scope, analysis of benefits, cost and risks. Each business unit puts those proposals together, and submits its own proposals for top management. Proposers explain their plans to top management. In the case of the project, there were several sub-projects. Hence, a project plan was made in each sub-project, and these project plans were gathered in a "full project plan" about the core services.

Then, top managers judge proposals. When proposals are approved by them, a project manager is appointed in each sub-project. The project manager makes an actual plan. In addition, management group and steering group, who take care of the project, are set.

5.4.3 Description about Project Implementation Phase

In implementation phase, project members launch service development projects, on the

basis of project plan. Project managers who are responsible for strategic projects attend a managerial meeting every month to give a status of projects. If some decisions are needed, the project managers ask top management about them. In addition, project managers discuss with steering group. This means that there is double steering system for strategic development projects in Fujitsu Finland.

The project faced problems. Firstly, project members had an issue of people. It was difficult to allocate the best people in the project.. An interviewee emphasized that it was generally easy to take good people to customer project, rather than to internal project. If people took part in both customer project and internal project, they tended to deal with customer project mainly. They thought that internal project was usually not important, without asking anything about the internal project. It is a problem of prioritization. For this problem, the project members tried to ask excellent people to take part in the project. Then, if they did not do, project members asked top management to persuade them. This is a normal escalation. (Project managers did not bring all problems to top management, and they tried to resolve problems by themselves, as much as possible.). The final solution for the people issue was to allocate appropriate people in the project full time (100%) and to decide not to move them to other projects without special permission from the Program Steering Group, whose members were management team members. Secondly, there were technical problems about system integration. For the problem, the project members held specific meetings to solve the technical problems. Sometimes, they invited top management to discuss about the problems together. Image of this case is shown in Figure 20.

Figure 20. Case (4) Service Development Project in Fujitsu Services Oy
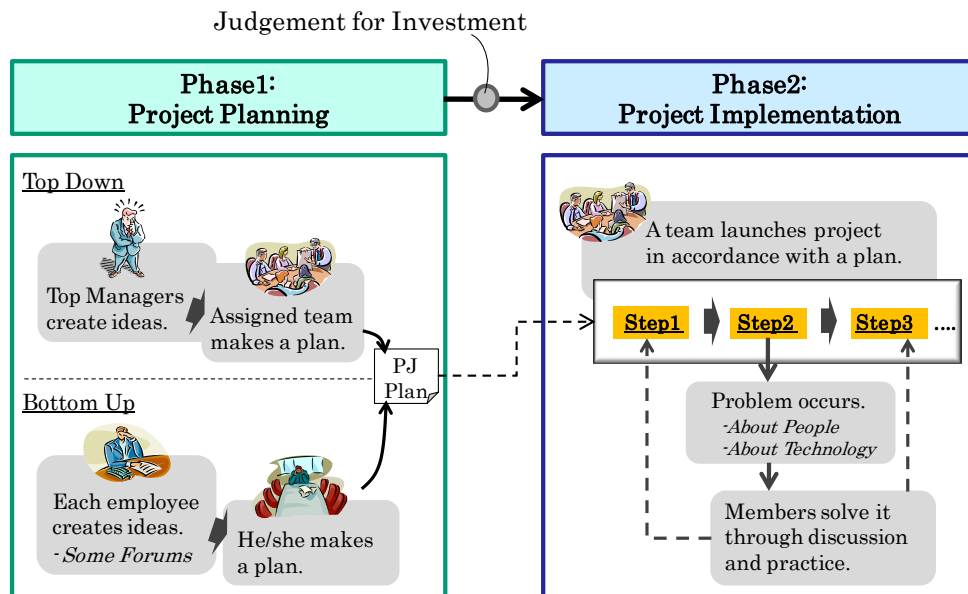
5.4.4 Comparison among Two Phases

Proposition 1 is about the spiral process in knowledge creation. In the case of Fujitsu Services's service development project, the project planning depends on individuals. Especially, the project was recognized firstly by a top manager. Then, an assigned team discusses about the project plan and submits it to top managers. In the team discussion, knowledge is created continuously towards common goals: making an effective plan. Because the team task includes characteristics of the spiral process, it is judged as a spiral process. In implementation phase, project members faced practical problems and overcome them together continuously. It is also judged as a spiral process.

Proposition 2 is about ba in knowledge creation. In a case of Fujitsu's service development project, there are various kinds of ba to recognize opportunities. They hold four kinds of forums to recognize ideas. "Next Generation Forum" is held for employees in Fujitsu Finland. In the forum, employees discuss about their own services together. "Future forum" is held for clients, for example, IT department in companies and public offices. "Vision forum" is held for top managements and visionary people who have interesting views about the future. In addition, they hold an open forum in

which participants can discuss about a specific topic. All people who are interested in the topic can take part in the open forum. In addition, they usually discuss about services internally with sales person, production department and so on. Furthermore, they sometimes use external resources to create ideas, e.g., consultants, researchers and also university students. Those ba are set intentionally. In implementation phase, project members discuss in regular meetings. In addition, they sometimes set a meeting with top managers to solve problems. Those meetings are set intentionally.

Proposition 3 is about objectives in knowledge creation. In the interview, an interviewee mentioned that top managers recognized the importance of the project, on the basis of corporate strategy. It is natural to judge that the planning task is closely related to corporate objectives. Then, the interviewee mentioned that project members tried to achieve project goals in implementation phase. It means that the implementation task is strongly related to project objectives.

Proposition 4 is about enabling conditions in knowledge creation. In the case of Fujitsu, interviewees feel that Fujitsu Finland has quite open and free atmosphere. Employees are expected to do their best.

According to interviewee, one difference among two phases is about people. He mentioned following:

> In the planning phase, you need people who can take care of everything about the project, e.g., resources and complexities, in limited time. In the implementation phase, you need people who can make things happen. They can look forward, through facing practical problems. In addition, firstly, in the planning phase, important intention means a company's goal. On the other hand, in the implementation phase, important intention means a project's goal.

5.5 Case (5) Concept Development Project in Rautakirja Oy
5.5.1 Description about Project

Rautakirja Oy is a customer-oriented trade and service company active in the fields of kiosk operations, trade services, bookstores and movie operations. The company's R-Kioskis form a nationwide centrally-administered chain of kiosk/convenience store outlets. There were 703 R-kiosks in Finland as at the end of 2009. Rautakirja is today active in eight countries: Finland, Estonia, Latvia, Lithuania, the Netherlands, Romania, Russia and the Ukraine. In addition, Rautakirja is a part of the Sanoma Group[33].

In Rautakirja, there are many kinds of projects – process-innovation / investment, research and development – which include internationalization, marketing, IT development and brand and concept development. In particular, this case focuses on "Sampo project", one of the large projects in Rautakirja kioskikauppa. In this project, new business concept is developed. It includes new shop concept, new service concept and new marketing concept. It started two years ago, and it is on the way. Because it is a large project, most of the company's employees are involved in the project. Everyone has certain responsibilities for the project. Though a couple of people concentrate on the project completely, most participants handle the project with normal daily work.

5.5.2 Description about Project Planning Phase

In Rautakirja, there are some opportunities to create project. One of them is an idea competition, in which employees create ideas for specific topics, e.g., development of campaign systems. Early this year, Rautakirja held an idea competition and got 362 ideas, almost 80 % of those ideas came from kiosk level. It was quite a lot. Then, a small team in marketing department chose best twenty ideas to develop further. In addition, some ideas were also chosen from the rest. Then, on the basis of those ideas, they actually have started many projects. It means that the competition is not only to ask ideas, but to implement them. In addition, Rautakirja has small workshops where employees try to innovate or create something.

About Sampo project, top managers create ideas. Through analysis of current situations

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[33] Sanoma Group is a strong European media group with activities in over 20 countries.

and estimation about what may happen in the future, they create first ideas of this project. In a case of large project like Sampo project, top managers decide who will be responsible for the project. Then, they create small teams which discusses about the idea for couple of months. Teams had clear target, time schedule, also unique way to operate, meaning for example co-operation between different departments with a small workshops. The teams also discussed possibility what "if" everything goes wrong. The team made a proposal and hand in it to top managers. In Rautakirja, there are some rules about who can make decisions about projects. For example, if the budget of a project is less than 10,000 euro, department managers can approve it. On the other hand, if the budget of a project is over 50,000 euro, top managements have to approve it.

### 5.5.3 Description about Project Implementation Phase

In Sampo project, after the planning phase, there were many tasks: first analysis task, creation task, first pilot task, second analysis task, second pilot task, third pilot task and rollout task. In each task, some kinds of groups are established. Because it was difficult to launch tasks in various members, members had to share a big picture clearly.

Present task is rollout task. A Sampo-model Kiosk has been established first in Helsinki area. After each pilot phase, they obtained feedback from a wide variety of sources, and sometimes went back to the analysis task. It is like a spiral model. After running practically, employees have to have a time to sit down and analyze it.

One big issue in the implementation phase is the kiosk-level people (called kiosk superior) who work actually in kiosks. It can be hard to change their mindsets, when something changes. People are used to old system, and provide feedback such as "Yes, I am ready for new one, but old one is good enough and safe". Then, kioski-level people thought a lot about how to handle kiosk superiors. Firstly, internal communication was important. The project members changed the way of their project meetings after first pilot phase. They asked kiosk superiors to participate in the project meeting. In the meeting, kiosk-level people brought feedback about renovation, product range,

advertising, and also customers feedback (using a memo, where daily all employees wrote down information on those issues) and discussed it with other project members. Through the process, project members could get involvement from kiosk people to go through changes. Secondly, they put all information about Sampo project in intranet and also keep presentations to other departments just inform how the project goes on. Employees can go there and see how feedbacks are handled. If they understand the change enough, they can keep motivation for it. Image of this case is shown in Figure 21.

Figure 21. Case (5) Concept Development Project in Rautakirja Oy
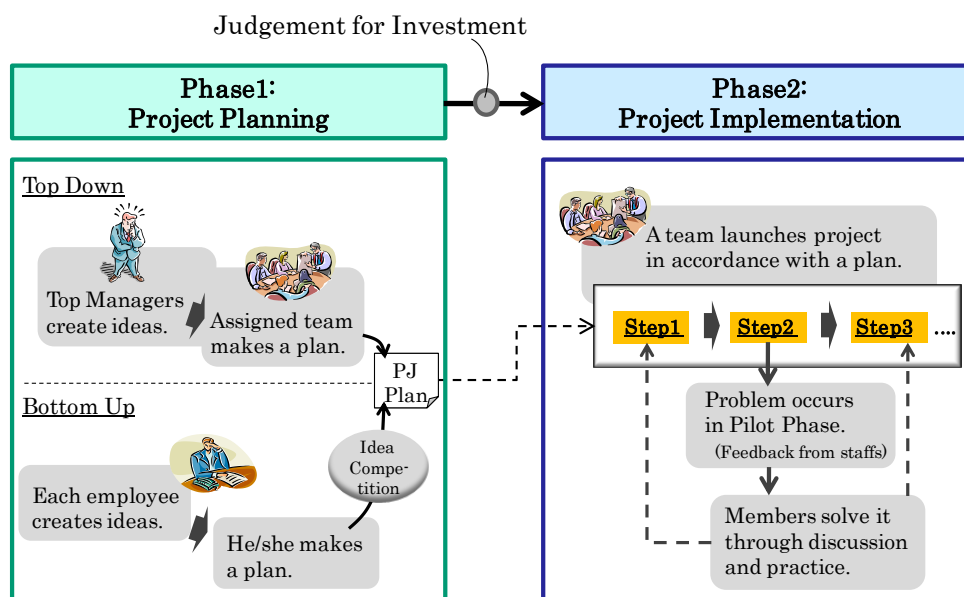
5.5.4 Comparison among Two Phases

On the basis of four initial propositions suggested in Chapter 3.3, two phases are compared.

Proposition 1 is about spiral process in knowledge creation. In the case of Rautakirja's concept development, first idea is recognized by individual. For example, the Sampo project was recognized by a top manager. Then, a small team discussed together to make an effective project plan. The process with continuous dialogue includes characteristics of spiral process, while first opportunity recognition does not include

them. On the other hand, in implementation phase, there are analysis and pilot tasks. After the pilot task, members get practical feedback and return to analysis task to discuss more. The process is also judged as a spiral process, because it includes its characteristics.

Proposition 2 is about ba in knowledge creation. In the case of Rautakirja's concept development, there is some ba for opportunity recognition, e.g., idea competition and workshop. Those are established intentionally. On the other hand, in implementation phase, members set internal communication effectively. It includes face-to-face meeting and also intranet. This ba is set intentionally.

Proposition 3 is about objectives in knowledge creation. In the case of the Sampo project, interviewees mention that it is planned strongly with corporate strategy. There are nine themes in Rautakirja's corporate strategy, and all of them have some level related / linked to the project. Then, the interviewee mentioned that project members tried to achieve project goals in implementation phase. It means that implementation task is strongly related to project objectives.

Proposition 4 is about enabling conditions in knowledge creation. In a case of Rautakirja, interviewees feel that most employees are positive for newness in Rautakirja.

In addition, interviewees emphasize some other differences and mention followings:

> *In the planning phase, employees analyze the project ideas. It includes tools, measures, risks and targets. It is what you do (mostly) in a paper. On the other hand, in the implementation phase, employees go and do it. It is a pure action. It includes checking qualities (lay-outs, machines, products, service and so on) also decisions about how they move on in the future. In the phase, employees have to make real money and profit.*

5.6 Case (6) Service Development Project in Rautakirja Oy

5.6.1 Description about Project

In this interview, a project which develops a new payment service is the focus. This service provides customers with opportunities for various kinds of payment in Kiosk.

5.6.2 Description about Project Planning Phase

In Rautakirja, employees can propose new ideas at some opportunities. In administrative department, there are possibilities to get ideas about solutions which make the business more efficient, or through which Rautakirja can obtain more money. It is an intranet system. In the intranet, employees in administrative department can propose ideas freely. When they fill in a proposal form in internet, the proposal is forwarded to the director, who is responsible for the topic. Then, the director decides whether it is worth investigating or not. An interviewee has proposed two topics through the intranet. Firstly, she proposed that employees could check their salary not by a written statement. Soon she got a response from a director. He had already noticed about the idea. A year later, the proposal has materialized. Secondly, she proposed that holiday-pay was paid in bulk once a year, rather than every time it happened. Soon she got a response from a director. She has also heard that she was not the only one who has proposed this.

The case project about a new payment service was suggested by a project manager's boss, who had known a similar service in other countries. Then, the project manager proposed the model to banks.

5.6.3 Description about Project Implementation Phase

This service provides customers with opportunities for various kinds of payment, e.g., electricity charges and water charges in Kiosk. If customers have a bill with barcode, they can pay it in kiosk shops. The bill data is transferred to the bank, and then the data is distributed to various payees by the bank.

Project is owned by marketing people. About ten people take part in the project, including representatives from the IT, finance, and marketing departments. A lawyer is also included. The project was established in May, and is now well on its way. The service is going to be tested in November 2010, and it will be started in 2011.

There are not any problems in the project. It is on schedule. It is not difficult to communicate between departments. However, an interviewee said that it was also true that there was some room to improve the communication. Image of this case is shown in Figure 22.

Figure 22. Case (6) Service Development Project in Rautakirja Oy
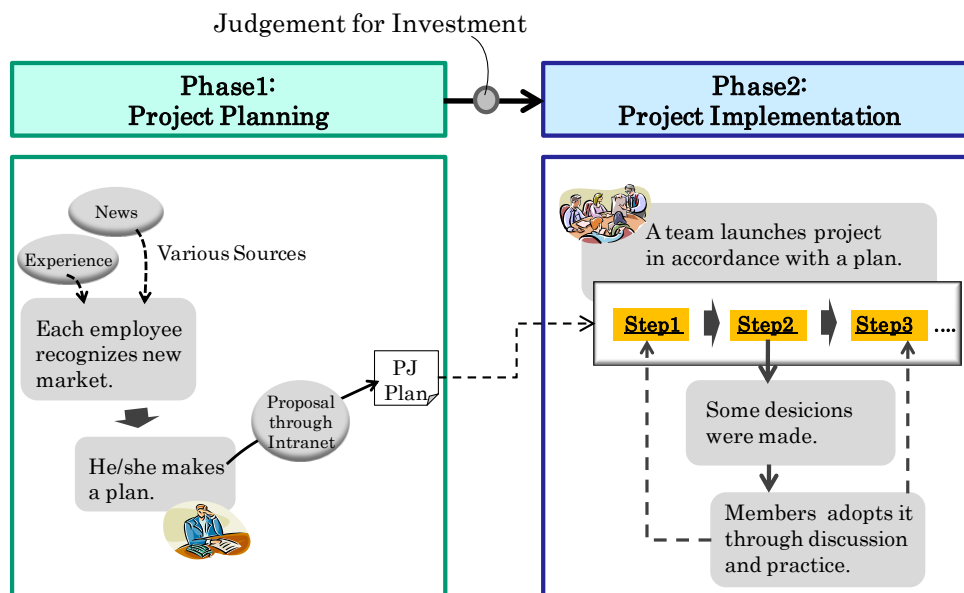
5.6.4 Comparison among Two Phases

On the basis of four initial propositions suggested in Chapter 3.3, two phases are compared.

Proposition 1 is about spiral process in knowledge creation. In the case of Rautakirja's new service development, project planning depends on individuals, rather than a special team. Then, it is difficult to judge that the planning phase is a spiral process. On the other hand, in the project implementation phase, project members with various

backgrounds discuss together and launch the project effectively towards the common goal. Because the implementation task includes characteristics of spiral process, it is judged as a spiral.

Proposition 2 is about ba in knowledge creation. In the case of Rautakirja's concept development, there is some ba for opportunity recognition, e.g., intranet and the idea competition. Those are established intentionally. On the other hand, in implementation phase, members set internal communications effectively. Those ba are also set intentionally.

Proposition 3 is about objectives in knowledge creation. In the case of the new service development, this proposition was not discussed by interview.

Proposition 4 is about enabling conditions in knowledge creation. In the case of Rautakirja, interviewees feel that most employees are positive for newness in Rautakirja.

6. Discussion and Findings

In this chapter, the cases are discussed. Analyzing data is the heart of building theory from case studies (Eisenhardt, 1989). Cross-case comparison is one of the important analytical approaches. Especially, it is effective to select categories or dimensions and look for within-group similarities coupled with intergroup differences (Eisenhardt, 1989). Here, the cross-case comparison among six cases is reported, on the basis of four initial propositions: *spiral process, ba objectives*, and *enabling condition* (in Chapter 6.1). In addition, other suggestions, which are discovered through the case studies, are discussed (in Chapter 6.2).

6.1 Discussion about Initial Propositions

6.1.1 About Spiral Process

Proposition 1 is about spiral process in knowledge creation. As is also suggested in Chapter 3.3, a process is identified as a spiral in this research, if it includes following three characteristics of Nonaka's spiral process: the process is done in a team; the process includes continuous dialogue and practice; and the team share common objectives.

In the implementation phase in the six cases, projects were mainly launched by an established project team. In the team, project members shared common practices and dialogues through challenging problems. They shared specific objectives which were set in a project plan. Towards the clear objectives, they created knowledge continuously together. Those are judged as spiral processes in accordance with Nonaka's theory.

On the other hand, the project planning phase is a little different (Figure 23). Cases show that this phase includes two main tasks: *opportunity recognition* and *project planning*. *Opportunity recognition* means that employees recognize first ideas about innovation. It is usually done by an individual. *Project planning* means that employees write down a project plan about the innovation. It is done by an individual or a team. In some cases, the recognized ideas are analyzed by each individual, and are articulated at

the end of the planning phase. In other cases, the recognized ideas are articulated in the organization in the middle of the phase, and discussed in a team. For example, in Rautakirja each employee recognizes ideas, analyzes them, and submits plans for idea competitions by himself/herself. On the other hand, in case (5), the Sampo project in Rautakirja, first recognition about an opportunity was dependent on a top manager. Then, the recognized opportunities were discussed in an established small team, which planed details about a project.

Figure 23. Two Tasks in Planning Phase
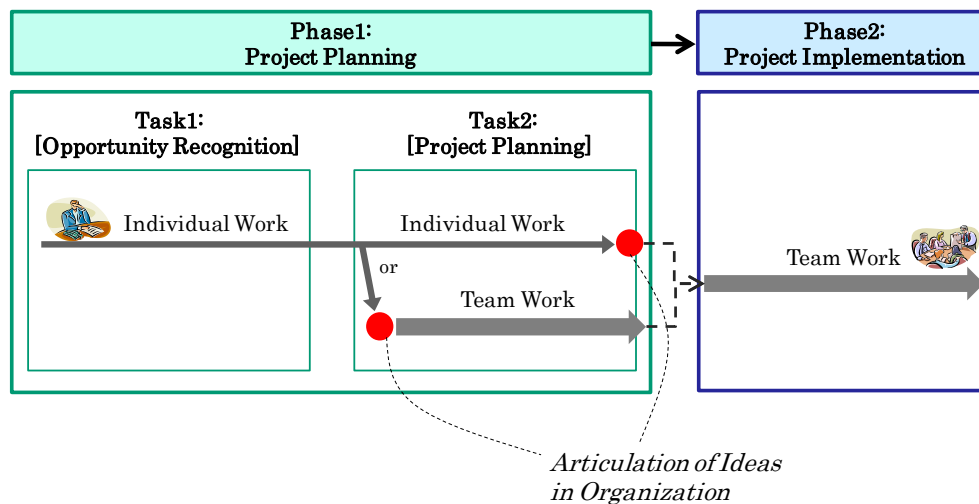
In accordance with Nonaka's theory, individual works are not viewed as a spiral process. Therefore, task of opportunity recognition and individual project planning are not judged to be spiral processes. On the other hand, a project planning by a team is judged to be a spiral process. Team members discuss about detail plans together towards a common goal, writing a good project plan. Figure 24 shows a result of discussion about spiral process.

*Figure 24. Discussion about Spiral Process*
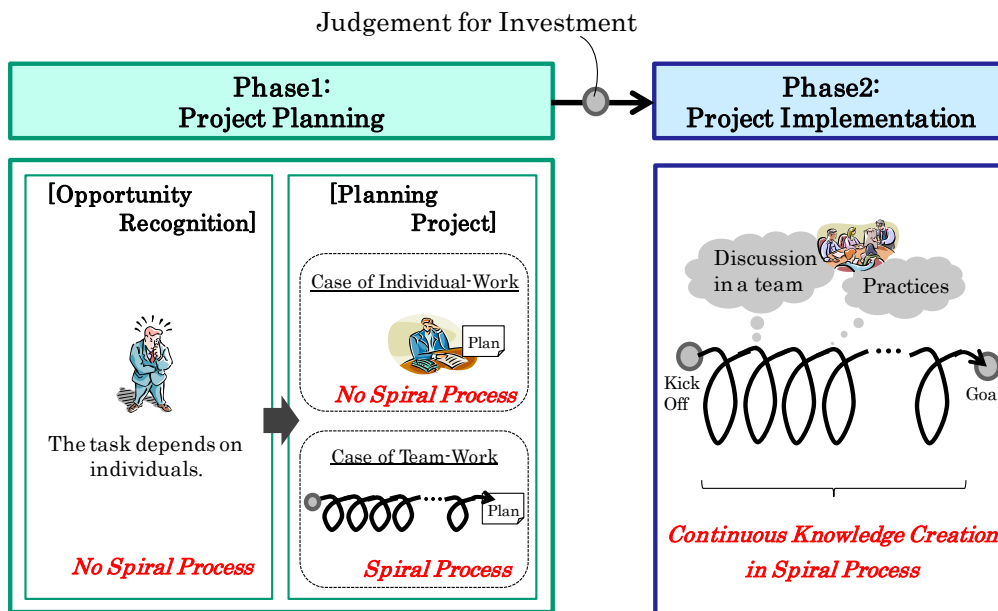
6.1.2 About Ba

Proposition 2 is about ba in knowledge creation. As suggested in Chapter 3.3, a ba is judged as designed one in this research, if it is planned in advance with clear objectives.

In implementation phase, all six cases established some kinds of ba e.g., a project meeting, a meeting with customers, a meeting with top managements, a cyber space, and also a place of practice. As mentioned above, implementation phase is done through a spiral knowledge creation process in a team. Then, the ba is set for launching the spiral process: socialization, externalization, combination and internalization. All are usually established by design.

On the other hand, the planning phase is a little different. As mentioned above, there are following two kinds of tasks in planning phase: opportunity recognition and project planning. Project planning by team-work is done through a spiral process. Then, ba for the task is similar to it in the implementation phase, e.g., team meeting, and it is usually established by design. In addition, there are also some kinds of ba for opportunity recognition and project planning by individual-work, though those are not in a spiral

process. Those are done by each employee individually. Ba for the individual work is usually accidental and dependent on each individual's capabilities and access to resources, including network, communication skill and specialty. However, some case companies establish organizational ba intentionally for supporting the individual work. The organizational ba is divided into two types. First type is ba for *opportunity recognition*. Individuals might recognize a clue of business opportunities through learning in the ba. For example, Fujitsu Services holds forums for recognizing opportunity. in order to get fresh ideas. Second type is ba for amplifying individual externalization of recognized opportunities. Especially, main function of the ba is named *articulation* in this research. If employees recognize a good opportunity, they could not propose it without any specific opportunities. In the ba, individuals articulate their own ideas which are considered in a long series of *opportunity recognition*. For example, Rautakirja holds idea competition and intranet system, in which employees can articulate ideas about their tasks and businesses. Figure 25 shows the result of the discussion about ba.

Figure 25. Discussion about Ba
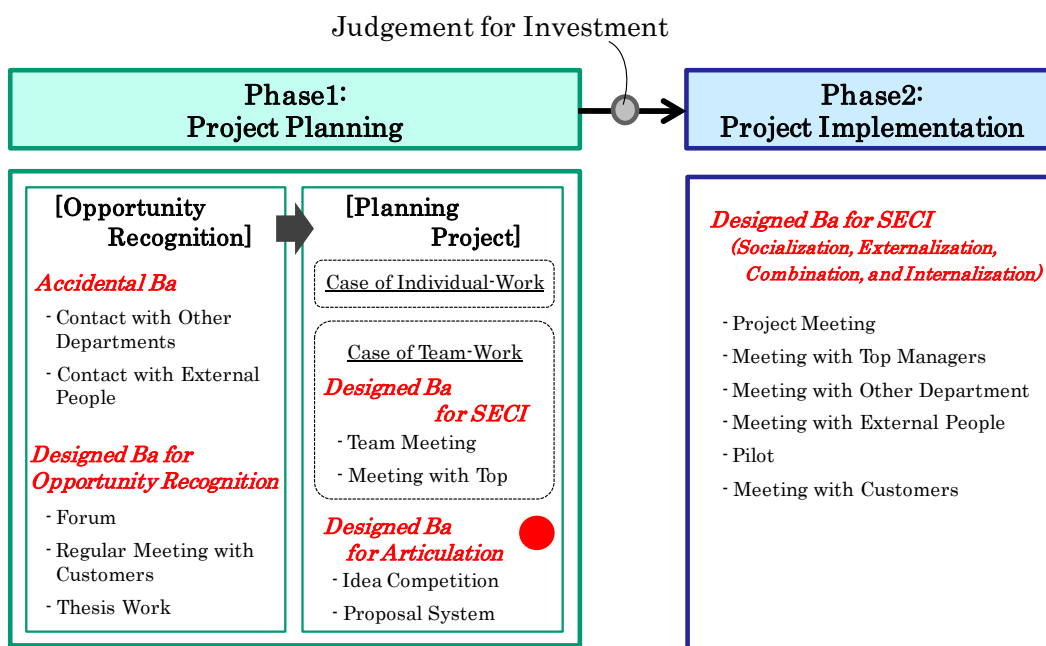
6.1.3 About Objectives

Proposition 3 is about objectives in knowledge creation. As is suggested in Chapter 3.3, an important objective is judged in this research when an objective is emphasized by interviewees in the open discussions.

In most cases, interviewees mentioned that a clear strategy from the company was important in the project planning phase. For example, Valio clears main target markets for internationalization. Therefore, employees can plan projects, in accordance with the strategy. Moreover, in some cases, top managers launched discussion about new opportunities by themselves, e.g., Lean Program in Fujitsu Services and Sampo project in Rautakirja. It is natural to judge that those are strongly related to corporate strategy.

On the other hand, in the implementation phase, interviewees emphasized the importance of achievement for project goals, because they were responsible for the achievement of the goals. In case (3), Lean program in Fujitsu Services, project members were careful of achievement of objectives, as well as schedules. It is possible to judge that the project goal is important mainly for them.

As a result, it is possible to judge that important objective likely to be associated with the company's goal in the planning phase, while more related to the project in the implementation phase. This does not mean that employees do not take company's goal into account in implementation phase. Because their activities are planned in the planning phase in accordance with corporate strategy, they follow the corporate strategy in implementation phase automatically. On the other hand, this judgment includes limitations with respect to validity, because it depends on the progress of individual interviews[34].

6.1.4 About Enabling Condition

Proposition 4 is about enabling conditions in knowledge creation.

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[34] The limitation is described again in Chapter 7.3.

In six cases, all interviewees identified that they have a free, autonomous and innovative atmosphere in their companies. All felt that such an atmosphere affected the knowledge creation in projects very much. On the other hand, it is difficult to identify corporate culture from a few interviews. Further research about the topic is required.

6.2 Other Discussions

Through case studies, some other points are extracted to discuss more about the knowledge creation in innovative projects.

Firstly, in the cases, there are two tasks in the project planning phase: *opportunity recognition* and *project planning*. As is mentioned above, those two tasks hold different characteristics to each other. Therefore, it is required to divide those two tasks clearly.

Secondly, it was difficult to distinguish between the planning phase and the implementation phase in some cases. For example, in the case (1) development of functional milk in Valio, a product was developed through various kinds of successive projects. Members planned projects at the beginning of every project. Therefore, it is required to define each phase clearly for future research. In this interview, a project planning phase is identified as a process in which the opportunity is recognized and articulated in a project plan for the first time. Then, all other project activities after first judgment are identified as project implementation phase.

7. Conclusion

This research has been concerned with knowledge creation, especially in innovative projects. The research started from a researcher's subjective doubt for a notable knowledge creation model. The subjective doubt was articulated in a research question ***what is the difference in knowledge creation between the planning phase and the implementation phase in innovative projects?*** Then, a research plan was established with a research methodology and research structure. As noted in the introduction, this research adopted a *theory building approach*, which requires continuous looping between proposing and checking. However, the research has experienced only one cycle in this study, and it should be discussed continuously with dialogue and practice towards building a theory.

Therefore, in conclusion, I report a second set of propositions which should be tested in future research, and also further suggestions for future studies. In addition, I discuss the limitations of this research.

7.1 Knowledge Creation in Innovative Projects

As is discussed in the previous chapter, it is possible to conclude that there are some differences about knowledge creation between the project planning phase and the project implementation phase. Especially, the planning phase includes original types of knowledge creation which are not shown in Nonaka's theory. The original types are *opportunity recognition* and *articulation*. The differences are summarized in a flow of knowledge creation in innovative projects (Figure 26).

Firstly, an opportunity for innovation is recognized by an individual. An individual searches opportunities by learning diverse issues with an entrepreneurial lens. The *opportunity recognition* is identified as a type of knowledge creation in innovative projects. It is analyzed by researchers in front end of innovation and corporate entrepreneurship. According to Zahra et al. (1999), it is done through formal and informal entrepreneurial activities. O´Conner & Rice (2001) emphasize the importance

of internal networks and external networks, in the view of innovation.

Then, a recognized potential project is articulated in a project plan. If employees recognize a good potential project, they would not have the chance to propose it without any specific opportunities. *Articulation* is identified as a type of knowledge creation in innovative projects. There are two cases of articulation: individual work and team work. Organizations can establish special ba for articulation, e.g., an idea competition and a proposal system. O´Conner & Rice (2001) identify it as a *call to action*.

After judgment, a project is established. Then, project members launch it towards common goals, with continuous discussions, practices, and problem solving in a spiral process.

Figure 26. Knowledge Flow in Innovative Projects
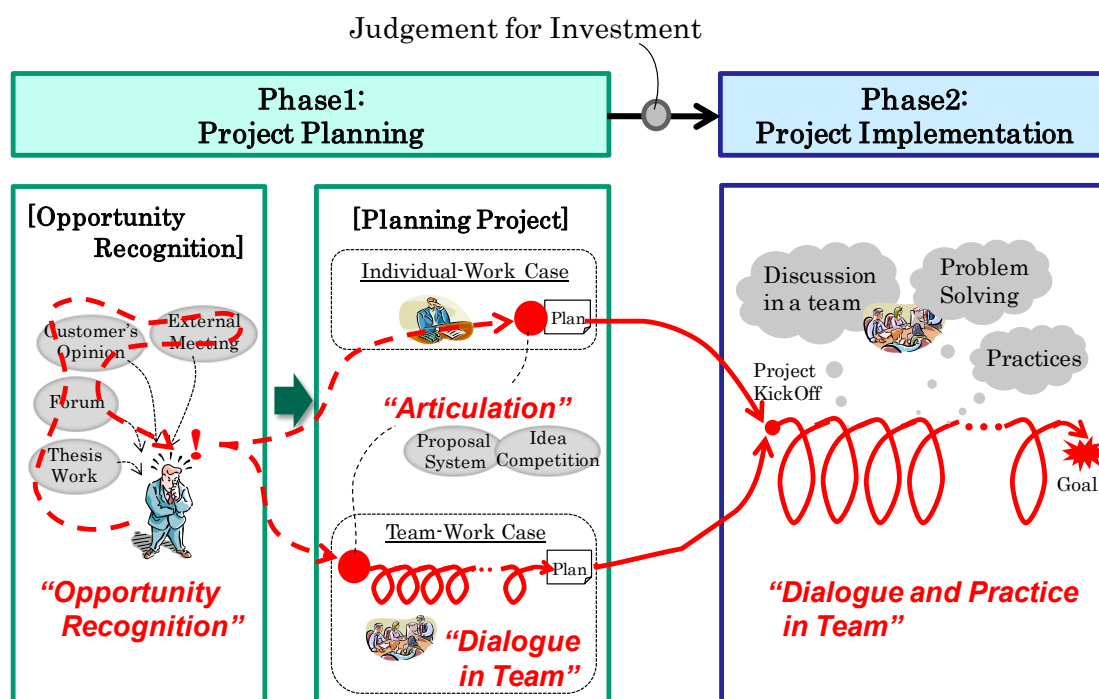
7.2 Setting Second Propositions

Here, initial propositions are revised as second propositions that show differences among three phases. The second propositions are followings:

Proposition 1a: Knowledge creation in opportunity recognition is usually the work of an individual, rather than a team. Organizations can amplify it by setting a special ba for both opportunity recognition and articulation and through clear corporate strategy.

Proposition 2a: Knowledge creation in project planning can be usually the work of an individual or a team. Organizations can amplify it by setting a special team or ba for to facilitate discussion and through clear corporate strategy.

Proposition 3a: Knowledge creation in project implementation is usually team-work through a spiral process. Organizations can amplify it by setting an effective dialogue and practice in ba and through clear project goals.

Proposition 4a: In all phases, an autonomous and creative culture is usually required for effective knowledge creation.

7.3 Further Suggestions for Future Researches

In addition, some other suggestions are extracted for future research. Those should be focused on in future researches.

7.3.1 Research about Managerial Judgment/Control

While this research has focused on two phases in innovative projects, it has not shed light on the managerial judgment located between the two phases. Top managers usually have to judge whether to invest the project or not. It is important to analyze how the managerial judgment affects knowledge creation in innovative projects.

7.3.2 Research about Opportunity Recognition and Articulation

The results of this research suggested the importance of following two types of ba in the

planning phase: *opportunity recognition* and *articulation*. However, details about the ba were not analyzed in this study, and further research about them is required. When focusing on the opportunity recognition and articulation, researchers can refer to two kinds of literature.

Firstly, literature that analyzes entrepreneurial organization are useful (e.g., Ghoshal & Bartlett, 1997; Kao, 1991). For example, one of the famous cases about an entrepreneurial organization is 3M Company. The company establishes effective systems, e.g., 15 percent rule, for enhancing corporate entrepreneurship. Those cases give this research a foundation.

Secondly, literature in the field of creativity research is useful. Though psychological researchers often cite knowledge creation and innovation, they do not usually analyze creativity in a flow of innovation. Rather, the literature focuses directly on individual's creativity. While traditional psychologists analyze creativity as an individual issue (e.g., Guilford, 1957), some scholars identify creativity as social issue (e.g., Csikszentmihalyi, 1988, 1990). In addition, Amabile (1983, 1988, 1997), one of the famous scholars about creativity, suggests a framework of integration between individual and organizational creativity. This literature would give this research come additional clues about opportunity recognition and articulation.

7.3.3 Research for Innovation Type

The empirical study in this research included various kinds of innovative projects, e.g., internationalization, new product development, and organizational change. However, this research did not discuss about differences by the innovation type. In developing a theory, it is meaningful to discuss knowledge creation with characteristics of each innovation type.

7.3.4 Research by Quantitative Method

The research adopts a qualitative method, rather than quantitative method, because

qualitative method can be used to uncover and understand what lies behind a phenomenon about what little is known (Strauss & Corbin, 1990). According to Strauss & Corbin (1990), two types of methods can be used effectively in the same research. One can use some forms of quantitative data to partially validate one's qualitative analysis. Therefore, this research also can use quantitative method in future research.

7.4 Limitations of This Research

The key limitations of this study come from the data collection and data analysis. Those are related to the qualitative method, especially case study research.

First limitation is from data analysis. According to Eisenhardt (1989), analyzing data is the heart of building theory from case study research, but it is both the most difficult and the least codified part of the process. The analysis of the qualitative data may often be biased by researcher's interpretations. For diminishing the limitation, this research has set clear criteria by which initial propositions are judged logically. On the other hand, there are possibilities that data analysis depends on researcher's interpretation.

Second limitation is from data collection. The results of this research strongly depend on interview data, as well as documentation data. Data collection by interview may often be biased by researcher's interview style and art of conversation. For diminishing the limitation, this research has set protocols and pursued a more conversational style of interview. On the other hand, there are some possibilities that the data collections depend on researcher's behavior.

Third limitation is that this research is not reinforced by quantitative data. Through case studies, some characteristics about knowledge creation in innovative projects have been extracted. However, the degree of importance in each characteristic has not been analyzed. For example, how the setting clear corporate objectives affects to knowledge creation should be analyzed in the future.

7.5 Contribution to Knowledge Creation Researches

As is mentioned, this research challenged the integration between knowledge creation research and innovation research. Historically, knowledge creation research has been hand in hand with innovation research. However, those have not been integrated carefully, and each field has specific theories, researchers and academic journals. This research worked toward further integration between two research fields, by reviewing both research fields and analyzing a process of innovation from the perspective of knowledge creation theory. In conclusion part, this research suggested a flow of knowledge in innovative projects. It would contribute to both the knowledge creation research field and the innovation research field.

Furthermore, this research challenged the analysis about two different phases in innovative projects: the planning phase and the implementation phase. Knowledge creation research is usually focused mainly on the implementation phase, rather than the planning phase. As a result of the comparison between two phases, this research revealed that the planning phase requires original types of knowledge creation, especially opportunity recognition and articulation. It would contribute to the further development of knowledge creation researches.

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