Target Cost Management and Organizational Theories

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Abstract

The purpose of the paper is to clarify the relationship between organization-related theories and target cost management (TCM). We can learn a lot from published articles on target cost management about its implications, power of cost reduction, needed supporting tools, and more. Most of the available articles, however, lack the theoretical bases as social science research. Among organization-related theories, organizational capability theories are research orientation derived from management strategy research and would provide a sound theoretical base for management accounting research.

An extensive literature survey for both organization-related theories and TCM will be taken place. The focus of the former is organizational capability theories. It sees enterprises as a collection and/or combination of various resources and capabilities. Utilizing this perspective, we may be able to handle the simple but hard to answer question; why one firm out-perform others even the entities reside in the identical industrial group? Based on our survey, we will present possible research opportunities of TCM studies. The ultimate goal of our research is to explain the relationship among cost management capabilities, other managerial capabilities, and performance.

This particular research can provide insights for various type of future management accounting research.
Research Motivations

Many researches relating to target costing or target cost management (TCM) have been accumulated, and our knowledge base has been enriching. However, the research that can answer the following questions is hard to obtain;

- Does TCM really contribute to the better performance of the firm?
- Why one firm outperform others in the same industry, even all these companies utilize the almost identical TCM system?
- What is the relationship between cost management capabilities and other managerial capabilities?

We have to say that current knowledge of target cost management is not sufficient to provide meaningful opportunities for the future management accounting research. Also, lack of promising theories of target cost management has prohibited even to set hypothesis that should be empirically examined.

The purpose of this paper is to examine whether the existing research of knowledge creation and organizational capabilities (OC) could bring better understandings of TCM.

The next section deals with the contribution and limitations of previous TCM researches through the examination of TCM literatures mostly written in Japanese, which are usually none-accessible to most Westerners. Some of these researches provide valuable information in terms of technical aspect of TCM. However, one of the weaknesses of Japanese TCM researches is that they too much focus on TCM techniques and/or procedures, and very few mentioned TCM processes and its organizational context. More research will be needed to explore the TCM dynamics in organizational context to our better understandings of TCM. Therefore, in the section three, relevant organization theories are examined. These perspectives include contingency theory approach, interactive control research, and theory of organizational knowledge creation. TCM researches utilizing these organization theories are also surveyed.

Section four explores the various types of organizational capability studies. We identified five inter-related research orientations that are driven by Japanese management researchers.

Based on these discussions, this paper finally presents the potential research opportunities for future TCM research.

Contribution and Limitations of Existing TCM Researches

Contributions

The first TCM literature was published in 1977 (Tanaka [1977]). Since then, numerous numbers of literatures were published, especially from early 1990's. Japanese researchers dominated in this research arenas for long, but several English literatures by Japanese researchers brought Westerners in this field (Hiromoto [1988], Kato [1993a], Monden [1989], Sakurai [1989], Tanaka [1989], Monden and Hamada [1991]). Japan Accounting Association (JAA) organized the Special Committee on Target Cost Management from 1992 to 1994. The Special Committee
discussed various aspects of TCM research\(^1\) and indicated the several promising paths for the future TCM research. The report of the Special Committee also did prepare a comprehensive list of nearly 300 literatures in Japanese, English, and German (JAA [1994, 1996]).

These piles of research did contribute to our better understandings of target cost management. First, basic concept of target cost management, that is totally different from traditional after-the-fact treatment of conventional cost control, is identified. The well-known formula of target cost computation (Target Cost = Target Price - Target Profit) could be found in most of the target cost management literatures. This formula clearly demonstrates the basic concept of TCM as many agree\(^2\). We also learned many supporting tools are utilizing to hit the ratter stretched target cost. These tools include VE (value engineering)\(^3\), VRP (variety reduction programs)\(^4\), cost tables\(^5\), tear down method\(^6\)(Sato [1997]), and mile stone management\(^7\), to name a few. There are papers that explain the details of target cost management tools, which are utilized by leading Japanese companies\(^8\). It is interesting to note that many Japanese professional journals,

\(^1\) The special committee aimed to identify the future research opportunities in target cost management studies. Extensive literature surveys are the major part of the report. The final draft was published for JAA members (JAA [1994]). The draft was revised with additional references and published in 1996 (JAA [1996]). JAA [1996] consists from four chapters (Chapter 1 Development of Target Cost Management and Its Research Implications, Chapter 2 Sophistication of Target Cost Management by Japanese Companies, Chapter 3 Overview of Target Cost Management Research, Chapter 4 Dysfunction of Target Cost Management and Target Cost Management Transfer into Different Culture) with Appendix (Terminology, Summary Report of Five Questionnaire Surveys, and References). JAA [1996] was awarded the Best Book of the Year from Japan Cost Management Association in 1997.

\(^2\) Major American textbooks (Ansari [1996], Atkinson et al. [1997], Horngren et al. [1997]) also captured the unique approach to cost reduction through target cost management, by comparing that of traditional standard cost systems.

\(^3\) Popular VE textbook include Akiyama et al. [1994], Sato [1996], Tanaka [1985], and Teshima [1993]. Japan Institute for Science and Technology, a non-profit organization, has been promoting value engineering activities. The institution publishes monthly magazine, Value Engineering, held various VE seminars, and establish the Miles Award, VE equivalent of Demming Prize of quality control.

\(^4\) VRP is a variant of VE to obtain the optimal variation of parts and components for possible cost reduction. Japan Management Association, another non-profit organization, is the main body for promoting this activity. Suzue [1994] describes VRP procedures.

\(^5\) Cost table is widely known as a major database for target cost management activities. Despite of its distinguished existence, a limited number of literatures explain the details (Sato [1965], Tanaka [1986, 1995], Tani [1998], Teshima [1993], Yoshikawa et al. [1990, 1993]).

\(^6\) Sato, the inventor of Tear Down method and manager of Isuzu, produced a video instruction for the wider use of this method. He himself appears on the video and explains how to use the method.

\(^7\) Kato [1993b] named management through several types of meetings (cost review, profit review, design review, and business review) as mile stone management. A unique feature of the milestone management is that it is done as needed basis at the critical points during new product development activities. At each mile stone, relevant personnel get together to ensure whether targeted cost, profit, quality, functionality, and/or time-to-market are fulfilled at the certain point. When problems are identified, necessary actions are discussed and taken place immediately. Mile stone meetings also include the check whether any new ideas violate competitors' patents and whether new product under development can clear the environmental regulations or self-established criteria. Horiuchi [1992], Ichida [1989], Ichida and Makino [1981], Kanno [1990], Kanno et al. [1993], and Yoshikawa [1991] are major references of design review activities.

\(^8\) Monden [1994] contains the reference list by company. Based on this list, case studies are available for the following Japanese companies; Toyota, Daihatsu Motors, Nissan, Honda, Isuzu, Mazda, Kanto Automobile Industries, Denso, Zexel, Kubota, Asmo, Matsushita Electric Works, Hitachi, NEC, Fuji Electric, TDK, JVC, Ricoh, Canon, Brother, Sumitomo Heavy Industries, and Daikin. R. Cooper collected teaching cases of Nissan, Komatsu, Olympus Optical, Isuzu, Yokohama (anonymous), and
accounting and non-accounting, play the important role to share ideas on sophisticated use of each
target cost management tools and even know-how to utilize them. These Japanese journals include
Kigyokaikei, Sangyo Keiri, Industrial Engineering Review, Hinshitsu Kanri (Total Quality
Management), Hinshitsu (Quality), Value Engineering, and others.

In addition, numerous number of non-profit organizations like Japan Management
Association, Japan Productivity Center for Socio-Economic Development, Value Engineering
Association, Japan Union of Science and Engineering (JUSE) provide various types of target cost
management seminars and publish booklets and technical notes to enrich the knowledge of target
cost management⁹. Moreover, major manufacturers that organize keiretsu or supply chain provide
TCM seminars and workshops to the member companies. Each company also organizes in-house
training sessions to make TCM as shared knowledge among employees¹⁰.

Questionnaire survey results (Kobe University Management Accounting Research Group
[1992a, b, c]) can help us to understand real-world application of target cost management. From
these surveys, we can know that majority of Japanese largest manufacturers, more than 80% of the
companies which listed their stocks at the Tokyo Security Market: Section 1, use target cost
management comprehensively and enjoy its tremendous and continuing cost reduction power. The
surveys also show characteristics of target cost management. Concurrent engineering, cross-
functional teams, inter-organizational cost management or supply chain cost management, mini-
profit centers are some examples to reinforce the power of target cost management.

Case studies of real application of target cost management are also available. These cases
indicate the variety of target cost management usage and rather unified-grounded thoughts to
support cost reduction efforts for new product development activities.

TCM was, in some extent, mysterious Japanese hidden-edge like JIT operations
management systems and TQM, or other Japanese cost management during 1960s, 1970s, and
1980s. Now, we know almost everything about TCM except some aspects of it that will be
discussed in the next section.

Limitations

Despite of number of publications and the long history of target cost management
research, especially in Japan, we could observe several deficiencies of existing literatures. Firstly,
most of the literatures are quite descriptive so that we can easily raise the question 'So what?' Very
few could provide the answers to the question.

Secondly, roles of management accounting in new product development activities are still
unclear. Surely, target cost management tools are indispensable for attaining target cost, but, most

⁹ Moreover, each Japanese university has its own journals, most of them are non-refereed, in which
we can find numerous number of TCM related ideas contributed by researchers and instructors. Ideas are
countless; so that non-refereed journals may contribute to increase our better understandings of TCM.
Of course, each reader has to judge the quality and reliability of papers by him/herself.

TCM curriculum of Magneti Marelli, S.p.A., an Italian-based multinational automobile parts
manufacturer.
of these tools have been developed in the different disciplines like VE, QC, or information systems. We do not know well how these tools are inter-related with management accounting activities.

Thirdly, extremely tight cost target or stretched target is perceived as a key for greater cost reduction, but there is no literature to describe what is an adequate level of the tightness and what is the working conditions of tighter target. Relating to this question, we have not commonly shared knowledge of realizing processes of cost target after assigning the tighter cost target. What we know is the assignment of decomposed target figure to the responsible departments, sections, and even individuals and re-assignment of unattained amount of costs to whole entities even some entities had already hit their target costs.

Fourth, the quality of case studies is poor. Most of the available cases described only procedures of target cost management. Harvard cases are much more detail in description but they have a limited power for research, because they have a strong educational orientation. There is no system can survive in the vacuum. Systems can live in organizational context. We can learn how particular companies use TCM systems. We can learn little, however, how and why the particular company uses those particular systems.

And lastly, existing literatures provide no idea for our research questions that were posted at the very beginning of this paper;
- Does TCM really contribute to the better performance of the firm?
- Why one firm out-perform others in the same industry, even all these companies utilize the almost identical TCM system?
- What is the relationship between cost management capabilities and other managerial capabilities?

In this section, we briefly explained various types of TCM research including descriptive analysis and case researches of Japanese literatures. Most of them are, however, self-contained and have little contribution to sophisticated research of cost management. In the following section, TCM research that tried to synthesize or coop with study output of management/organization research.

**Organization Theories and Related TCM Researches -**

**Contributions and Limitations**

**3-1 Contingency Theory Approach**

Contributions and limitations of contingency theory are well documented in the literatures so that the discussion here focuses on its application to TCM researches. The Management Accounting Research Group of Kobe University has been executed various mail surveys including the state of the art survey of TCM application among Japanese companies in 1991 and 1996. The main purposes of the survey did not only investigate the practices of TCM

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11 Based on the Harvard cases, Robin Cooper developed the discussion to confrontation strategy (Cooper [1995]), and inter-organizational cost management (Cooper and Slagmulder [1997]).

12 1991 survey results are available from Kobe University Management Accounting Research Group
but also establish a theory of TCM system design. Other mail surveys (Inoue [1993], Sakurai [1991], Tokyo Science University Cost Engineering Laboratory [1993], Yoshikawa [1992]) also exist, but they neither established nor tested hypothesis to deepen our knowledge of TCM.

Tani et al. [1993a] utilized four contingency variables (complexity and the uncertainty of the decision environment, corporate/business strategy, and organizational structure, i.e., degree of decentralization) to explain the efforts of the companies to make TCM systems adaptive to decision environment, strategy, and organizational structure.

(Figure 1: Contingency Model of Target Cost Management)

The findings were described as follows. Firstly, the more frequent is product development and technological innovation, the more important timely introduction of new product than that of cost reduction as the objective of TCM would be. The more intensive upstream control becomes, product managers possess more influential power, the more frequent product planning meetings are held, and the more commercial managers have a great say in the meetings.

Secondly, market-oriented TCM activities are perceived more important among objectives for the companies that are operating under the very uncertain environment. These companies utilize a variety of sales promotion devices, and also try to differentiate their products from those of competitors. They have a clear tendency to perceive 'market-oriented thinking and satisfying customers needs' as the major objective of TCM implementation. The influential power of product planning managers is higher and updating cost tables and VE application databases are quicker.

Thirdly, the survey suggests that basic propositions of contingency theory are also applicable to TCM activities. More specifically, to solve the problem of heavy information-processing load, 'organic' type of structure was selected by the companies that are facing complex and uncertain decision-making environment.

Tani [1994, 1995] and Tani and Kato [1994] dig more deeply into the details of TCM application. They tested the following hypotheses and all of them were supported empirically;

**Hypothesis 1:** The more customers' needs become diversified, the higher the influential power of sales managers, product planning managers and product managers, during the stage of product planning would be.

**Hypothesis 2:** The more intensive market competition become, the higher the influential power of sales managers, product planning managers and product managers during the stage of product planning would be.

**Hypothesis 3:** When the timely introduction of new products is a key success factor, the influential power of sales managers, product planning managers and product managers will be high during the stage of product planning.

**Hypothesis 4:** The more customers’ needs become diversified, the higher the influential power of purchasing and production engineering managers during the stage of development and/or detailed

[1992a, b, c], Tani [1994, 1995], Tani et al. [1993a, b, 1994], and Tani and Kato [1994]. 1996 survey results have not published yet, but brief results will be presented to the CAM-I Target Costing Interest Group in San Antonio, Texas, June, 1998.
design would be.

**Hypothesis 5:** The more frequent is technological innovation, the higher the influential power of product and product-planning managers in the stage of product planning would be.

**Hypothesis 6:** The more frequent is technological innovation, the higher the influential power of purchasing and production engineering managers in the stages of development and/or detailed design would be.

Available TCM contingency type of research increase our knowledge of target cost management applications. Companies operate in different business environment so that we could hypothesize the real applications of TCM may differ each other. Studies above mentioned gave a clear picture of TCM application in the real world setting, by testing the logically derived hypothesis. Findings from these studies were also identified by those of field research, i.e., shifting power of functional managers during new product development.

There are some limitations of this type of research, however. Firstly, the contingency theory application cannot provide any insight for TCM contribution for performance; why do companies have significant performance differences even they are operating under the same circumstances? Secondly, traditional contingency theory cannot capture all of the relevant contingency variables. For example, the surrogates (diversity of product market and diversity of sales promotion) were used to represent 'complexity of decision environment.'

There are, however, many other candidates of surrogate variables. Ill-consistent results may be shown if other surrogates were used for analysis.

Interactive control studies are an attempt to overcome the latter limitation of contingency theory applications.

**Interactive Control Research**

(1) Reference Literatures

Simons [1987a, b, and 1990] executed a series of interviews with Johnson and Johnson’s managers and found that there were several practices that were not able to explain by the traditional contingency theory findings\(^1\). Two types of control - programmed control and interactive control - were identified. Programmed control is the control processes that business managers direct their attention primarily to ensuring that predetermined control procedures are established and

\(^1\) First, based on R. E. Miles and C. C. Snow’s work (Miles and Snow [1978]), Simons identified two strategic types of the firm; Prospector and Defender. Secondly, Different control attributes between Prospectors and Defenders were examined through a series of interviews and questionnaire survey. As the results, high performing Prospector firms seem to attach a great deal of importance to forecasting data in control systems, setting tight budget goals, and monitoring outputs carefully. In addition, Prospectors large in scale appear to emphasize frequent reporting and the use of uniform control systems, which are modified as needed basis. Traditional contingency theory, however, explains that high-performing prospectors will take ‘organic’ organization structure that is less control oriented. On the contrary, Defenders cannot perform well, if they have attributes that work better for prospectors. Defenders emphasized bonus remuneration based on the achievement of budget targets and tended to have little change in their control systems (Simons [1987a, p. 370]).

These observations were not able to explain by propositions of contingency theory. The theory suggests the companies that face complex and uncertain decision-making environment to solve the problem of heavy information-processing load would select ‘organic’ type of structure.
maintained by designated subordinates. Interactive control is the control processes that business managers actively use planning and control procedures to monitor and intervene in ongoing decision activities (Simons [1987b]). Simons indicated the latter was out of sight in traditional contingency theory discussions. High performing firms can either change their organizational structure 'organic' or introduce interactive type of control to overcome decision environment complexity and uncertainty.

By managing vertical interactions (Simons [1987a, b, 1990]) and those of horizontal (Dent [1987]), interactive control can promote the information and value sharing among managers. Simons [1987a, b, 1990] point out that vertical interactive control promotes top management in various way;
to communicate corporate strategy with philosophy to middle management,
to collect information from middle management that is relevant to strategy formulation, and
to absorb middle management intelligence that seems to be the major body of the corporate strategy.

Dent [1987] discussed the overlapping measurement of performance through horizontal interactive control reporting systems, then, described how these systems promote horizontal interaction, in a computer company, through informal communication among managers.

(2) Target Cost Management Research of Interactive Control

To understand the reasons why simultaneous engineering or concurrent engineering works effectively among Japanese companies, Tani [1994, 1995] and Tani et al. [1993b] focused on the interactive control which emphasizes information and value sharing among managers.

Tani et al. [1993b] analyzed interactions taken place among managers during cost and product planning meetings, respectively. In cost meetings, horizontal interactive control works beautifully. When cost meetings unveiled cost target was not attained, then, various ideas were proposed by functional specialists. In emergency, cost meeting are held overnight to invite various functional managers to company-owned accommodation. They sit together for long to create unique ideas to attain the cost target. Various idea creation techniques like KJ method, Delphi, Functional Trees to name a few are utilized. This kind of environment with appropriate supporting tools promotes horizontal interaction, and as the consequence, cost target is attained. Simultaneous engineering or concurrent engineering also makes it a must to meet functional managers each other. Product planning meetings are milestones for vertical interaction, because product manager can assure the new product development progress and monitor how his/her subordinates think and behave. The results show that product manager constantly possess the higher influential power during new product development. Each manager plays the dominant role at the stage that he or she is responsible for. But, they still have a rather strong say to adjacent stages to their own. This finding may suggest that vertical interaction is taken place during product development meetings.

Tani [1994] analyzed strategic aspect of interactive control in TCM. First, the research found the interaction between managers from different functions and disciplines helps to generate unique cost reduction ideas. Secondly, in product planning meetings, vertical interactive control between top management and middle management supplements the top management's monitoring activities and helps to formulate their strategy formulation. Top management interacts presumably to collect information for strategy formulation from middle management. This process also helps to
interweave and infuse values and ideas of middle management into corporate strategy implementation. Four hypotheses, which were the determinants of shared information in product planning meetings, were formulated using the same logic as previous six hypotheses, and almost all hypotheses were supported empirically.

The results showed that product planning and cost meetings are key devices of interactive control to share information and values among the people responsible for product development. Simultaneous engineering works effectively only if information and values are shared (Tani [1995]). However, it has to be noted that just organizing these meetings is not sufficient for information and value sharing. Shared information does not automatically lead to shared value. More in-depth research is needed to recognize the dynamic mechanisms to convert shared information into shared value.

Kobayashi [1988] suggested more generally that planning and control, accounting structures, reward systems, or any combination of them promote vertical and horizontal interactions. We have, however, no systematic analysis on the issue. More specifically, researches are expected to explore how and to what extent target cost information, TCM systems, and interactive control of TCM influence the organizational interactions.

**Applicability of Organizational Capability Approach to TCM research**

**Organizational Knowledge Creation**

(1) **Reference Literatures: Theory of Organizational Knowledge Creation**

Nonaka [1990, 1991] and Nonaka and Takeuchi [1995] focused on knowledge creation mechanisms and its power to competitive advantage of Japanese companies. He perceived knowledge and knowledge creating capacity are important elements of organizational capabilities, mainly because knowledge is a source of continuous innovation that is perceived as one of the competitive advantage of Japanese firms.

(Figure 2- Knowledge: A Source of Competitive Advantage)

First, they focused on the epistemological dimension of organizational knowledge creation, and referred to two aspects of knowledge; tacit knowledge and explicit knowledge (Polanyi[1966]). Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate. On the other hand, explicit knowledge is transmittable in formal, systematic language. Tacit knowledge and explicit knowledge are not totally separate but mutually complementary entities. They interact with and interchange into each other in the creative activities of human beings (Nonaka and Takeuchi [1995, p. 61]).

(Table 1- Two types of Knowledge)

Knowledge is created through four modes of knowledge conversion, which are as follows:
• from tacit knowledge to tacit knowledge, or socialization that creates sympathized knowledge,
• from tacit knowledge to explicit knowledge, or externalization that creates conceptual knowledge,
• from explicit knowledge to explicit knowledge, or combination that creates systemic knowledge, and
• from explicit knowledge to tacit knowledge, or internalization that creates operational knowledge

(Figure 3 - Four-step model)

The content of the knowledge created at each step could interact and generate more knowledge. Conceptually, and as see in the figure below, these processes are perceived as the spiral accumulation of new knowledge.

(Figure 4 - Spiral processes of knowledge creation)

Organization cannot create knowledge by itself. Tacit knowledge of individuals is the basis of organizational knowledge creation. The tacit knowledge of individuals is 'organizationally' amplified through four modes of knowledge conversion and crystallized at higher ontological levels. Interaction between tacit knowledge and explicit knowledge will become larger in scale as it moves up the ontological levels.

(Figure 5 - Five-phase model of the organizational knowledge-creation process)

Nonaka also indicates five enabling factors to promote the organizational knowledge creation; intention, autonomy, fluctuation and creative chaos, redundancy, and requisite variety. Literatures of this orientation provided many real world examples to demonstrate that their theory can explain the behavior of excellent Japanese companies during new product development.

14 These five enabling factors are explained in Nonaka and Takeuchi [1995, pp. 73-83]. (1) Intention is defined as an organization's aspiration to its goals. Efforts to achieve it usually take the form of strategy within a business setting. If not for intention, it would be impossible to judge the value of information or knowledge perceived or created. Therefore, to create knowledge, business organizations should foster their employees’ commitment by formulating an organizational intention and proposing it to them. (2) Autonomy: At the individual level, all members of an organization should be allowed to act autonomously as far as circumstances permit. By doing so, the organization may increase the chance of introducing unexpected opportunities, motivation of individuals to knowledge creation is increased, and the self-organizing individuals are realized. (3) Fluctuation and Creative Chaos stimulate the interaction between the organization and the external environment. When fluctuation is introduced into organization, its members face a breakdown of routines, habits, or cognitive frameworks. The other hand, intentional chaos which top management gives employees is referred to as creative chaos. (4) Redundancy refers to intentional overlapping of information about business activities, management responsibilities, and the company as a whole. Redundancy facilitates the sharing of both tacit and explicit knowledge. However, at the same time, it increases the amount of information to be processed and can lead to the problem of information overload. (5) Requisite Variety: According to Ashby [1956], an organization's internal diversity must match the variety and complexity of the environment in order to deal with challenges posed by the environment.
(2) Target Cost Management Research of Knowledge Creation

There are two streams of TCM research that utilize knowledge creation literature. One perspective insists that management accounting information can contribute directly to knowledge creation of the firm. The other approach is an attempt to explain target cost management activities as a series of knowledge creation processes.

Shimizu [1992a] focused on the role of VE (value engineering) in TQM activities and explained how cost reduction ideas are created during new product development processes. As well recognized, VE is one of the major TCM tools to reduce costs. Also, major cost reduction ideas could be merged in process of VE activities. He paid an attention to knowledge creation theory, especially, focused on an enabling factor (fluctuation and creative chaos), and explained how target cost tightness could encourage or discourage the relevant personnel for their cost reduction efforts. As long as the tightness of cost target is well managed, involved personnel could understand existing solutions and/or previous experiences give little help to hit the target, then, begin to seek new solutions under quite chaotic environment.

Shimizu [1992b] tried to extend his previous discussions of personal knowledge creation mechanisms to those of organizational knowledge creation. Again, he utilized the discussion of knowledge creation and explained how each individual becomes to be motivated to work together as a team to create ideas that would contribute to attain the tight cost target. In this situation, target cost information itself acts as a commonly shared objective. Accumulation of individual efforts cannot reach to the targeted costs under tighter situation. If the objective is commonly shared and accepted, then, it becomes more easier to drive team efforts, horizontal and vertical interaction, cross-functional activities, and/or inter-organizational cost management/supply chain activities.

Shimizu's discussions are informative, but utilize the very limited part of Nonaka theory, and provide little in-depth understanding of TCM from knowledge creation perspective. Research will be needed, at least, to cover all five enabling factors of knowledge creation.

Iwabuchi [1992] focused on the role of shared information among departments with a short case description of a Japanese large electric manufacturer. He explained how information sharing are amplified to create sympathized knowledge, conceptual knowledge, systemic knowledge and operational knowledge through socialization, externalization, combination, and internalization, respectively. He also presented an ideal model for creating new knowledge for possible cost reduction, that is, shared information lead to the cooperative efforts among different functions, then, collection of expertise and professional experience and knowledge turn into unique solutions. As you can guess, there will be conditions to make this model work. This study, however, discuss little on these conditions.

All these existing studies perceived the target costing activities as the knowledge creation activities. These efforts, however, are quite normative, as we see in most of the Japanese papers. Nevertheless, knowledge creation theory is intuitively very promising so that it could be a sound theoretical base for future target cost management research. To say more specifically, we want to have researches that aim to clarify the unknown mechanisms of target costing. For example, we would like to know how to control the tightness of target cost to turn each piece of individual knowledge into that of organizational and how creative chaos is created and managed in new product development activities. We also want to clarify the mechanisms of knowledge transformation processes in target costing activities. Knowledge creation studies would deepen our
knowledge of TCM in the future.

**Organizational Capability Theories**

**(1) Resource-based Approach**

In recent years, many researches in the fields of strategic management and organization theory have focused on organizational capabilities. Among various types of OC researches, Itami [1980, 1984, and 1987] were the earlier contribution in this research arenas and focused on the ‘invisible assets’ or information-based resources including know-how of technology and production, degree of customers' royalty to the firm, brand images, organization climate, business morals, and management skills. He perceived ‘invisible assets’ as the major source of the competitive strengths. Hall [1992, 1993] also paid an attention to ‘intangible resources.’ Hall utilized Conye [1986]'s classification of organizational capabilities that are consisted from (1) positional capabilities, (2) regulatory capabilities, (3) functional capabilities, and (4) cultural capabilities. Developing his initial research attempt, Hall [1992, 1993] pointed out the necessary skills and resources for enabling four capabilities, respectively.

Definitions of OC are different among researchers, nevertheless, most authors shared the rather common understandings to OC attributes, namely, the source of sustainable competitive advantage. OC studies assign special meaning to the word ‘capabilities.’ Capabilities should be firm specific and relate to customer values. Only capable organizations can differentiate themselves from others.

Organizational capabilities have two notable characteristics; imperfect imitability and imperfect substitutability (Dierickx and Cool [1989]). If a company can launch the products that are hard to imitate by other companies, then, the company could be perceived as the possessor of the competitive advantage over its competitors. There are two major factors that contribute to the imperfect imitability; (1) attribute of output and its generating processes and (2) accumulation process of capabilities. Attribute of output and its generating processes consist from three variables; tacitness (Fiol [1991], Nelson and Winter [1982], Reed and Defillippi [1990], and Winter [1987]), complexity (Fiol [1991], Garud and Nayyar [1994], Nelson and Winter [1982], Reed and Defillippi [1990], Winter [1987]), and immobility (Reed and Defillippi [1990]). Accumulation process of capabilities is very much path-dependent and is also governed by causal ambiguity (Barney [1991], Dierickx and Cool [1989] Grant [1991]). Substitutability largely depends on the technological innovation so that management related capabilities have a limited contribution to reinforce the imperfect substitutability.

These researches paid an attention to identify the unique organizational capabilities that would lead to the long-term and/or sustainable competitive strength. Based on this perspective,

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15 Penrose [1959] brought the resource-based perspective into organization studies. Learned et al. [1969] and Andrews [1971] are typical researches based on this resource-based approach. After passing stagnation period in early 80s, new resource-based perspective was emerged. New perspective approach has broadened the discussion on the relationship between corporate resources and competitive power of the organization. Rumelt [1984], Wernerfelt [1984], Barney [1986, 1991] are classified into this research category.

16 Using mail survey and case investigations, Hall [1992, 1993] tried to grasp the major capabilities of the firms.
relative competitiveness of the firms could be explained. Previous discussion of management strategies paid little attention to the nature of corporate resources, imperfect imitability and imperfect substitutability. They also, intentionally or unintentionally, discuss the corporate competitiveness for short-term and/or at one time.

Resource-based approach tried to find out the consisting elements, or resources of organizational capability. Even if each capability may contribute to company's sustainable competitiveness, quantity and quality of each of the capability variables cannot explain the strength of the firm as a whole.

One weakness of these 'static' OC studies is that they merely list a collection of capability variables as earlier contingency research application did. These literatures also cannot explain how to use, develop, combine, learn, or renew existing resources and capabilities. They are blind for the dynamic processes of capability accumulation. Our TCM literature database contains no TCM articles that refer to the existing literature of resource-based OC.

In the following subsection, we focus on the literatures that try to overcome the limitations of resource-based approach.

(2) Dynamic Capability Approach

Teece et al. [1991, p. 20] developed the concept of 'dynamic capabilities,' which are 'the ability of an organization to learn, adapt, change and renew over time. This involves search, problem finding, and problem solving at the organizational level. Capabilities are the mechanism and process, which enable firms to develop new competence.' This perspective is quite different from the resource-based approach in a sense that the dynamic capability approach emphasizes the systematic views on developing capabilities.

Prahalad and Hamel [1990] presented a similar definition of core competence, which 'are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies. (Core competence) are communication, involvement, and a deep commitment to working across organizational boundaries.' Using Japanese cases including Sony, Canon, Honda, and NEC, they refer to necessary conditions of core competence, which are not only highlighted in the previous subsection but also provide potential access to a wide variety of markets. Itami [1980, 1984, 1987] also refer to information-based capabilities as 'invisible assets', and highlight the importance of multiple availability of informational managerial assets. Additional suggestion of his informational managerial resources theory is that decision maker must have two strategic thinking (input and output of the resources) at the same time when they select a particular strategic action from possible alternatives.

Thus far, we have overviewed the discussions of dynamic capabilities, core competence, informational managerial resources, all of them are looking at OC from slightly different perspectives. OC are not only the attributes of the firms' unique resources, but also the mechanisms and processes of accumulating firm-specific capabilities, which could contribute to the sustainable competitive advantage of a firm (Amit and Schoemaker [1993], Grant [1991], Itami and Kagono [1993]).

Based on our best knowledge, no research attempt is made to tackle TCM topics from the dynamic capability perspective. Nevertheless, OC literatures, especially those of dynamic capability approach, seem to have a potential to satisfy our research interest. TCM activities are
corporate-wide and use various types of information from all levels of organizational hierarchy, functional departments, and even from outside suppliers. In this sense, dynamic capability approach seems more suitable for exploring TCM practices.

**Recent Japanese Research on Organizational Capabilities: Five Possible Paths for the Future TCM Research**

In the previous sections, we overviewed the existing research of resource-based approach as well as dynamic capability approach of OC. Most of these articles were emerged from the extension of organization theories of diversification. On the contrary, Japanese researchers try to expand the OC discussions into product development management that seem to be more relevant to TCM studies.

In this section, we outlined the five existing research approach with the above mentioned flavor and examine the possibilities of applying these researches to TCM studies.

(1) Integrating Problem Solving and Product Champion's Role

In extensive comparative analysis of product development projects among world auto manufacturers, Clark and Fujimoto [1991] made it clear that certain Japanese auto manufactures had two distinguished organization capabilities; integrating problem-solving through stage overlapping and intensive communication and the HWPM (the heavyweight product manager structure).

We observed a general tendency that the higher integrated problem solving capability leads to higher total product quality that is the measure of overall product quality. This relationship was particularly strong in conformance quality\(^\text{17}\). There was also a significant positive correlation between integrated problem solving and product development performance (total lead time and development productivity). Japanese firms, however, were dominated the higher scores of integration among samples so that we may only observe that Japanese firms outperformed Western competitors.

Moreover, HWPM structure is common among the better performing firms in terms of product development performance. HWPM is characterized by the higher integration of effective coordination within the project team members (internal integration) and that of matching the product to customer expectations (external integration), and the lower level functional work specialization.

(Figure 6 - Four Modes of Development Organization)

Fujimoto [1995b] tried to generalize the research findings of Clark and Fujimoto [1991] by including more samples from other industries. Three measures were selected to examine the

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\(^{17}\) Conformance quality is the measure of how well products realize the product design or specifications, including reliability, deficiency rate, and durability. The other hand, design quality is the measure of the degree to which product designs match customer expectations. When a product conforms perfectly to design, design quality and total product quality are the consistent (Clark and Fujimoto [1991], p. 82).
industrial differences; (1) relationship between technological innovation of parts design and its impact on product design change (Henderson and Clark, 1990), (2) relationship between product complexity and product usability, and (3) separability of product design (product technology) from process design (production technology). The paper hypothesizes that effective product development mechanisms are identical to that of auto industry when firms in other industries equip the following characteristics,

- architectural innovation (ever changing inter-relationship among parts and/or components and reinforcing nature of existing product core concept)
- complex products (higher complexity of internal structure of products and product-user interface), and
- independence of product design from process design (richer knowledge of product structure and varieties of processing methods for product design).

It is regret to say that neither empirical analysis nor case evidence is available in the paper. Nevertheless, established hypotheses are intuitively appealing.

It is notable to raise a research question whether OC found in excellent Japanese new product development practices are universally valid in other industries and other cultural settings. Moreover, we would like to have clear ideas for effective performance evaluation scheme of heavyweight product managers that are seldom found in other industries.

(2) Multi-Project Management

Project-based product development led by heavyweight product managers or product champions is commonly observed among Japanese auto manufacturers. This structure, however, has a deficiency; a weak tie and/or insufficient knowledge transfer among projects. Nobeoka [1996], based on the effective triangulation of research methods; field survey, case research, and statistical analysis, discussed multi-project strategy/management implemented in Toyota that tries to achieve both cross-functional and inter-project coordination to overcome the problem.

Toyota reorganized its overall product development structure in 1992 to overcome its facing problems as described below that include two HWPM-related problems.

- Rapid changes of business environment made it difficult for product champions (in Toyota, they are called as 'chief engineers') to align a variety of engineering function (HWPM related problem)
- Organization led by chief engineers was not appropriate for inter-project coordination (HWPM related problem)
- There were too many engineering departments, which are narrowly specialized by function.
- Too many vehicle development projects were assigned to each functional manager. This heavy workload prohibited the smoother inter-project coordination, mainly because of the time constraint
- The research and development group and new vehicle development projects were insufficiently coordinated.

Toyota made two major changes in its product development organization to solve the problems. Firstly, Toyota integrated all of its new product development projects into three centers;
Development Center 1: FR (front drive rear engine) Vehicles, Development Center 2: FF (front drive and front engine) Vehicles, and Development Center 3: RV (recreational vehicles) and Vans. Each center is categorized by the similarity of platform design. Then, in 1993, Toyota created Center 4 to develop components and systems for all vehicle projects. Before the Center 4 establishment, Toyota had a research oriented laboratory that aimed to progress technology innovation for the future use. Because of the nature of the laboratory, three Centers had less frequent communication with the laboratory. The laboratory could concentrate on its own interests. It may be good for researchers at the laboratory, but not so great for the profitability of each of the three Centers. Now, Center 4 works closely with and has effective interaction with three vehicle centers in terms of new vehicle development activities.

(Figure 7 - Toyota's Product Development Organization as of 1992)

Important features of this reorganization include:

- Reduction of the number of projects assigned to the general manager of each center to make coordination much easier (HWPM)
- Easier and smoother project integration by reducing of functional engineering departments
- Establishment of planning divisions (the administration department, the TCM department, and the product audit department) in each center\(^{19}\)
- Hierarchical organization of chief engineers for effective product differentiation and efficient part / component sharing\(^{20}\).

Simplified organization makes it possible to facilitate and integrate functional interaction among centers and decreases coordination tasks among departments. With this new systems, Toyota also improved its performance in terms of development related cost (30% off), number of trials (40% off), and development lead time (several months shorter).

Nobeoka [1996] added the knowledge of the new movement in Toyota that was unknown to Western audiences. What is more important is the added knowledge of our understandings of Japanese product development management, in which TCM plays an important role\(^{21}\). One more important issue is the Toyota's capabilities to accept the radical organizational restructuring and its abilities to keep continuously improving performance.

Actually, the number rose to about 12,000 in 1993. Decreasing number of relevant personnel was not perceived as a serious problem in Toyota (Nobeoka [1996], p. 140).

\(^{19}\) Before the organization changes, TCM department resided in the headquarters. The department gave helping hands ad hoc basis and provided rather general guidance for TCM activities. After the changes, TCM department in each of the centers becomes more responsible for cost reduction activities. Because of the nature of the centers, TCM department focuses much on common cost reduction ideas among products. This makes cost reduction activities more efficient in terms of input (cost reduction efforts)/ output (real cost reduction) ratio.

\(^{20}\) For example, the chief engineer of Lexus Coupe is the superior to that of Supra. This hierarchical structure makes it possible to use common parts/components for these two models. The chief engineer of Lexus Coupe can manage the product development process of Supra. He can also accumulate the knowledge for the future development of Toyota's high-end sporty coupes.

\(^{21}\) Most of the TCM researches are heavily rely on the product development management literatures up to early 90's. Despite of the progress of the research in new product development management, TCM researches have been blind to these progresses.
(3) Knowledge Retention and Inter-Project Learning

Based on the existing empirical research on product development of the Japanese and the U. S. automobile industry, some studies extended their research interests into the capabilities of retaining product-related knowledge across projects (Aoshima [1996], Aoshima and Nobeoka [1997], Nobeoka [1995, 1996]). Among the important research findings, they showed that the direct linkage among new vehicle development projects brings effective accumulation, retention, and reuse of the product-related knowledge. There are two ways of project linking. One is the individual-based retention type of linkage by transferring core personnel from one project to another (Aoshima [1996], Aoshima and Nobeoka [1997]). The other one is the time-overlapping type of project linkage, with which knowledge retention through direct communications and interactions among projects are facilitated (Aoshima and Nobeoka [1997], Nobeoka [1995, 1996]).

(Figure 8 - Two Types of Linkage with Knowledge Retention)

Aoshima [1996] obtained data from 229 core project members in 25 new product development projects of Japanese auto manufacturers. Firstly, Aoshima [1996] investigated how knowledge retention influences performance within well-established component development. In general, dependence on archival-based devices, such as documents, reports and computerized tools, rather than on individual-based mechanisms, tended to be associated with higher local performance.

Secondly, he analyzed the data set at project level. Data suggested that retention of individual experience and communication with previous project members have positive impact on several performance indicators. In particular, these individual-based retention mechanisms affected improvements of system performance derived from the complex interactions among different engineering and functional domains. However, data also suggested that retention of prior experience tended to cause problems when projects have to introduce new market concepts. In this case, previous experience may be hazardous to create the totally unique concept.

Nobeoka [1995, 1996] used the survey results of 58 new vehicle development projects of Japanese and U.S. companies. The result shows that time-overlapping projects required significantly fewer engineering hours than that of sequential-linkage projects. This finding clearly shows that the time-overlapping type of linkage makes it easy to transfer relevant knowledge from one project to another.

(4) Process Capability

In the previous sections, we viewed the organizational capabilities play an important role for better product development activities. But, there is a limitation to generalize the findings. All previous researches collected data from only automobile industry. Kusunoki et al. [1995] is an attempt to overcome the deficiency of other OC research.

Kusunoki et al. [1995] recognizes three layer of the capability hierarchy; local capability, architectural capability, and process capability. They also perceive that each of the capabilities is

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22 Aoshima [1996] defines local performance as the portion of overall performance reducible to particular technological and functional elements, and system performance as the portion attributed to interactive effects among these elements.
derived by respective knowledge; knowledge base for local capability, knowledge frames for architectural capability, and finally, knowledge dynamics for process knowledge.

(Figure 9 - Organizational Capabilities derived from Multi-layered Knowledge)

The knowledge base is the layer-bottom, which includes distinctive individual units of knowledge. Such individual units of knowledge enable the knowledge base to provide local capabilities. The knowledge frame includes knowledge concerning linkages of units of knowledge, which hold a certain form of stable pattern or configuration, and their priorities. This layer focuses on organizational structures and strategies that determine these stable patterns. The OC derived from the knowledge frame are called architectural capabilities. The knowledge dynamics sheds light on processes of dynamic interactions in which individual units of knowledge are combined and transformed.

Based on this recognition of multi-layered organizational capabilities, Kusunoki et al. [1995] tested hypothesis on the relationships between product development performance and each of these three different OC. They also tried to specify what type of OC that affects product development. The data used in the analysis were collected by a mail survey to all manufacturing firms in Japan that listed their stocks. Total number of population was 1,226.

The results of the analysis clearly demonstrate the importance of process capabilities in product development among Japanese firms. Process capabilities have significant impacts on performance, and that impact extends to all types of performance, i.e., productivity, product quality, and innovation. Then, several interesting implications concerning the interaction of knowledge can be derived from the analysis. Firstly, the importance of the lateral interaction within the development departments or between different functional groups is identified. The second point is the relationship between two forms of the interaction of the knowledge: leader's involvement' and 'shared experience.' 'Leader's involvement' has a strongly significant relationship with product quality. However, when productivity and innovativeness are examined, its significance disappears, and conversely, 'shared experience' through personnel transfers becomes a powerful positive association with product quality.

( Table 2 - Research Findings of Kusunoki et al. [1995] )

(5) Evolutionary Capability

Fujimoto [1995a] tried to find the logic why selected Japanese automobile manufacturers, especially Toyota, demonstrate the extremely high performance in 1980s. For this purpose, Fujimoto [1995a] keeps eye on 'firm-specific resources and capabilities,' and identifies three levels of OC: static capability, improvement capability, and evolutionary capability.

Static capability is consisted from productivity and manufacturing quality, which affect the level of competitive performance at the certain point of time. Improvement capability is the one that affects the pace of performance improvement over static capability. And, evolutionary capability is the ability to accumulate static and improvement capabilities. Level of evolutionary capability is perceived as the major determinant of performance difference among companies, mainly because most of all Japanese automobile companies seem to possess the same level static
HWPM structure is seldom found in the Japanese industries other than automobile, though this structure and the derived unique capabilities form one of the major strength of Japanese automobile industry in the past. This finding limits the explanatory power to generalize. Starting from that point, Fujimoto [1995a] narrowly focused on automobile industry and took the approach to know why the particular companies like Toyota and Honda keep their competitive strength from competitors.

Fujimoto [1995a] did the archival search as well as intensive interviews and found the following facts:

- Failure to introduce the whole set of Ford production systems and scientific management made Toyota to find the way to rationalize their production systems and operations management
- Toyota started from the weaving machinery industry. This history made Toyota to introduce management intelligence from other textile-related industries through benchmarking
- Toyota could have such talents including the Kiichiro Toyoda, the founder of Toyota, and Taichi Ohno who invented JIT production systems
- Toyota recruited many engineers from aircraft industries after the World War Two. Toyota learned 'product manager systems' from these recruits
- Toyota has a born-nature capability to institutionalize the newly introduced management ideas.

These facts reflect the quite path-dependent nature of accumulating capabilities and support that Toyota possesses the extremely high evolutionary capability over its competitors. Toyota seems to be superior to turn accidental happenings into the triggers for advancing their competitive strength.

**Concluding Remarks**

This paper aimed to provide the basic discussions to explore whether TCM contribute to the better performance of the firm. Many Western firms have hassled to introduce Japanese cost management like JIT operations management, TQM, and TCM. One of the major motivations of these companies is surely acquisition of the competitive strength in the marketplace by learning from benchmarked Japanese companies. Despite of this fact, no clear evidence is available concerning the real impact of Japanese cost management on performance. The rise of Japanese companies were perceived to last long especially in 1980's, but many observers changed their opinions, and now they are explaining why Japanese firms face the difficulties. One persuasive phenomenon is the dysfunctional influence of Japanese cost management. Cole [1995] discussed the difficulties to implement TQC to American companies. Some of the difficulties are related to the dysfunction of TQC like forced team activities, time-consuming efforts without success for some time periods, and stresses of involved workers. Kato [1993a,b] and Kato et al. [1995] dealt with the TCM dysfunction including design engineers burn out, suppliers fatigue, and mistreatment.
of customer requirement. New managerial concepts may be welcome by the practice and bring significant results at the initial stage of introduction. Nevertheless, these new concepts or techniques may damage the companies in a long run. To avoid this type of unwelcome results, it is better to know whether new managerial concepts and techniques contribute to the performance or they are just buzzwords.

Discussions of organizational capability would provide the good starting point to study the relationship among any particular organizational capability (TQM, JIT operations management, or whatever), other organizational capabilities, and corporate performance. To explore this relationship is the ultimate goal of our research attempt.

(Figure 10 - relationship among organizational capabilities and corporate performance)

To stand the starting point of above mentioned research, the paper first examined Japanese TCM literatures that are seldom accessible for Western researchers. This part of the literature survey unveiled that many Japanese researches are available, but limited number of qualified researches can provide insight for the future TCM research. Discussions, then, expand to the notable Japanese TCM researches that utilize the theories and findings of other disciplines like contingency theory, interactive control, and knowledge creation. Contributions, possible research opportunities, and also problems or limitations are discussed. Table 4 provides an overview of these discussions.

(Table 4: TCM Researches and Organizational Theories (1))

There is a theoretical development from above mentioned research orientations to organizational capability studies. None TCM literatures on organizational capabilities are available today, but the paper emphasizes the potential to apply these discussions to TCM studies. One clear motivation for this attempt is mentioned at the very beginning of the final remarks. Literature review of organizational capability indicates the potentials as well as difficulties to apply the available organizational capability literatures as shown in Table 5. Especially, Japanese literatures of new product development management seem promising for the TCM research of the future, even these papers have some problems.

(Table 5: TCM Researches and Organizational Theories (2))

As the summary, we will list the promising research to enrich our knowledge of TCM.

- To reinforce new product development management with TCM. New product development management literatures seldom discuss cost issues. Cost aspect is indispensable to discuss so that neglecting cost issues is a big deficiency of previous studies.
- To unveil the knowledge creating mechanisms in TCM activities.
- To understand contents of TCM capabilities and relationship of each of the capabilities.
- To know the accumulating processes of TCM capabilities.
- To comprehend the relationship between TCM capabilities and those of others.

Without those 'knowledge' in hand, we cannot be at the starting point to explore whether
TCM could bring the better performance of the firm.

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Figure 1. Contingency model of target cost management (TCM) (Tani, 1995, p. 404)

Figure 2. Knowledge: A Source of Competitive Advantage (Nonaka=Takeuchi, 1995, p. 6)
Figure 3. Four-steps model of knowledge conversion (Nonaka=Takeuchi, 1995, p. 62)

Figure 4. Spiral Processes of Knowledge Creation (Nonaka=Takeuchi, 1995, p. 71)
Figure 5. Five-phase Model of the Knowledge Creation Process (Nonaka=Takeuchi, 1995, p. 84)

Figure 6. Four Modes of Development Organization (Clark and Fujimoto, 1991, p. 254)
Figure 7. Toyota's Product Development Organization as of 1992 (Nobeoka, 1996, p. 141)

**Individual-based Retention Type**

![Diagram of Individual-based Retention Type]

**Time-overlapping Type**

![Diagram of Time-overlapping Type]

Figure 8. Two Types of Linking with Knowledge Retention (Aoshima and Nobeoka, 1997, p. 29)
Figure 9. Organizational Capabilities derived from Multi-layered Knowledge (Kusunoki et al., 1995, p. 93)

Figure 10. Relationship among Organizational Capabilities and Corporate Performance
<table>
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<tr>
<th>Tacit Knowledge (Subjective)</th>
<th>Explicit Knowledge (Objective)</th>
</tr>
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<tbody>
<tr>
<td>Knowledge of experience (body)</td>
<td>Knowledge of rationality (mind)</td>
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<tr>
<td>Simultaneous knowledge (here and now)</td>
<td>Sequential knowledge (there and then)</td>
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<td>Analog knowledge (practice)</td>
<td>Digital knowledge (theory)</td>
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</table>
Table 2. Research Findings of Kusunoki et al. [1995] (1)

Variables Used in the Regression Analysis

<table>
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<td>Utilization of data bases for product development</td>
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<td>Utilization of information technologies (CAD etc.)</td>
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Cont.
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Variables without notes are measured along 7-point Likert scale
(a) 7-point scale: Locus of influence is entirely at functional groups (= 1); entirely at integration group (= 7)
(b) Mean of six development stages: Concept creation; Product planning; Detailed product design; Testing; Process design; Introduction
(c) Eleven industries up to "Metal fabrication" in Tab. 1 are classified into "Material-based": the other six industries are "Assembly-based"
(d) Questions to ask current conditions in the industry, not in the firm
### Table 2. Research Findings of Kusunoki et al. [1995] (3)

#### Organizational Capabilities and Product Development Performance

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Productivity</th>
<th>Product Quality</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>$t$</td>
<td>$\beta$</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry Type</td>
<td>0.02</td>
<td>0.63</td>
<td>-0.04</td>
</tr>
<tr>
<td>Environment</td>
<td>0.04</td>
<td>0.98</td>
<td>0.08</td>
</tr>
<tr>
<td>Firm Size</td>
<td>-0.07</td>
<td>-1.88</td>
<td>-0.05</td>
</tr>
<tr>
<td><strong>Local Capabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technological Accumulation</td>
<td>0.05</td>
<td>1.21</td>
<td>0.08</td>
</tr>
<tr>
<td>Data Base</td>
<td>0.07</td>
<td>1.50</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Architectural Capabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-sufficiency</td>
<td>0.06</td>
<td>1.60</td>
<td>0.07</td>
</tr>
<tr>
<td>Authority of Development Dept.</td>
<td>0.09</td>
<td>2.41*</td>
<td>0.08</td>
</tr>
<tr>
<td>IWPM Structure</td>
<td>0.09</td>
<td>2.51*</td>
<td>0.01</td>
</tr>
<tr>
<td>Task Specialization</td>
<td>-0.01</td>
<td>-0.24</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Process Capabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>0.15</td>
<td>3.55***</td>
<td>0.21</td>
</tr>
<tr>
<td>Leader’s Involvement</td>
<td>0.04</td>
<td>1.12</td>
<td>0.17</td>
</tr>
<tr>
<td>Shared Experience</td>
<td>0.15</td>
<td>3.70***</td>
<td>0.07</td>
</tr>
<tr>
<td>Prototyping</td>
<td>0.14</td>
<td>3.55***</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Adjusted R-square</strong></td>
<td>0.28</td>
<td>0.33</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>18.06***</td>
<td>22.18***</td>
<td>28.59***</td>
</tr>
</tbody>
</table>

*p<0.001; **p<0.01; *p<0.05
Table 2. Research Findings of Kusunoki et al. [1995] (4)

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Correlation Matrix for Variables Used in the Regression Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>.14</td>
</tr>
<tr>
<td>2</td>
<td>.27</td>
</tr>
<tr>
<td>3</td>
<td>.35</td>
</tr>
<tr>
<td>4</td>
<td>.07</td>
</tr>
<tr>
<td>5</td>
<td>.06</td>
</tr>
<tr>
<td>6</td>
<td>.06</td>
</tr>
<tr>
<td>7</td>
<td>.04</td>
</tr>
<tr>
<td>8</td>
<td>.22</td>
</tr>
<tr>
<td>9</td>
<td>.29</td>
</tr>
<tr>
<td>10</td>
<td>.06</td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Three Levels of Development-Production Capabilities (Fujimoto, 1995a, p. 8)

<table>
<thead>
<tr>
<th>basic nature</th>
<th>influence on</th>
<th>components</th>
</tr>
</thead>
<tbody>
<tr>
<td>static capability</td>
<td>static &amp; routine</td>
<td>level of competitive performance</td>
</tr>
<tr>
<td>improvement capability</td>
<td>dynamic &amp; routine</td>
<td>change in competitive performance</td>
</tr>
<tr>
<td>evolutionary capability</td>
<td>dynamic &amp; non-routine</td>
<td>change in capability</td>
</tr>
</tbody>
</table>

- static capability: productivity = efficiency of information transmission, throughput time = efficiency of information reception, quality = accuracy of information transmission, flexibility = redundancy of information stock
- improvement capability: problem finding, problem solving, retention of solutions
- evolutionary capability: pre-trial capability: ex-ante rationality, entrepreneurial visions, post-trial capability: ex-post rationality, retention and institutionalization
<table>
<thead>
<tr>
<th>Base Theories</th>
<th>Existing TCM Researches</th>
<th>Literatures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Explained that complexity and uncertainty of decision</td>
<td>Cannot explain TCM</td>
</tr>
<tr>
<td></td>
<td>environment defined TCM system characteristics</td>
<td>contribution on performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard to define relevant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>variables to explain TCM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>systems (to many variables)</td>
</tr>
<tr>
<td>Dent (1987)</td>
<td>product planning and cost management meetings</td>
<td>- How information sharing is</td>
</tr>
<tr>
<td></td>
<td>Found decision environment defines the types of information</td>
<td>accomplished</td>
</tr>
<tr>
<td></td>
<td>shared by relevant personnel</td>
<td>- How information sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lead to value sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Whether information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sharing contributes to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>performance</td>
</tr>
<tr>
<td>Nonaka (1990, 1991)</td>
<td>Explained target cost information is a key variable for</td>
<td>Not empirically validated</td>
</tr>
<tr>
<td>Nonaka = Takeuchi (1995)</td>
<td>knowledge creation in TCM activities</td>
<td>Conflicting views for target</td>
</tr>
<tr>
<td></td>
<td>Described TCM activities also contribute to corporate-wide</td>
<td>tightness (TCM vs. Standard</td>
</tr>
<tr>
<td></td>
<td>knowledge creation in addition to that of cost reduction</td>
<td>cost accounting)</td>
</tr>
<tr>
<td></td>
<td>Provided insight for future TCM research</td>
<td>Same as interactive control</td>
</tr>
<tr>
<td></td>
<td>Strategy enhancement and formulation</td>
<td>approach</td>
</tr>
<tr>
<td></td>
<td>Organizational learning and innovation</td>
<td>Limited knowledge of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How information sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>is accomplished</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- How information sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lead to value sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Whether information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sharing contributes to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>performance</td>
</tr>
<tr>
<td>Literatures</td>
<td>Approach</td>
<td>Pros.</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Wernerfelt (1984), Rumelt (1984), etc.                                    | Resource Based Approach           | ○Focused on resources and capabilities of organization as key variables for sustainable competitiveness | ○Not empirically validated  
○Paid less attention to inter-relationships among OC variables  
○Static view (Limited knowledge of organizational process)                                                                  |                                                                                |
○What is "performance"?  
○Made OC buzzword                                                                                                             |                                                                                |
| 1 Clark=Fujimoto (1991), Fujimoto (1995b)                                | Integrating Problem Solving and Product Champion's Role | ○Empirically explained the relationship between product development power and performance  
○Excellent research methodology                                                                                 | ○Examined only automobile industry  
○Applicability of HWPM to other industries                                                                                                                                                 |                                                                                |
| 2 Nobeoka (1996)                                                         | Multi-Project Management          | ○Extended analysis on knowledge creation processes  
○Examined relationship among projects  
○Analyzed relationship among product strategy, organization structure, and performance                                                                                             | ○Examined only automobile industry  
○Limited perspective  
○Heavily depend on Toyota's current practice                                                                                                                                           | N/A                                                                         |
○Found a meaningful variable (knowledge retention)                                                                                                                                     | ○Examined only automobile industry                                                                                                                                                 |                                                                                |
| 4 Kusunoki et al. (1995)                                                  | Process Capability                | ○Intuitively appealing categorization of knowledge  
○Explained the strength of Japanese firms  
○Covered all industries                                                                                                           | ○Tricky operationalization of variables  
○Mentioned few about relationships among three categories of knowledge                                                                                                                |                                                                                |
| 5 Fujimoto (1995a)                                                       | Evolutionary Capability           | ○Focused on the strength of the specific firm (i.e, Toyota)  
○Extended discussion of path dependency                                                                                                                                                | ○Generalization of the findings                                                                                                                                                    |                                                                                |
Target costing is a market-driven system of cost reduction, focused on managing costs at the developmental and design stages of a product. Kaizen costing relies on setting cost reduction targets and attaining the targets through continuous improvement activities in the manufacturing phase. Activity Based Costing. One of the primary reasons that Japanese managers find target costing so attractive is its compatibility with the management strategies they use to deal with the shortening product life cycles in today’s market. They need to monitor the profit and cost performance in short intervals because they want to recover their investment in a short period of time. Management and Organization Theory offers a summary and analysis of the 40 most popular, researched, and applied management and organization theories. This important resource includes key instruments used to measure variables in each theory and examines pertinent questions about the theory: strengths and weaknesses, practical applications, and the seminal articles published on each theory. "This is a remarkable book. Jeffrey Miles clearly explains and synthesizes 40 major theories of management and organization in an easily accessible and engaging style. Well researched, comprehensive in Cost management activities are conducted throughout the project life cycle, from planning and budget allocation to controlling costs during project execution and assessing a project’s cost performance upon completion. Although cost management includes a whole ensemble of activities, it is sometimes referred to in terms of more specific functions, such as spend management, cost accounting, and cost transparency. Cost managers sometimes use these terms as loose synonyms for the broad cost management function. Cost Management: Four Major Steps. The Project Management Body of Knowledge (PMBOK), th