國立交通大學

資訊管理研究所

博　士　論　文

習慣領域、可變空間下的決策及創新動態學

Habitual Domains, Decision Making in Changeable Spaces, and Innovation Dynamics

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中華民國九十九年十一月

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博士論文

A Dissertation

Submitted to Institute of Information Management

College of Management

National Chiao Tung University

in Partial Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy in Information Management

November 2010

Hsinchu, Taiwan, the Republic of China

中華民國九十九年十一月

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摘　要

人類行為乃由動態且複雜的流程所組成。重要的決策行為係人類行為的一部份，因此亦與含有許多動態變化的參數。這些參數互相影響，且會隨著時間、情境，乃至於決策者的心理狀態變化而有所改變。根據習慣領域理論，決策行為雖因不同參數的變化而改變，卻會隨著時間的經過而達到穩定狀態，並且具有習慣性；這使得人們常不自覺地假設決策參數的維度或範圍是固定的。然而在現實生活中，決策參數的變化並非固定在某特定範圍，甚至可能不為人所注意。具備這種動態特性的決策，稱為可變空間下的決策。企業創新問題即屬於可變空間下的決策問題。

企業創新本身是一個動態過程，包含了能力集合的擴展轉化，提供產品及服務以解除特定族群的痛苦與煩惱，創造價值並進一步分配價值等環節；其中每個環節都涉及可變空間之決策制定。過去的創新研究中，尚缺乏整體性的架構以描述此一動態流程。

本研究以習慣領域理論與相關之能力集合分析為基礎，探討決策問題的動態本質，並提出「創新動態學」此一動態循環架構，探討企業如何深入潛在領域，有效獲取、轉化其能力集合，滿足顧客需求，並且創造價值。該架構著重於潛在領域裏參數的動態變化，強調企業的創新流程中各環節皆涉及可變空間下的決策問題。本研究針對五個企業個案進行探討，發現企業創新成功的關鍵因素皆與創新動態學相吻合。藉由檢視架構中各環節的相關活動與議題，企業可瞭解其在創新過程中是否適切地關照到各參數的變化，以便持續不斷地提升其產品或服務，解除目標族群潛在領域裏的痛苦與煩惱，進而創造最大的價值。因此，本研究所提出之觀念性架構，可做為企業組織，甚至個人，在創新及創造價值時之重要參考。

關鍵字：習慣領域，可變空間下之決策，能力集合分析，創新動態學

Habitual Domains, Decision Making in Changeable Spaces, and Innovation Dynamics

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ABSTRACT

Human behaviors involve dynamic, evolving, interactive, adaptive processes. Important decision making, as a part of human behaviors, is usually dynamic and involves changeable parameters. These parameters can interact with each other and vary with time, the situation, and changes in the psychological states of the decision makers involved. According to the habitual domains theory, decision making can reach a steady state and exhibit habitual patterns as time passes. As a consequence, people may unwittingly assume that the decision parameters have fixed known dimensions and ranges. However, in real life, the parameters might or might not be noticed. Even when they are noticed, their dimensions and ranges cannot be predetermined. Decision making with this kind of feature, is called "decision making in changeable spaces". Corporate innovation problems are of this type.

Innovation itself is a dynamic process, which includes transforming competence sets for innovation, producing products or services to release the pains and frustrations of target groups, and creating and distributing value. In the field of innovation studies, no framework has systematically described these processes in the past. This research is the first attempt to integrate these components into a single system.

Based on habitual domains theory and its related competence set analysis, this dissertation introduces the concepts of habitual domains and decision making in changeable spaces in order to describe the dynamics of human behaviors and the changing nature of decision-making problems. It goes in depth into potential domains to explore the expansion of competence sets and creation of value, and proposes an integrated framework, innovation dynamics, which emphasizes decision making in changeable spaces and focuses on the exploration of parameters in potential domains. To verify innovation dynamics, five corporate case studies are discussed herein. It shows that these cases are all consistent with innovation dynamics. By examining the operations of each link in innovation dynamics, corporations can understand if each and all links are properly developed, so that they can continually upgrade their products/services and create maximal value by releasing the pains and frustrations in potential domains of customers.

Keywords: Habitual Domain, Decision Making in Changeable Space, Competence Set Analysis, Innovation Dynamics

誌　　謝

「因為需要感謝的人太多了，就感謝天罷。無論什麼事，不是需要先人的遺愛與遺產，即是需要眾人的支持與合作，還要等候機會的到來。越是真正做過一點事，越是感覺自己的貢獻之渺小。」 -- 陳之藩，謝天。

本論文得以完成，我首要、也最要感謝的人是我的指導教授，游伯龍教授。他引領我進入習慣領域的學習殿堂，不只在學術研究上給我最多的指導，更鼓勵我突破自我，勇敢飛翔。他開拓我的視野，是我生命中的貴人。我會永遠記住並努力實踐他說的成功十六字箴言：「堅忍不拔，恆心毅力，刻苦耐勞，全力以赴。」

感謝我的學位論文口試委員：黎漢林教授、曾國雄教授、姜林杰祐教授、李永銘教授及林明宏教授。黎教授提供了極具創意的想法，讓我受益匪淺；曾教授提點我從事學術研究應關注的諸多事項，他的指導使論文結構更完備；姜林教授的建議使本論文分析更完整；李教授對於本論文未來研究方向的意見，讓我收獲良多；林教授的建議使本論文的論述更臻完善。謝謝他們的指導與啟發。

感謝習慣領域研究室一起奮鬥的夥伴：宗智、靜芳、鴻順、子玉，以及交大資管所前後期的同學：泊寰、瓊芬、亞梅、勇劭、易霖。這麼多年的研究生涯，謝謝有他們相互扶持，陪我一起朝著共同的目標前進。

感謝研究室的兩位助理，韻嵐及艾林。謝謝她們一路相挺，口試時期她們的細心協助更讓我感動莫名。如果不是她們的幫忙，我的口試無法如此順利進行。

感謝修平技術學院校方的支持與配合，允許我在博士生涯的最後一年留職停薪，專注於博士論文的撰寫。也特別感激資管系謝志明主任、盧志偉院長、曉芸、俐麗和所有同仁們的鼓勵。

特別感謝摯友們一路幫我加油打氣。在博士班修業這麼多年期間，是若珩和潛瑞的支持，才讓我有勇氣和信心走到今天；在「天這麼冷，風這麼大」的新竹，謂立、嘉輝、阿結、唯晴、嘉惠的鼓勵讓我備感溫暖。當我處在低潮時，這些好朋友常成為我抒發壓力的對象，如今終於畢業了，我願將這份快樂也與他們一同分享。

最後，我要感謝我的家人。謝謝我的父親陳振賢先生與母親賴幸慧女士，這麼多年來，在我於學業、家庭、工作三者之間疲於奔命時，他們兩位總是在第一時間解除我生活上的壓力、痛苦與煩惱，做我最堅強的後盾。我何其有幸能身為他們的女兒，也希望今天他們能以我為榮。謝謝我的先生甫文長久以來的包容與體諒，並始終如一地支持我；也謝謝可愛的兒子奕箴，在我無暇照顧他的情況下，還能努力長成一個品學兼優的兒童，沒讓我多操心。對於他們，我有無限的感恩，願將這份榮耀與他們共享。

陳彥曲　謹識於新竹交大
九十九年十一月


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Chapter 1. Introduction

Human behaviors involve dynamic, evolving, interactive, adaptive processes. Important decision making, as a part of human behaviors, is usually dynamic and involves changeable parameters. Decision blinds, decision traps, and fuzziness unavoidably occur in the process of dealing with challenging decision problems.

Although human behavior is dynamic, it gradually stabilizes. Therefore, people will have *habitual* concepts and ways of thinking, acting, judging, and responding (generally called ideas and operators). The collection of these ideas and operators together with their operation is called habitual domains (HDs) (Yu 1990, 2002, 2009). Because of different HDs, when making decisions, different people might have different frames to perceive problems and generate different solutions. As decision makers' *perception frames* are enlarged, they can see problems more clearly, and the fuzziness is reduced. In terms of HDs, as one's HD expands, one can see problems more clearly with reduced fuzziness.

Decision problems can be characterized by various dimensions of parameters, which involve a number of elements such as decision alternatives, decision criteria, decision outcomes, decision preferences, and decision information inputs. They also involve the following four environmental facets: decisions as a part of the behavior mechanism, stages of the decision process, the players involved, and unknowns in decision making. These parameters can interact with each other and vary with time, the situation, and changes in the psychological states of the decision makers involved. Although dynamic in nature, decision making, as a part of human behaviors, may reach a steady state and exhibit habitual patterns as time goes by. As a consequence, in mathematical programming or ordinary decision-making problems, we may unwittingly assume that the decision parameters (or variables) have fixed known dimensions and ranges. However, in real life, the parameters might or might not be noticed. Even when they are noticed, their dimensions and ranges cannot be predetermined. Decision making with these features is called "decision making in changeable spaces" (Yu & Chiang-Lin 2006; Yu & Chen 2010a, 2010b, 2010c). Many corporate management problems are of this type.

Corporation innovation itself, which involves setting corporate goals, evaluating states, understanding customers' needs, producing and providing products and services, and creating value for targeted customers and themselves, is of the type of challenging decision-making problems in changeable spaces. If corporate decision

makers are not aware of the existence and changing nature of the relevant parameters in decision making, they may fall into decision blinds and traps (Yu & Chiang-Lin 2006) and make serious mistakes.

According to Yu (1990, 2002), "superior strategists find the best strategies by changing the relevant parameters, while ordinary strategists find optimal solutions within some fixed parameters." In the corporate management field, "corporate competitiveness" has always been a hot topic. To be competitive, corporations must continually innovate to provide faster and more-effective products or services that satisfy the needs of customers than their competitors, and be capable of creating value and distributing value to all stakeholders. Clearly, innovation is a process which involves a number of decision parameters and decision making in changeable spaces. Understanding the behavioral dynamics and HDs of one's self and others can enable decision makers to study, search, and identify the best changes of the relevant parameters to become a superior strategist and avoid making mistakes in the process of corporate innovation. To illustrate this point, let us consider the following two cases (details of which are given in Chapter 6).

At the end of 2006, a 1.5-year-old video-sharing company, YouTube, was purchased by Google, the well-known search engine, at a price of US$1.65 billion. This high-profile event was the biggest merger case for Google at that time. It generated a great deal of discussion and attention.

The three YouTube founders originally intended to provide their product to eBay as a way to introduce auction products, in addition to pictures and text descriptions. The idea appeared to meet a demand, but never succeeded. They then extended their product to potential domains (PDs, one of the four sub-concepts of HDs described in Chapter 3) (Yu, 1990, 2002, 2009) of potential users, and found a large number of people with a strong desire to express themselves to online friends. Those desires in the PDs were not discovered until YouTube dropped their original idea and explored real needs in the PDs of potential customers.

From the initial garage venture to a website worth over US$1.6 billion, the growth and development of YouTube involved a process of continual integration and transformation of competence sets. In the process, they released people's potential pains and frustrations by providing effective products and services that others could or would not. By doing so, they enhanced their corporate competitiveness and used it to create value.

Take Wii (Nintendo) as another example. Nintendo began working in the game console industry in the 1970s, when there were not many design alternatives for game consoles. Players had to operate a gamepad with two hands, and they could only use their thumbs to control movement. That was until 2006, when Satoru Iwata, who had been the president of Nintendo for less than five years, led Nintendo to break with the three-decade old design. Wii, with the simple creativity of "operate with one hand", was born. The appearance of Wii created a new generation of games. It brought a new entertainment experience, and the innovative interface of the game control successfully reduced the time needed for new players to learn how to play a game. The remote control is equipped with sound effects, vibrates, and has orientation functionality. It allows players to simulate the behavior of real games and brings users an unprecedented gaming experience.

Nintendo had lost its leading position in the gaming industry before Wii entered the market, which had caused the company's market share to fall behind. Wii was Nintendo's innovative breakthrough. Its innovation was not only in "subverting traditional design", but more importantly, it satisfied the desire of people "wanting to experience realistic gaming" in PDs. In the past, the game console industry was always committed to pursuing exquisite graphics, and sound and light effects, attempting to satisfy the desires of player. However, luxurious graphics and sound and light effects are needs in the "actual domains" (ADs, one of the four sub-concepts of HDs described in Chapter 3) for gamers (desire for audio and visual aspects). Allowing body movements and feeling the speed, direction, and even power with the game are strong needs hidden in players' PDs. By satisfying the needs in the PDs, Wii recreated the interaction between gamers and games, which not only created value for Nintendo, but also allowed the company to regain its competitive advantage.

As illustrated in the two examples above, to innovate and enhance competitiveness, one must understand decision making in the changeable spaces of parameters. Innovation must be able to release the potential pains and frustrations of target customers, and satisfy their potential needs. In the past decades, there was abundant research regarding the definition, methods, tools, and value creation of innovation. However, those related studies on innovation seldom explored the key factor of successful innovation from the perspective of "satisfying or releasing potential needs, pains, and frustration". Innovation itself is a dynamic process which includes transforming a competence set for innovation, producing products or services to release the pains and frustrations of target groups, and creating and distributing values. In the field of innovation studies, there previously was no framework that

systematically described these processes. This research is the first attempt to integrate these components into a single system.

Based on HD theory and its related competence set analysis, this study examines PDs in depth to explore the expansion of competence sets and creation of value, and proposes an integrated framework, innovation dynamics. The major links of the framework, which can be interpreted both clockwise and counterclockwise, include: (i) the expansion and transformation of competence sets; (ii) the provision of products/services to release the pains and frustrations of target customers; (iii) creation and release of charge; (iv) creation of value; and (v) distribution and reinvestment of the created value. It describes the dynamics of how to solve a set of problems with existing or acquired competence (to relieve the pains and frustrations of targeted customers or decision makers in certain situations) so as to create value, and how to distribute this created value so that one can continuously expand and enrich the competence set to solve more challenging problems and create greater value.

Unlike usual innovation studies, innovation dynamics emphasizes decision making in changeable spaces and focuses on exploring parameters in PDs. If a corporation is aware of innovation dynamics, it can avoid stepping into decision traps. By examining the operations of each link in innovation dynamics, corporations can understand if each and all links are properly developed, so that they can continually upgrade their products/services and create maximal value by releasing the pains and frustrations of customers in the PDs, as illustrated in the two examples of YouTube and Nintendo. This framework also points out that each and all links must be properly examined and developed. Omitting any one of them can lead to serious mistakes.

This dissertation is organized as follows. Chapter 1 is the introduction. In Chapter 2, the important literature and related innovation studies are surveyed, from which we find that they lack a holistic and comprehensive model to assist corporations with focusing on customers' potential needs, releasing potential pains and frustrations, and further creating value. These involve the dynamics of human behavior and decision making in changeable spaces, which is described in Chapter 3. The stability of behavioral dynamics leads to the concept of the HD. The important elements of HDs are also sketched out. As an important application of HDs, the concept of competence set analysis is introduced in Chapter 4. Decision blinds and decision traps are closely related to the concepts of HDs and competence set analysis; this relationship is also explored.

In Chapter 5, the anatomy of innovation dynamics is described. Innovation dynamics consists of a number of key components. Graphically these components are linked together. Each link contains a sequence of activities. Based on the habitual domain theory and competence set analysis, the contents of each link in the framework are explored and discussed. Activities over each link of innovation dynamics usually involve decision-making problems in changeable spaces. To verify innovation dynamics, five corporate case studies are discussed in Chapter 6, including *Super Girl* (Section 6.1), Wretch (Section 6.2), YouTube (Section 6.3), Wii (Section 6.4), and 85 C Bakery Café (Section 6.5). It shows that these cases are all consistent with innovation dynamics. The executives of each corporation might not be aware of innovation dynamics, but unwittingly, they followed the pattern of innovation dynamics which resulted in the success of their business.

Finally in Chapter 7, the contributions and conclusions of this dissertation are provided. This dissertation introduces the concepts of HDs and decision making in changeable spaces by describing the dynamics of human behavior and the changing nature of decision-making problems. Understanding the dynamic features of related parameters in decision making can enable people to study, search, and identify the best changes in the relevant parameters so as to become superior strategists and decision makers. By looking in depth at PDs to acquire and master the needed competence sets, decision makers can reduce decision blinds, avoid decision traps, and obtain better solutions for decision problems in changeable spaces. In addition, innovation dynamics proposes an integrated model which has not previously been explored in the study of innovation. It provides a systematic framework for corporations to innovate and create value, and also can be applied by individuals to continually expand and enrich their HDs and maximize the value of their lives.


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Chapter 2. Literature Review

2.1. Dynamic decision making

Human history is full of literatures recording dynamic decision making events. However, putting dynamic decision making problems into mathematical analysis started in the 19th century by economists and applied mathematicians including Pareto, Edgeworth, Von Neumann, Morgenstern and many more.

Typically, the studies of dynamic decision making are based on the following three patterns of logic. The first is "simple ordering" which states that a good decision should be such that there is no other alternative that can be better in some aspects and not worse in every aspect of consideration. This concept leads to the famous Pareto optimality and nondominated solutions. The second one is based on human goal-setting and goal-seeking behavior, which leads to satisficing and compromise solution. The third pattern is based on value maximization, which leads to the study of value function (Yu 1985 and quoted therein). The three types of logic lead to an abundant literature of dynamic decision making or multiple criteria decision making (Dong *et al*. 2005; Dyer *et al*. 1992; Ehrgott 2006; Jaramillo *et al*. 2005; Junker 2004; Kou *et al*. 2005; Shi 2001; Wallenius *et al*. 2008; Yu 1985 and quoted therein). Most of them assume that the parameters involved in decision problems such as the set of alternatives, the set of criteria, the outcome of each choice, the preference structures of the decision makers, and the players are, more or less, fixed and steady. In reality, for most nontrivial decision problems, these parameters could change dynamically. In fact, great solutions are located only when those parameters are properly restructured. This observation prompts us to study decision making in changeable spaces (Yu & Chiang-Lin 2006; Yu & Chen 2010a, 2010b, 2010c).

Note that the term "dynamic" could have diverse meanings. From the viewpoint of social and management science sense, it carries the implication of "changeable, unpredictable"; however, from the hard science and technological sense, it may also mean "changing according to inner laws of a dynamic process", which might, but not necessarily, imply unpredictability. Much works in dynamic decision making were motivated by applying multiple criteria analysis to dynamic processes (in the second type of meaning), for example, see the concept of ideal point, nondominated decision, cone convexity and compromise solutions in dynamic problems of Yu and Leitmann (1974a, 1974b), and in technical control science of Salukvadze (1971a, 1971b). In this dissertation, the term "dynamic" is used to imply "changes with time and situation". The dimensions and structures of decision making could dynamically change with

time and situations, consistent with the changes of psychological states of the decision makers and new information.

2.2. Innovation concept

People have always engaged in innovative activities to improve their lives, and allow life to be richer and more interesting. Whether they are tangible products or intangible services, all great inventions or ideas are proof that people engage in innovation. In 1934, scholar Schumpeter proposed the interpretation of "innovation". It was his belief that innovation is related to economic development, and defined innovation as "the re-combination of productive resources" (Schumpeter, 1934). Since then, the study of "innovation" has prosperously developed. In recent years the concept of innovation has become more integrated, and is no longer just the result of a specific activity. We have organized the related literatures and found some of the descriptions in the library database, and listed them as follows. These scholars' descriptions of the innovation concept may not be the most complete, but can still be used for reference. Please see the cited literature for more details.

- Innovation is a "problem solving" process (Dosi, 1982).
- Innovation is an interactive process; it is related to the relationship between itself, the enterprise and different individuals (Kline and Rosenberg, 1986).
- Innovation is a diverse learning process. Learning uses different methods: learning while applying, learning while working, and leaning while sharing. It is also the result of absorbing and integrating internal and external knowledge (Cohen & Levinthal, 1990; Dogson, 1991).
- Innovation is an expressed or implied knowledge exchange process (Patel & Pavitt, 1994).
- Innovation is a learning and exchanging interaction process between the "innovation system" or "innovation group" creator and an individual (Edquist, 1997).
- Effective business innovation refers to "the process of an individual responding to the environment with his/her innovative capacity due to environmental changes. This process may go through technical and production procedure improvement, and new product design and development to allow the product, process, or procedure to become different or better" (McAdam, 2000) .
- Innovation is used to improve a product, service or technology. The enterprise will have the competitive advantage and continue to survive and grow through the innovation of products, processes and services (Tidd *et al.*,

2005).

- Innovation is the process that introduces a new product or service to the market. The involved scope includes marketing, quality management, production management, technology management, organization behavior, product development and strategy management (Hauser *et al*., 2006).

A few scholars have also proposed different points of view in regards to the overall innovation idea. The representative works are listed as follows.

- Peter Ferdinand Drucker proposed the concept of "Knowledge Worker" in "*The Age of Discontinuity. Guidelines to our Changing Society*" (Drucker, 1969). Since then, knowledge has become a major force in the economic system; it is treated as a valuable resource, which can be accumulated, transformed and inherited. Enterprises need to compete for the best creativity and application of knowledge. Professional knowledge and skill, in addition to being accumulated, can also be specifically presented in the daily organization operation procedure and in software and hardware. The proposal of this book has allowed many of the innovation related studies to be related to the creation, accumulation and inheritance of knowledge.
- Leonard-Barton proposed an overall framework of innovation studies in her book, "*Wellsprings of Knowledge*" (Leonard-Barton, 1995). It describes enterprises building and sustaining innovation sources. Leonard thinks that only core or strategic capabilities will provide the company with the competitive advantage. In the innovation framework proposed by Leonard, the core capacity of an enterprise is based on the creation and accumulation of knowledge. Enterprises can strengthen their core capacity through problem solving, implementing and integrating new tools or new methods, experiment and prototype design, and introducing/absorbing external new knowledge, etc. methods. Knowledge is definitely one of the major forces of innovation. However, the innovation and value creation of enterprises is not only limited to the management and creation of knowledge. The creation and accumulation of knowledge can enrich the enterprise core capacity, improve enterprise quality, and assist enterprises to setup a good foundation in the innovation and value creation process. Leonard's framework completely explores the creative activity and method of knowledge, and the development of core capacity, but has disregarded how to see potential domains (potential knowledge, needs and competences). As for value creation, Leonard neglected to perform in-depth exploration on "how to further develop the value of knowledge and competence". In fact,

potential domains must be explored further to "integrate knowledge and competence, and develop value", and satisfy people's potential needs.

- Christensen proposed the concept of "Disruptive Innovation" in his book, "*The Innovator's Dilemma*" (Christensen, 1997). It pointed out that the traditional enterprise operating rule is to "use all funds and technology to concentrate on the development of products that are greatly needed by existing major customers to obtain the greatest amount of profit", however this kind of sustaining innovation is often less competitive than other "disruptive innovation" strategies applied by some new market entrants. It uses cheap and poor functioning (but adequate) products to obtain low-end customers of major manufacturers, and once the technology is improved, and the product function is gradually enhanced, they will be able to enter the high-end market with their low price advantage, and replace the old product. This kind of innovation strategy has allowed enterprises with the entrepreneurial spirit to master the industry growth trend and rise. "Disruptive innovation" stresses on looking for opportunities from non-mainstream customers. This kind of concept happens to coincide with the concept of "finding customers from potential domains, and satisfying the needs in potential domains" in habitual domains.
- Shapiro organized 7-R steps focusing on the organization innovation in his book, "*24/7 Innovation: A Blueprint for Surviving and Thriving in an Age of Change*" (Shapiro, 2001). It established an innovative framework of Rethink, Reconfigure, Re-sequence, Relocate, Reduce, Reassign and Retool, however the framework only proposed recommendations focusing on the improvement of enterprises (supply), and seldom mentioned the consumers (demand).
- Stan Lai (賴聲川) interpreted creativity and innovation with the perspective of an artist in his book, "*Stan Lai's Creative Learning*" (賴聲川的創意學) (賴聲川, 2001). Lai proposed the concept of a "creative pyramid" to interpret the process of innovation. He divided creative learning into "creation" and "learning", and used "wisdom" and "method" to respectively represent these two co-existing fields. Creation includes content, inspiration, and knowledge; learning includes forms, tools, and techniques. Lai explores innovation with the nature of philosophy; many of his perspectives are similar to the concept of habitual domains, such as the innovation dynamics framework proposed by the study used the habitual domains as a basis to emphasize that the process and result of innovation must be able to satisfy human nature. This perspective is very consistent with the perspective of

"starts from your heart", stressed in his book.

2.3. New direction for innovation study

In the field of innovation study, due to the fact that expertise and experiences of each scholar are with different habitual domains, the innovation studies proposed also have different habitual domains, and various dimensions and styles. However, whether in the exploration of the innovation framework, method or practical experience, the innovation studies in the academic field are mostly limited to specific area discussion (such as innovation thinking, innovation product design or innovation procedure, etc.). These discussions often focus on the innovation management method analysis of the corporation itself, or propose the innovation solution and strategy focusing on the organizational specific problem. They can propose a solution for the corporation while facing difficulties or problems, but they lack a holistic and comprehensive systematic model to assist corporations to focus on the customer's/user's potential needs, release the potential pain and frustration, and further create values. In other words, the current innovation studies indeed explore or resolve the issue observed from the actual domains of a corporation or customers, however, there is not any related in-depth exploration of the problems, charges, pains and frustrations in potential domains.

To provide a comprehensive framework to compensate the incompleteness of the existing innovation studies, this study will explore corporate competence sets transformation and innovation and value creation process from the perspective of the "habitual domains theory" and "competence sets analysis". By getting into the in-depth potential domains, an integrated framework, Innovation Dynamics, is proposed. This is a brand new research direction; there is no systematic analysis for this area in the past. This framework, in addition to providing entrepreneurs a specific operating idea and method, will assist them to continuously create value and sustainably operate in the fierce competitive environment. It can also be applied to individuals to create value, and release others' pain and frustration through personal competences (including the relationship resource and the skills of having a good relationship, etc. in potential domains), and further create one's own value. This kind of research direction will create a new vision and situation for the corporate innovation research field.


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Chapter 3. Habitual Domain and Decision Makings in Changeable Spaces

To illustrate the impact of habitual domain on decision making, let us consider Figure 1 as an example.

Example 1: What is it inside the frame?

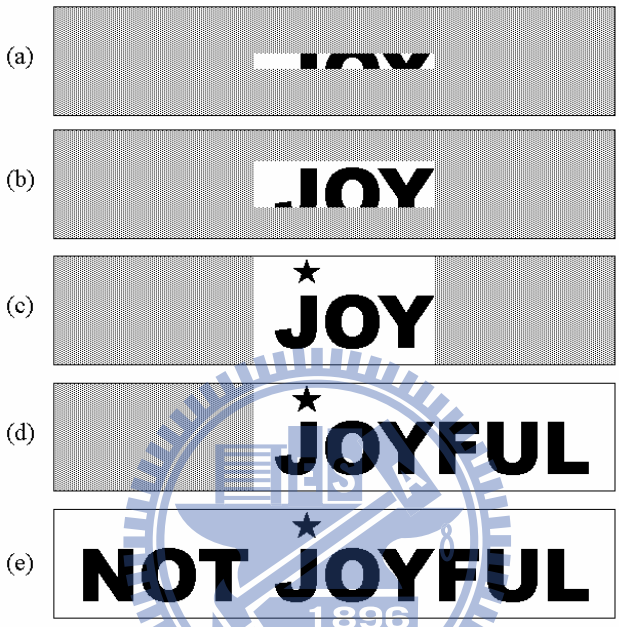

Figure 1: JOYFUL

Assume the frames of perception are represented by the "lighted" (white) area as illustrated in Figure 1(a) to 1(e). In Figure 1(a), we can see something fuzzy, but do not understand what is in the frame, the lighted area; but when our frame is expanded, as in Figure 1(b), we might be able to guess it is "JOY". Progressively, as the lighted area gets larger, we see "JOY" with an asterisk in Figure 1(c), "JOYFUL" in Figure 1(d), and then "NOT JOYFUL" as in Figure 1(e).

3.1. Definition and Elements of Habitual Domains

Example 1 illustrates that one's judgment is greatly affected by his/her perception frames, the size and shape of the lighted areas of Figure 1. The perception frames are largely determined by the parameters of our human behavioral systems. Being able to understand and utilize these parameters is therefore a vital step to making decisions efficiently and effectively in changeable spaces.

Habitual domains was first suggested in 1977 (Yu 1977) and further developed (Chan and Yu 1985; Yu 1980, 1981, 1985, 1990, 1991, 1995, 2002 and quotes therein) by Yu and his associates. It states that over a period of time, the set of ideas and concepts which we encode and store in our brain can gradually stabilize in certain domain, know as **Habitual Domains (HDs)**; unless there is an occurrence of extraordinary events, our thinking processes will reach some steady state or may even become fixed. This phenomenon can be proved mathematically (Chan and Yu 1985; Yu 1985).

Being aware of the habitual ways of our decision making is important for us to clarify fuzziness, make better decisions and avoid costly mistakes. To better understand the concept of HDs, let us briefly introduce the elements of HD, which are important parameters in the human behavioral systems.

Habitual domains at time t, HD_t, include the following four sub-concepts:

(i) *Potential domain*, designated by PD_t, is the collection of all ideas and operators which can be potentially activated with respect to specific events or problems by one person or by one organization at time t. In general, the larger the PD_t, the more likely that a larger set of ideas and operators will be activated, holding all other things equal.

(ii) *Actual domain*, designated by AD_t, is the collection of ideas and operators which are actually activated in our minds at time t. Note that not all the ideas and operators in the potential domain can be actually activated. Also note that the AD_t is a subset of the PD_t, that is $AD_t \subset PD_t$.

(iii) *Activation probability*, designated by AP_t, is defined for each subset of PD_t and is the probability that a subset of PD_t is actually activated or is in AD_t. For example, people who emphasize profit may be more likely to activate the idea of money, while people who study mathematics may be more likely to generate equations.

(iv) *Reachable domain*, designated by RD_t, is the collection of ideas and operators which can be generated from a given set in an AD_t. In general, the larger the idea set and/or operator set in AD_t, the larger the RD_t.

At any point in time, without specification, HD_t is the collection of the above four subsets. That is,

$$HD_t = \{PD_t, AD_t, AP_t, RD_t\}$$

When there is no confusion, the subscript "t" may be dropped as to simplify the

presentation. Recall that it is humans that make decisions. Understanding human behavioral systems plays a vital role in making good decisions. The complex processes of human behaviors have a common denominator resulting from a common behavior mechanism. The mechanism depicts the dynamics of human behavior. Based on the literature of psychology, neural physiology, dynamic optimization theory, and system science, Yu (1980, 1981, 1985, 1990, 2002) described a dynamic human behavior mechanism as presented in Figure 2 which is briefly explained below:

(i) **Box (1)** is our brain and its extended nervous system. Its functions may be described by the four hypotheses (**H1-H4**) in Table 1.

(ii) **Boxes (2)-(3)** represent two basic functions of our mind, explained by **H5** in Table 2.

(iii) **Boxes (4)-(6)** represent how we allocate our attention to various events, described by **H6** in Table 2.

(iv) **Boxes (8)-(9), (10)** and **(14)** represent a *least resistance principle* which humans use to release their charges, described by **H7** in Table 2.

(v) **Boxes (7), (12)-(13)** and **(11)** represent the information input into our information processing center (**Box (1)**). **Boxes (11) and (14)** represent internal information inputs. **Boxes (7), (12)-(13)** represent external information inputs, which are explained in **H8** in Table 2.

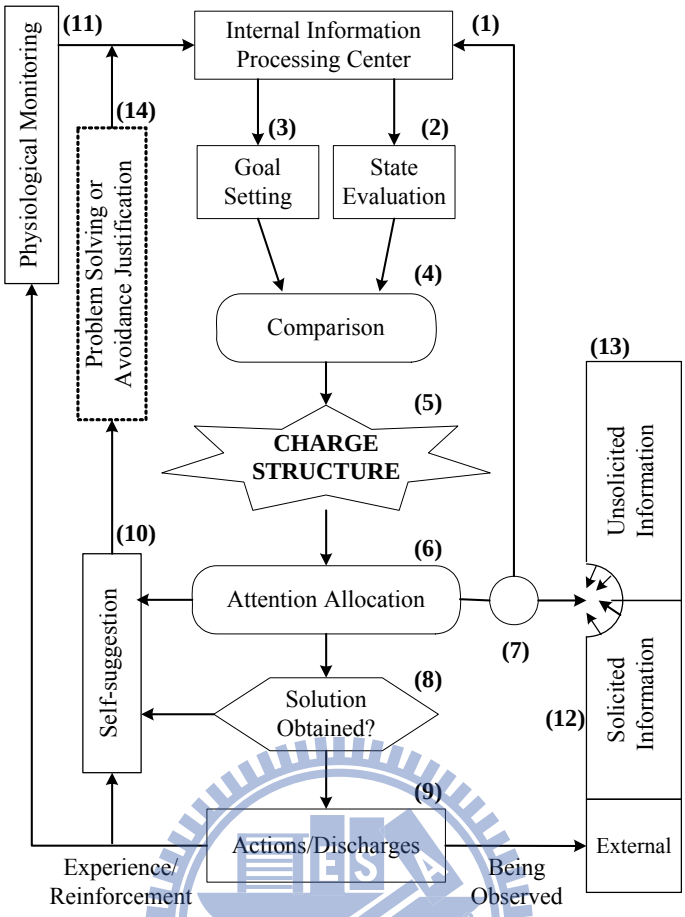

Figure 2: The Behavior Mechanism

Table 1: Four Hypotheses of Brain Operation

	Hypotheses	Descriptions
H1	Circuit Pattern Hypothesis	*Thoughts, concepts or ideas are represented by circuit patterns of the brain. The circuit patterns will be reinforced when the corresponding thoughts or ideas are repeated. Furthermore, the stronger the circuit patterns, the more easily the corresponding thoughts or ideas are retrieved in our thinking and decision making processes.*
H2	Unlimited Capacity Hypothesis	*Practically every normal brain has the capacity to encode and store all thoughts, concepts and messages that one intends to.*
H3	Efficient Restructuring Hypothesis	*The encoded thoughts, concepts and messages (H1) are organized and stored systematically as data bases for efficient retrieving. Furthermore, according to the dictation of attention they are continuously restructured so that relevant ones can be efficiently retrieved to release charges.*
H4	Analogy/Association Hypothesis	*The perception of new events, subjects, or ideas can be learned primarily by analogy and/or association with what is already known. When faced with a new event, subject, or idea, the brain first investigates its features and attributes in order to establish a relationship with what is already known by analogy and/or association. Once the right relationship has been established, the whole of the past knowledge (preexisting memory structure) is automatically brought to bear on the interpretation and understanding of the new event, subject or idea.*

Table 2: Four Hypotheses of Mind Operation

Hypotheses		Descriptions
H5	Goal Setting and State Evaluation Hypothesis	*Each one of us has a set of goal functions and for each goal function we have an ideal state or equilibrium point to reach and maintain (goal setting). We continuously monitor, consciously or subconsciously, where we are relative to the ideal state or equilibrium point (state evaluation).*
H6	Charge Structure and Attention Allocation Hypothesis	*Each event is related to a set of goal functions. When there is an unfavorable deviation of the perceived value from the ideal, each goal function will produce various levels of charge. The totality of the charges by all goal functions is called the* ***charge structure*** *and it can change dynamically. At any point in time, our attention will be paid to the event which has the most influence on our charge structure.*
H7	Discharge Hypothesis	*To release charges, we tend to select the action which yields the lowest remaining charge (the remaining charge is the resistance to the total discharge) and this is called the least resistance principle.*
H8	Information Inputs Hypothesis	*Humans have innate needs to gather external information. Unless attention is paid, external information inputs may not be processed.*

Note that there are four hypotheses (H1-H4 of Table 1) describing the information processing functions of the brain and four hypotheses (H5-H8 of Table 2) describing the general framework of our mind.

From the behavior mechanism of Figure 2 and the eight hypotheses, we notice that human's behavioral system involves the following parameters: *goal setting*, *state evaluation*, *charge structure*, *attention allocation*, *information inputs*, *physiological monitoring*, *memory*, etc. Each parameter also involves complex subsystems. For instance, goal setting involves the following subparameters: *survival and security*, *perpetuation of the species*, *feelings of self-importance*, *social approval*, *sensuous gratification*, *cognitive consistency and curiosity*, *self-actualization*, etc. As people change any or some of these parameters, his or her perception will change. Awareness of the existence and changes of the relevant parameters play an important role in understanding human behavior and making good decisions. For more details, see Yu (1990, 2002, 2009) and Yu & Chiang (1999).

3.2. Decision Makings in Changeable Spaces

Mathematically, decision makings in changeable spaces can be described as follows:

Assume that changeable decision parameters involve the following decision

elements (extension to include other parameters can be done similarly):

(i) the alternative set at time t, denoted by X_t;

(ii) the criteria at time t, denoted by F_t;

(iii) the outcome measured in terms of the criteria at time t, denoted by $\mathcal{F}_t$;

(iv) the preference of decision maker at time t, denoted by D_t; and

(v) the information inputs at time t, denoted by I_t.

Each decision element is a set which can vary with time, situation, and the decision maker's perception to the decision problems. The alternative set at time $t+\Delta t$ can be denoted by

$$X_{t+\Delta t} = G(X_t, F_t, \mathcal{F}_t, D_t, I_t, HD_t) \qquad (1)$$

where HD_t consists of actual domains (AD_t), reachable domains (RD_t), potential domains (PD_t) and activation probability (AP_t). As in (1), $X_{t+\Delta t}$ not only depends on X_t, but also on the other decision elements, F_t, $\mathcal{F}_t$, D_t, I_t as well as HD_t.

Note that X_t and $X_{t+\Delta t}$ can be set functions, and the difference between X_t and $X_{t+\Delta t}$ would describe the changes due to time and situation. Also note that X_t and $X_{t+\Delta t}$ can have different dimensionality.

Similarly, we can write the dynamic change of other parameters as follows:

$$F_{t+\Delta t} = H(X_t, F_t, \mathcal{F}_t, D_t, I_t, HD_t) \qquad (2)$$

$$\mathcal{F}_{t+\Delta t} = J(X_t, F_t, \mathcal{F}_t, D_t, I_t, HD_t) \qquad (3)$$

$$D_{t+\Delta t} = K(X_t, F_t, \mathcal{F}_t, D_t, I_t, HD_t) \qquad (4)$$

$$I_{t+\Delta t} = L(X_t, F_t, \mathcal{F}_t, D_t, I_t, HD_t) \qquad (5)$$

Note, (1) – (5) describe the fact that the decision elements (or parameters) not only vary with time, but also mutually interact with each other through time. For further discussion see Ch 7-8 of Yu (1990, 2002).

3.3. Habitual domains and corporate innovation

Regarding to a product or service provided by a corporation, the value it created

can be described in one sentence:

"Whose pain and frustration are released by the product or service in a specific circumstance?"

In other words, we must explore from the following two directions when estimating values:

(i) ***Targets***: who are the customers? Whom will the products or services be served to, currently and potentially?

(ii) ***Functions***: what kind of pains and frustrations, both in actual and potential domains, can the products and/or services help release?

Whether they are targets or functions, they both have their actual domains, reachable domains and potential domains. Take the aforementioned YouTube case as an example (see Chapter 1 and Section 6.3 for details). In view of the target group dimension, at the beginning, the target objects to be served by YouTube were eBay sellers, which is the customers that the corporation can see (and want to serve) in the actual domains at that time. After it failed, it expanded the target customers to "all internet users", who in fact existed in the potential domains.

Looking from the functional perspective, the problem that a product or service can solve will also have actual domains, reachable domains and potential domains. Most corporations are devoted to solving the urgent problems, which are initiated from the actual domains, such as that YouTube is created to provide a useful platform to solve the difficulty of video sharing. However, we need to discover and effectively release the charge in the potential domains to truly create value, and bring happiness and satisfaction to customers.

The potential domains not only exist in people (target customers), but also exist in affairs (problem sets or competence sets). Therefore, in addition to thinking about who the ***potential customers*** are, a corporation should also try to figure out what the target customers' ***potential pain and frustration*** are. Besides, the ***resource or competences in the potential domains*** shall be deeply searched and properly applied so as to enrich and empower one's competence sets (see Chapter 4 for further discussion).


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Chapter 4. Competence Set Analysis

4.1. The concept of competence sets

The study on *Competence Set Analysis* began with Yu (1989), as a derivative of HD theory. Its mathematic foundation was built by Yu & Zhang (1989, 1990, 1993). The *competence set* (CS) for a given decision problem is defined as a collection of ideas, knowledge, skills, resources and efforts for its effective solution. Such a set, like HD, implicitly contains potential domain, actual domain, reachable domain, and activation probability as discussed in Chapter 3. *Anything or anyone, including a product or service that can release the pain, frustration and charge, has competence. Everyone, and every corporation, has its competence sets.*

One will set up the goal and evaluate what competence sets (including people, techniques and resource) are needed, and whether the existing competence sets can assist him/her to effectively solve the problem when a spontaneous or triggered creativity causes an event input in the competence sets transformation process (Yu & Lai, 2004). If the existing competence sets are inadequate to solve the problem effectively, one will start thinking about what competence sets are necessary, but not yet obtained, and how these competence sets should be effectively obtained. The competence sets transformation process of a corporation or producer is also the same.

To analyze the competence sets of individuals or corporations, we can decompose the CS as follow:

$$CS_t = (CS_t^1, CS_t^2, CS_t^3, ..., CS_t^n) \tag{6}$$

where CS_t^k denotes the kth item of the CS at time t. Note that CS will be dynamically changed as time (t) goes by.

4.2. Decision blinds and decision traps

Because of HDs and being unaware of the decision parameters and their changing nature, people would easily have decision blinds or even get into decision traps. Recall in Example 1, we might not be able to know or misunderstand the complete word or situation because we are trapped by our perception frame (the lighted area). The dotted area outside the frame is our blind.

At time t, let us denote the *truly needed* CS for solving problem E successfully by $CS_t(E)$, and its perception by decision makers, by $CS_t^*(E)$. Then $CS_t(E) \backslash CS_t^*(E)$ would be the *decision blinds*, the set of all the competences required but not seen by the decision makers at time t. See the illustration of Figure 3. Note that the larger the decision blind is, the more likely decision makers might make dangerous mistakes. Refer to Example 1. Suppose that the perception frame of Figure 1(e) is $CS_t(E)$. Then the shaded areas of Figure 1(a) to 1(d) are the decision blinds. Note that as the blinds are progressively reduced, the picture becomes progressively clearer, and eventually the fuzziness disappears.

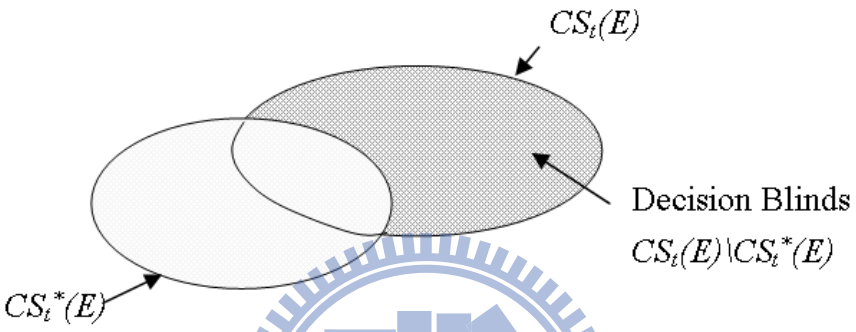

Figure 3: Decision blinds

Usually, $CS_t(E)$ and $CS_t^*(E)$ can be changed with time. Suppose that $CS_t^*(E)$ is fixed or trapped in a certain domain and $CS_t(E) \backslash CS_t^*(E)$ is large, then we tend to make mistake in decision and we are in a decision trap. Decision trap (i.e. $CS_t^*(E)$ is fixed, independent of t) can lead to dangerous mistake, especially when $CS_t(E)$ changes rapidly with time and $CS_t(E) \backslash CS_t^*(E)$ becomes very large.

Note that $CS_t^*(E)$ being fixed or trapped in a certain domain is equivalent to the corresponding actual domain (AD_t) and reachable domain (RD_t) being fixed or trapped in a certain domain. This can occur when we are in a very highly charged state of mind or when we are over confident, which makes us respond quickly, and unwittingly and habitually commit the behavior of decision traps. Recall in Chapter 1, suppose that YouTube was in highly charged state of serious financial difficulty, it might fall into a decision trap, and sell the services to less interested customers with much less value created.

By changing our actual domains (ADs), we can change and expand our reachable domains (RDs). We can reduce decision blinds and/or avoid decision traps by systematically changing the ADs. For illustration, assume that $CS(E)$ and RDs are given, as depicted in Figure 4. Then as we move the AD from A to B, then to C, our

decision blind reduces progressively from *CS(E)\RD(A)* to *CS(E)\(RD(A)∪RD(B))* then *CS(E)\(RD(A)∪RD(B)∪RD(C))*.

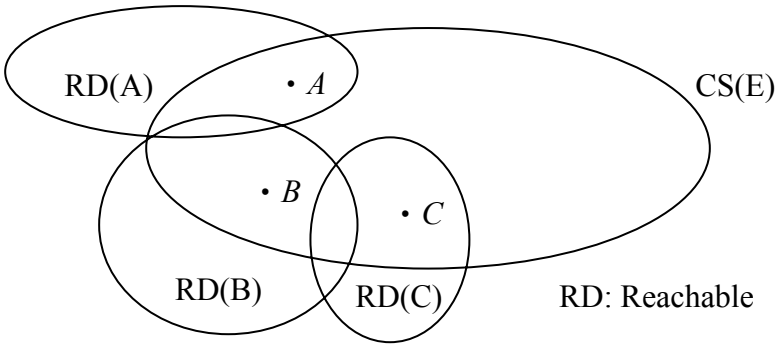

Figure 4: Decision blind reduces as we move our AD from A to B then to C

For challenging decision problem, we can treat the decision parameters as different points for ADs. Systematically moving over the parameters and pondering their possible RDs can expand our RDs for dealing with the challenging problems. As a consequence, $CS^*(E)$ is expanded and our decision blinds, $CS(E)\backslash CS^*(E)$, reduced. In additions, the HD tools (Yu 1990, 1995, 2002, 2009) can work with the individual decision parameters as to reduce the decision blinds and avoid decision traps. They can expand and enrich our actual domains and reachable domains and look into the depth of the potential domains, they can also expand and enrich our perception on the decision problem and its related parameters.

4.3. Acquirement, expansion and transformation of competence sets

When confronting a decision problem, a corporation needs to evaluate its current competence sets to see if they are adequate for solving the problem. If the current competence sets are inadequate, then competence sets transformation or expansion must be processed. Competence sets transformation can be shown in the following equations:

$$CS_{t+1} = \mathrm{T}_t(CS_t, E_t) \tag{7}$$

where E_t denotes the events, decision problems, or environment that the corporation or individual is confronted. It may be a challenge or information that a corporation faces, or a motivation that promotes a corporation to change. After transforming by the function T_t, the original competence set CS_t is expanded into a new one, CS_{t+1}.

By adding new functions or capabilities on the original products or services, corporations can expand their old competence sets into new ones. For simplicity, let us drop the notation of time (t). Suppose CS^k denotes the original competence sets of products/services provided by corporations, and CS^{k*} denotes the competence sets after transformation and expansion. The transformation of competence sets can be presented as follow:

$$\begin{aligned} CS^{k*} &= CS^k \oplus \Delta^k \\ &= \mathrm{T}^k(CS^1, CS^2, ...CS^n; E) \end{aligned} \tag{8}$$

where Δ^k denotes new functions or capabilities. It could be some single item/ function, or some comprehensive competence set. After transforming by the function T^k, the original competence set CS^k is expanded into a new one, CS^{k*}.

For instance, a traditional grocery store added information technology, operation management capability, and modern equipment to its own competence sets, and transformed into a convenience store, which can serve more customers and release more people's pain and charge. Also, Google originally specialized in information searching technology, but after it merged with YouTube and DoubleClick, its competence sets further expanded, and become a complex web portal with more equipped functions.

For a corporation, when the goal is set, the next step is to process competence sets transformation, and allow equation (8) to be possible. Competence sets expansion and transformation can be processed in the following two methods:

(i) Internal adjustment or development: Improve or transform the original competence sets to achieve the goal or solve problems by adjusting corporation resource, time or management procedure or method.

(ii) Integrate with external competences: Expand or transform the original competence sets to assist the corporation to solve problems through borrowing, proper application or sharing external resource or competence sets. As an example, China Mengniu Dairy Company Limited (蒙牛乳業) cooperated with television media, telecommunication operators, and network operators to improve the sales performance of its dairy products through the spread of "Super Girl" and the power of the audience, which successfully achieved its goal of improving the sales performance (see Section 6.1 for details). In addition, through outsourcing, strategic alliance or merging, the competence sets can be also expanded by obtaining external ones.

Equations (6), (7), and (8) described the decomposition, transformation and expansion concept of competence sets. To allow the study to focus on the corporate cases, we will not explore the mathematical model and proof of competence sets analysis in detail here.

4.4. Research Issues of Competence Set Analysis

Competence set analysis has two inherent domains: competence domain and problem domain. Like HD, each domain has its actual domain and potential domain, as depicted in Figure 5.

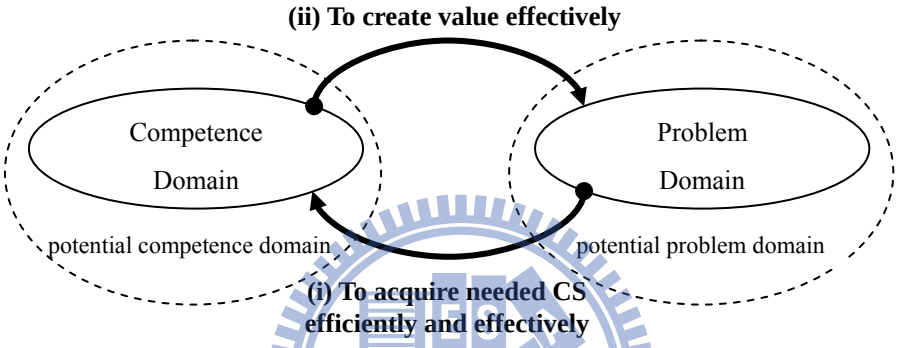

Figure 5: Two Domains of Competence Set Analysis

From these two domains, there are two main research directions:

(i) *Given a problem or set of problems, what is the needed competence set? and how to acquire it?*

For example, how to produce and deliver a quality product or service to satisfy customers' needs is a main problem of supply chain management. To successfully solve this problem, each participant in a supply chain including suppliers, manufacturers, distributors, and retailers must provide the chain with its own set of competence, so that the collected set of competence can effectively achieve the goal of satisfying customers' needs.

How to expand the existent competence set to the needed competence set in most effective and efficient way? A mathematical foundation for such competence analysis is provided by Yu & Zhang (1990). Under some suitable assumptions, the problem can be formulated and solved by decision tree, graph theory, spanning trees, spanning tables and mathematical programming (Feng & Yu 1998; Huang *et al.* 2004; Li&Yu

1994; Li *et al.* 2000; Lin 2006; Shi & Yu 1996; Yu & Zhang 1989). Most earlier researches have focused only on the deterministic situation. However, one could remove this assumption to include uncertainty, fuzziness, and unknowns. In the recent studies, some heuristic methods, such as genetic algorithm (GA), hybrid genetic algorithm (hGA), multicriteria genetic algorithm, multi-objective evolutionary algorithm (MOEA), data mining technology, and forest learning technique have also been incorporated into the analysis of competence set expansion (Chen 2002; Hu *et al*. 2003; Huang *et al*. 2004; Lin 2006; Opricovic&Tzeng 2003, 2009).

(ii) *Given a competence set, how to locate a set of problems to solve as to maximize the value of the competence?*

Given a competence set, what is the best set of problems that can be solved by the competence set as to maximize its value? If someone has already acquired a particular competence set, what are the problems he/she should focus to solve as to maximize its value? For instance, if we get a doctoral degree from certain university, which symbolize we have a certain set of competence, how do we maximize the value of this degree? Think of the opportunities in actual domains and potential domains. There are lots of studies of competence sets analysis working in this direction. For example, Chen (2001) established several indices that have impact on consumers decision making and provided a framework for helping firms in expanding the benefits of their products to fully address the consumer's needs. Hu *et al.* (2002, 2004) generate learning sequences for decision makers through competence sets expansion to help them make better decisions. Chang & Chen (2009) develop an analytical model of competence sets to assist drivers in routing decisions. Chiang-Lin *et al.* (2007) studied the change of value when competence set are changed in linear patterns so that the corporations can create value by taking loss at the ordering time and making profit at the delivery time.

Competence sets expansion and transformation play a vital role in the corporation innovation process. The follow-up cases explored in the study all have a close relationship with the aforementioned two directions. We will inspect how each corporation case obtained its required competence sets to solve problems, and will also analyze how these corporations utilize their competence sets and create values.

Chapter 5. Innovation Dynamics

According to the HD theory and CS analysis, all humans and things can release pains and frustrations for certain group of people at certain situations and time. Thus, all humans and things carry the competence (in broad sense, including skills, resources, functionalities, even attitudes). If we regard all humans and things as a set of different CSs, then producing new products or services can be regarded as a transformation of the existent CS to a new form of CS. Based on this, we could depict a comprehensive and integrated framework, called the ***Innovation Dynamics*** (see Figure 6), to help people understand corporate innovation and creation of maximal values for the targeted customers and themselves.

The dynamics can be interpreted clock-wise, according to the indices of Figure 6, as follows:

(i) According to HD Theory, when there exists unfavorable discrepancies between the current states and the ideal goals of individuals or organizations (for instance, the corporations are losing money instead of making money, or they are technologically behind, instead of ahead of the competitors), it will create charges which can prompt the individuals or corporations to work harder to reach their ideal goals;

(ii) The transformation of CSs will be presented in visible or invisible ways, which results in a new set of the products or services produced by the corporations;

(iii) The products or services produced by corporations must carry the capability to relieve / release the pain and frustration of targeted customers. Note that there are actual domains, reachable domains, and potential domains for the targeted customers, and for their pains, frustrations, and problems;

(iv) Besides discharge, corporations or organizations can create charges to the targeted customers by means of marketing, advertisement or promotion, and vice versa;

(v) The targeted customers will experience the change of charges. When their pains and frustrations are relieved, the customers become happy. By their buying the products or services, the products and services create their value;

(vi) The value will be distributed to the participants such as employees, stakeholders, suppliers, society, etc. In addition, to gain the competitive edge, products and services have to be continuously upgraded and improved. The reinvestment therefore is needed in order to develop and produce new products and services.

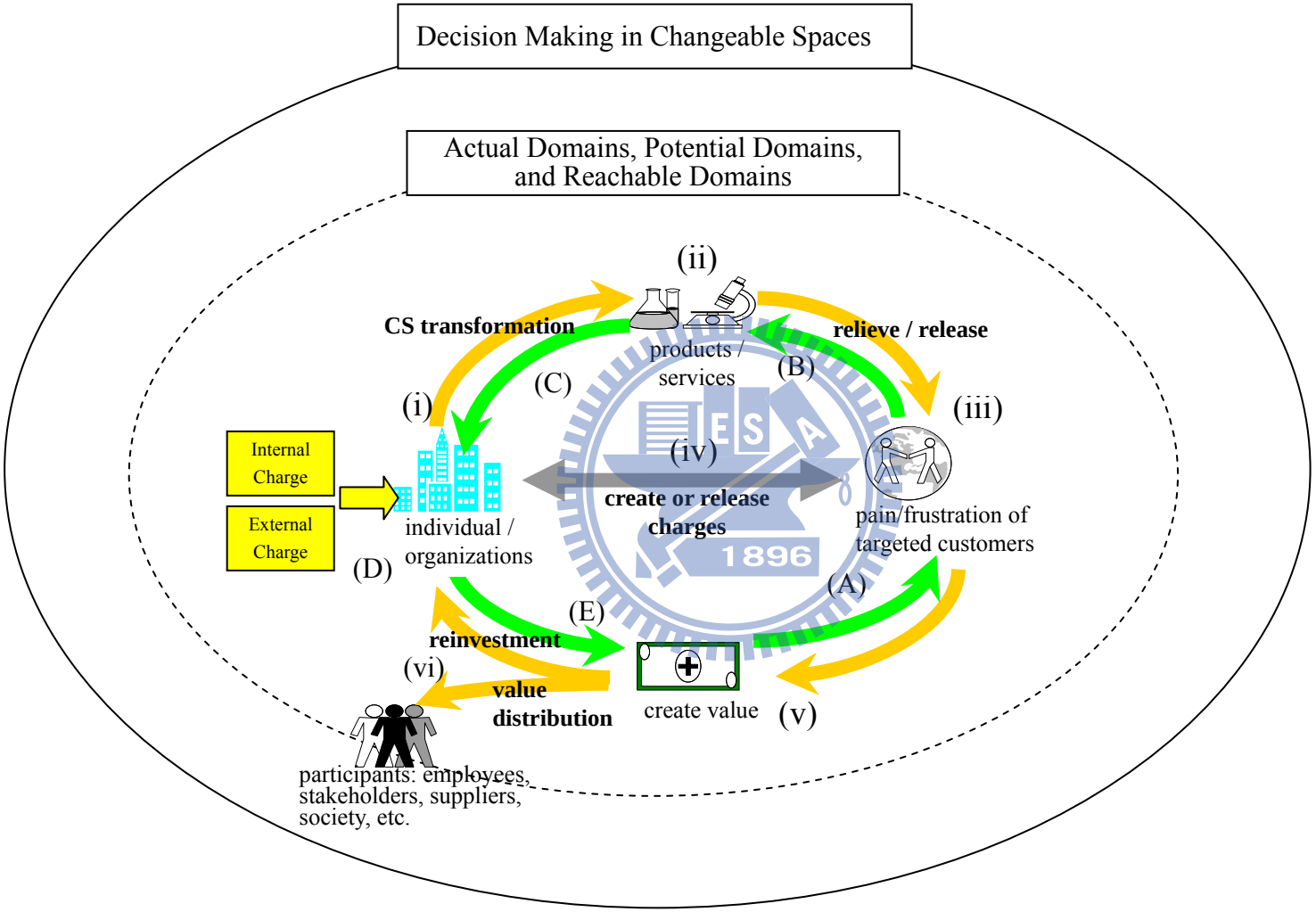

Figure 6: Innovation Dynamics

In contrast to the clockwise cycle, the Innovation Dynamics can be interpreted counter-clockwise, according to the indexing of Figure 6, as follows:

(A) To create values, the corporations must consider who will be the targeted customers, and what kind of pain and frustration they have, both in actual and potential domains;
(B) In order to ease the pains and frustrations for the targeted customers, what products or services, in actual and potential domains, are needed? Competitiveness becomes an important issue in the final selection of the products and services to produce;
(C) How do the corporations transform their internal and external competence and resource to develop or provide the selected products and services effectively and efficiently?
(D) When the transformation of CSs succeeds, the corporation's internal and external charge will be released, at least partially;
(E) New goals as to create new values can be reestablished. The innovation cycle: (A) → (B) → (C) → (D) → (E) → (A) will go round and round.

The concept of Innovation Dynamics describes the dynamics of how to solve a set of problems with our existent or acquired competence (to relieve the pains or frustrations of targeted customers or decision makers at certain situations) as to create value, and how to distribute this created value so that we can continuously expand and enrich the CS to solve more challenging problems and create more value. Observe that each links, clockwise or counterclockwise, in Figure 6 involves decision makings in changeable spaces.

To verify the framework of Innovation Dynamics, we have studied several cases, including Super Girl (to be described in Section 6.1), Wretch (to be described in Section 6.2), YouTube (to be described in Section 6.3), Wii (to be described in Section 6.4), and 85 C Bakery Café (to be described in Section 6.5), and we did observe that these cases followed the pattern of Innovation Dynamics. In the following subsections, we will further explore and discuss the contents of each link in Innovation Dynamics, coupled with these five case studies in Chapter 6 as verification.

5.1 Competence sets expansion and transformation (see Figure 6 (i) and (C))

Recall the brief description of link (i) of Figure 6 mentioned earlier, "when there exists unfavorable discrepancies between the current states and the ideal goals of

individuals or organizations (for instance, the corporations are losing money instead of making money, or they are technologically behind, instead of ahead of the competitors), it will create charges which can prompt the individuals or corporations to work harder to reach their ideal goals."

The change of corporate or individual charge structure is the origin of creativity, and also the starting point of the innovation cycle. The charge structure may be changed internally (such as a corporation wanting to pursue sustainable development, or create value for all participants…), or externally (such as the industrial environment or market structure changes, which force the corporation to pursue innovation; or customer cognition or preference changes, resulting in the corporation having to reform the product or service). The change of the charge structure will impact the attention allocation of a corporation or individual and the generation of creativity. When a corporation or individual's attention is allocated to some problem or event which creates the most charge, combining the experience of background knowledge of the corporation or individual who wants to deal with the problem or event, the creativity is often generated. The creativity here refers to the idea or thought which can jump out of one's habitual domains and creates value. The idea of value creation implies "being able to release the pain and charge of oneself and others". We can further define innovation as "creating a new structure, organization or situation, working hard to implement creativity, and fulfilling the value with perseverance."

Take Case I (please refer to Section 6.1 for details), Super Girl, as an example. The sponsor of the show, China Mengniu Dairy Company Ltd., is the promoter of the entire innovation process. Due to the poor sales performance of Mengniu's dairy products (from internal charge), they tried to improve the sales performance (attention allocation, goal setting and state evaluation). One of the key factors for improving sales performance is to increase product exposure. How can product popularity be enhanced? The most direct way is to cooperate with television program, and show the product advertisement to the audience through sponsorship.

However, this kind of approach is not innovation. Advertisement marketing has been around for years. The focus is how China Mengniu Dairy Company Ltd. can make "Super Girl" an innovative show, and further create value for the corporation itself and all the participants of the show to achieve the goal?

As described in Case I, Super Girl broke through people's habitual domains by changing rules of the game. With a creative idea, the show released the pain and

charge, and created value for the participants: high TV show ratings, improved sales performance on Mengniu's dairy products, text message profit was created for telecommunication operators, ordinary girls accomplished their dreams, and the audiences relieved their charge of "being bored" through this show. It started a new program trend which all other competitors also follow. To be brief, "Super Girl" is an example of successful innovation, which matches the aforementioned definition (create a new structure, organization or situation, and fulfill the implementation of creativity).

Corporations will start to think of expanding or transforming their competence sets when they find there is an unfavorable deviation between their ideal goals and the current states. In Case I, Mengniu needs the competence sets of media channel to enhance the product exposure through TV advertisement, so it seeks for external competence sets. Similarly, when the television station wants to apply text messaging or internet voting, it needs the competence sets from telecommunication operators. Therefore, Mengniu cooperated with Hunan TV, and Hunan TV cooperated with telecommunication operators. Progressively, the competence sets continuously transform and expand. Similar examples can also be seen in other cases, such as YouTube combining the competences of different groups (network, internet users, venture capitalist, and information technology) to continuously expand and transform its competence sets. From the perspective of *contrasting and complementing principle* (Yu 1990, 2002), it has become a part of Google Inc. competence sets. That is, it also takes a place in Google's competence sets transforming and expanding.

Competence sets transformation involves some related issues of business management. Its basic concept is to "enrich and expand self competence sets by utilizing or borrowing from other competence sets"; therefore, "how to transform" and "what to expand" become critical issues related to business management. In the case of 85C Bakery Café (Case V, please refer to Section 6.5), it involved issues such as human resource management, organization management, production management, logistics management, etc., which are all closely related to the transformation of competence sets. This indicates that Innovation Dynamics is not to overturn researches of conventional management fields, but to form a new innovation study framework by combining the past important management studies.

5.2. Providing product/service to release the pain and frustration of target customers (See Figure 6 (ii)-(iii) and (B))

The competence sets transformation appears in tangible or intangible forms,

which are the products and services provided. Whether it is tangible product or intangible service, it must be able to release the pains, frustrations and problems for target customers. Note that there are actual domains, reachable domains, and potential domains for the target customers, and for their pains, frustrations, and problems.

The target customers (and their pains and frustrations) in actual domains is easily observed, therefore most corporations often focus on goals and problems that can be seen when devoted to innovation. However, the needs or desires that lead to frustration or create charge are often hidden in the potential domains, and even the target customers are not aware of their existence. If a corporation can provide a product/service that meets the invisible need of customers, and release their pain and frustration hidden in the potential domains, it can be more competitive than the others in the industry.

For example, the reason for Super Girl being so popular is that no one ever thought that "an ordinary girl could be a big star", or that "I also have the right to decide the winner". These thoughts are actually the desire in people's potential domains. The appearance of Super Girl just satisfies these potential desires and triggers the thoughts in reachable domains: "Can I try too?", "I can make the girl that I support become a winner, even though I don't have the opportunity to be a star myself." So, people support the one they like through various ways. Super Girl satisfied the dream and autonomy of these groups; consequently it became a big hit.

Similarly, in Case III (please refer to Section 6.3 for details), YouTube was originally designed to solve the uneasiness of video sharing; in other words, the product was originally meant to release the pain and frustration of a certain group in the actual domains. However, it unexpectedly became the stage for users to express themselves. YouTube has released and satisfied the internet users' desires in the potential domains. Similar examples can also be seen in other cases, such as that Wretch (Case II, see Section 6.2) was originally designed by a few university students to share their pictures, but it became very popular for internet users. The "Wretch Pretty Girls" are still highly discussed and imitated by young people, and the major reason is because the desire to "look at pretty people" is satisfied.

In addition to having the perspicacity to discover the needs and desires in the potential domains or reachable domains, corporations also need to have the capabilities of developing, producing and delivering the product, providing after-sale service and further releasing the pain and frustration of target customers. Therefore, the activity in this link is closely related to R&D, production management, inventory

management, logistics management, customer relationship management, service management, etc. in the management fields.

5.3. Creating charge and releasing charge (See Figure 6 (iv))

In addition to releasing the charge of target customers, corporations can also create charges to them. Through advertising or marketing techniques, corporations can appropriately create charge and further induce the desires in the potential domains.

In the case of 85C Bakery Café (Case V, please refer to Section 6.5). "High quality at reasonable price" products are pursued to release the charge created by the idea of "coffee equals to high consumption, so don't drink coffee too often" in the potential domains. Also, corporations cleverly applied marketing activities to draw attention, which created fame for the chain store in a short period of time and allowed more people to notice its products. The shop location is always at a road intersection, and the counter setting is also different from traditional shops, maybe these ideas are not directly related to the product provided, but they have effectively drawn people's attention. More people are attracted to shop due to the lineup while they are waiting for the traffic lights. It successfully created charge, and also effectively released charge.

In contrast, the target customers can also create charge or release charge for corporations through similar ways. For example, consumers will team up to shop and ask the company to provide a discount (wholesale price); if the seller is willing to accept it, the buyer will make an order (to release seller's charge). This is a common way of creating and releasing charge directly from customers to corporations.

To effectively apply strategies and create charges, corporations must utilize marketing techniques and have in-depth understanding of the target customers. Hence, the activities in this link are closely related to marketing management and customer relationship management.

5.4. Creating values (see Figure 6 (v) and (A))

The products or services create value when target customers' pain, problem and frustration are released. When customers are discharged, corporations gain profit and create value. As mentioned earlier, value can be estimated in two parts, tangible and intangible. Tangible value is easily to be measured by numbers or the amount of

money, but the intangible value comes from the satisfaction and happiness resulted from charge release in the potential domains. Tangible value provides direct contribution to corporate profit; intangible value contributes to the customers. People often tend to pay attention to things they can see, so only tangible value will be noticed, and intangible value is often neglected. However, the power created and the impact brought by intangible value is usually greater than the specific money value.

Corporations will have a sweet profitable period when they promote a new product and have tangible value. However, not all companies can sustain the profit and the tangible value. The major reason is the fact that the power of intangible value will impact the sustainability of tangible value. Profit comes from the willingness of purchasing and using from consumers. If the needs or desires are not satisfied, target customers could only try on the products or services once and never come back again. In that case, tangible value can only contribute to a corporation once. On the contrary, if the charge and needs in the potential domains are released and satisfied, customers will be willing to consume again, which will bring more tangible value. Through sharing their happiness and satisfaction with others, the tangible value will be increased due to the creation of intangible value.

Take Wii as an example (see Case IV in Section 6.4). The launch of Wii brought back the leading position in the gaming market for Nintendo. It surely created values. However, players will not spread the news if Wii didn't create satisfaction and happiness for them, and Wii would not be so popular in such a short period of time. Wii has allowed players to experience the fun of "realism". It changed the stereotype of most people for video games, and combined entertainment and exercise. Consequently it released charge and created value for users. The more users there are, the more profit it will bring for Nintendo. Similarly, in the case of Super Girl (Section 6.1), Wretch (Section 6.2), YouTube (Section 6.3) and 85C Bakery Café (Section 6.5), we can see that because the product or service has released the pain, charge and frustration for target customers in the actual domains and potential domains, value is created.

In this link, both tangible and intangible values have to be taken into account. In the creation of tangible value, corporations will need to pay attention to financial management related issue; and for the operating and creation of intangible value, it will be important to take care of issues regarding to customer relationship management and service management, etc.

5.5. Value distribution and reinvestment (see Figure 6 (vi) and (D)-(E))

The tangible value described in the previous session is the profit created when a corporation innovates successfully. It may be distributed in many ways. The most straightforward way is to deliver it to employees in the form of salary to release employees' charge. It can also be delivered to stakeholders or investors by providing bonuses or stocks to those who invested funds into the corporation. In addition, corporations must pay tax according to laws and regulations. Tax payment represents the value distributing to the society. Value may also be reinvested to the corporation itself to enlarge and enrich its competence sets, and allow it to start a new value creation process.

In the case studies described in Chapter 6, most corporations continuously provide or improve their products and services to release charge of target customers so as to create value. We can see the value distribution and reinvestment do contribute the enlargement and enrichment of corporations' competence sets, so that the dynamic innovations processes can be moving forward perpetually. For instance, YouTube launched the localized services to allow users in different countries to search and browse videos according to their local cultures and preferences. It also cooperates with other industries to allow users to share videos through different devices. 85C Bakery Café expands its business to Australia, China and the US, and it has the name of "Asian Starbucks". Wretch started from BBS and now it is a complex blog web portal. We can see the ambition from its continuously launching new services in recent years. Nintendo also sustainably launches and develops popular products and equipment after Wii. The only exception is "Super Girl". The show has been temporarily stopped because of the charge from external environment. However, Mengniu, Hunan TV, and telecommunication operators all received a giant amount of profit due to the show's success. It is quite substantial that the internal and external charges of these corporations and organizations were released by the created values.

The activities in this link are closely related to the concept of value chain analysis, which was described and popularized by Michael Porter in his 1985 best-seller, *Competitive Advantage: Creating and Sustaining Superior Performance*. The concept of value chain can be applied to whole supply chains and distribution networks. The delivery of a mix of products and services to the end customer will mobilize different economic factors, each managing its own value chain. This larger interconnected system of value chains is called the "value system" (Porter, 1985). Capturing the value generated along the chain, distributing and re-investing it to the

related stakeholders or the corporation itself become important issues for management strategists.

5.6. Summary

Several hypotheses can be proposed based on the previous discussion. The term hypothesis is used here to signify the fact that although these statements are based on the observations and findings from Innovation Dynamics, they are not absolutely conclusive. The hypotheses are as follows.

H1. The richer the competence set of a corporation is, the more competences their products or services can provide.

H2. The more pains and frustrations of target customers are released by products or services provided by corporations, the more value can be created.

H3. The more efficiently and effectively that the created value is reinvested and/or distributed to the related stakeholders, the higher possibility that a corporation can succeed in re-innovation.

H4. The more effectively and frequently that the Innovation Dynamics is used, the higher possibility that a corporation can successfully innovate and create values.

Note that activities over each link of the Innovation Dynamics involve decision making in changeable spaces. Let us sketch their relations in the following Table 3. The table may serve as a list of new directions for the various fields of management to develop and research.

Table 3: Innovation Dynamics and fields of management

Processes in Innovation Dynamics	**Descriptions**	**Related Management Fields**
Transforming of competence sets (refer to (i) and (D) in Figure 6)	◆ Acquiring, adjusting and allocating resources (human resources, skills, technologies, etc.); transforming resources into products/services ◆ The corporation's internal and external charge will be released when the transformation of CSs succeeds.	◆ Human resource management ◆ Organization management ◆ Production management ◆ Research and development (R&D) ◆ Procurement management ◆ Logistics management ◆ …
Producing of products/services (refer to (ii) and (C) in Figure 6)	◆ The outcome of CS transformation and expansion ◆ How to transform the internal and external competence and resource to develop or provide the selected products and services effectively and efficiently?	◆ R&D ◆ Production management ◆ Inventory management ◆ Logistics management ◆ Value chain analysis ◆ …
Releasing pains and frustrations of target customers (refer to (iii) and (B) in Figure 6)	◆ Discovering of target group and exploring their needs in actual and potential domains ◆ What products or services are needed in order to ease the pain and frustrations of customers?	◆ Marketing management ◆ Services management ◆ Customer relationship management (CRM) ◆ …
Creating charge / releasing charge (refer to (iv) in Figure 6)	Besides discharge, corporations or organizations can create charges for the targeted customers by means of marketing, advertising or promotion, and vice versa.	◆ Marketing management ◆ CRM ◆ …
Creating / distributing values and reinvestment (refer to (v) and (vi) ; (A) and (E) in Figure 6)	◆ Releasing the charge of the target customers and creating values; how to distribute and share the created value effectively as to keep the stakeholders in unity for growth prosperity and competitiveness. ◆ To create values, the corporations must consider who will be the targeted customers, and what kind of pain and frustration they have, both in actual and potential domains.	◆ Financial management ◆ Compensation management ◆ Investment management ◆ Public relation management ◆ Value chain analysis ◆ …


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Chapter 6. Verification of Innovation Dynamics with Case Studies

6.1. Case I: Super Girl

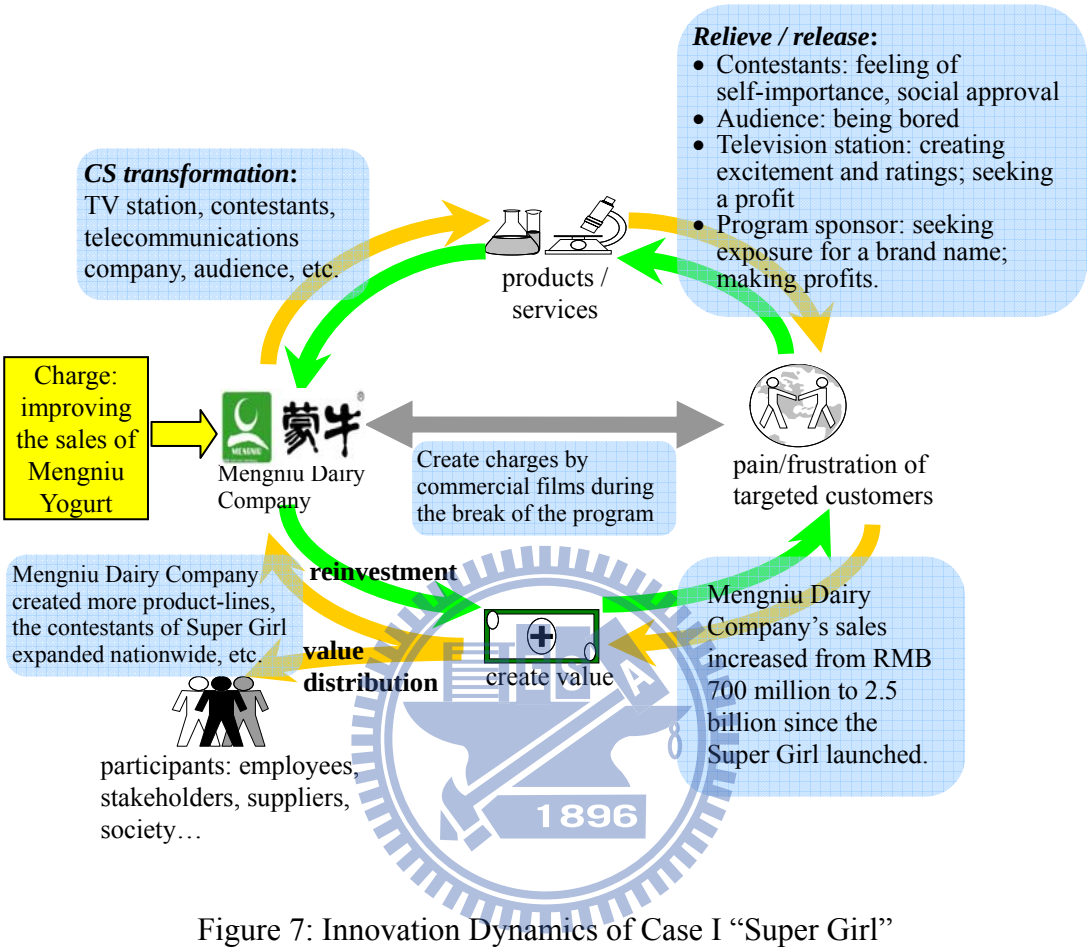

Figure 7: Innovation Dynamics of Case I "Super Girl"

6.1.1. Case review

"Super Girl" (超級女聲) was a television show produced by Hunan TV (湖南衛視), a television station in Hunan Province, China starting in May 2004. When first introduced, the program was hosted through cooperation of local TV stations in the four cities of Changsha, Wuhan, Nanjing, and Chengdu. In March 2005, "Super Girl" continued to be broadcast in the five cities of Guangzhou, Changsha, Zhengzhou, Chengdu, and Hangzhou and received great responses from television audiences.

"Super Girl" was a singing competition entertainment show. There were no restrictions on contestants other than being female, which meant that any female with an interest in singing was free to join regardless of singing style, age, appearance, and region of origin. The program's assessment method differed from traditional singing competitions, in that instead of allowing judges to make the decisions, the audience

was allowed to vote by sending mobile phone text messages to decide the fate of the singers.

In 2005, "Super Girl" attracted about 150,000 contestants. It attracted 195 million viewers nationwide during the first five semifinal matches. The ratings of the finals reached 19.45%, ranking it as the nation's highest viewership satellite channel in that time slot. During the finals, the number of people who voted by text message in each episode exceeded 1 million; the number of audience votes totaled 4 million, and discussion of the show on the internet was endless. After four or five final contests, there were about 400 million viewers following the show. The well-known Chinese enterprise, Mengniu Dairy Group, sponsored the show, buying the exclusive sponsorship rights of the program for 14 million RMB. The group introduced a new Mengniu sour yogurt product, invested a total of 100 million RMB in advertising costs in media, and strengthened the image of "Super Girl" in the minds of the audience with promotions and internet marketing. Mengniu and "Super Girl" created a great example of a successful communication marketing partnership in the advertising industry.

Due to the sensation of "Super Girl", similar television shows have arisen to follow suit, creating a trend. The voting system encouraging "voting rights for all" in this society caught the attention and concern of central authorities. After 2006's contest, Hunan TV did not continue broadcasting "Super Girl" the next season. In September 2007, China's State Administration of Radio, Film, and Television (SARFT) issued an announcement, instituting multiple restraints on talent search shows. Shows were not allowed to last over 2 months, and broadcasting during the prime time of 19:30~22:30 was prohibited on provincial and sub-provincial satellite TV channels. Strict regulations were also established for the host's behavior and language, judges and guest's professionalism, and contestant's outfits (Xinhuanet, 2006).

In January 2009, Hunan TV announced that after a hiatus of three years, "Super Girl" would make its return. The following May, after obtaining approval from SARFT, the show returned to the air under the name "Happy Girl".

For the interpretation of Innovation Dynamics of Case I (Super Girl), please see Figure 7.

6.1.2. Case analysis

6.1.2.1. Game analysis

The game had its own habitual domains, including forms of engagement, rules, and players. If any part changed, the game transformed and was restructured. The nature of "Super Girl's" program did not differ from general singing competitions, but it changed the rules and forms of engagement, and broadened the aspect of the players. The differences between "Super Girl" and traditional singing contests are shown in Table 4.

Table 4: Comparison of "Super Girl" with traditional talent competition shows

Habitual domains of the competition	"Super Girl"	Traditional singing competition shows
Forms of engagement	• Participants are wide-ranging; • The audience votes for the winner, the result is unpredictable; • Exclusive sponsorship enhances sales of products through the program's high ratings; • Communication is done through the sending of text messages and discussion on the internet.	• Participants are limited; • Judges choose the winner, viewers watch the show for entertainment purposes; • Companies purchase advertising time for product promotion, however the sponsorship rights are not exclusive; • Communication is done by newspaper and magazine articles and reports.
Rules	• All females in the nation are eligible to compete; • The audiences send text messages to vote on the winner.	• There are restrictions on eligibility, including age, region, and song genres; • The judges decide who the winner is.
Players	• Contestants; • Family and friends of the contestants; • Audience of the show; • Host television station (Hunan TV); • Cooperating TV stations; Sponsor (Mengniu Dairy Company); • Mengniu Dairy's consumers; • Telecommunication company.	• Contestants; • Judging panel; • Host television station; • Sponsors.

Past singing competitions or beauty shows were based on selecting the elite, using high professional standards for the assessment. From the consumers' (audience)

point of view, they only play a passive role (viewing the program and accepting the decision of the professional judges). “Super Girl” broke with the limited, traditional rules of talent competition shows, offering no restrictions to competing in the show other than being female. This broadened the range of participants, and attracted wide attention and interest of the masses. In the past, there might have been some who were optimistic about these talent competitions, but were discouraged because their age or appearance did not meet high professional standards. This difference in “Super Girl” ignited hope for such people, and resulted in major changes to the participants in the game.

Another alteration in the rules was the different method of assessment. In the past, a few selected professionals decided the winner, leaving the consumers (audience) to only play passive roles; they had the option of only watching the professional’s decision on television. “Super Girl” transferred the right to choose the winner from on-stage to off-stage, giving a wide range of audiences the right to participate in decision making. This rule changed the authority structure for participants, as they did not have to worry about pleasing the few selected professional judges; but they had to be committed to understanding the preferences of the audience and try to appeal to the masses. We can see that the final contestants did not necessarily possess astonishing appearances or voices, but they were more realistic and ordinary, which elicited the audience’s approval and support for victory.

As the power of decision making was in the hands of the audience, contestants had to encourage their family and friends to vote, and audiences who wished to support their own contestant of choice also needed to lobby their friends and family for votes. As more and more people entered the game, discussion groups arose on the internet, and the strength of public opinion transformed “Super Girl” from a simple singing competition show to a subject of attention in society. Based on business considerations, the main source of profits for the television station was companies purchasing advertising time. As companies desired to successfully sell their products, naturally they would hope that the advertisements they broadcast would be seen by as much consumers as possible. As “Super Girl” became a subject of attention in society with rising ratings, advertisement sponsors hoped that “increasing their product exposure” would be achieved with the high television ratings. The program began by altering the rules, which led to changes in the players and a transformation of the entire game.

The support of information technology also played a huge role in changing the rules of the game. The television station and telecommunication company cooperated

and allowed the audience to vote by sending in text messages. Past voting systems were operated through the mail, which was time consuming, and the votes could not be counted in real-time. Phone calls with slightly higher rates were also used; this method was more profitable for the industry, and real-time vote counting stimulated the audience, but the method was still a one-way process. However, the voting mechanism of “Super Girl” took another step forward. Simultaneously when a member of the audience was sending in a text message to vote, he/she agreed to purchase additional-value services from the telecommunication provider, allowing it to send back messages with information regarding the program. Therefore, the audience was not only paying to send a text message, but also paying to receive one. This allowed for interaction between the audience and contestants, and also between the television station and telecommunications company during the game.

As mentioned earlier, "superior strategists find the best strategies by changing the relevant parameters, while ordinary strategists find the optimal solutions within some fixed parameters" (Yu 1990, 2002). “Super Girl” successfully altered the rules, creating a new and complex engagement form for the game by adding new players and restructuring the rules; this brought a fresh new system to break the mold for traditional talent competition shows.

6.1.2.2. Analysis of the charge structure

As described in Chapter 3, charge is the driving force behind our actions, and our attention is directed at events which have the greatest influence on our charge structure. If corporations and producers can understand from where the charges of consumers originate, and what pains and frustrations need to be alleviated, they can design or provide a product or service that can release the charge of the people. If the product or service can release pains and frustrations of the customer, it will gain in popularity, and the corporations or producers will make a profit. Table 5 lists the participants involved in “Super Girl”, and their charge structure was analyzed to further understand the reason the program was able to capture the hearts of the people.

Table 5: Charge Structure of the Participants of "Super Girl"

Participant	Charge structure	Attention allocation
Contestants	• Seek approval (feeling of self-importance, social approval); • Compared to peers, peer pressure, following trends.	• Participate in the competition to be noticed; • Peers participate in order to not be left behind.
Audience	• Being bored; • Being the approval group.	• Killing time by watching television; • Has to support people they know or like on television.
Television station	• Creates excitement and ratings; • Seeks a profit.	• Seeks audience viewership and sponsors.
Sponsors	• Seek profit and to expand their market; • Seek exposure for a brand name.	• As the sponsored program attracts attention, the product receives high exposure.

As the goals and charge structure of each participant differ, they will have different attention allocations as well. Whether from the point of view of the supply or demand side, as long as a comprehensive consideration of the participants involved is made for the product or service, the designed product should be able to release pain, frustration, and the charge of the customer. Feedback from customers can also help producers achieve this objective; then the product or service will be popular with the masses.

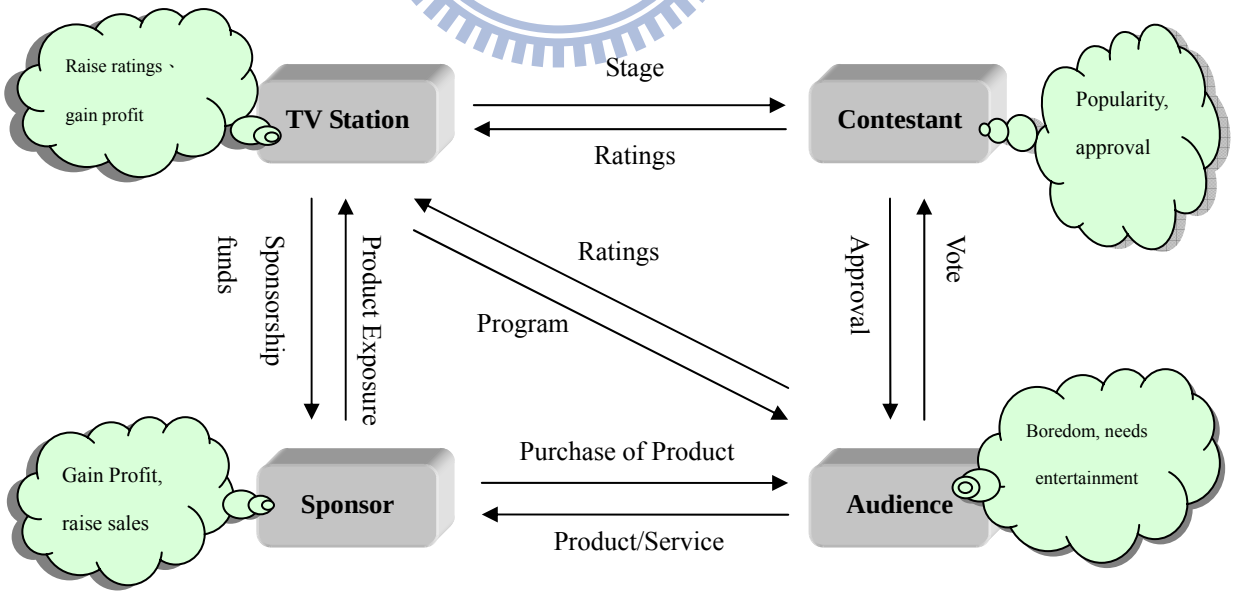

Figure 8: “Super Girl” Participants' Charge Structure and Supply Demand.

In this case, participants had the charge structure of wanting to be famous and gaining approval, while the audience’s charge came from boredom and having to

depend on television programs to keep them from being bored. The television station hoped to make a profit through the support of sponsors, and the sponsors decided whether to provide support or not depending on the program's ratings. A sponsor's charge structure was mainly based on how to make a profit, as long as they were able to create a market, they could release their charge. The arrival of "Super Girl" effectively released the charges of all participants: the audience, television station, and sponsors. As Figure 8 shows, the show gave participants a stage to showcase their talents, and relieved the charge of the audience of being bored. When the program attracted wide attention of audiences, the sponsor's product had greater exposure in the market, so the support of the sponsor and audience released the charge of the television station. This is why "Super Girl" captured the hearts of so many people.

6.1.2.3. Discussion of habitual domains

Most observable human behaviors, such as actions, thoughts, ideas, etc., belong to the scope of the actual domain. Therefore, if we use observations in the actual domain to design products and services, the product and service can only provide value in people's expected range (in their actual domain). In past singing competitions, a glamorous voice and stage presence were the traditional assessment standard. This type of standard is deeply imprinted on the minds of audiences, thus becoming part of our actual domain. If the competition operation rules had remained the same, no one would have paid particular attention to it. To attract public curiosity, one had to create sparks in people's stable actual domain. Actual domains can be transformed by discovering and changing parameters in the potential domains. "Super Girl" was a product designed to effectively utilize people's potential and reachable domains (as shown in Table 6).

Table 6: Potential and Reachable Domains

	Potential domain	Reachable domain
Contestants	• Express and differentiate themselves; • Hope to gain fame overnight; • Hope to break traditional standards.	• Wish to join because others joined too; • Are courageous due to a lack of restrictions.
Audience	• Is autonomous and has decision rights; • Hopes to break traditional standards.	• Must vote diligently and lobby others to vote after seeing family and friends on TV; • Projects effects and approval after seeing that ordinary people can become idols, too.

Traditional society requires young people to behave accordingly; they might be

labeled unconventional or immoral if they behave in an irregular manner. Therefore, in the actual domain of young people, their demeanor has to comply with the norms of society; they rarely have the opportunity to express their personal uniqueness. However, in their potential domain, they still seek attention and want to be noticed; it is just that this has not been explicitly expressed. The television station saw this parameter in the potential domain, coupled with new-generation trends and cultural developments, and designed the "Super Girl" program. The program brought out the side of young people that wanted to showcase their talents and uniqueness, and they thus became a part of actual domains.

Based on social comparisons (Yu 1990, 2002, 2009), when young people began seeing self-expression by their peers on the show, they unconsciously wanted to join, too. This was when the reachable domain began to transform. Another parameter that changed was the game rule of "no restrictions for those who want to participate". This directly corresponds to the desire in the potential domain to break traditional standards. People gain confidence when they believe that anyone can achieve fame overnight. With this change in the reachable domain, a desire to try and participate arose.

At the same time, people had already accepted the practice of all decision rights residing in the judges in previous competitions. So why not change the parameters and transfer the decision rights to the people? The idea of making their own decisions has always existed in people's potential domains; however, no one has applied this idea to talent competition show assessments. "Super Girl" used this as an advantage and successfully applied the idea from the potential domain. When one's own family and friends are on television, one will naturally gather people to watch, and lobby hard for votes, because they have voting rights. Even if there are no friends or family in the competition, after seeing that ordinary people have the opportunity to become idols, projection effects (Yu 1990, 2002, 2009) kick in. People are able to easily identify with the contestants on stage and become a loyal audience of the show. These were all due to changes in the reachable domain.

6.1.2.4. Competence set transformation and value creation

Everybody has the ability to sing, but not everyone can create value from it. The sending of messages is as simple as using your fingertips, but not many people saw the enormous business opportunities hidden within. "Super Girl" successfully transformed its competence sets to create value. Table 7 lists the competence sets of the participants involved. Of course, people have unlimited potential, much more than

the ones listed, but for simplicity and ease of discussion, we list only those competence sets related to the program.

Table 7: Competence Sets of "Super Girl"

Participant	Competence sets (ability, technology, resources, knowledge, information, etc.)
Contestants	Singing ability, human resources (family and friends, cheerleaders, audience), etc.
Audience	Ability to watch TV, ability to send text messages, ability to use the internet, human resources (family and friends), communication resources (mobile phone, internet), etc.
TV station	Planning capacity, broadcasting ability, human resources, funds, media/channel, etc.
Telecommunication company	Broadcasting technology, equipment, funds, human resources, etc.
Sponsors	Funds, human resources, techniques, etc.

"Super Girl" began when a Chinese dairy company, Mengniu, wanted to create a market for its new product called Mengniu Yogurt (a sour yogurt product). Because the product appeared on the market with only lackluster sales, the company hired the marketing expert, J. Sun (孫雋, former manager of Eastman Kodak Company, then working as Mengniu's marketing director, and now currently serving as the vice president of Linktone) to improve the sales performance of Mengniu Yogurt. J. Sun combined "Super Girl" (which had already been on the air for a year with mediocre ratings) with a telecommunications company, changed the application and voting system of "Super Girl", and successfully attracted the attention of the Chinese public. Mengniu Dairy Company's sales increased from RMB 700 million to 2.5 billion (陳邦鈺&莊芳, 2005). Figure 9 depicts the competence set transformation of Mengniu Dairy Company.

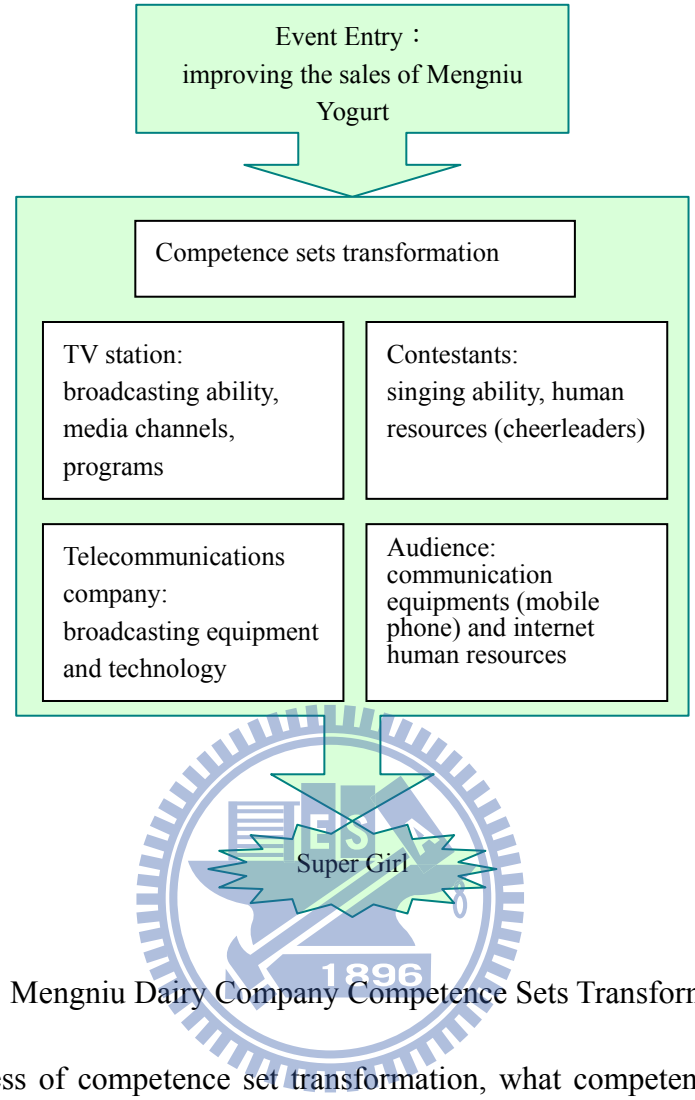

Figure 9: Mengniu Dairy Company Competence Sets Transformation

In the process of competence set transformation, what competence sets should businesses be thinking about? Are these competence sets sufficient to resolve problems? If not, what other necessary competence sets yet need to be acquired? What are the usable resources? Proper utilization of resources is the basic transfer of other people's competence sets and habitual domains to expand one's own competence sets and habitual domain. This case was an example of proper utilization of all resources. Mengniu Dairy Company specializes in dairy products, so most of its competence sets are concentrated in dairy expertise. However, it was able to effectively utilize human resources, the media, and telecommunications, a group of resources that initially did not exist in its competence sets; these resources each effectively produced great benefits that helped solve the company's problems.

In this case, all participants (the TV station, telecommunication company, contestants, the audience, etc.) engaged in their own competence set transformation and created great value. For example, all of the contestants had singing abilities, but originally, the value of singing was "entertaining self and others". Using this ability

(technique), with media (resources) and the supporting audience (human resources), the competence (i.e., the ability to sing) was fully expanded; they became idols and household names, with record companies rushing to sign them (charge release achieved), and created a value greater than "entertaining self and others". Another example is the text message service provided by the telecommunications company. Initially a text message's function was communication, but after being transformed, it became a tool for voting. Charging slightly higher rates on these text messages, and adding another rule that all texts sent during the voting period automatically agreed to buy extra value-added services (with additional fees) allowed the telecommunications company to work with the television station. Program-related information texts were sent to the audience's mobile phones, and those texts were charged on a case-by-case basis (大西洋新聞, 2005). The telecommunications company transformed its competence sets, and by uniting texts (technology), television channels (resources), and the audience (human resources), it successfully created tremendous value.

6.1.2.5. Postscript

"Super Girl" began in 2004, received a great reception in 2005, and became a great success. However, the unique competition rules and system were like a double-edged sword; it created great success, but also caused its demise. As the public had the right to vote and support their contestant of choice through mobile phones, the trend created a sense of cohesion and unity among people. This phenomenon posed a threat and worried the Chinese central government. First "Super Girl", then next might be "Super Freedom", and what if even "People's Demands" arose? Hunan TV's "Super Girl" posed a threat to the monopoly of China Central Television (CCTV), and finally led to the show being cancelled. In 2009, even though Hunan TV brought back the competition as "Happy Girl", China's SARFT introduced several restrictions on talent competition shows, including not broadcasting for over 2 months, and not broadcasting during prime time at 19:30~22:30 on provincial and sub-provincial satellite TV channels. Strict regulations were also instituted for the host's behavior and language, judges' and guests' professionalism, and contestant's outfits. Under the new restrictions, in 2009, "Happy Girl" was not able to recreate the sensation and success that "Super Girl" had.

From the development of "Super Girl" after 2006, we can see that there were many unknowns and uncertainties in the potential domain, and they affected both corporations and individuals. From the perspective of innovation, between 2005 and 2006, "Super Girl" certainly released the charge and frustration of participants and created value. However, its success revealed the Chinese public's desire for autonomy,

which is absolutely the last thing the authorities want to see. When a greater external charge from the central government arose, the process of innovation and value creation was abruptly terminated.

6.1.3. Summary

This case study explored the successful factors of "Super Girl". Although its success only lasted two to three years, from the perspective of innovation dynamics, it still stands as a great example. To sum up, the following are factors that led to the success of "Super Girl".

(i) A deep understanding of customer needs: The mass audience and contestants were all target customers of "Super Girl". "Super Girl" moved from potential domains to reachable domains, seeing the hidden charge structure that others could not; the program was able to capture people's hearts and gain popularity from creating new innovations on top of an old format.

(ii) Flexible transformation of competence sets: "Super Girl" used a variety of resources, technology, human resources, etc., combined different competence sets (television station, telecommunications company, sponsors, and a mass audience), and was able to expand and transform its competence sets to meet goals and create value.

(iii) Bold breakthroughs in strategy: "Super Girl" audaciously changed the traditional rules of the game and added new parameters (including new participants, new technology, etc.) to completely transform the habitual domain. The bold and audacious courage to break old traditions was one of the key factors in its success.

All of these three points are key factors for corporations that want to boost competitiveness. We believe that whether making changes to an old product/service or developing a new one, these three factors must be grasped. Utilizing potential domains and reachable domains, and flexible transformation of competence sets will definitely create great value for corporations and open up new opportunities.

6.2. Case II: Wretch

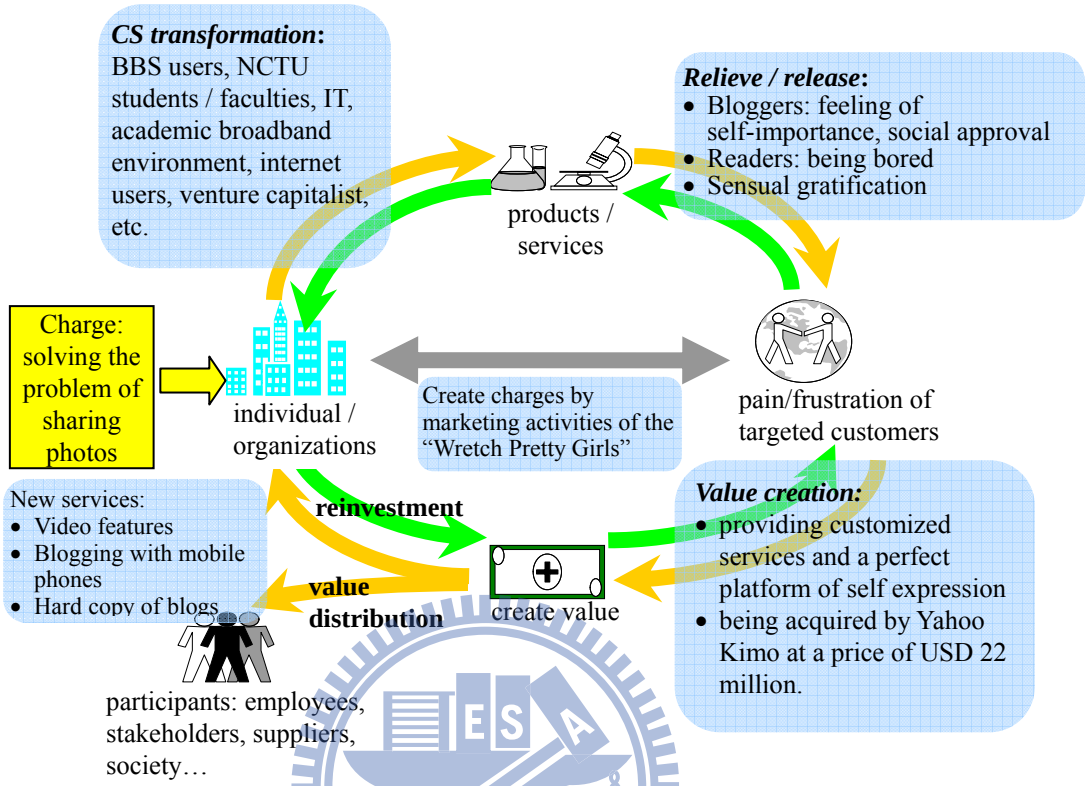

Figure 10: Innovation Dynamics of Case II (Wretch)

6.2.1. Case review (Data source: Wretch official web site and *Business Next*)

Wretch is a social network site integrating the functions of blogs, online photo albums, internet communities, and a bulletin board system (BBS). By September 2009, the total number of valid members of Wretch was 6.5 million, and the figure was increasing by 5000~10,000 every day. Started as a BBS site, Wretch was constructed by a freshman, C. Y. Chien (簡志宇), at the Department of Computer Science, National Chiao Tung University (NCTU) in 1999. Wretch acquired little popularity before word of mouth spread from several of Chien's classmates, and it gradually turned into the most popular BBS at his department.

Before enrolling in the graduate program, Chien enjoyed spending his free time searching for online photos of pretty girls around 2003, a time when digital cameras began to spread. Chien's friends began buying digital cameras and making pictures of their girlfriends but found no handy photo-sharing tools for photos of trips with their girlfriends. Based on the concept of "contributing what one learned to satisfy others", Chien wrote a program for an online photo album and launched this free service on Wretch to registered members in September 2003. Afterwards, Wretch responded to

user demands by adding blogging into their service portfolio that consisted of a BBS and an online album. The three functions were accessible with a single Wretch account, which was very convenient to internet users at that time, such that Wretch earned their recommendations, and Wretch users expanded from NCTU to every other university and college in Taiwan. The services of the online album and blog substantially boosted Wretch website traffic. Wretch was made even more famous after the *China Times* reported on the user behavior of its members who were of the young generation in August 2004.

During a seven-day serious crash at Wretch in November 2004, site managers received countless complaints and inquiring phone calls. A professor even called Chien's department office to ask that Wretch be recovered because he had saved some examination questions for the final exam there without a backup. Realizing the fact that Wretch had already turned from a leisure site to the center of many users' lives, site managers began seriously considering the future development of Wretch.

The Wretch server was officially removed from NCTU and the Wretch Limited Company was founded in March 2005. Wretch offered compensation of NT$10 million to NCTU for the cost of technology transfer to quell the controversy of using academic broadband resources for commercial activities. Wretch began to charge for its services and officially joined the commercial market in May 2005, a time when its members had surged beyond 800,000.

Wretch currently attracts two to three million visits every day, and is the 32nd largest website globally and the second in Taiwan in terms of website traffic. In addition to its blog, online photo album, BBS, and forum, Wretch has continually provided new services such as the video features, map functions, blogging with mobile phones, blog publication, etc. Wretch successfully turned from a nobody to a leader, and its future development is certainly expected by many people. Please see Figure 10 for the Innovation Dynamics interpretation of Wretch.

6.2.2. Case analysis

6.2.2.1. Analysis of the charge structure

Users of internet media such as blogs are of two types: writers and readers. A user can certainly simultaneously belong to both types or to each type alternately. In the real world, everyone plays his/her own role. Everyone's actual domain is limited, while there is infinite possibility in his/her potential domain. The discussion below is based on the two types of roles of writer and reader.

Nardi *et al*. (2004) explored the reasons why bloggers maintain blogs and proposed five major motivations for blogging: documenting one's life, expressing comments and opinions, releasing emotions, organizing thoughts, and exchanging opinions with friends on the internet. These results are consistent with the blogging behavioral research by scientists in Taiwan. Chou (周立軒, 2005) found that the purposes of using blogs in Taiwan were mostly "life documentation" and "release of emotion", while "information sharing" and "data compiling" also accounted for certain proportions. Liu (劉江釗, 2005) analyzed the operation on many blogs by their popularity and discovered that interconnected links among blogs were usually directed to the most popular blogs.

From the viewpoint of the habitual domain theory, the most common source of charge in everyone's daily life is boredom, which drives people to seek fun and ways to kill time. Watching television and surfing the internet are both means to kill time. "Life documentation" and "releasing emotions" are also behaviors to discharge boredom. For bloggers, blogs are platforms for self expression that discharge boredom. With the attention, support, and approval perceived from visits or messages left by other internet users, a blogger's life goals of feeling self-importance and gaining social approval are satisfied. Although many people have a strong desire to express themselves in their potential domains, this desire might not always be fulfilled in daily life. Blogs are the perfect stage for this desire. Therefore, readers and friends on the internet play significant roles. Their support is a kind of gentle charge, encouraging bloggers to carry on.

"Being bored" is definitely another charge in life for readers and viewers and a reason for browsing others' blogs and online photo albums. The anonymity and speedy circulation of internet media satisfy readers' desire for anonymous participation in their potential domains. The abundant information on blogs makes it easy for sensual gratification to those with a taste for nice-looking girls and guys. On a deeper level, this sensory need is induced by the circuit patterns of perpetuation of the species (see Appendix 1). Blogs satisfy the need for cognitive consistency and curiosity in those who search for information online. They also satisfy the feeling of self-importance of both bloggers and those who enjoy interacting with them.

Chien, the chief manager of Wretch, once said that the idea of building an online photo album simply came from his boredom and his taste for online photos of pretty girls. He did not expect so many people to have the same need. Responding to requests from its numerous members, Wretch began a blog service to meet the needs of bloggers and readers. The beginning and success of Wretch are obviously a great

example of discharging the pain and frustration in user's potential domains.

6.2.2.2. Competence set analysis

The primary goal of Wretch was just to have fun (boredom discharge), so Chien set up a BBS site the competence set of which consisted of basic site construction skills, simple hardware, and the human resource of Chien as the site manager. Wretch began its online album service in 2003, followed by blog service in 2004. Thanks to these two services, Wretch site traffic incredibly increased, leading to the need for the expansion and transformation of its competence set. To expand human resources, Chien brought in other students from the Computer Center at the Department of Computer Science at his school where academic broadband resources allowed unlimited album space in Wretch that no other competitors could offer. Operating through the academic broadband eventually created some controversy. As its user numbers grew, demands for hardware caused Wretch to begin seeking financial support in 2005, to reach out for external support due to its insufficient funding. It was the need for funding that prompted Wretch to go commercial and work as a private company. Its competence set was beyond comparison to the BBS site where Wretch began. Figure 11 illustrates the expansion of Wretch's competence set from the perspectives of human resources, skills, and resources.

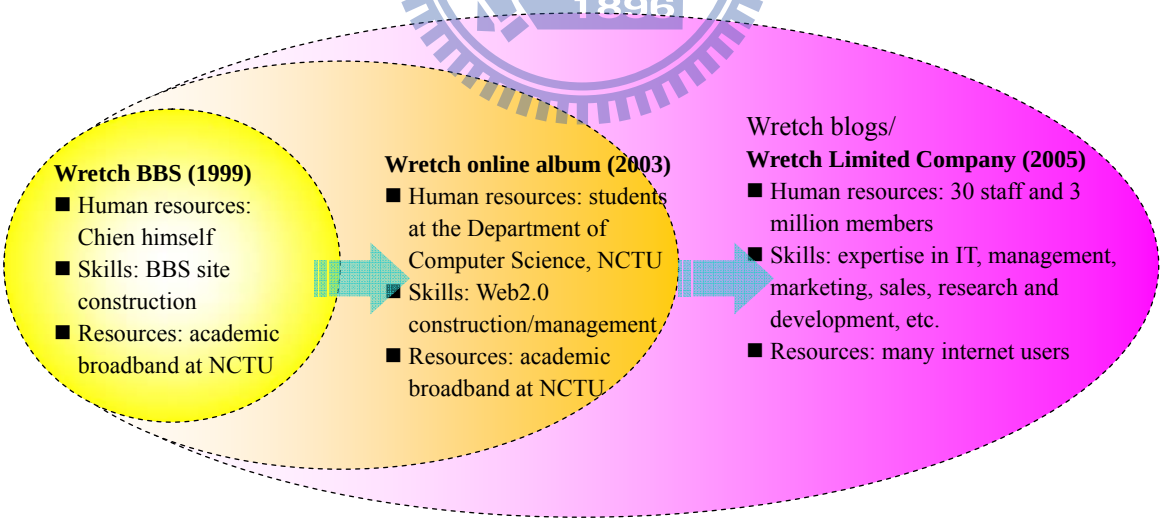

Figure 11: The Expansion of Wretch's Competence Set.

Wretch currently has more than 6.5 million members. The rapid growth trend from 200,000 in mid-2004 to the current figure is illustrated in Figure 12. Every user and peer resources contributed to the competence set such as new knowledge, resources, skills, etc. of Wretch. Therefore, Wretch's competence set expanded faster

as users rapidly increased.

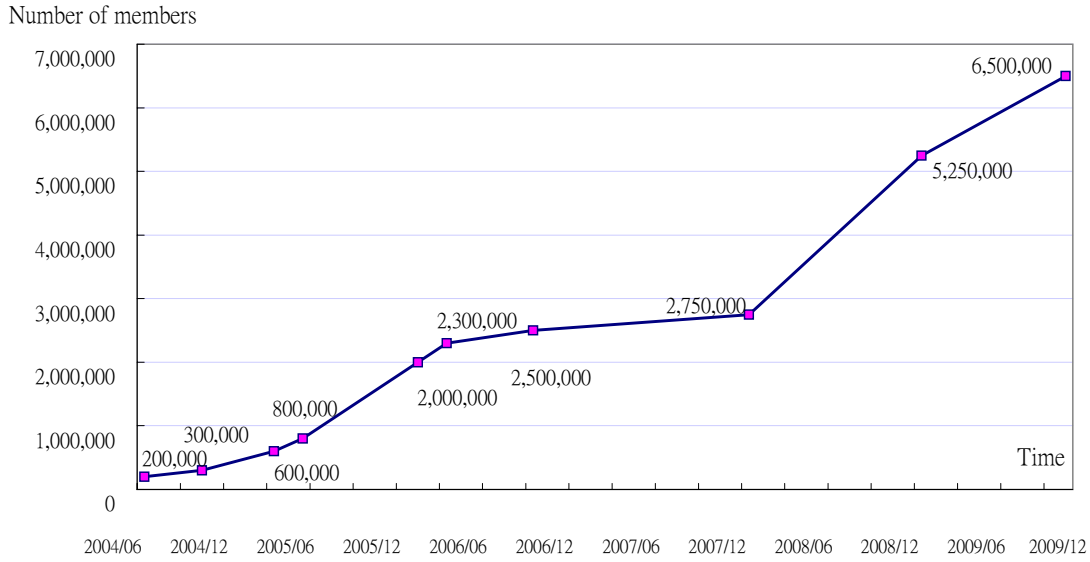

Figure 12: The Rising Number of Wretch Members.

6.2.2.3. From charge release to value creation

Wretch describes its operating purpose and principle on its website as follows: "The major purpose is to provide customized services and a perfect platform of self expression. Service stability is our first priority. Wretch's outstanding research and development as well as friendly and immediate customer service make it possible to offer the most needed services and efficient customer service channel for our users."

From the above description, we see that Wretch prioritizes and strives to satisfy user's needs. Identifying "self expression" as the major charge for internet users today, Wretch provides services related to this charge, and value is created when the charges are released and user needs are satisfied. Some new services launched since 2006 at Wretch are listed as follows.

(i) Video features: In an effort to emulate YouTube, this feature allows video files in Wretch photo albums and blogs, which satisfies the need for video watching/sharing and even the dream of a personal television network.

(ii) Blogging with mobile phones: Photos and videos taken with a mobile phone can be uploaded to Wretch blogs with Multimedia Messaging Service (MMS,

多媒體簡訊) provided by Chunghwa Telecom (中華電信). By integrating the competence set of Chunghwa Telecom, Wretch created 50,000 messages for the first wave of activities, a win-win situation satisfying Wretch users while boosting the mobile service of Chunghwa Telecom.

(iii) Hard copy of blogs: Users get a hard copy of their blogs with simple steps on the Wretch interface at a cost of NTD 699 (shipment included) for a minimum of two copies. This innovation releases the desire to "be a real author" for internet users while bringing in substantial earnings.

From the new services above, we know that Wretch began from releasing charges for target customers by providing online photo albums at high speed and large storage, which led to immediate success. However, it has developed services that not only release users' charges but also satisfy their desires and needs in potential domains. The innovative services in association with information technologies have created immense value.

6.2.3. Summary

Chien, during a press interview, attributed the success of Wretch to great timing, an appropriate environment, and support from people (龐文真, 2006), which respectively refer to the timing when information technology was taking off, the resourceful academic environment at NCTU, and Wretch users, investors, and staff. The key factors to Wretch's success are summarized below from the viewpoint of the habitual domain theory and competence set analysis.

(i) Knowing users' charge structure. Wretch satisfied the need for self expression by users and the desire to share which have been hidden in their potential domains for a long time. It designed its products to meet these invisible needs, and has enjoyed great popularity. Similarly, corporations and manufacturers must identify target customers and their needs in potential domains to create successful products and services.

(ii) Corporations should continually improve themselves and expand their competence sets to solve problems and release target customers' pain and frustrations. The founders of Wretch were all from the Department of Computer Science, NCTU and were the professionals that built Wretch. In this case, the operating group realized the insufficiency of its competence set as Wretch grew, and reached out for more resources. Note that human resources, especially internet users, played an important role here in the expansion of the competence set as well.

(iii) Besides tangible factors such as human resources, financial resources, skills, etc., attitude is also a key factor in the expansion and transformation of competence sets. Chien and the other founders shared the characteristics of perseverance and persistence. They were optimistic and not afraid to meet challenges and take advice. This attitude helped Wretch expand its competence set and excel in the competitive internet world. Any corporation or individual can succeed only with the same attitude during the expansion and transformation of competence sets.

6.3. Case III: YouTube

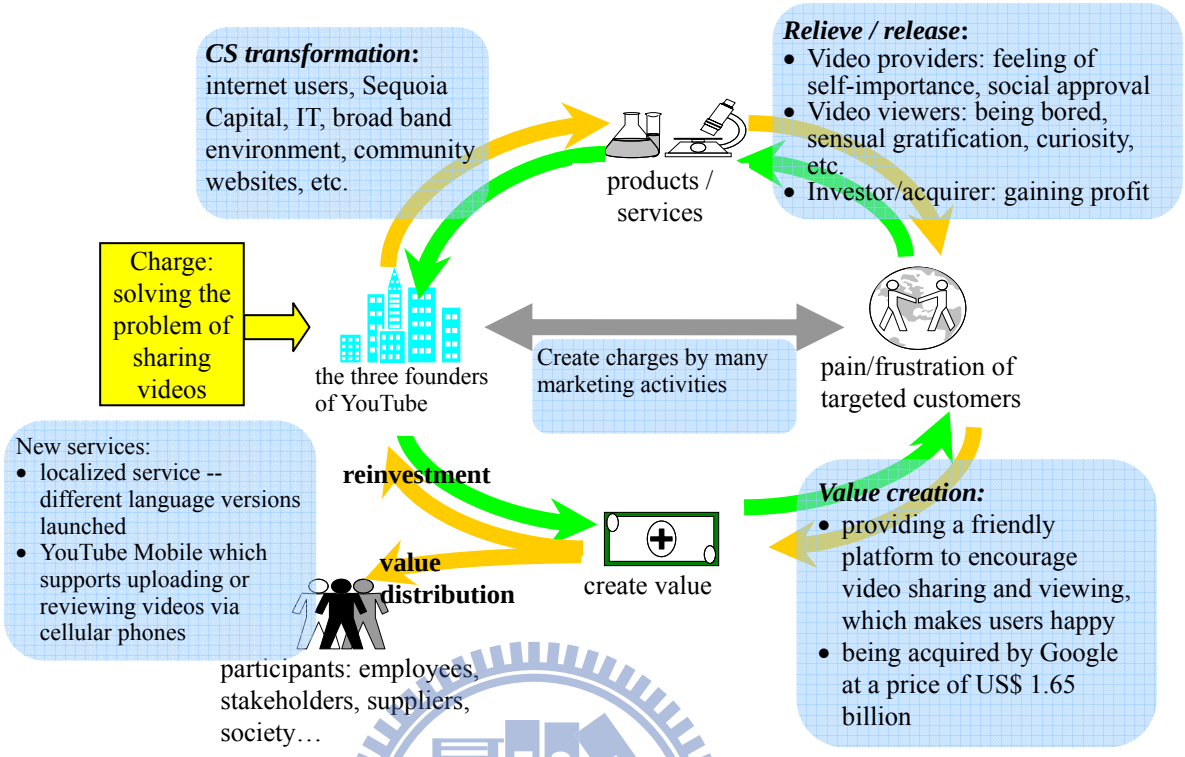

Figure 13: Innovation Dynamics of Case III (YouTube)

6.3.1. Case review (Data source: YouTube official website, *Business Weekly* (Issue 1009), *Insight Magazine* (Dec. 2006), and *Business Next* (Sept. 2006))

6.3.1.1. Introduction to YouTube

Founded by three young men, Chad Hurley, Steve Chen, and Jawed Karim, in February 2005, YouTube is the leader in online videos and a pioneer in viewing and sharing original videos on the World Wide Web. Users can easily upload and share their videos on the YouTube website and view videos through websites, blogs, email, and mobile devices such as cell phones.

Anyone can watch videos on YouTube where users find videos about popular issues, their own hobbies, and all types of strange topics. More and more users are recording their special moments with videos, and YouTube is turning them into the media of the future at the same time.

One month after receiving capital investment from Sequoia Capital, YouTube was founded in December 2005. Chad Hurley and Steve Chen, once members of the management team, are now the Chief Executive Officer and Chief Technology Officer,

respectively. Google Inc. merged with YouTube at a price of US$1.65 billion in November 2006, which was one of the highest-profile merge and acquisition (M&A) events to the present. Figure 13 depicts the Innovation Dynamics of YouTube.

6.3.1.2. Motivation to set up YouTube

Trying to share some videos taken at a get-together with other friends in January 2005, Chad Hurley and Steve Chen were frustrated by the inconvenience of the online video-sharing platforms at that time. Some platforms required certain software, some censored the videos uploaded, and some only provided access to the videos after several days.

Working at PayPal at that time, an online billing service provider, Hurley and Chen believed that their background was sufficient to deal with the technical problems, but no one had really worked on solving the inconvenience of using online video-sharing platforms. One month later, Hurley and Chen began to design an online platform to share videos at Hurley's place in February 2005; YouTube was born.

6.3.1.3. Development process

At the beginning of YouTube in May 2005, Hurley, Chen, and Karim provided the platform to eBay sellers, who showed little interest. After discussion, they realized that they had focused on how to profit from YouTube by charging for the service in the future, while forgetting their original intention to create a user-friendly platform to share videos.

Therefore, they set aside their profit concerns and decided to "stop selling what's created for consumers but creating what they want." They provided "embedded service", which allowed users to view the videos uploaded without connecting to the YouTube website. Users could set up links at their own websites and view the videos there. This decreased the number of visits to YouTube websites, which meant less opportunity to profit from commercials on the websites. In order to provide an undisturbed platform, YouTube continually turned down advertisers and the easy money in its first year until it began online advertisements in its second year.

Discovering this handy platform, a group of young internet users began video blogging in MySpace, the biggest community site globally at that time, with videos uploaded on YouTube. This was a hit in MySpace and also brought YouTube to the attention of the world.

Noticing its surging popularity after the success at MySpace, Sequoia Capital, the sponsor of Google and Yahoo, was introduced by a colleague at PayPal to solve the financial problems for YouTube with an investment of US$3.5 million (NT$116 million). This 1.5 year-old video-sharing company, YouTube, merged with Google, the well-known search engine, at a price of US$1.65 billion in November 2006. This high-profile event was the biggest merger case for Google at that time.

6.3.2. Case analysis

The value creation and innovation processes for YouTube are divided below into sections for further discussion according to innovation dynamics.

6.3.2.1. Competence set analysis

The competence set of YouTube in the beginning stage consisted of its three founders' knowledge, skills, capability, and of course their resources and information inputs. It seemed the founders began from only some old computers and a credit card in a shabby garage; however, information technology, the internet environment (resources), and the influence demonstrated by internet users (information inputs) were all part of the competence set of YouTube.

New human resources (eBay sellers) and new information inputs (the lack of success at eBay and the work experience of putting customers first at PayPal) were added to the competence set in May 2005, followed by internet users, led by those on MySpace, and resources (blogs, video diaries, etc.) after modifying its service in response to the lack of success at eBay.

Other investor competence sets were added after the official release of the YouTube website. Some of them were human resources, such as ex-colleagues, the consultation from Sequoia Capital, financial investment from Google and Sequoia Capital, etc., and of course the internet and media exposure (i.e., many news reports show images taken from YouTube.) Changes in the competence set of YouTube are listed by time in Table 8.

Table 8: Changes of YouTube's Competence Sets

Time	Competence sets (human resources, capabilities, skills, resources, knowledge, information input, hard work, attitude, etc.)
2005/02	*Human resources*: Steve Chen, Chad Hurley, and Jawed Karim *Skills and capabilities*: the technical background from the Information Technology Department at the University of Illinois *Resources*: Hurley's garage and one credit card *Information inputs*: consumer influence demonstrated in 2004; the popularity of Wikipedia among internet users *Sharing*: the maturity of the digital cable environment; the wide use of digital cameras
2005/05	*Human resources*: eBay sellers *Information inputs*: eBay sellers showed little interest in YouTube for its lack of prioritizing consumer needs, which led to service modifications; the work experience of putting customers first at PayPal
2005/10	*Human resources*: internet users (MySpace) *Resources*: blogs and video diaries in the digital environment
2005/11	*Human resources*: ex-colleagues *Resources*: funding; the recognition of YouTube's potential by Sequoia Capital
2006/10	*Human resources*: internet user groups; Sequoia Capital *Resources*: funding; circulation of YouTube videos by media and the internet; Google

As indicated in Table 8, the large number of users, the venture capital firm, and Google, that eventually merged with YouTube, worked with the founders in achieving the success of YouTube. These participants formed an immense set where all kinds of competences interacted and inspired one another to achieve this synergy. The competence set of YouTube is rearranged by participant in Table 9.

Table 9: Competence Set Analysis for YouTube Founders and Other Participants

Participant	Competence sets (human resources, capabilities, skills, resources, knowledge, information input, hard work, attitude, etc.)
YouTube founders	*Human resources*: Steve Chen, Chad Hurley, and Jawed Karim *Skills and capabilities*: the technical background from the Information Technology Department at the University of Illinois *Resources*: Hurley's garage and one credit card *Information inputs*: consumer influence demonstrated in 2004; the popularity of Wikipedia among internet users
Many internet users	*Human resources*: eBay sellers, bloggers on MySpace, blog fans *Capabilities*: using the internet, sharing information, recording and uploading videos, etc.
Sequoia Capital	*Human resources*: the connection from previous investment in PayPal led Sequoia Capital to YouTube *Resources*: funding, expertise in operation and management, experience in bargaining negotiations, etc.
Google	*Human resources*: a large number of users *Resources*: funding, current search engines

As indicated in Table 9, the founders were not the only participants in the competence set. The large number of users exercised their capability for information sharing on the internet, which was also an important factor in the success of YouTube. The contribution of resources from investors was also undeniable. Because of their funding, expertise in operation and management, and experience in bargaining and negotiations for M&A, YouTube survived its financial crises, earned user recognition and popularity, and created value.

6.3.2.2. Analysis of the charge structure

From the perspective of the charge structure, there is another important factor in the success of YouTube. YouTube accurately identified user needs in the actual domain (i.e., the need to share videos on user friendly platforms) and also the underlying desire to express oneself and the needs of attention and recognition hidden in their potential domains. The charge structure for each participant is listed in Table 10.

Table 10: Analysis of the Charge Structure

Participant	Charge structure（including actual domains and potential domains）
YouTube founders	Intention to solve video-sharing problems A taste for sharing Intention to succeed in business
Video provider	Desire to share Desire to express oneself and be recognized
Video reviewer	Boredom; the charge to release boredom through the internet Satisfying one's curiosity; the desire to pry A taste for new information and novel things
Investor/acquirer	Expansion of users with better service Gaining profit Assisting targets to prove the investment decision

As a user-friendly video sharing platform, YouTube released the pain of sharing video files and satisfied everyone's desire to express themselves by conveniently sharing their uploaded videos with the entire world. YouTube provides a platform where everyone can play the lead role in their videos. Satisfying users' need to create and publish with the unlimited influence of the internet, YouTube released the charge of expression and attention for the large number of users and created its underlying advertising value.

6.3.2.3. Value creation

Value has two parts, tangible value and intangible value. The former is evaluated by numbers and the amount of money, while the latter is evaluated by the happiness resulting from satisfaction of needs and charge release in potential domains. Attention was drawn to the US$1.65 billion Google-YouTube merger, especially to the three new billionaires who were younger than 30 years. Some may value YouTube according to the acquisition price, whereas the intangible value YouTube has created is much greater than the tangible one.

To video providers, YouTube, a user friendly platform, encourages video sharing. Growing willingness and number of video providers have boosted the influence of YouTube and its intangible value. Video providers can better satisfy their feelings of self-importance with wide use of the internet and mature user-friendly platforms as more-convenient tools to express themselves. The group function of YouTube allows information sharing among users, who receive social approval from their own fan group built up through this function.

To release the boredom of video reviewers, YouTube provides more options such as online films, news reports, variety shows, etc. The YouTube search engine conveniently enables reviewers to find and join groups with their interests where reviewers exchange information and support one another.

To gain profit is the charge structure for investors. Sequoia Capital did profit from YouTube and released its charge. This investment considerably boosted the image of Sequoia Capital by proving its expertise in assisting new companies and its outstanding insights once again after its successful investment in Google, which has turned out to be the leading global search engine. The success of YouTube created substantial value for Sequoia Capital as a venture capital firm.

Google expanded its users with better services resulting from its acquisition of YouTube, which attracted more advertisers and higher profit. In addition, this acquisition meant that Google did not have to invest in a research and development budget for video-sharing technology, as it specializes in search engine techniques, and those staff members were allocated to other projects.

6.3.2.4. Value reinvestment and distribution

Continued improvements and new functions have been added to the YouTube service portfolio even after the acquisition, meaning that YouTube reinvested its created value into its own products and services in order to satisfy other additional user needs. For example, YouTube has been proactively promoting its global "localized" service since June 2007 with platforms in nine languages in the first stage. The interface is now in multiple languages for users to choose from and the website displays the most popular videos and searches in the user-chosen region. The launch times of the different versions are listed in Table 11. This service makes it easier for users to search for popular videos in their regions and to communicate in their own language.

Table 11: Launch Times for Different Language Versions of the YouTube Interface

Launch time	Launched version
2005/02	US (English)
2007/06	UK (English), Brazil (Portuguese), French, Hiberno-English, Italian, Japanese, Dutch, Polish, Spanish
2007/10	Mexico (Spanish), Hong Kong (traditional Chinese), Taiwan (traditional Chinese), New Zealand (English), Australia (English)
2007/11	Canada (English), German, Russian
2008/01	Korean

Moreover, YouTube is continually developing new services in response to behavioral traits of modern users. For example, YouTube Mobile supports uploading or reviewing videos via cellular phones off the desktop, which applies mobile communication technology and expands the competence sets of YouTube while creating new value for cellular phone users. With its innovation and competence set transformation, YouTube created value, which was later reinvested into competence set expansion, which created greater value by developing new services to release the potential pain and frustration of target groups. This mechanism of a dynamic cycle serves as a perfect example of innovation dynamics.

6.3.3. Summary

From three young men in a garage to a website worth more than US$1.6 billion, the development of YouTube is an example of the continuous integration and transformation of competence sets. Starting from the concept of “customer first”, YouTube not only satisfied the visible needs of customers but also their underlying (invisible) needs during its development. As a matter of fact, “satisfying customer needs” is a concept known to every enterprise. How could YouTube create value faster and more efficiently than other competitors? The trick lay in YouTube releasing the potential charges and pain of an enormous number of users.

By releasing the pain and frustration of target groups, YouTube created value by successfully transforming and expanding its competence sets with different parties and environmental integration. Created value was reinvested and activated the dynamic circulation in the innovation process, which can serve as a solid example of the necessary processes and steps for value creation in any enterprise or institution as described by innovation dynamics.

6.4. Case IV: Wii

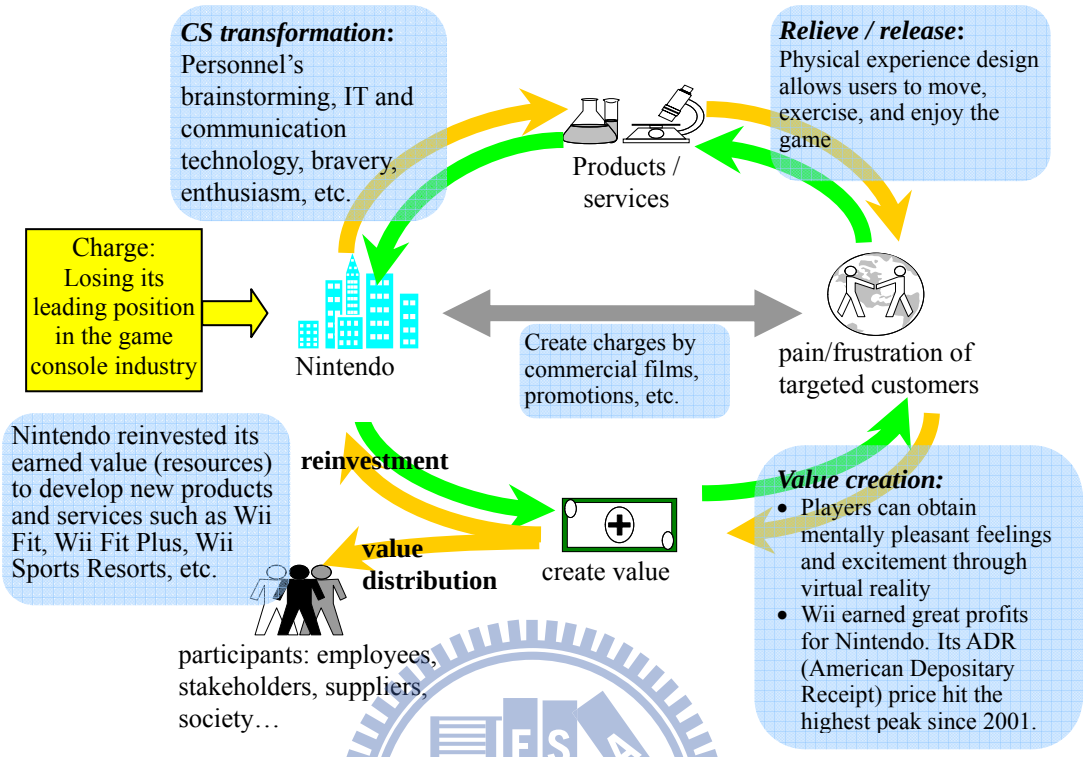

Figure 14: Innovation Dynamics of Case IV (Wii)

6.4.1. Case Review (Data Source: Nintendo official website; *Business Next* Issue 148, 2007/2/15)

Wii, the fifth home game console released by Nintendo, was the direct successor of the Nintendo GameCube. A distinguishing feature of Wii is its wireless controller, the Wii Remote, which can be used as a handheld pointing device that detects movements in three dimensions. Another distinctive feature of the console is WiiConnect24, which enables it to receive messages and updates over the internet while in standby mode. Wii belongs to the 7th generation home game console; its current competitors are Xbox 360 (from Microsoft) and PlayStation 3 (from Sony).

Since the 1970s, Nintendo has been engaged in the video game console industry. In 1996, Nintendo launched the first ever 64-bit video game console, N64; in 2000, Game Boy, its hand-held video game console, reached a record of selling 100 million units globally. At that time, Nintendo entered the markets in both the US and Japan, its ADR price on the NASDAQ Composite Index once reached a peak of US$28. However, N64 failed to compete with the PlayStation series game console manufactured by Sony. In order to gain a market share, Nintendo then launched the

GameCube to contend with Sony's PS and Microsoft's Xbox. Unfortunately, Nintendo's game products were still unable to compete with its opponents; as a result, its ADR stock price was downgraded from 2002, and was even less than US$9 in May 2003, which created a high level of charge on the management. Please see Figure 15 and Table 12 for Nintendo's price and earnings history.

Figure 15: Ten-Year Trend of Nintendo's ADR Price
(from May 1999 to May 2009)

Table 12: Nintendo Price and Earnings History (data from Standard & Poor's)

Year	2001	2002	2003	2004	2005	2006	2007	2008
Calendar year EPS (US$)	0.69	0.71	0.51	0.68	0.69	0.96	2.13	2.38
Change in earnings vs. previous year	N/A	2.90%	-28.17%	33.33%	1.47%	39.13%	121.88%	11.74%
Price/earnings	0.0x	20.2x	44.1x	17.7x	22.6x	25.0x	25.7x	-

Being surrounded by major competitors since the late 1990s, Nintendo lost its leading position in video game console products, and fell into third place. In mid-2006, Wii with the code of "Revolution" was launched, and it helped Nintendo again become the market leader in worldwide console sales. Wii's success brought Nintendo astonishing profits, and its ADR stock price also reflected the popularity for such product. In 2007, the stock price of Nintendo hit a mark of US$35 on the NASDAQ Composite Index which was the highest peak for the past 6 years (see Figure 15). Nintendo's innovation process can be interpreted by Innovation Dynamics as shown in Figure 14.

6.4.2. Case Analysis

Satoru Iwata, the president of Nintendo, stated that Wii is “a disruptive innovation product”. He set up goals “to expand the game population and make people who never played games play.” In other words, Nintendo was trying to get into the potential domain to expand its target customers, and to determine their needs and interests in potential domains so that these potential customers would use its products. In the following subsections, we discuss its competence set analysis and charge structure, and explore how it fits in with the framework of innovation dynamics.

6.4.2.1. Competence set analysis

The expansion and transformation of CSs played a vital role in Wii’s success. Personnel’s brainstorming, information and communication technology, and even bravery and enthusiasm were all important elements in its CS.

The idea of designing Wii Remote began with Satoru Iwata’s interest in TV remote controllers. “People are willing to take TV remote controller for interaction, but not every family member would like to touch the remote controller of a video game console.” Satoru Iwata gave the problem to his R&D colleagues and requested that they make a video game console which would be as popular as a TV remote controller. Thus, in order to achieve such a conceptual idea, Miyamoto Shigeru, Senior Managing Director and General Manager of Entertainment Analysis and Development of Nintendo, gathered designers and engineers together to discuss various opinions and ideas, and created a video game console that can easily attract senior family members with the willingness to buy it. Moreover, the result of personnel’s brainstorming gradually formed the basic goals and concepts for Wii, including being simple, fast starting, power saving, quiet, etc., and many important suggestions occurred that influenced the design of Wii in the process of brainstorming, such as “new video game console should not have too many lines, otherwise it may be easily messed up and made mom to be mad”. Finally, Wii was successfully targeted to female and senior groups who had never played video games before.

In terms of IT and communication technology, Wii successfully integrated wireless communications technology, sensor bars, infrared pointer, etc., into its CSs. Wii’s console embedded the standard wireless networking function, which allows users to access the internet and subscribe to Nintendo DS built-in services, including “Nintendo WiFi Connection” and “WiiConnect24”.

In addition, there are some intangible but extremely important elements to

support the enterprise's innovative activities, such as bravery and enthusiasm. Based on the idea of "amusement is more important than visual attraction", Wii does not support higher definition; thus its visual effects have been greatly exceeded by its competitors, PS3 and Xbox 360. Great courage and enthusiasm were required to do something that departed from the traditional track.

6.4.2.2. Charge structure in potential domains

The video game industry has been around for decades. In the past, producers believed that players' requirements for playing game lay in sensuous gratification of the eyes and ears; therefore, the game's images/sound effects had to be exquisite and vivid.

However, with the development of the "physical experience design", Wii made players physically move their bodies while playing games. In addition to enjoying the fun and excitement of playing games, in a player's potential domain, he/she would like to "win" (for the strong circuit patterns of "social comparison", please refer to Appendix 2). For example, the moment when the physical-experience designed remote controller hits the ball on the screen image, there are vibrations and sound effects of hitting a tennis ball which makes players believe that they have hit a beautiful shot. Moreover, when a player hits an ace and scores, the reachable domains triggered by the actual physical movements may possibly accelerate the player's heartbeat and make the player have feelings of glory and excitement as if he/she was really on a tennis court playing and winning.

In our busy and tense modern societies, the real reason that many people exercise and engage in leisure activities is to relieve physical and mental charges, suffering, and problems. However, not everyone has the time or opportunity to go to a stadium or leisure spots. These are the charge and suffering in people's potential domains. The emergence of Wii turned one's living room into a virtual stadium, or speedway, or fishing pond. Players can obtain mentally pleasant feelings and excitement through virtual reality, As a consequence, the charge in their potential domains can be relieved.

6.4.2.3. Nintendo's innovation dynamics

In Section 6.4.1, we describe the charge structure of Nintendo, which can be regarded as the motivation for Nintendo to innovate. With hard work and persistence in effectively integrating the creative thinking of human resources, the IT environment, and communication technology, in 2006, Nintendo officially announced

the latest generation of its home video game console, Wii. Nintendo successfully expanded and transformed the CSs (as shown in (i) of Figure 6).

As mentioned in Section 6.4.2.2, Wii's physical experience design allowed players to enjoy the movement of their bodies while playing, departing from the traditional "sit and play" way of using a game console. Players get excited and tell their friends. Thus more and more people are attracted to the product. Therefore, the target customers have greatly expanded to include women and seniors. As Wii released the charge, pain, and frustration in the potential domains for a large targeted group of people, many people bought and used Wii and its services. As a consequence, it earned great profits for Nintendo. Please refer to (ii) to (iii) of Figure 6.

To continually upgrade its products and services, Nintendo reinvested its earned value (resources) to develop new products and services. In December 2007, Nintendo further promoted the new-generation software, Wii Fit, which is an exercise game consisting of activities using the Wii Balance Board peripheral. The balance board measures a player's weight and center of gravity. The software can then calculate the players' body mass index when told his or her height. As most people are concerned about their health condition, Wii Fit was very popular and became the fifth best selling videogame in history (among games not packaged with a console) with 18.22 million copies sold as of March 31, 2009. As a result, Nintendo has become far more than a game console provider in the industry; it has also connected communication-related, network-related, and health-related industries. The reinvestment, continuous transformation of the ever growing CS to relieve more customers more pains to create even more value and resource keep on going, which is consistent with innovation dynamics (see Fig. 6 (vi)→(i)→(iii)→(v)→(vi)). Being limited by space, we encourage readers to explore the counter-clockwise cycling of Figure 6.

6.4.3. Summary

Wii was Nintendo's innovative breakthrough. Its innovation was not only in "subverting the traditional design", but more importantly, it satisfied the desires of people "wanting to experience realistic gaming" in potential domains. In the past, the game console industry was always committed to pursuing exquisite graphics and sound and light effects, attempting to satisfy the desires of players. However, luxurious graphics and sound and light effects are needs in the actual domains of gamers (desires for audio and visual aspects). Allowing body movements and feeling the speed, direction, and even the power in a game are strong needs hidden in players'

potential domains. By satisfying the needs of potential domains, Wii recreated the interaction between gamers and games; this not only created value for Nintendo, but also allowed the company to regain its competitive advantage.

6.5. Case V: 85°C Bakery Café

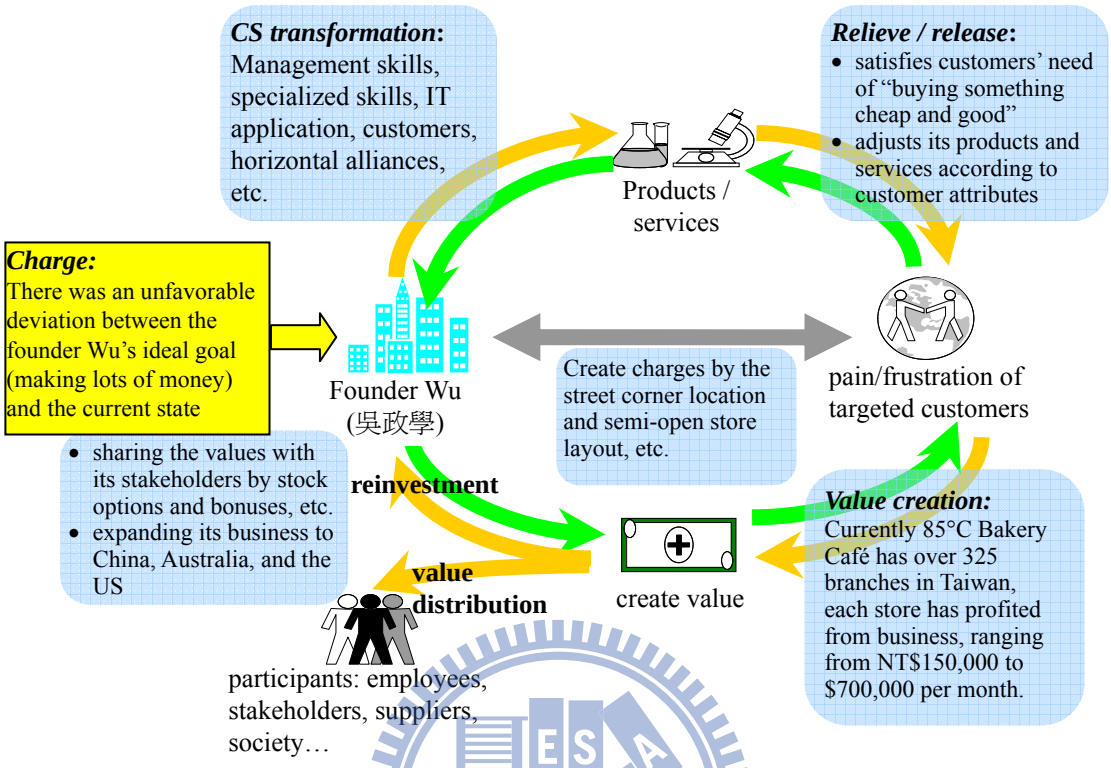

Figure 16: Innovation Dynamics of Case V (85°C Bakery Café)

6.5.1. Case review (Data source: 85°C Bakery Café official website)

Founded in 2004, the 85°C Bakery Café is a chain store specializing in coffee and gourmet pastries run by Comestible Master Co., Ltd. (美食達人股份有限公司). Its founder, C. H. Wu (吳政學), was no stranger to the low-priced food and beverage (F&B) chain business; his previous accomplishments of creating the chain stores of the tea shop "Easy Way Tea" (休閒小站) and the pizza shop "50 Bucks Hot" (50 元熱到家披薩), not only caught the attention of local customers but also attracted franchises to join his business.

Because his parents did not have steady jobs, Wu spent most of his childhood moving around. He often thought about how nice it would be to have his own house. However, he knew that this would take ages to achieve if he worked for others, so he came to the conclusion that if he wanted to make money, he had to own his own business. This pattern was planted deeply in Wu's mind and became a strong influence in his grown-up life.

Easy Way Tea and 50 Bucks Hot were two remarkable successes on his road of

self-employment. Although he left (or finished) these two businesses, he learned valuable lessons from them. The collaboration with Easy Way Tea taught him that he was better suited for managing his own business, where he could maximize his creativity. The failure of 50 Bucks Hot pizza shops taught him that he must be able to control the source of the raw ingredients to ensure the quality of the final product.

In 2004, Wu went to the source of Starbucks' most popular beans and persuaded the Guatemalan supplier to sell him virtually all its Arabica (a species of coffee). Then he hired five-star hotel chefs to concoct fancy drinks and desserts that sell for about half the price of Starbucks'. It truly lives up to its slogan "an affordable extravagance", allowing customers to enjoy quality products without being charged too much, and in turn won their hearts.

Currently, 85°C Bakery Café has over 325 branches in Taiwan and is expanding to China, Australia, and the US. It has surpassed Starbucks to become the largest coffee chain in Taiwan. Figure 16 depicts the Innovation Dynamics of 85°C Bakery Café.

6.5.2. Case analysis

As described earlier in Chapter 5, unfavorable discrepancies existing between the current states and ideal goals of individuals or organizations will create charges which can prompt the individual or corporation to work harder to reach the ideal goals. Through the process of competence set transformation, corporations can design or provide products and services which carry the capability to relieve/release the pains and frustrations of targeted customers. When customers' pains and frustrations are relieved, they become happy. By buying the products or services, the products and services create value, which can be distributed or reinvested to participants and the corporation to develop and produce new products and services, and create more value. The success of 85°C Bakery Café is an excellent example of innovation dynamics described above. Let us illustrate each link (see Figure 16) by applying this case as discussed in the following subsections.

6.5.2.1. Expanding and transforming competence sets

Since his childhood, C. H. Wu, the founder of 85°C Bakery Café, has had a strong pattern planted in his mind: "profit can be made only from self-employment." When there was an unfavorable deviation between Wu's ideal goal (making lots of money) and the current state (still being penniless), this pattern prompted him to search for new opportunities. It created a charge structure which made him brainstorm

about the kinds of services or products that would meet consumer demands. When he finalized coffee and cakes as his main product line, Wu knew (from his past experience of running the pizza shop 50 Bucks Hot) that his cakes must be made by professionals that he could count on. Therefore, he sought out former Agora Garden (亞太會館) dessert chef C. L. Cheng (鄭吉隆). Cheng, who was teaching school at the time, declined Wu's call to join his venture in opening a new business. Unperturbed, Wu repeatedly traveled from Taichung to Cheng's home in northeastern Wanli (萬里) to convey his management concepts, philosophy, and execution plan. After seven visits, Wu finally got the big chef to take on the major task of managing the baking and pastry sector of 85°C Bakery Café (黃亞琪, 2006).

From the point of view of competence set expansion, Wu knew that the specialized skills of the F&B industry was the missing piece of the jigsaw puzzle, so he sought out Cheng for assistance; yet while Cheng possessed the skills, his initial concern of being incompetent to hold a management position kept him from answering Wu's call. When the two people finally agreed to cooperate, their knowledge, skills, and resources enriched the competence sets of 85°C Bakery Café.

Besides recruiting professional talents, 85°C Bakery Café also enhanced its competence sets by utilizing information technology and implementing strategic alliance partnerships to increase its customer base. The corporation adopted the point-of-sale (POS) system that is used by many retail businesses to gain comprehensive knowledge of a product's sales status and analyze sales variance in different time periods. For example, they could find out which flavors are more popular and identify the best time for products to come on stack through the information provided by the system so as to ensure that consumers get products of the highest quality possible.

With joint promotions during special holidays, 85°C Bakery Café also utilizes the competence sets and customer bases of its alliances to increase product exposure. For instance, in 2007 the corporation collaborated with the social networking website, i-Part (愛情公寓), and jointly hosted a Mother's Day cake-decorating contest, in which the winner was chosen based on votes by registered members (「母親節，愛情公寓與你相約在 85 度 C」活動網站, 2007). The event received enormous positive feedback and successfully attracted more attention to both 85°C Bakery Café and i-Part, making it a win-win collaboration for two different industries, online websites and the F&B business, as well as a success of merging the competence sets of the virtual channel with that of the physical channel.

Figure 17 illustrates the competence set transformation process of 85°C Bakery Café. The flexibility of its competence set transformation can be seen from founder Wu's own management capability of seeking out collaborators with specialized skills, and further applying information technology to its operational strategy, expanding the customer base, and partnering with other industries.

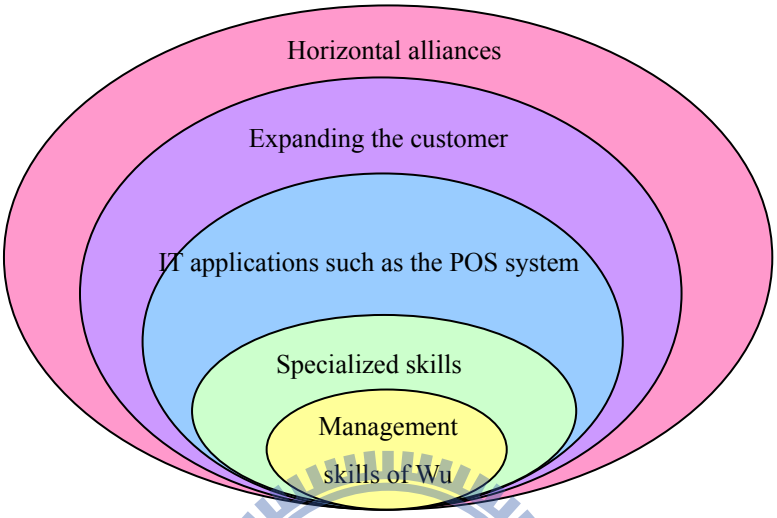

Figure 17: Competence Set Expansion of 85°C Bakery Café

6.5.2.2. Releasing pains and frustrations in the potential domain

What causes pain and frustration? For customers, when commodity prices are sky high and everything is marked up except for paychecks, it creates a charge. In the past, people thought of coffee and desserts as leisurely extravagances with an underlying tint of being high-end commodities. Being aware of this stereotyped thinking from customers, 85°C Bakery Café provides top-quality products at an affordable price. It effectively released the pain and frustration of consumers, and dissolved the stereotype that "low price implies low quality." Figure 18, a list of beverages sold at 85°C Bakery Café, shows that the prices of its products range NT$20~$60, which is only half of what other competing chain coffee businesses (such as Starbucks Coffee under the Uni-President group) offer in their stores. Wu once mentioned in a media interview that he "remembers spending over NT$100 for a cup of coffee… that's like two lunchboxes! It's simply too expensive and unaffordable!" (王曉玟, 2007).

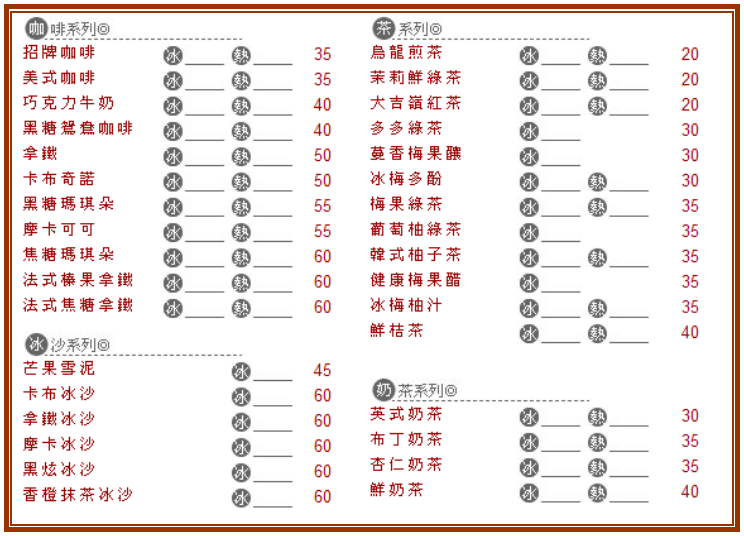

Figure 18: 85°C Bakery Café Beverage Menu.

85°C Bakery Café emphasizes that every one of its products is “an affordable extravagance”, which satisfies the visible need of “buying something cheap and good” in the actual domain of customers. Moreover, it also endeavors to meet and release the needs and frustrations in customers’ potential domains. The following are two instances of its strategies that really consider people’s needs in the potential domains.

(i) It offers customers the option of getting coffee and pastries at the same place. Formerly, the easiest way for people to enjoy afternoon tea like Westerners was to dine at a high-end restaurant. If they wished to enjoy afternoon tea at home, they would need to go to a coffee shop to get coffee, and then go to a pastry shop to get dessert. The service that 85°C Bakery Café offers is a thoughtful approach to meet the needs in the potential domains of customers.

(ii) It adjusts its products and services according to customer attributes. People’s need to consume food and drinks is what generates the F&B industry. It is a need that is observable in actual domains. However, people might not notice that the “timing” of the needs for food and drinks differs for each person, for example, nurses on night shifts, students attending cram schools, blue-collar workers working at the break of dawn, etc. People active in different sectors than regular office workers may miss the chance to enjoy gourmet food because their hours are not compatible with F&B providers operating during regular hours. These are unseen frustrations in the potential domain of customers. Some of 85°C Bakery Café stores are open 24 hours, and many of them adjust the time that freshly made pastries come on-stack based on their locations to cater to those people who are just getting off night shift or

leaving cram school, ensuring that these people can also enjoy steaming bread fresh from the oven. It is not hard to meet demands in the actual domain; knowing how to relieve needs in the potential domain is what has made 85°C Bakery Café the successful business it is today.

6.5.2.3. Creating and distributing value

Presently every 85°C Bakery Café store has profited from business, ranging NT$150,000~$700,000 per month. Wu is never hesitant to share the values and profits that 85°C Bakery Café creates. Stock options are one of the most vital policies of 85°C Bakery Café. Associate managers and above are allowed to purchase company shares, while bonuses are offered as rewards to employees who work hard to reach monthly targets. Wu is convinced that this can enhance employee engagement with the corporation. Currently, 30%~40% of company shares have been purchased by employees. The mindset that "I am my own staff and boss" will enable each employee to work harder both for the company and for him/herself.

Apart from distributing value to its employees, 85°C Bakery Café also reinvests its created value into itself. To meet the massive demand from stores, Comestibles Masters Co., Ltd. bought 2000 ping (about 6600 m^2) of land in Taichung to build a new pastry factory. To keep the corporation in line with international trends and standards, all 85°C Bakery Café stores use state-of-the-art pastry making equipment imported from Japan. The distribution is carried out by over 30 large, compact vehicles in a low-temperature environment, and fresh products are delivered to each store once every 2 days to ensure quality and safety. 85°C Bakery Café also continues to demonstrate its creativity by developing new products with new tastes, such as combining coffee with Taiwanese traditional nougat candy, and selling coffee-flavored egg rolls.

After creating value from its business, 85°C Bakery Café not only shares those values with its employees, but also uses those values to further enrich its competence sets and give back to the community. It distributes the values created in the best ways possible.

6.5.2.4. Creating and releasing charges

Enterprises and organizations can create and release charges directly to target customers (rather than through products or services). The most common way is through marketing techniques such as advertisements and promotional events. Many advertisements create charges for customers through messages that prompt customers

to react in order to release the charges. For example, commercials selling shampoo will always contain a girl with long flowing hair, and with each throw of the head, various messages go through the customer's mind: "What beautiful hair!" "I wish I had such long glowing hair", etc., and when the consumer repeatedly receives this sort of message, a charge will be created and may easily be converted into a motive to purchase the advertised shampoo. Consequently, the motive will turn into action when the consumer finally concludes that "I have to have it!"

Similarly, the decorations and geographical locations of each 85°C Bakery Café store are designed to make customers feel the same way. A typical 85°C Bakery Café store is on a street corner. Other than being a clear target that can be easily identified, the position is usually a street intersection with traffic lights; whenever potential customers such as pedestrians, motorists, or drivers make a stop because of a red light, the bright 85°C Bakery Café store will easily catch their eye. The semi-open kitchen design allows customers to see the entire coffee-making process; the sensory stimulations of seeing the dark liquid drip through the espresso machine and smelling the sweet aroma will strengthen charges in customers (encouraging them to turn the thought, "I have to have one!," into action). Interestingly, unlike most other restaurants, 85°C Bakery Café does not put as much emphasis on its dining space, since the products at 85°C Bakery Café are convenient as to-go orders. Even the display shelves for desserts face outside towards the street rather than in the store itself like regular patisseries. Therefore, the entire purchasing process at 85°C Bakery Café, from giving one's order, paying for it, to taking it away, is done outside the store, which would easily cause passersby to think that there is good business here because of the line outside the store. This induces curiosity in the potential domain. The passersby who may or may not have been planning to make a purchase might stop to take a look, and end up buying something from 85°C Bakery Café.

The display design of 85°C Bakery Café is based on the idea of "creating an impression of a bustling business". By cleverly turning people into a promotional tool, it creates charges in customers. Note that it can also be regarded as a way to transform and expand the competence sets.

6.5.2.5. Creating a win-win situation

The success of 85°C Bakery Café has created winning situations for different participants. As shown in Table 13, for founder Wu, the success of his business has brought him substantial profits and also the achievement of many of his goals in life (such as survival, security, the feeling of self-importance, social approval,

self-actualization, and so on); for franchisers, their dreams of having their own business are realized through joining 85°C Bakery Café, and they profit from it as well; for employees, the stock options and bonuses satisfy their life goals; for consumers, the convenience, low price, and guaranteed quality of the products and services at 85°C Bakery Café release their pains and charges; and for partners of 85°C Bakery Café through strategic alliances, their public exposure is increased, customer base is enlarged, and competence sets are expanded. To sum up, it is a win-win situation for all those involved.

Table 13: Creating a Win-Win Situation

Participant	**What they get**
Founder	Profits
Franchisers	Professional assistance in creating a business, realization of the dream of being self-employed, profits
Employees	Making a living off of stock options and bonuses while realizing their life goals
Consumers	Convenience, low price, guaranteed quality
Alliances	Increased exposure of one's own brands through collaborative projects

6.5.3. Summary

Begun in 2004, 85°C Bakery Café has successfully expanded its business volume to more than 300 franchises in Taiwan, Australia, China, and the US. The key factors in this achievement can be summed up as follows.

(i). Creating charges gently

85°C Bakery Café made a breakthrough when it put two different products, coffee and cakes, together. The exquisite-looking cakes and the pleasant smell of freshly brewed coffee create a gentle charge for customers who planned to buy one or the other but who end up buying both products. Additional charges were also created from opening stores on street corner locations despite the higher rent, as well as utilizing outward-facing display shelves.

(ii). Releasing charges effectively

Wu came up with the idea of selling five-star quality goods at affordable prices after seeing people's willingness to line up to buy a NT$150 five-star quality lunch box when the entire nation was under the threat of SARS. Noticing customers' needs hidden in the potential domain, 85°C Bakery Café not only provides the best quality

products at the best value, but also offers different solutions, such as adjusting the time that freshly baked pastries come out or offering customers wireless internet access in the store, to release charges for target customers. Its increasing popularity comes from the fact that it can meet many of the actual and potential needs of its customers.

(iii). Transforming and expanding competence sets flexibly

Wu's management expertise, the professional skills of the five-star hotel dessert chefs, and the aid of information technology contribute to the competence sets of 85°C Bakery Café, and have allowed it to surpass other competitors in the F&B industry. In addition, greater exposure and a larger customer base were gained from strategic alliances with online social networking platforms. The transformation and expansion of its competence sets have allowed the business to continue developing new and better products to create value and a win-win situation for all participants.

6.6. Discussion and Implication

In the above sections, the five case studies discussing innovation and value creation are all consistent with Innovation Dynamics. They might not have Innovation Dynamics in their minds, but unwittingly, they follow the pattern of Innovation Dynamics. If a corporation is aware of Innovation Dynamics, it can avoid stepping into decision traps. By examining the operations of each link in Innovation Dynamics, corporations can understand if each and all links are properly developed, so that they can continuously upgrade their products/services and maximally create value by releasing pains and frustrations for the customers in the potential domains. The Innovation Dynamics can help them to be as successful and competitive as Super Girl, YouTube, Nintendo, Wretch, or 85C Bakery Cafe.

The Innovation Dynamics also points out that each and all links must be properly examined and developed. Missing one of them could lead to serious mistakes. For instance, if the distribution of the created value is unfair or ineffective, the stakeholders can be disintegrated or lose the morale for continuously upgrading the products/services.

Without Innovation Dynamics, people can easily get into decision traps. They may focus on some activities in certain links and neglect those on other links (decision making in changeable spaces), which could lead to serious problems. As an example, suppose corporations emphasize on all the links, except that of pains and frustrations of the customers in the potential domains. They may not be able to

provide the products/services which could really satisfy customers' needs and release their charge. For example, in Nintendo's case (Section 6.4), its opponents (Sony and Microsoft) focused their video game console design on the game's image/sound effects to satisfy people's gratification of sight and sound. They paid little attention to the gratification of physical movement and emotional excitement of winning while playing a video game. As a consequence, they lost their market competitiveness to Nintendo. The case clearly shows that if companies cannot create value, they cannot survive. To create value, companies need to reduce or remove the pains and frustrations of potential customers in the potential domains.

Let us look at the following example, the failed acquisition of BenQ-Siemens, to illustrate how innovation and business management can fail if decision makers are unaware of the major points of innovation dynamics. BenQ-Siemens was the mobile communications subsidiary of the Taiwanese BenQ Corporation. In October 2005, the division was formed out of BenQ's acquisition of the then struggling Siemens Mobile Group. The goal of the company was to pull together BenQ's lifestyle experience, their renowned design team, and Siemens' engineering capabilities to create a new leader in the mobile communications arena. Unfortunately, due to huge financial losses of over NTD35 billion (which is about USD1.1 billion), in September 2006, BenQ announced that it would stop investing in the German division of the company (Siemens Mobile Group). BenQ-Siemens filed for bankruptcy in a Munich court in 2006, and the acquisition failed.

According to Pritchett (1987), companies have as much as a fifty-fifty chance of achieving a successful merger, with the worst case findings of up to 80 percent of all mergers being disappointments. Merger and acquisition, as two ways to expand corporate CSs, are actually an integration of different corporate HDs, including different human resources, skills, technologies, management styles, problem solving attitudes, corporate cultures, etc. Some of these parameters are observable, but some are not. If BenQ had understood innovation dynamics, it would have been aware that in link (i) to (ii) of innovation dynamics (see Figure 6), the variables hidden in PDs (such as attitudes, management styles, cultures, etc.) must be taken into account when expanding or transforming their CSs. The difficulties of integrating two corporate CSs and HDs should not be underestimated, and this risk-taking strategy could have been avoided or at least reconsidered.

A similar experience occurred to Dell, which attempted to reinvent itself from a PC and server maker to an all-encompassing IT products and services company, but did not succeed in launching its first smartphone product or buying a small,

little-known developer of high-end data storage technology called 3PAR (藍書平, 2010). Although it is good at manufacturing and delivering low-cost PCs, Dell missed cues from its markets that the company needed to change. It focused on maximizing earnings out of its existing resources and capabilities rather than thinking about what its customers needed. As indicated in link (ii) to (iii) of innovation dynamics, this can lead to failures or mistakes. Therefore the company has not had an easy time claiming a bigger stake in higher-margin corporate-focused businesses – like storage services that 3PAR offers – and fast-growing consumer markets such as smartphones.

Chapter 7. Contributions and Conclusions

7.1. Contributions

While pursuing a better decision making tool or problem solving model, one must remember that it is human beings who are making decisions. To solve decision making problems efficiently and effectively, one should manage, improve and enhance the most essential decision making tool - our own human systems. This dissertation introduces the concepts of Habitual Domains and decision makings in changeable spaces as to describe the dynamics of human behavior and the changing nature of decision making problems. Understanding the dynamic feature of parameters in decision making, the behavior dynamics and HDs of ourselves and others can enable people to study, search, and identify the best change of the relevant parameters as to become a superior strategist and decision maker.

This dissertation also introduces the concepts of Competence Set Analysis and discusses the relationship between CS and decision blinds and traps. As suggested by this study, by looking into the depth of potential domains to acquire and master the needed competence sets, decision makers can reduce decision blinds, avoid decision traps and obtain better solutions for decision problems in changeable spaces.

Based on HD theory and CS analysis, a framework of Innovation Dynamics is introduced. The dynamics describes how we can expand and enrich our CSs on one hand and maximize the value of our CSs on the other hand. In the aspect of business management, corporations are not just facing one single decision problem but a sequence of problems in changeable spaces. Innovation Dynamics provides a framework to show systematically the cycling processes including transforming CSs, developing products/services, releasing pains and frustrations for targeted customers, creating and releasing charge, creating and distributing values, etc. It allows us to examine key management problems in potential domains in the dynamics. The contributions of Innovation Dynamics can be summarized as follows:

(i) Providing a blueprint for corporations to create value:

In the increasingly competitive world, many corporations in search of higher competitiveness have turned to such means of cooperation as direct investment, strategic alliances, common development, acquisitions, etc., to maximize corporate synergy and expand markets. The Innovation Dynamics proposed in this paper are the blueprint these corporations need. By utilizing the aforementioned clockwise and counterclockwise exploration of the framework, one can effectively discover a

corporation's innovation direction and value. The success of this study will provide corporate leaders with a concrete and powerful management ideal and means, enabling them to continue creating value and attain sustainability in a competitive environment.

(ii) Creating a virtuous cycle in non-profit organizations (NPO):

Besides enhancing competitiveness and creating value for business corporations, Innovation Dynamics can also be applied to NPOs. Satisfying the life goals and obtaining a sense of achievement are all intangible values; these potential values cannot be measured with money. As the saying goes, "You can buy a house, but you can't buy a home; you can buy sex, but you can't buy love." The values in potential domains are not quantifiable. NPOs carry out public services and pursue the prosperity of society; Innovation Dynamics can assist in sublimating the invisible and intangible values within to create a virtuous cycle. Moreover, even though NPOs seem to have nothing to do with commerce, they do need knowledge of organization management. The management keys emphasized at each link of Innovation Dynamics can be a useful reference of organization planning and strategic implementation for NPOs.

(iii) When applied to the self, being able to bring good to self and others

Every person has his or her own competence sets; Innovation Dynamics can also be applied to the self to utilize one's competences (including those in PDs, such as contacts, people skills, etc.) and create values, thereby releasing others' pain and frustration, creating one's own values. Similarly, when we experience pain, frustration, and need, we can also use this system to understand how to transform our CSs and release the pain and frustration of a certain group under certain circumstances. By following the clockwise or counterclockwise directions of the Innovation Dynamics, we can continuously create and accrue our CSs, continuing to release the pain and frustration of ourselves and others; and we will move towards an ideal habitual domain (HD), giving us more strength, higher productivity, and more joy in increasing our own energies, so as to release the charge, pain, and frustration of even more people. As a result, the success of the study of Innovation Dynamics will not only bring advantages to corporate management, but also bring prosperity to personal management of the self, even bringing prosperity to society as a whole.

7.2. Conclusions

In this dissertation, the dynamics of human behavior, the concepts of decision

making in changeable spaces, HDs, CS analysis, Innovation Dynamics and its verification are introduced. It first explores the dynamics of human behavior through eight basic hypotheses, which is a dynamic decision making in changeable spaces. The stability of this behavior dynamics leads to the concept of HD. The stability of HD on one hand makes us to be more efficient for routine problems; on the other hand, it can hinder one's innovation.

Decision problems, like human beings, have their HDs. Some of the related parameters, such as alternative sets, criteria sets, outcome sets, etc., are observable and existed in actual domain, but some of them are invisible and hidden in the reachable domain and potential domain. The interaction of these visible or invisible parameters forms a changeable space. In fact, CSs of a problem is a projection of the HDs of the decision makers on the problem. This study enable us to understand that to obtain better solutions for decision making in changeable spaces, decision makers need to look into the depth of potential domains to acquire and master their needed CSs.

Based on Habitual Domains theory and Competence Sets analysis, Innovation Dynamics is introduced to describe a process of dynamic decision making in changeable spaces. This framework is closely related to studies in management fields; furthermore, it is connected with psychology and behavioral science, which makes the process and results of innovation better suited to satisfy the true needs of human nature, and releases the pain and frustration of target group more effectively and efficiently.

Innovation Dynamics delivers the concepts of "sustainable innovation" and "continuous value creation", which perfectly match the basic objectives of a corporation: sustainability and profit. This framework does not emphasize a one-time innovation success; rather, by continuously exploring the abundant resources in potential domain, it assists the corporation in perpetual development and growth.

Besides the "clockwise cycle" of transforming competence sets into goods and services, creating value, and distributing value, Innovation Dynamics also has the "counterclockwise cycle" of setting the goals of value, looking for the pain, frustration, and charge of target customers in potential domains, finding the right product or service to develop, discovering the needed CS transformation, and releasing the pain and frustration of everyone involved (including the corporation and potential consumers) as to satisfy their needs. The former provides a direction for those corporations that "already own a certain competence set but do not know how to

utilize its values"; the latter is reference for corporations that "lack innovative spark and do not know from where to transform competences to open a process of innovation." Whether it is the clockwise or counterclockwise cycle, Innovation Dynamics can comprehensively explicate the process by which corporations innovate and create value, proving it to be an all-encompassing theoretical framework. The case studies discussed in this paper, such as Super Girl, Wretch, YouTube, Wii, and 85C Bakery Café, all perfectly exemplify the Innovation Dynamics framework, powerfully depicting the process and means by which a corporation or organization creates value or enhances competitiveness.

Innovation Dynamics explores that in a corporation's process of enhancing competitiveness, there must be breakthroughs and expansions in the corporation's own habitual domain, and the corporation must effectively transform and utilize its competence sets. In the area of the target customers, the corporation must find a way to locate consumers in the PD; in satisfying customers' needs, it must be able to discover and satisfy the wants and needs in the PD. When put to practical application, the different departments of a corporation can perform according to their specialties in the different stages of the Innovation Dynamics process, so as to implement the Innovation Dynamics framework more effectively.

Future studies remain to be explored. For instances, how to identify and understand the relevant and/or key parameters and their potential change in decision making effectively and efficiently? How to restructure the relevant parameters so that each participant in the decision problem can declare a victory as to form a win-win strategy? How to effectively detect and deal with decision traps and decision blinds before we commit mistake? How to systematically analyze the invisible potential domains as to find effective method to acquire, adjust and allocate needed competences in potential domains? The hypotheses of Innovation Dynamics need to be tested. Mathematical analysis for specific decision problems in each link of Innovation Dynamics would be of great interest to study. Answers to these questions will bring value to both practical decision making in changeable spaces and academic research in decision science.

References

1. 大西洋新聞，2005/8/22，“超級女聲短信投票瘋狂圈錢”，http://ent.dayoo.com/gb/content/2005-08/22/content_2189069.htm
2. 「母親節，愛情公寓與你相約在 85 度 C」活動網站，http://www.i-part.com.tw/html/action/070419/mothersday_index.html
3. 85℃ Bakery Café Official website, http://www.85cafe.com/
4. Nintendo Official website, http://www.nintendo.com
5. Wretch Official website, http://www.wretch.cc/
6. YouTube Official website, http://www.youtube.com
7. 商業週刊第 1009 期
8. 遠見雜誌 2006 年 12 月號
9. 數位時代雜誌 2006 年 9 月號
10. 王曉玟（2007）。500 大服務業。天下雜誌，第 371 期，2007 年 5 月 9 日。
11. 黃亞琪（2006）。85 度 C 咖啡的連鎖傳奇。理財周刊。2006 年 02 月 10 日。
12. 周立軒（2005）。網誌的使用者與使用行為之研究。元智大學資訊傳播研究所碩士論文。
13. 劉江釗（2005）。部落格之社會網絡與自我呈現初探。中山大學資訊管理研究所碩士論文。
14. 陳邦鈺、莊 芳（2005）。讓蒙牛銷售額從人民幣七億元上翻至二十五億元。今周刊，第 460 期。
15. 賴聲川（2006）。**賴聲川的創意學**。台北市：天下雜誌出版。
16. 藍書平（2010）。五年股價跌六成，戴爾「睡過頭」。天下雜誌，第 457 期，pp. 248-249。2010 年 10 月 6 日。
17. 龐文真（2006）。完全解讀無名小站。數位時代，第 137 期，pp. 46-55。
18. Nardi, B. A., Schiano, D. J., Gumbrecht, M. & Swartz, L. (2004). Why we blog. *Communications of the ACM, 47*(12), 41-46.
19. Chan, S. J. & Yu, P. L. (1985). Stable Habitual Domains: Existence and Implication. *Journal of Mathematical Analysis and Application, 110*(2), 469-482.
20. Chang, H. L. & Chen, P. C. (2009). Expanding the competence sets of drivers to alter their habitual domains when addressing the route choice problem. Working paper, submitted to *International Journal of Information Technology and Decision Making* for publication.
21. Chen, T. Y. (2001). Using competence sets to analyze the consumer decision problem. *European Journal of Operational Research, 128*(1), 98-118.
22. Chen, T. Y. (2002). Expanding competence sets for the consumer decision problem. *European Journal of Operational Research, 138*(3), 622-648.
23. Christensen, C. (1997). *The innovator's dilemma.* Harvard Business School

Press.

24. Chiang-Lin, C. Y., Lai, C. C. & Yu, P. L. (2007). Programming Models with Changeable Parameters-Theoretical Analysis on Taking Loss at the Ordering Time and Making Profit at the Delivery Time. *International Journal of Information Technology and Decision Making, 6*(4), 577-598.
25. Cohen, W. M. & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly, 35*(1), 128-152.
26. Dong, J., Zhang, D., Yan, H., & Nagurney, A. (2005). Multitiered Supply Chain Networks: Multicriteria Decision-Making Under Uncertainty. *Annals of Operations Research, 135*(1), 155-178.
27. Dyer, J. S., Fishburn, P. C., Steuer, R. E., Wallenius, J., & Zionts, S. (1992). Multiple Criteria Decision Making, Multiattribute Utility Theory: The Next Ten Years. *Management Science, 38*(5), 645-654.
28. Dogson, M. (1991). Technology, learning, technology strategy and competitive pressures. *British Journal of Management, 3*(2), 132-149.
29. Dosi, G. (1982). Technological paradigms and technological trajectories. *Research Policy*, *11*(3), 147-162.
30. Drucker, P. (1969). *The age of discontinuity. Guidelines to our changing society*. London: Heineman.
31. Edquist, D. (1997). *Systems of innovation. Technologies, institutions and organizations*. London: Pinter.
32. Ehrgott, M. (2006). A Discussion of Scalarization Techniques for Multiple Objective Integer Programming. *Annals of Operations Research, 147*(1), 343-360.
33. Feng, J. W. & Yu, P. L. (1998). Minimum Spanning Table and Optimal Expansion of Competence Set. *Journal of Optimization Theory and Applications, 99*(3), 655-679.
34. Hauser, J., Tellis, G. J., & Griffin, A. (2006). Research on innovation: a review and agenda for marketing science. *Marketing Science*, *25*(6), 687-717.
35. Hu Y. C., Chen R. S., & Tzeng G. H. (2002). Generating Learning Sequences for Decision Makers Through Data Mining and Competence Set Expansion. *IEEE Transactions on Systems, Man, and Cybernetics, 32*(5), 679-686.
36. Hu, Y. C., Chen, R. S., Tzeng, G. H. & Chiu, Y. J. (2003). Acquisition of Compound Skills and Learning Costs for Expanding Competence Sets. *Computers and Mathematics with Applications, 46*(5-6), 831-848.
37. Hu Y. C., Tzeng G. H. & Chen C. M. (2004). Deriving Two-Stage Learning Sequences from Knowledge in Fuzzy Sequential Pattern Mining. *Information Sciences, 159*(1), 69-86.

38. Huang, G. T., Wang, H. F. & Yu, P. L. (2004). Exploring Multiple Optimal Solutions of Competence Set Expansion Using Minimum Spanning Table Method. Proceedings of the 11th Conference on Habitual Domains, 163-175.
39. Huang, J. J., Ong, C. S. & Tzeng, G. H. (2006). Optimal Fuzzy Multi-Criteria Expansion of Competence Sets Using Multi-Objectives Evolutionary Algorithms. *Expert Systems with Applications, 30*(4), 739-745.
40. Kline, S.J. & Rosenberg, N. (1986). An overview of innovation. In R. Landau & N. Rosenberg (Eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth* (pp. 275-306). Washington, DC: National Academy Press.
41. Leonard-Barton, D. (1995). *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*. Harvard Business School Press.
42. Li, H. L. & Yu, P. L. (1994). Optimal Competence Set Expansion Using Deduction Graphs. *Journal of Optimization Theory and Applications, 80*(1), 75-91.
43. Li, J. M., Chiang, C. I., & Yu, P. L. (2000). Optimal Multiple State Expansion of Competence Set. *European Journal of Operational Research, 120*(3), 511-524.
44. Lin, C. C. (2006). Competence Set Expansion Using an Efficient 0-1 Programming Model. *European Journal of Operational Research, 170*(3), 950-956.
45. Lin, C. M. (2006). Multiobjective Fuzzy Competence Set Expansion Problem by Multistage Decision-Based Hybrid Genetic Algorithms. *Applied Mathematics and Computation, 181*(2), 1402-1416.
46. Mcadam, R. (2000). Knowledge management as a catalyst for innovation within organizations: a qualitative study. *Knowledge and Process Management*, *7*(4), 233-241.
47. Opricovic, S. & Tzeng, G. H. (2003). Multicriteria Expansion of a Competence Set Using Genetic Algorithm. In: Tanino, T., Tanaka, T. and Inuiguchi, M. (Eds), *Multi-Objective Programming and Goal-Programming: Theory and Applications* (pp. 221-226). Springer.
48. Opricovic, S. & Tzeng G. H. (2009), "Competence Set Expansion: Multicriteria Routing Model and Compromise Solution", Working paper, submitted to Management Science for publication.
49. Patel, P. & Pavitt, K. (1994). National innovation systems: why they are important and how they might be measured and compared. *Economics of Innovation and New Technology*, *3*(1), 77-95.
50. Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York, NY: The Free Press.
51. Pritchett, P. (1987). *Making Mergers Work: A Guide to Managing Mergers and*

Acquisitions. Homewood, Illinois: Dow Jones-Irwin.

52. Salukvadze, M. E. (1971a). Optimization of vector functionals, I. The programming of optimal trajectories. *Automation and Remote Control 32*(8), 1169-1178.
53. Salukvadze, M. E. (1971b). Optimization of vector functionals, II. The analytic construction of optimal controls. *Automation and Remote Control 32*(9), 1347-1357.
54. Schumpeter, J. (1934). *The theory of economic development. An inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge: Harvard University Press.
55. Shapiro, S. (2001). *24/7 innovation: a blueprint for surviving and thriving in an age of change.* M. McGraw-Hill.
56. Shi, D. S. & Yu, P. L. (1996). Optimal Expansion and Design of Competence Set with Asymmetric Acquiring Costs. *Journal of Optimal Theory and Applications*, *88*(3), 643-658.
57. Tidd, J., Bessant, J. & Pavitt, K. (2005). *Managing Innovation*, John Wiley & Sons Ltd, Chichester.
58. Yu, P. L. (1977). Decision Dynamics, with an Application to Persuasion and Negotiation. In: M. K. Starr & M. Zeleny (Eds), *Studies in the Management Science* 6 (pp. 159-177). North Holland.
59. Yu, P. L. (1980). Behavior Bases and Habitual Domains of Human Decision/Behavior -- Concepts and Applications. In: G. Fandel & T. Gal (Eds), *Multiple Criteria Decision-Making, Theory and Applications* (pp. 511-539). New York: Springer-Verlag.
60. Yu, P. L. (1981). Behavior Bases and Habitual Domains of Human Decision/Behavior - An Integration of Psychology, Optimization Theory and Common Wisdom. *International Journal of Systems, Measurement and Decisions, 1*(1), 39-62.
61. Yu, P. L. (1985). *Multiple Criteria Decision Making: Concepts, Techniques and Extensions*. New York, New York: Plenum Press,.
62. Yu, P. L. (1989). *Understanding Behaviors and Forming Winning Strategies*, Monograph, School of Business, University of Kansas.
63. Yu, P. L. (1990). *Forming Winning Strategies, an Integrated Theory of Habitual Domains*. Berlin, Heidelberg, New York, London, Paris, Tokyo: Springer-Verlag.
64. Yu, P. L. (1991). Habitual Domains. *Operations Research, 39*(6), 869-876.
65. Yu, P. L. (1995). *Habitual Domains: Freeing Yourself from the Limits on Your Life.* Kansas City, Kansas: Highwater Editions.
66. Yu, P. L. (2002). *Habitual Domains and Forming Winning Strategies*. Taiwan:

NCTU Press.

67. Yu, P. L. (2009). *HD: Habitual Domains, the Human Softwares That Determine Your Life*. Taipei, Taiwan: Reading Times.
68. Yu, P. L. & Leitmann, G. (1974a). Compromise Solutions, Domination Structures and Salukvadze's Solution. *Journal of Optimization Theory and Applications, 13*(3), 362-378.
69. Yu, P. L. & Leitmann, G. (1974b). Nondominated Decisions and Cone Convexity in Dynamic Multicriteria Decision Problems. *Journal of Optimization Theory and Applications, 14*(5), 573-584.
70. Yu, P. L. & Zhang, D. (1989). Competence Set Analysis for Effective Decision Making. *Control Theory and Advanced Technology, 5*(4), 523-547.
71. Yu, P. L. & Zhang, D. (1990). A Foundation for Competence Set Analysis. *Mathematical Social Sciences, 20*(3), 251-299.
72. Yu, P. L. & Zhang, D. (1993). A Marginal Analysis for Competence Set Expansion. *Journal of Optimization Theory and Applications, 76*(1), 87-109.
73. Yu, P. L. & Chiang, C. I. (1999). Judgmental fuzziness and habitual domain, *International Journal of Fuzzy Systems*, 1(1), 11-21.
74. Yu, P. L. & Lai, T. C. (2004). Knowledge management, habitual domains, and innovation dynamics. *Lecture Notes in Artificial Intelligence*, *3327*, 11-21.
75. Yu, P. L. & Chiang-Lin, C. Y. (2006). Decision traps and competence dynamics in changeable spaces. *International Journal of Information Technology and Decision Making, 5*(1), 5-18.
76. Yu, P. L. & Chen, Y. C. (2010a). Dynamic MCDM, Habitual Domains and Competence Set Analysis for Effective Decision Making in Changeable Spaces (Chapter 1). In: M. Ehrgott *et al.* (Eds), *Trends in Multiple Criteria Decision Analysis, International Series in Operations Research & Management Science*, *Volume 142* (pp. 1-35). Springer.
77. Yu, P. L. & Chen, Y. C. (2010b). Dynamic multiple criteria decision making in changeable spaces: from habitual domains to innovation dynamics. *Annals of Operations Research*, to be published. doi:10.1007/s10479-010-0750-x
78. Yu, P. L. & Chen, Y. C. (2010c). Blinds, fuzziness and habitual domain tools in decision making with changeable spaces. *Human Systems Management, 29*(4), 231-242.

Appendix 1: A Structure of Goal Functions (Yu 1990, 2002, 2009)

[1] ***Survival and Security*:** physiological health (correct blood pressure, body temperature and balance of biochemical states); right level and quality of air, water, food, heat, clothes, shelter and mobility; safety; acquisition of money and other economic goods;

[2] ***Perpetuation of the Species*:** sexual activities; giving birth to the next generation; family love; health and welfare;

[3] ***Feelings of Self-Importance*:** self-respect and self-esteem; esteem and respect from others; power and dominance; recognition and prestige; achievement; creativity; superiority; accumulation of money and wealth; giving and accepting sympathy and protectiveness;

[4] ***Social Approval*:** esteem and respect from others; friendship; affiliation with (desired) groups; conformity with group ideology, beliefs, attitudes and behaviors; giving and accepting sympathy and protectiveness;

[5] ***Sensuous Gratification*:** sexual; visual; auditory; smell; taste; tactile;

[6] ***Cognitive Consistency and Curiosity*:** consistency in thinking and opinions; exploring and acquiring knowledge, truth, beauty and religion;

[7] ***Self-Actualization*:** ability to accept and depend on the self, to cease from identifying with others, to rely on one's own standard, to aspire to the ego-ideal and to detach oneself from social demands and customs when desirable.

Appendix 2: Eight Common Behaviors (Yu 1990, 2002, 2009)

[1] ***Social Comparison***: People have an innate drive to evaluate themselves, and in the absence of objective means, they make their evaluation by comparing themselves with other people.

[2] ***Halo Effect***: To judge other people, one tends to first classify the subjects into two groups: good or bad. People in the good class take on all the positive attributes of good people; and people in the bad class take on the negative features of bad people.

[3] ***Projection Effect***: Human beings have a strong tendency to assume that other people are similar to themselves when they don't know other people's attributes, personality, attitudes or thoughts. In other words, when we need to judge other people, we frequently tend to project our own judgments onto them and assume that they make the same or similar judgments.

[4] ***Proximity Theory***: People are more likely to develop good friendships or intimacy when they live closer together rather than when they live farther apart.

[5] ***Reciprocation Behavior***: People tend to like those whom they know like them and dislike those whom they perceive dislike them.

[6] ***Similarity Effect***: It has been commonly recognized that people with similar backgrounds, attitudes and thought processes are more likely to develop good friendship and intimacy among themselves than are people with different backgrounds, attitudes and thought processes.

[7] ***Scapegoating Behavior***: When people are in a state of frustration or anxiety, and when they don't know the source of their frustration, or they know the source but do not dare to attack it directly, they often tend to search for a substitute to attack in hopes of releasing their frustrations.

[8] ***Responsibility Diffusion in Group Behavior***: When people do something together without a precise and clear assignment of their responsibilities, some of them tend to neglect, to a certain degree, the responsibilities which they would otherwise assume.