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## 創業機會之發展—需求與資源整合觀點

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國際合作研究計畫國外研究報告書一份

# **The Nature of Entrepreneurial Opportunity: Amalgamation of Subjective and Objective Opportunities**

## **Introduction**

As a field of scholarly inquiry, entrepreneurship has attracted significant attentions among various disciplines. From psychology to economics, scholars conducted numerous researches, mainly in that the entrepreneur and the new organization bring something new to the world, with the potential for transforming the civilization of human being, economically and socially.

Entrepreneurs, from psychologists' perspective, are uncommon individuals who possess unique personalities and motivations, and consequently introduce new products and services to people (e.g. McClelland, 1961; Brockhaus, 1982). Psychologists investigated personal traits and social backgrounds of entrepreneurs thoroughly, believing that these presumably idiosyncratic characteristics were prerequisite to and deterministic of entrepreneurial activities. Such person-centric approach has advanced our understandings on entrepreneurs as individuals, but was criticized in its insufficiencies in explaining how entrepreneurs succeeded in starting a new business or forming a new organization (e.g. Eckhardt & Shane, 2003; Shane, 2000; Shane & Venkataraman, 2000).

In response to such insufficiencies originated from the cross-sectional and static person-centric perspective, scholars advocated an alternative to move the focus away from characteristics of agents to actions of agents. They expected more fruitful insights from studies on the dynamic process of enterprising to understand how entrepreneurs discover, evaluate, and exploit entrepreneurial opportunities (Eckhardt & Shane, 2003; Stevenson & Jarillo, 1990; Venkataraman, 1997), where entrepreneurial opportunities were defined as “. . . situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships” (Eckhardt & Shane, 2003), or as “a set of environmental conditions that lead to the introduction of one or more new products or services in the marketplace by an entrepreneur or by an entrepreneurial team through either an existing venture or a newly created one” (Dutta & Crossan, 2005).

Studying entrepreneurial opportunities, researchers have delved into the phenomenon from different

angles. Eckhardt and Shane (2003) distinguished Schumpeter (1934) and Kirzner (1973)'s views on sources of opportunities. In Schumpeterian standpoint, exogenous shocks such as changes in technology, regulation, and other factors in the environment generated entrepreneurial opportunities, while in Kirznerian perspective, entrepreneurs capitalized on prior knowledge and experience, or on information asymmetries, and were thus able to "alert" to opportunities which could not be recognized by others.

Such a contrast could also be found in Gartner, Carter, and Hills (2003). Analyzing prior researches on entrepreneurial opportunities, the authors argued that the phenomenon has been studied from two ontologically distinctive perspectives. The first, , predominant among North American researchers, attached mainly to a positivist/realist positions, suggesting that opportunities existed objectively in the environment, waiting to be discovered. The second, more prevalent in the European research tradition, was anchored in the interpretive or social constructionist position, proposing that entrepreneurial opportunities were enacted subjectively by entrepreneurs, rather than discovered.

Although past researches in both traditions have contributed a significant body of knowledge on how entrepreneurs dealt with opportunities, the phenomenon and process is still far from well-understood, especially the relationship between the Schumpeterian/objective opportunities and Kirznerian/subjective opportunities. How do entrepreneurial opportunities arise actually? Do environmental upheavals create objective opportunities, or entrepreneurs, based on their prior knowledge and experience, enact subjective opportunities, or both? Which type of opportunities, in what context, is more salient or vital in the entrepreneurial process? This article aims to extend our understanding on entrepreneurial opportunities by conducting exploratory case studies to examine the process of how objective and subjective opportunities arise, as entrepreneurs act to enterprise, and the relationship between the two types of opportunities.

This article is structured as follows: we begin by highlighting the two distinct streams of researches on entrepreneurial opportunities, and then we illustrate our research method. Narratives on our case companies will be presented next, followed by findings and discussion. Finally, we conclude the article with implications and future research suggestions.

## **The Schumpeterian Objective Opportunities versus the Kirznerian Subjective Opportunities**

Entrepreneurial opportunities have gradually been accepted as the center of entrepreneurship researches. As stated earlier, researches on entrepreneurial opportunities are generally categorized into two streams:

the Schumpeterian view focused on opportunities created by exogenous shocks or environmental upheavals, while the Kirznerian perspective centered on idiosyncratic individual characteristics such as alertness, prior knowledge, and information asymmetry (Eckhardt & Shane, 2003; Gartner *et al*, 2003). The distinctions need to be explored in depth and reconciled to shed light on the nature of entrepreneurial opportunities. In the following paragraphs, we examine past development of the two seemingly contrasting research streams, aiming to lay a solid theoretical ground for our case studies.

Schumpeter (1934) introduced the concept that economic development proceeded in cyclic fashion along several time scales. Periods of market efficiency were punctuated by periods of upheaval. He further depicted entrepreneurs as individuals who initiated “creative destructions” to disturb economic equilibrium, and thus facilitated economic growth (Schumpeter, 1942). Changes in technology, regulation, and other factors brought opportunities for entrepreneurs to use resources differently, and consequently introduced new goods or services, brought in new methods of production, opened up new markets, utilized new sources of supply of raw materials, or created certain new organizational forms in the industry (Schumpeter 1934, 1942). Eckhardt and Shane (2003) illustrated several examples of “exogenous shift-based opportunities”, including “those spurred by government action, those triggered by demographic changes, and those generated by the creation of new knowledge” (p.341). These opportunities arise due to exogenous shocks in the environment, regardless of individual entrepreneurs.

Kirzner’s (1973, 1979, 1997) theory, similar to Schumpeter’s, also considered the entrepreneur as the primary human actor regarding entrepreneurial opportunities, and as the driving force of economic growth. However, contrary to the Schumpeterian view of exogenous shocks as the main source of entrepreneurial opportunities and entrepreneurs as individuals who disturb economic equilibrium, Kirzner argued that entrepreneurs, capitalizing on knowledge and information gap, alerted “to possibly newly worthwhile goals and to possibly newly available resources” (Kirzner, 1973, p. 36), and thus equilibrated the economy, which, in Kirzner’s market process theory, never reached so-called equilibrium. Kirzner’s viewpoint implies that entrepreneurial opportunities are idiosyncratic to the individual; only these who possess adequate knowledge or information can alert to opportunities. Entrepreneurial psychologists, based on the Kirznerian view, further brought cognitive psychology to the study of entrepreneurship, aiming to build the model to explain how entrepreneurs perceive changes in their environment and alert to opportunities (e.g. Gaglio, 1997; Gaglio & Katz, 2001). For example, Gaglio and Katz (2001) presented a schema of the entrepreneurial alertness process, where alert individuals are found to have a more accurate and veridical perception of the environment (Gaglio & Katz, 2001). Other researchers in their studies also found that factors idiosyncratic to individuals, such as prior knowledge (Shane, 2000) and social networks (Singh, Hills, Hybels, & Lumpkin, 1999), did affect the way entrepreneurs identify opportunities.

In sum, both Schumpeterian and Kirznerian view recognize opportunities' crucial role in entrepreneurial process, but, conversely, they focused on different aspects of opportunities. Schumpeterian scholars emphasized more on the impacts of exogenous shifts in the environment, namely, the "objective opportunities", while Kirznerian scholars stressed the importance of characteristics idiosyncratic to the individual entrepreneurs and the way they identified opportunities, that is, the "subjective opportunities". Evidences from past researches revealed that both types of opportunities, objective and subjective, played substantial roles in the entrepreneurial process. Due to complexity associated with the process, neither could be neglected. To understand the nature of entrepreneurial opportunities, it is, we believe, essential to take both into consideration, and explore their interrelationship. Such a belief drove us to conduct case studies to explore both types of opportunities in depth, simultaneously. We now introduce our research method to indicate how we preceded our case studies.

## **Research Method**

We adopt exploratory case study (Yin, 1983; Eisenhardt, 1989) in this research. Four reasons explain why we choose this approach. First, exploratory fieldwork is essential in emerging areas of research that lack an extant body of consolidated theories and data (Glaser & Strauss, 1967; Noda & Bower, 1996). Second, qualitative studies are necessary where organizational or entrepreneurial processes are involved. Quantitative measurements are either inappropriate or not preferred in this situation (Gartner & Birley, 2002; Van Maanen, 1979; Yin, 1983). Third, exploring fine-grained processes of how an entrepreneurial opportunity arises requires a level of analysis not available through survey-based researches (Yin, 1983). Finally, the use of exploratory case research enables ideas to be developed for further study (Noda & Bower, 1996).

Six companies were selected for case studies. The firms were chosen through purposeful sampling (Patton, 1990), which is a criterion-based selection method that permits a sample to be constructed fitting a predefined profile. We aim to maximize the richness of information from the cases, and therefore choose the strategy of "intensity sampling", where information-rich cases that "manifest the phenomenon of interest intensely" are selected (Patton, 1990). The six companies were chosen from various of industries, ranging from retailing and high-tech hardware/software to medical equipment. They were formed in different periods of time by founders with diverse profiles, and faced dissimilar social, economic and institutional environment in their founding stage.

To assure our correct understandings of the formation of entrepreneurial opportunities, we broadened our examination of the process to include as more relevant activities as possible. The data required for the study were collected from both in-depth interviews with founders/CEOs/CTOs/managers and publicly available archival sources, including company websites and documents (such as financial reports, annual reports, corporate press releases, public conferences, and magazine or newspaper reports). Follow-up questions and answers were conducted via email communications iteratively. Data analysis relied on a mixture of thick description and pattern matching, of an iterative process and a grounded approach, as suggested by the comparative case study approach (Eisenhardt, 1989). The data obtained from interviews, email and archival sources were triangulated, revealing a high level of consistency (Denzin, 1978; Janesick, 1994).

We divide our presentation of data analysis and discussion of findings into two main parts. In the next section, Case Description, we illustrate the detailed process of how the external environment changed or evolved during the founding stage of each firms, and how the founder(s) acted to identify and seize opportunities. In the section of “Findings and Discussions”, we further analyze data to reveal the relationship between objective and subjective opportunities, and endeavor to theorize. Implications for researchers and for practitioners, limitations of the present study and future research suggestions, will also be covered in this section.

## **Case Description**

### **RT-Mart**

Founded in September, 1996, by the Ruentex Group, a prestigious conglomerate in Taiwan and China, RT-Mart International Ltd. is currently the second largest discount retail chain store in Taiwan. Annual revenue of RT-Mart reached NTD\$37.5 billion (around US\$ 1.14 billion at the exchange rate of 33) in 2003, and number of stores amounted to 23 in Taiwan and 40 in China in the following year.

The discount retail industry in Taiwan began as Makro, a Dutch chain of self-service wholesale stores (now part of the German-based Metro Group), formed a joint venture with a local partner and started operation in Taiwan in 1989. A French rival, Carrefour, also opened its first store in Taiwan later in the same year. Despite business models of the two companies were not exactly the same, both were brand new to Taiwan. Their self-serving, volume-discount, wholesaling, and one-stop-shopping nature

inaugurated a new era of the retail industry in Taiwan. The two companies led the discount retail market in Taiwan since, with Carrefour ranked number one and Makro number two.

However, for such a highly densely populated country as Taiwan (ranked the ninth in the world), it was extremely difficult to acquire lands for operations of big stores, especially those with huge space for warehousing and extensive parking lots. With very limited choices, the two pioneers operated mostly either in the industrial districts or in the residential areas, where commercial activities were legally banned, and were thus fined repetitively by the government. Some of their stores were even forced to be shut down.

In 1992, the Ruentex Group started to conduct pilot studies on retailing, which had not been included in its business portfolio. Its land development and construction arm even planned to work with a Japanese partner to open a big discount retail store in the ground floor of a newly constructed multi-functional building in the outskirts of Taipei, the capital city of Taiwan. However, lacking of necessary expertise and perceiving high risks due to government regulations, Ruentex Group temporarily put its retailing business plan on hold. The already renovated store was then rent to Carrefour, and later ironically turned to be a cash cow for the rival.

Not until November, 1994 did the government alter the regulation on land use. A new law was passed to allow large retailing stores and supermarkets to operate in certain pre-authorized industrial-commercial complexes. Retailers could also apply for alternation of land use in the industrial districts if they had already operated there. The deregulation provided a favorable institutional environment for potential retailers, relieving the previously major concern of land acquisition.

The Ruentex Group did not start their retailing business right away after the deregulation, though. Deregulation indeed resolved the issue of land acquisition, while the long process of application made the conglomerate hesitate to penetrate the market immediately. They conducted more researches on the retail industry, finding that lifestyle in Taiwan changed rapidly during that period of time: percentage of working women increased dramatically, ownership of car per household also increased from 24.9% in 1989 to 45.5%, 48%, 51.2% in 1994, 1995, and 1996 respectively. It was confirmed that demographic changes in Taiwan presented good opportunities for the discount retail business. The legal process gradually improved in the year of 1995, and the group filed its applications for setup of retail stores. Experts in retailing were also recruited, though there had not been many in Taiwan then.

RT-Mart was officially founded in September, 1996, without initial capital of NTD\$ 1 billion (around USD\$ 30.3 million), of which 40% came from the textile wing of the Ruentex Group, another 40% from

the construction arm of the group, and the remaining 20% from Dr. Yin, Yang-Liang, the group chairman. The first store was opened in March, 1997; two additional stores were opened via equity exchange with a small local retailer later in this year, and expanded their operation. The management team did not have abundant experiences in retailing, but they learned by doing, and accumulated sufficient know-how soon. They adjusted traditional supermarket business model to include grocery as part of their product mix, aiming to attract working women, who did not have much time to do grocery.

In the next year, RT-Mart further acquired three more stores from another small local retailer, turning them into bigger discount supermarkets. Fast expansion and right business model brought RT-Mart to surpass Makro and become the second largest chain of discount retail stores in 1999. The company also commenced its operation in China in 2000, and continued to prosper.

### **Advanced Analog Technology**

Founded in March, 1999 by Dr. Liu, Shou-Tsung, Advanced Analog Technology Incorporated (AAT) specialized in the development of analog semiconductor products, such as power management integrated circuit (IC), used in LCD displays, cellular phones, and consumer electronics such as digital cameras and mp3 players. Annual revenue of 2004 reached NTD\$326 million (around USD\$9.9 million).

After receiving his PhD degree in electrical engineering from University of California at Irvine, Dr. Liu has been working for companies like Rockwell and Motorola, accumulating over 22 years of experience in the semiconductor industry before he founded AAT in 1999. His prior experience equipped him with thorough understanding of the industry, especially in the field analog semiconductors, in which power management account for an important part.

Traditionally, large chipmakers in the semiconductor industry, such as Intel, Texas Instrument, Rockwell, and Motorola, produced chips from scratch on their own. The value chain was long, comprising of designing, manufacturing (more often known as “foundry” or “fabrication” now), testing, assembling, and packaging. The 1980s saw the beginning of a trend toward outsourcing semiconductor manufacturing operations. Two key activities of IC development, the electronic design process, and the manufacturing (fabrication) of physical devices, were gradually separated. Some companies began choosing to focus their energies on designing novel chips, while relying on contract manufacturers, or foundry partners, to produce the physical product. Since they do not own or operate semiconductor fabrication facilities (or “fabs”), these chip companies are often called “fabless.”

Initially, designers from the fables submit their designs, piggy-backing on manufacturing lots of large commercial semiconductor manufacturers. However, running a business around this model was difficult. These large semiconductor manufacturers sold production capacity on a surplus basis, as a secondary business activity. As every manufacturer had its own internal production-commitments to fulfill, the external fabless customer could not expect a stable, guaranteed capacity source. The situation did not change until Taiwan Semiconductor Manufacturing Co. Ltd. (TSMC) pioneered the dedicated foundry business model.

TSMC was founded in 1987 as the world's first dedicated merchant foundry. The dedicated foundry business model offered several key advantages to its customers: First, it did not sell finished IC-products into the supply channel, thus a dedicated-foundry would never compete with its fabless customers. The common concern for the fabless was resolved. Second, the dedicated foundry could scale production-capacity to a customer's needs. TSMC offered low-quantity shuttle-services in addition to full production-lines. Finally, the dedicated foundry offered a "COT-flow" (customer owned tooling), which allowed the fabless customer to completely control over the design-process, from concept to mask-ready status. The dedicated foundry business model flourish the fabless firms, and even chipmakers that own fabs (often called integrated device manufacturers, or IDMs) increasingly depended on foundries to ease some the burdens of manufacturing. Many major semiconductor manufacturers were turning to foundries for chip production. For example, STMicroelectronics, the world's ninth biggest semiconductor company in 1999, indicated a goal of outsourcing about 20% of its total fabrication operations.

Success of TSMC stimulated the development of foundries in the Asia/Pacific region and Japan. Both Japanese and Taiwanese government created special areas, known as "science cities" or "industrial and science based parks", which were designed to attract high-tech plants, including dedicated foundries and plants for back-end operations, sometimes known as test, assembly, and packaging (TAP) operations. Indispensable services for the fabless firms were all available in these science cities; sometimes even major customers were located in the same area. In addition, the foundries continued to rapidly expand their production capacities, accompanied by the imbalance of supply and demand in the semiconductor industry, leading to a cyclical pattern of capacity utilization. In the period of low capacity utilization, fabless firms have very strong bargaining power against dedicated foundries. The year of 1999 happened to be a good year for the fabless firms.

Dr. Liu perceived the favorable industrial environment, and, based on his past experience in the semiconductors industry, the huge potential for power management ICs due to the flourishing variety of devices such as cellular phones and personal digital assistants (PDAs), decided to found AAT in Taiwan, where foundries and other semiconductor manufacturing services were abundant. The first product of

AAT was a switching power supervisor, which was moderately successful after its launch. In the year of 2000, Dr. Liu observed the thriving of LCD display industry in Taiwan, and determined to change the company's focus to the development of power management ICs for LCD displays. The first product was launched in 2001 and became the first IC made by local firms in Taiwan. The product's good quality and reasonable price very soon attracted AU Optronics Corporation, the biggest LCD display vendors in Taiwan, to adopt, and soon built up the company's reputation as a specialist of power management for LCD displays. The company continued to grow fast and prosper, and went public in 2004.

## **CWeb Technology**

In 1999, Dr. Jang, Roger Jyh-Shing, a UC Berkeley PhD in electronic engineering and his wife, Ms. Huang, Sue co-founded CWeb Technology in the Incubation Center of National Tsing Hua University (NTHU) in Taiwan. Before establishing the company, Dr. Jang was a faculty member in the Department of Computer Science in NTHU, and, at the same time, led the Multimedia Information Retrieval (MIR) Laboratory in the Department. Much of the Lab's activity centered on melody recognition algorithms.

Melody recognition algorithms allow a user to “query by humming”. The engine records the singing and analyzes its melodic and rhythmic characters. Both attributes are to be compared with known melodies, and further used for a database lookup. If someone wants to look for a song or musical item, he simply sings a melody, and the melody recognition engine will respond to his whistling, singing or humming, delivering the requested song to him. The user does not need to know other information, such as name or lyrics of the song. The technology is also “singer independent”—any users' humming can be recognized, regardless of their voice. Unlike some speech recognition technologies, melody recognition developed by the Lab does not require users to repetitively “train” the system to adapt. Neither does it call for users' intentional break-ups of humming into discrete excerpts of melodies. Singing naturally and continuously is acceptable.

Such as powerful algorithm could be applied to numerous musical searches, such as the query service for a musical library. Dr. Jang and Ms. Huang creatively chose a unique way to apply the technology—karaoke. Karaoke is a form of entertainment where recorded music accompanies an amateur singer. The music is typically of a well-known song in which the voice of the original singer is absent or highly reduced in volume. Lyrics are usually also displayed, sometimes including scenic views or good-looking guys and gals with the music, to help with the sing-along. Karaoke has been a popular form of entertainment in Japan since at least the 1980s, and has since spread to other parts of Asia and the world, including Taiwan.

In Taiwan, singing is a pastime for all generations. Since Karaoke's origination 20 years ago, Taiwan has also picked up on the craze. Karaoke very soon became extremely popular, and transformed to a new form—KTV, or Karaoke Television. KTV is a variation of Karaoke; instead of singing on a stage in front of friends and some random people, KTV is done in the customers' own rooms so there is more privacy if they feel uncomfortable to sing in public. The market of KTV has been growing fast in Taiwan in late 1990s, reaching a significant size of NTD\$18.2 billion (around US\$551.5 million) in 2001, and became the biggest segment in the recreational services industry in Taiwan (Directorate General of Budget, Accounting and Statistics, 2001).

Perceiving the huge potential of the karaoke/KTV market in Taiwan, Dr. Jang and Ms. Huang started to apply the melody recognition algorithm to develop Karaoke software, a PC (personal computer) based solution to "turn the PC into a karaoke machine". The software helped users search for songs on their own computer by humming, and they could then sing along. The product was launched in May, 2000. Unfortunately, the product was never a hit. CWeb Technology's founders did not give up right away; they kept looking for other opportunities to improve their product. As a well-trained and certified network management engineer, Ms. Huang's soon identified the Internet as a platform for online karaoke, and pooled necessary resources to build up an online karaoke web site, where users could search for songs online, sing along and be graded based on similarity of the user's singing to the original performer's, record the singing and share it online with specified users.

CWeb spent a fortune to license popular songs legally, avoiding possible legal disputes with the recording industry, as in the case of Napster. Users paid for initial membership fees and purchased a software pack with credits online or at convenience stores, installed the software and activated the credits, and they could enter CWeb Technology's online karaoke lounge to sing. Once the credits were used up, users could buy more online or at shops. Various services and activities such as forum, entertainment news, singing competition, etc. were later added to the web site, and gradually turned the site into an entertainment center, where users could meet or even date new people. Members accumulated very soon—active members reached 32 thousand within one year.

The founders kept looking for new opportunities. Introduced by Dr. Chang's high school classmates, some IC designers, whose products were used in consumer electronics, started to work with CWeb Technology. Dr. Chang and Ms. Huang licensed their intellectual property to the IC designers, who then embedded the melody recognition algorithm in chips for further use in toys. The first toy product "Bingo the Beagle Plush Sing-A-Long" was launched in the fourth quarter of 2003, and marketed by Manley, a major US toy company. The plush toy recognized kids' humming and sings along with them. Success of the toy attracted quite a few venture capitalists' attentions, and revealed their interests in funding CWeb

Technology. The company is currently in the second-round of fund raising, and considers establishing another new company to dedicate in intellectual property licensing on their melody recognition algorithm.

## **Syntech Information**

Syntech Information, founded in 1988, designs, manufactures, and markets bar code scanner products and systems worldwide. The majority of the company's products are marketed under its own brand name, CipherLab. The company's customer base is a diversified, well-established roster of major enterprises, including Compaq, Fiat and Bayer. Syntech's annual revenue in 2004 was NTD\$ 1.1 billion (around USD\$ 33.3 million). The company is listed on the Taiwan OCT market.

In 1988, seven National Tsinghua University alumni founded the company. These old classmates have started their researches on bar code while in college, and consequently accumulated adequate knowledge in the field of bar code. During the research process, they collaborate with several key persons in the bar code business in Taiwan, and established and maintained good relationships with them.

When they graduated, they entered the same company. This was the first company to sell bar code technology in Taiwan. After few years, they left the company one by one and built their own company, SYNTECH. Because they had long been familiar with the sales manager of their former company and the sales manager knew their capabilities, the sales manager usually introduced customers to them. In the first stage of their business, all of their customers came from this previous network relationship.

There were already some famous competitors like UNITECH, which was an agency of a foreign bar code company, when SYNTECH entered bar code market. UNITECH found high gross margins of profit of bar code products. It tried to develop products by revising suppliers' products. However, instead of revising, SYNTECH developed its own products which meant the products were unique in the world. It became the first company had capability to develop barcode in Taiwan.

Thus, because it was a late mover in the bar code market and the products SYNTECH designed were not good in the beginning. The products were always in great demand because of uniqueness. Many customers had great confidence in SYNTECH and asking SYNTECH to keep developing other products like LCD. SYNTECH developed LCD with a better quality than other companies. This again proved SYNTECH had better skills than its competitors.

Performing well in Taiwan, SYNTECH decided to push their products into foreign markets.

At that time, Australian agencies had a common bad image about Taiwan firms because they thought the firms from Taiwan were always bad in accountability. SYNTECH found the opportunity and started to

communicate with and persuade Australian agencies that SYNTECH would always satisfy agencies' needs. Because SYNTECH had good accountability, it got agencies' trust and expanded into the Australian market within a year.

In conclusion, the opportunities seemed everywhere when these founders founded SYNTECH because there were few people who had advanced skills in Taiwan. However, only people who had the skills could hold the opportunity. Namely, it was a subjective opportunity resulting from the founders' capabilities and network resources. We could see the founders in the case had built good network relationships when they even were college students and freshmen in the society so that they could get many orders during the first few years. New enterprises usually failed due to low sales volume, SYNTECH founded.

Although other competitors like UNITECH also recognized the high gross margin of bar code market, they could not hold the opportunity effectively. They did not have capabilities like SYNTECH's founders who graduated from National TSINGHUA University, a leading university in the technology field in Taiwan. Another reason for the success of SYNTECH was its accountability to cooperate with foreign agencies so it got the agencies' trust. It showed the importance of complementary firms for the success of starting a firm.

## **Portwell**

Founded in 1993 by three PC industry veterans with initial capital of NTD\$ 5 million (around USD\$152 thousand at the exchange rate of 33), Portwell dedicated itself to design and production of industrial computers. The company provides a full range of industrial personal computer (IPC) products for use in the telecommunication, medical electronics, industrial automation, and information security industries. The company filed its IPO in the Taipei Stock Exchange OTC market in 2001, with 265 employees and 2004 annual revenue of NTD\$ 1.889 billion (around US\$ 57.2 million at the exchange rate of 33).

Before establishing Portwell, the three founders were working at the modem division and later IPC division of MiTAC, a major Taiwanese computer manufacturer. Productions of IPC products were very different from those of standard PCs. Orders of IPC products usually came in very small quantities but in a large variety, compared with standard PCs, and sometimes required considerable customizations. With frequent conflicts encountered in capacity allocation in production lines, and insignificant portion of revenue accounted for the whole company, the IPC division was never a focus in manufacturing companies such as MiTAC, which produced standard products in large quantities. In 1993, two founders of Portwell, Mr. Chang, Ling-Hung and Mr. Chang, Ray-chang, decided to leave MiTAC to pursue their entrepreneurial career life, and thus founded the company.

At the very beginning, the two founders, based on their experience in MiTAC's modem division earlier, considered the modem market very lucrative, and hence led Portwell to develop and sell modems to overseas customers. Unfortunately, the technologies used in modem had been highly matured, and the market was seriously commoditized, making it virtually impossible to differentiate. As a small startup, Portwell was unable to compete with well-established incumbents, who had been enjoying the benefits from economy of scale. Continuous losses forced the two founders to give up production of modems, transformed the company to a distributor of modems.

For a certain period, Portwell sustained itself by sourcing modem products from Taiwan and selling them to overseas customers. The two founders' experience in MiTAC's IPC division again inspired them to incorporate IPC, starting from the third quarter of 1994, as part of their product mix. Success of the sales of IPC products encouraged the two founders to expand the company's IPC business; they invited Mr. Chen, Chi-chung, a previous subordinate of Mr. Chang, Ling-Hung in MiTAC, to join Portwell in early 1995. The three entrepreneurs then chose to focus on IPC business by developing and producing their own IPC products, and exit from the modem market.

In 1995, the main stream IPC market was still dominated by Intel 486 CPU. Intel launched the first Pentium CPU in 1993, which gained popularity among standard PCs very shortly. But the IPC market did not pick up as soon. Requirements of computing power in traditional industrial applications, such as automation and industrial control systems, were not so high as the consumer and commercial market. At that time, Intel 486 CPU was powerful enough for IPCs. Existing IPC customers did not reveal any needs or even interests in new products with more powerful CPUs. The three entrepreneurs therefore encountered a tough decision to make: to go for Intel's 486 CPU or Pentium CPU? If they chose 486, keen competition would be inevitable because there had been numerous competitors with outstanding products in the market. However, the market for Pentium-based IPCs simply did not exist. It was extremely risky to launch such a new product.

The failure experience of the modem business made the entrepreneurs hesitate to pick Intel 486 CPU. They expected to face the same situation as in their modem business earlier. Seeing no competition yet in the market then, they finally chose to adopt Intel Pentium CPU for their first IPC product. Product developers were recruited shortly, and the basic product was born soon in October, 1995, around four months after the initial development. Two months later, an enhanced model was introduced, followed by another advanced model with dual CPUs launched in February, 1996.

Established competitors such as Advantech, the biggest IPC vendor in Taiwan, had different view toward Intel Pentium-based IPCs. They thought IPC market was limited to applications of automation and industrial control systems, which did not require high CPU performance. Intel 486 CPU was powerful enough to handle all these applications. In addition, these companies emphasized more on stability than on novelty of their products. Their development philosophy tended to halt a new product from being launched if the product was not stable enough. As a result, none of these bigger players introduced their Pentium-based IPC products as soon as Portwell, which was able to preempt the market for around six months.

Sales of the Pentium-based IPC products did not pick up very soon. In the first half of 1996, Portwell received occasional small orders, with customers buying the products simply for trial. Not until late 1996 did sales of the product start to increase significantly. In 1997, demand of the Pentium-based IPCs surged, and became the mainstream product. Portwell's sales revenue in 1997 reached NTD\$ 490 million (USD\$15 million), and profit amounted to NTD\$ 100 million (USD\$ 3 million), roughly 10 times of increased capital of NTD\$ 10 million (USD\$ 0.3 million) in 1996. Portwell's sales revenue continued to grow steadily in the following years, and the company moved into a stable and established position.

Retrospectively, the three entrepreneurs attributed success of their Pentium-based IPC products to new demand emerged unexpectedly—the computer telephony applications. Traditional circuit switch equipments used in call centers was only provided by large telecommunication companies, such as Nortel and Siemens. These equipments were very expensive. Computer telephony applications, which utilized computers to process voices, were introduced by information technology vendors like SUN Micro Systems, highly reducing the cost of setting up a call center, and gradually replaced old telecom switch equipments. However, the hardware provided by SUN Micro Systems, due to its proprietary architecture and components, was still much more expensive, when compared with ubiquitous personal computers. Microsoft, in 1995, developed computer telephony application programming interface (API), allowing users to write their own telephony application programs on standard personal computers. PCs again replaced SUN's proprietary computers to become the most prevalent computer telephony equipment. Meanwhile, computer telephony applications on PCs require much more computing powers, which could not be fulfilled by old 486-based PCs. Noticing that quite a few trial customers used Pentium-based IPCs for computer telephony applications, Portwell customized their product to allow users to add on 2.5 times more telephony-related components. Portwell's products could find no rival, in terms of performance and expandability, and very soon became a market leader. Analyzing Portwell's sales data, the three entrepreneurs found that the majority of sales in 1996 and 1997 indeed came from computer telephony applications, and confirmed their attribution.

## **Clinico**

CLINICO Company, the largest agent of eye and ear care instruments in Greater China, was founded in 1987. The founder of CLINICO Company was Lin, who was the head of the ophthalmology department in an important company that sold equipments of medical treatments before 1987.

At that time, the ophthalmology department was a small Strategic Business Unit (SBU) in that company but with a high growth rate under Lin's leadership. There were seventy percent of the ophthalmologists used company's products in Taiwan. To become a specialist in ophthalmic instruments, Lin read professional magazines including foreign leading journals hardly. Lin recognized there would be an industrial revolution in the medical treatment in the 1980's.

Before 1980, ophthalmologists could only treat patients by using internal medicine. After 1980, the abundance of new technology in upstream led to the development of skills using lasers and microscopes in America. The progress in these skills reduced the risk of ophthalmic operations and made more hospitals have the capability to proceed to ophthalmic operations.

Although there was technical progress in upstream industry in America, lots of ophthalmologists in Taiwan did not know how to use this advanced equipment. No one in the industry recognized the gap except Lin. It was a good chance for Lin to introduce the advanced equipment into Taiwan. So he offered his idea to his boss, the owner of the company.

But his boss didn't accept his idea because there seemed to be more opportunities in other departments such as the dialysis department and the orthopedics department. His former company would not catch the opportunity due to the organizational inertia in resource distribution so the ophthalmology department was spun off from the company after their coordination and Lin became the general manager of the new company, CLINICO, in 1987. Lin's former boss became the major stockholder in the new company.

The most important reason Lin could exploit the opportunity effectively was he kept good relationships with his former company. That way he could apply network resources like the authority of agency and customer database from former company to CLINICO.

Lin had the first-mover advantage because other companies had not recognized the opportunities yet. In order to keep the advantage, Lin decided to sell the equipment to the ophthalmologists directly instead of distributors. So his salesmen could establish good relationships with the ophthalmologists. This way other companies have no chance to contact ophthalmologists.

At that time, there were many ophthalmologists did not know how to use this advanced equipment because they had left school for many years. They could not use try and error in their daily operations because it's impossible to use patients' real eyes for practice.

CLINICO built experimental laboratories, offered free equipment and invited foreign specialists to teach updated operation skills to ophthalmologists. CLINICO spent lots of time and money teaching ophthalmologists. The professional image of CLINICO was established accordingly. It made CLINICO became the leading firm in the market in a very short time.

The opportunity Lin recognized was an objective opportunity resulting from the progress in upstream industry. The reason Mr. Lin recognized the opportunity was he had watched out the technical development and industry trend in the developed countries carefully so that he could catch the opportunity earlier than his competitors. When downstream had followed up upstream more and more ophthalmologists used new equipment already, the opportunities for starting new enterprise disappeared.

## **Findings and Discussion**

Data drawn from the cases were analyzed by examination of both the exogenous shifts and entrepreneurs' actions to identify and portrait the objective and subjective opportunities. Data shows that both types of opportunities, objective and subjective, exist and played certain roles in the entrepreneurial process, as past researches suggested. A summary of the two types of opportunities in different cases is provided in Table 1.

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Please insert Table 1 about here.  
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### **Influences of objective opportunities and subjective opportunities vary**

Both types of opportunities, objective and subjective, played certain roles in the entrepreneurial process; however, they have different influences, in terms of weight and intensity, on the entrepreneurial process. In some of our case companies, objective opportunities contribute more or precede in the entrepreneurial process. RT-Mart is a typical example of new venture based mainly on objective opportunities. The company was established primarily in response to government deregulation and demographic changes, though the founders did not have much experience in retailing. In the context of Advanced Analog

Technology, development of the semiconductor industry and the trend of manufacturing outsourcing preceded, creating objective opportunities for “fabless firms” to thrive in the industry, and the founder then acted to exploit his prior knowledge and experience to seize the opportunity.

In certain cases, subjective opportunities appeared to prelude or have stronger influences in the founders’ enterprising process. In the case of CWeb Technology, the melody recognition algorithm developed by Dr. Chang, one of the founders, created clear subjective opportunities for the entrepreneurs to establish the new venture. Founders of Syntech Information also based on their prior knowledge and experience to found the company, even though there had been certain competitions.

Sometimes objective opportunities and subjective opportunities seemed to be equally important in the entrepreneurial process, and both types of opportunities influence each other. Two types of opportunities practically arise simultaneously, making it virtually impossible to identify their sequence or to clarify their causal relationship. In the cases of Portwell and Clinico, it appears to be that way.

For summary and a quick view, we labeled the more influential opportunity in Table 1 with shades. Those shaded cells represent higher importance in the entrepreneurial process.

### **The complementary and substitutive relationship between objective and subjective opportunities**

Extending the analysis above, we found certain relationships between objective opportunities and subjective opportunities. In most cases, the two types of opportunities complement each other, together facilitate the entrepreneurial process. However, in certain cases, one of the two types of opportunities is so strong that entrepreneurs can, even without the other opportunity, still undertake their enterprising activities. RT-Mart is the best example: the effect of government deregulation was so strong that, even without sufficient experience and industry know-how of retailing, the founders still successfully established the company and kept it lively.

### **Formation of entrepreneurial opportunity as simultaneous presence of entrepreneurial capital and exogenous shocks in the general or task environments**

For the purpose of theorization and generalization, we followed Eisenhardt (1989)’s approach to refine the definition of entrepreneurial opportunity, and built evidence which measures the construct in each case. We endeavor to propose that *an entrepreneurial opportunity arises when **entrepreneurial capital** and **exogenous shocks** in the **task or general environments** exist simultaneously.*

**Entrepreneurial capital**, according to Erikson (2002)'s definition, is “a multiplicative function of *entrepreneurial competence* and *entrepreneurial commitment*”, where *entrepreneurial competence* refers to “the combined capacity to identify and pursue opportunities, and to obtain and coordinate resources”, and *entrepreneurial commitment* reflects “the capacity to see ventures through to fruition (Erikson 2002, p278)”. In addition, evidences from our case studies suggest that entrepreneurs’ expertise, experience, knowledge, reputation, and skills, which Becker (1964) and Coleman (1988) defined as “human capital”, and “social capital”, which Nahapiet and Ghoshal (1998) defined as “the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit”, also play crucial roles in the subjective entrepreneurial opportunities. Integrating all these relevant elements, we broadly refer **entrepreneurial capital** to “the aggregation of *entrepreneurial competence*, *entrepreneurial commitment*, *entrepreneurs’ human capital*, and *entrepreneurs’ social capital*”.

**Exogenous shocks** arise from either the *task environments* or the *general environments*, or both. The *task environments* conceptions denote what are relevant to the role of markets, resources and competitions. Key constituents in an organization's task environment include those essential to the organization's core work activities, including customers (both distributors and users), suppliers of the critical factors of economic production, such as materials, land, labor, and capita, competitors, and firms providing complementary goods (Lawrence & Lorsch, 1967; Pfeffer & Salancik, 1978; Scott 1998; Thompson 1967).

Exogenous shocks arising from the task environments have attracted the greatest attentions of scholars, especially classic economists, who dedicated themselves in the inquiries of competitive markets. However, upheavals in an organization’s environment do not confine to the market or competitions only; changes in the political, legal, and social aspects in the environment also bring entrepreneurial opportunities. Therefore, we differentiate *task environment* from *general environment*, intending to address the exogenous shocks comprehensively. We broadly define *general environment* as whatever environmental elements not incorporated or considered in the *task environment*. These elements include, but not limit to, “institutional environment”, which have been addressed by institutional theorists to emphasize the profound influence of regulatory structures, government agencies, rules, laws and professional associations in shaping an organization's legitimacy and performance (e.g. DiMaggio & Powell, 1983; Zucker, 1987), and “social environment”, where sociologists analyze the collective, cultural, and demographic influence on organizations (e.g. Davis, 1971; Deeks, 1993; Sawyer, 1985; Siegel, 2002).

For a clearer conceptualization and better understanding, we provide a conceptual diagram in Figure 1,

with details listed for each of the three elements, entrepreneurial capital, exogenous shocks in the task environment, and exogenous shocks in the general environments.

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### **Discovery and exploitation of opportunity as an iterative and enduring process**

Evidences from our case studies also revealed that the process of discovery and exploitation of entrepreneurial opportunity is *iterative* and *enduring*. “*Iterative*” here refers to entrepreneurs’ endeavors to learn from failure, sometimes in the manner of trial and error, without sufficient knowledge *ex ante*. Entrepreneurs do not always effectively discover opportunities, especially the “right opportunities”, or successfully exploit the opportunities in the enterprising process. Nevertheless, entrepreneurs learn from failure. They may not be well-equipped with sufficient knowledge upon the time they found their company, as in some of our cases, but they accumulate necessary knowledge from the experience of failure, transforming the experience into part of their knowledge to serve as the foundation for the next activity of opportunity discovery and exploitation. “*Enduring*” here denotes entrepreneurs’ ongoing efforts on searching for new opportunities. Their actions of opportunity discovery and exploitation never stop, even as the new ventures have been well established. The two characteristics, we believe, are central to entrepreneurship, be it for nascent firm or corporate venturing.

### **Implications for researchers and future research suggestions**

As mentioned above, evidence from our case studies suggest that both objective and subjective opportunities matters. However, due to the exploratory nature of this research, we only reveal the complementary and substitutive relationships between them, leaving details of the interaction process untouched. To advance our understanding of entrepreneurial opportunities, we would like to advocate more researches to unveil the details. To achieve better scholarly rigors, we discuss some ontological and epistemological concerns below.

Both the Schumpeterian and Kirznerian view implies that there is an objective opportunity outside the environment, waiting to be discovered by entrepreneurs. Ontologically, the thinking is more closely linked to positivism or realism, which claims that an objective reality exists outside the observer, waiting to be discovered (Dutta & Crossan, 2005). According to Gartner *et al* (2003), “most scholars currently pursue a line of reasoning about the nature of opportunity that suggests that opportunities are, so to speak, concrete

realities waiting to be noticed, discovered, or observed by entrepreneurs” (pp.104). Examples of this stream of researches on entrepreneurial opportunities included Kaisch and Gilad (1991), Shane (2000), Shane and Venkataraman (2000), just to name a few. However, Gartner *et al* (2003), on the other hand, argue that “in many circumstances, opportunities are enacted, that is, the salient features of an opportunity only become apparent through the ways that entrepreneurs make sense of their experiences”, and “opportunities are seen to emerge out of the imagination of individuals by their actions and their interactions with others” (pp.105). They advocate an “enactment perspective” in researching entrepreneurial opportunities.

In our case studies, we found evidences which support the argument of Gartner *et al* (2003). In certain circumstances, entrepreneurs could only state their enterprising process retrospectively, feeling difficult in describing how they actually identify, discover, or exploit opportunities. As a consequence, we agree on Gartner *et al* (2003)’s enactment perspective in general, and, based on their point of view, propose Mir and Watson (2000)’s “constructivist methodology” to conduct inquiries on entrepreneurial opportunities by means of “ontological realism and epistemological relativism”. That is, ontologically, we believe the objective existence of entrepreneurial opportunities; while in the quest of knowledge on entrepreneurial opportunities, epistemological relativism allows us to explore the constructed or enacted nature of the phenomenon, where the entrepreneur is an active participant rather than merely a reactor or information processor. Certain research techniques such as ethnography, institutional analysis, textual analysis, appreciative inquiry, and historical analysis, are explicitly suitable for such inquiries, as suggested by Mir and Watson (2000). We agree on their point of view, and would like to call for more process researches in these manners.

### **Implications for practitioners**

Our study also has several managerial implications for entrepreneurs. First, for prospective entrepreneurs, equipping themselves with adequate knowledge, skills, reputations, good relationship with other, etc. and observing external environment for changes such as new technologies, shifts in consumers’ behavior and tastes, new law or policies, etc. are both important. They should at least be strong enough in certain aspects, and then they can succeed in venturing. Second, in the process of venturing, it is vitally imperative to accumulate necessary “entrepreneurial capital”, that is, to enhance their competence, to commit themselves in seeing the new venture through, to access and acquire necessary knowledge, skills, and resources. If entrepreneurs could not build up their entrepreneurial capital as the new venture grows, they will be doomed to fail eventually.

## **Conclusion**

Opportunity has been accepted as a fundamental part of entrepreneurship researches. Scholars set out from Schumpeterian perspective and Kirznerian view both recognize opportunities' important role in entrepreneurial process, though they focus on different aspects of opportunities—objective and subjective. We conducted exploratory case studies to examine both types of opportunities, and found that both of them contribute to the formation of entrepreneurial opportunities. Usually they complement each other to facilitate the entrepreneurial process, but, when one is strong enough, an entrepreneurial opportunity still arises without presence of the other. We further attempt to theorize formation of entrepreneurial opportunity as simultaneous presence of entrepreneurial capital and exogenous shocks in the general or task environments, and propose the approach of “ontological realism and epistemological relativism” in entrepreneurial inquiries, expecting to contribute to enrich scholarly rigors of researches in this direction. Finally, we hope limitations due to the exploratory nature of this study will trigger more fruitful researches in entrepreneurial opportunities.

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Table 1. A summary of objective and subjective opportunities in cases.

	<b>Subjective Opportunities</b>	<b>Objective Opportunities</b>
<b>RT-Mart</b>	<ul style="list-style-type: none"> <li>• <i>Learning</i> Knowledge and experience accumulated in the entrepreneurial process.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Deregulation</i> Government loosened up the regulation of land, allowing big retail stores to be located in industrial areas.</li> <li>• <i>Demographic changes</i> Taiwanese' lifestyle changed, and consumers' shopping behavior thus changed.</li> <li>• <i>Changes in demand</i> Huge demand for big retail stores was generated by changes in consumers' shopping behavior.</li> <li>• <i>Low intensity of competitions</i> Big retail chain stores in Taiwan were few during the founding stage.</li> </ul>
<b>Advanced Analog Technology</b>	<ul style="list-style-type: none"> <li>• <i>Actions to exploit prior knowledge and experience</i> The founder's past knowledge and experience in analog semiconductors enabled him to perceive the potential in power management ICs, and thus developed the new products.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Abundance of complements</i> Dedicated foundries and related serving companies in the semiconductor industry were abundant before the founders started the company.</li> <li>• <i>Changes in demand</i> Demand for power management ICs increased as more and more consumer electronic devices and LCD displays gained popularities.</li> </ul>
<b>CWeb Technology</b>	<ul style="list-style-type: none"> <li>• <i>Actions to exploit prior knowledge and experience</i> Founders' past knowledge and experience in melody recognition enabled him to develop their algorithm (Dr.Chang), and perceived the potential demand for online karaoke (Ms. Huang).</li> <li>• <i>Actions to exploit social capital</i> The entrepreneurs' good relationship with high school classmates brought them potential customers—the IC designers.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Changes in demand</i> <ol style="list-style-type: none"> <li>(1) Popularity of karaoke and Internet in Taiwan created new demand for online karaoke.</li> <li>(2) Application of the melody recognition algorithm in IC embedded in toys created new demand for the algorithm.</li> </ol> </li> <li>• <i>Abundance of complements</i> Internet bandwidth and accessibilities were getting abundant in Taiwan</li> </ul>
<b>Syntech Information</b>	<ul style="list-style-type: none"> <li>• <i>Actions to exploit prior knowledge and experience</i> Founding team's past knowledge and experience in bar coding enabled them to develop the new products.</li> <li>• <i>Actions to exploit social capital</i> The entrepreneurs' good relationship with the previous employer brought them potential customers.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Low intensity of competitions</i> Bar code reader/scanner vendors in Taiwan were few during the founding stage.</li> <li>• <i>Changes in demand</i> Demand of bar code readers/scanners in Australia increased.</li> </ul>
<b>Portwell</b>	<ul style="list-style-type: none"> <li>• <i>Actions to exploit prior knowledge and experience</i> Founders' past knowledge and experience in industrial PCs enabled them to develop the new product.</li> <li>• <i>Learning</i> The founders also learned from failure</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Abundance of complements</i> <ol style="list-style-type: none"> <li>(1) Intel Pentium CPU technologies had been matured before the founders started the company.</li> <li>(2) Computer telephony was maturing when Portwell's new product was launched.</li> </ol> </li> </ul>

	<p>experience of the initial model business to avoid direct competition against established incumbents.</p> <ul style="list-style-type: none"> <li>• <i>Motivation</i> Previous employer did not take IPC business seriously, upsetting person in charge (Portwell's founders), and thus quit the company to pursue their entrepreneurial career lives.</li> <li>• <i>Serendipity</i> The unexpected huge demand for Pentium-based IPCs in the telecom industry highly facilitated the new product's sales.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Incumbents' myopia</i> Incumbents did not perceive the potential of Intel Pentium-based IPCs.</li> <li>• <i>Changes in demand</i> Demand for Pentium-based IPCs in the telecom industry surged as telcos gradually adopted computer telephony technologies.</li> </ul>
<b>Clinico</b>	<ul style="list-style-type: none"> <li>• <i>Actions to exploit prior knowledge and experience</i> The founder's past knowledge and experience in ophthalmology enabled him to introduce new products to the market.</li> <li>• <i>Motivation</i> Previous employer did not see ophthalmologic equipment as a major business, creating opportunities for the entrepreneurs to pursue.</li> <li>• <i>Actions to exploit social capital</i> The entrepreneur's good relationship with the previous employer brought him potential customers.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Changes in supply</i> Laser technologies were matured and widely used in ophthalmologic equipments.</li> <li>• <i>Low intensity of competitions</i> Laser-based ophthalmologic equipments in Taiwan were not available during the founding stage.</li> <li>• <i>Changes in demand</i> Demand for eye surgeries in Taiwan increased.</li> </ul>

Figure 1. Conceptual diagram of the formation of entrepreneurial opportunity.

