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INFORMATION REGARDING

*THE INTERNATIONAL JOURNAL OF ORGANIZATIONAL INNOVATION*

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Submissions are welcome from the members of IAIOI and other associations & all other scholars and practitioners. Student papers are also welcome.

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***Note: The format for this Journal has changed with the January, 2013 issue. The journal is now published in a two-column format (instead of the single column format used in prior issues). Please see the new author guidelines on the Journal's website, as well as a sample article showing how they will appear in the new format.***

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JULY 2 – 4, 2013  
HUA HIN, THAILAND

The *Seventh Annual (2013) International Conference on Organizational Innovation (ICOI)* will be held July 2 -4, 2013. To obtain complete information on the conference and to register for the conference, hotel, tours and events, go to: <http://www.iaoiusa.org/2013icoi/index.html> The conference registration fee includes all conference materials, all refreshment breaks, 2 lunches and the Annual Dinner on the first night of the conference (This will be held beach-side at the conference hotel!)

The conference will be held at the Hilton Hua Hin Resort & Spa, which is offering a special rate for the 2013ICOI conference participants - \$100USD/ per room per day, which also includes breakfast. All rooms have sea view. However, in order to receive the special conference rate for the hotel, you will need pay to **Suan Sunandha Rajabhat University** (if you pay Hilton will be charged USD: \$170). For booking the conference hotel room - participants have to inform Dr. Charles Shieh on the registration form and provide the following information: (names of guests, passport numbers, dates and time of check in/out). On arrival at the conference, participants will pay for their room accommodation in cash (Thai baht) to the conference organizers at the conference registration desk in the hotel lobby. Participants can stay as long as they want (at same room rate). The University will also arrange a tour of Santorini Park on July 3 and a day Trip to Bangkok with a visitation of **Suan Sunandha Rajabhat University**, and sightseeing on July 4. Conference participants need to register for these tours when registering for the conference.

All conference events will be held at Hilton Hua Hin Resort and Spa  
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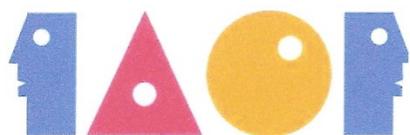
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Participants should arrange flights arriving into Bangkok anytime before July 1. The university will arrange the minivan to pick the 2013ICOI conference participants from Bangkok to Hua Hin in July 1 - it is a 3 hours ride.

For complete conference details, go to the conference website:

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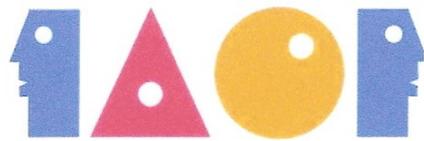
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## KNOWLEDGE MANAGEMENT IN EDUCATIONAL ORGANIZATIONS: A PERSPECTIVE OF KNOWLEDGE SPIRAL

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### Abstract

In recent years, the issue of knowledge management has gained more and more attention in management field. Organizations have desired the attainment of a faultless knowledge management mechanism so as to promote knowledge transfer and creation within organizations, thereby achieving a competitive advantage. Although researchers have previously studied on this topic, research regarding how educational organizations effectively utilize knowledge management skills to strengthen their organizational capability and promote innovative teaching skills is far from enough. The main task of an educational organization is to pass on knowledge to learners. The tutors (front line teachers) are knowledge workers who need to absorb large amounts of information in order to build up the basis for knowledge creation. This study applied the case-study method to interview and observation members of an educational organization. And, this study also adopted the knowledge spiral of Nonaka and Takeuchi (1995), using this theoretical perspective to explore the knowledge transfer and creation process of an educational organization. The result of this study indicated that inner-organizational knowledge flow can be obtained through the members' mutual interaction and sharing, thereby strengthening the organization and its individual teaching skills. Moreover, in this study, we also pointed out the role of different knowledge workers in the educational organizations.

Key Words: knowledge management, knowledge spiral, educational organizations

## Introduction

In a knowledge-based society, knowledge workers are a major asset of an organization (Nonaka and Takeuchi, 1995; Wu, Yeh and Hung, 2012; Wang, Chiang and Tung, 2012). In educational organizations, the tutors (knowledge workers) are mainly responsible for passing on and transferring knowledge and those who are learned are mainly students. This study argued that the source of knowledge in educational organizations is developed from interactions between tutors and those students, with teaching skills as the main product. Nevertheless, due to the extension and development of teaching skills, there is a need to accumulate and integrate abundant and relevant knowledge and teaching experience. There is, however, little literature on educational organizations from the aspect of how to facilitate the skills of knowledge management to achieve the improvement of teaching techniques.

Therefore, this study took the case study method, through interviewing the organization's members and undertaking in-depth observations, to analyze knowledge management practices in an educational organization. Moreover, this study apply the knowledge spiral theory of Nonaka and Takeuchi (1995) to further explore organizational members' roles and positioning during the process of knowledge transfer and creation, and how organizations can strengthen the members' professional competencies through knowledge transfer so as to build their innovative teaching skills.

The discussion of knowledge transfer and creation in organizations is mainly based on the knowledge spiral theory proposed by Nonaka and Takeuchi (1995). This theory emphasized the fact that interaction between colleagues is the main source of knowledge acquisition for organizational members, indicat-

ing that organizational members' individual tacit knowledge is enlarged within organizations through four knowledge transformation modes, namely, externalization, socialization, internalization, and combination, becoming higher-level knowledge ontology.

The exploration of knowledge spirals places the emphasis on the exchange between explicit and tacit knowledge, which are the processes of knowledge transfer and creation. According to the nature of knowledge, it can be divided into two aspects, tacit knowledge and explicit knowledge (Polanyi, 1966; Nonaka and Takeuchi, 1995).

“Tacit knowledge” refers to the information and related data belonging to the knowledge workers' personal experience and techniques. It cannot be clearly expressed by words, language or figures, and only exists in the experience and skills of individuals. “Explicit knowledge” refers to the knowledge produced through codifying or digitizing in accordance with understood information or highly repeated information. In other words, explicit knowledge is information that can be verbalized, textualized, and structurally organized, and relates to clear conceptual knowledge that can be verbally passed on or printed in journals, magazines, and textbooks. Furthermore, the generation of organizational knowledge has to be through member interaction, thus intertwining explicit knowledge and tacit knowledge so as to develop a kind of understandable and usable knowledge. The knowledge spiral theory indicated four types of fundamental modes for the intertwining and transformation of knowledge: externalization, socialization, internalization, and combination.

### (1) Socialization:

This refers to knowledge that arouses resonance and the process of creating

tacit knowledge through experience sharing. According to Nonaka and Takeuchi (1995), socialization is achieved through three steps, namely, observation, mutual imitation and reflection. Davenport and Prusak (1998) emphasized that the best mode for transferring tacit knowledge is through the interaction and communication between people. Chen (2006) also indicated that the application of such spiral theory in a teaching environment is when, through informal patterns, such as experience sharing and the "open house" activities of schools, etc., an individual's tacit knowledge, which belongs to knowledge workers alone, can be shared with other knowledge workers, thereby exerting an unconscious influence.

#### (2) Externalization:

This refers to the generation of conceptualized knowledge, and equates to the clear presentation of tacit knowledge with linguistic or word forms. In the past, scholars emphasized that an organization's members should be offered communication space at this stage, allowing organizational members to express their personal opinions or experience on a specific theme in order to achieve the purpose of knowledge creation (Nonaka & Konno, 1998). Also, the externalization of tacit knowledge is a means of substantiating an individual's tacit knowledge through group interaction and brain storming so as to obtain new concepts as the source of innovative knowledge (Chen, 2006).

#### (3) Combination:

This is the generation of systematic knowledge, which means systemizing developed conceptions and integrating them into the knowledge system. Nonaka and Takeuchi (1995) pointed out that explicit knowledge can be acquired via different channels, such as documents, conferences, Internet and emails. After being classified and organized, knowl-

edge will be preserved and combined to form new systematic knowledge.

#### (4) Internalization:

Internalization refers to the transformation of explicit knowledge, or concepts, into substantial personal experience and practices. This is the generation of operational knowledge and normally takes place in the process of work. These stand for the tacit knowledge and are generally processed through learning by doing. In other words, with learning by doing in the practices, knowledge workers have an in-depth learning and understanding of external explicit knowledge. Following this, with the integration of their personal practice experience, they will internalize the knowledge they have learned into the individual mind.

According to the knowledge spiral theory, the creation of organizational knowledge is considered to be a set of spirals which spreads from individuals, groups and to organizations, and to inter-organizations in which the scope of knowledge is expanded through organizational interactions. Additionally, the overlapped knowledge is regarded as the basis for the further and common creation of knowledge. Moreover, as the organizational members' communication grows to be more frequent, it will be more helpful for the passing on of highly tacit knowledge and for promoting the development of new knowledge in order to develop the think tank for organizational knowledge.

#### Case study

This study is mainly based on a qualitative research and adopts the research method of case study to explore the knowledge transfer and creation of an educational organization. For the confidential reason and required by interviewees, the case organization's name is not revealed to the public and is called KYC

instead. The major information with regard to the case organization is taken from the organization's official website, publications and interview with the employees. This study uses the purposive sampling method to proceed with a non-structural interview in the case organization.

The initiator of KYC is a Japanese math professor. Through individual teaching experiences, the initiator of KYC continuously creates and modified a series of teaching materials, finally completing a whole set of sequential teaching materials. In 1973, an initiator in Taiwan learned about this educational method and went to Japan to receive professional training. In 1979, he integrated the learned educational method, ideas, and the concept of parental education to formally promote such an educational system. The teaching materials for this method are a set of systematically sequential materials suitable for learners of different levels. Today, over 4,100,000 learners in more than 40 countries are involved and devoted to the promotion of this kind of educational method. In terms of the organizational scope in Taiwan, there are nine liaisons from the north to south part of Taiwan, which are, respectively, responsible for the tutors' research and learning activities, administrative works, as well as the supply of teaching materials, in these areas.

The human resources in each area include tutors, district administrators, section managers and the director, etc; the human resources in corporate headquarter include CEOs, general managers and associate managers, and top management levels. The tutors are located in different countries/cities and are organized and assisted by district administrators. On the other hand, the transmission of information regarding the status of the organizations and tutors are taken care of by mid-

level managers, who are also the district administrators.

Therefore, the whole organization is a typical "middle-to-upper-to-lower" hierarchical management mode, with the advantage that the communication from mid-level management can help to avoid the direct conflict between high-level management and the lower-level personnel. The main research objects of this study are tutors who are mainly marketers of parental education; and at any moment, could readjust and lead the study of learners in the process by observing the learners' study and assignments.

The major competitive advantages of the educational organization in this study are that the tutors can cultivate the learners' self-study and habitual independent thinking patterns through the teaching mode. This places the emphasis on learners' individual study and competence aspects, thereby succeeding in excelling the yearly study goals. This teaching mode is totally different from that which exists after class tutoring patterns, which are inclined to be passively educational learning.

Depending on the classification of Davenport and Prusak (1998), this study divided the knowledge worker of KYC into three types, namely: knowledge management workers, managers of knowledge projects and the chief knowledge officer according to their different roles, such as the knowledge management workers responsible for fundamental works, the managers of knowledge projects responsible for middle-level management, and the chief knowledge officer in charge of whole managerial activities. The knowledge management workers of educational organizations are the tutors who are the professional knowledge staff within the organization and are responsible for the development

of teaching skills and knowledge accumulation. The district administrators are the mid-level management team who play the role of managers of knowledge projects and who are responsible for knowledge exploration and being the communicators within the organization. The top management team within the organization is responsible for integrating a higher level of strategic decisions.

Choosing Taiwan KYC as the case study, this research interviewed eight tutors whose job seniority was either less than five years or between 10 and 20 years, and one district administrator. The interviewing content is mainly about the setting up of the training course for the organization and the focus of the interviews are on how courses are set up and how, after the set-up, the organization provides a related process and content for its employees. This explorative study is conducted via observation and field participation and further to analyze and describe the roles and positions of knowledge workers through the case study. Additionally, we apply knowledge spiral theory to illustrate knowledge transfer and creation within the case organization so as to discover a valid way of speeding up the development of knowledge.

#### *The knowledge transfer and creation in knowledge spiral process*

According to Nonaka and Takeuchi (1995), the knowledge spiral process can be divided into four stages; namely, socialization, externalization, combination and internalization. Knowledge transfer and creation happens in each of the stage. For academy research, we can somehow be clearly to argue that knowledge transfer and creation are two different concepts; however, in practice, knowledge transfer and creation usually happens simultaneously in each of the above four stages. Therefore, in the following case analysis, we do not be especially to dis-

tinguish the difference between knowledge transfer and knowledge creation.

#### *Socialization (transform tacit knowledge into tacit knowledge).*

Socialization is the process of transforming individual tacit knowledge into group tacit knowledge. Using internship training activities within the classrooms, regular study and learning activities, and district conferences/workshops, KYC places the emphasis on interactive learning, the higher degree of feedback on communications, the higher level of knowledge sharing among colleagues. Through learning by doing, tutors can have consensus and consonance via the sharing of their experiences; it leads to a great effectiveness of knowledge transfer. The work contracts of the tutors of the case organization are reviewed once a year.

In order to guarantee the learners' privilege for study, the credit system is employed by the organization and the tutors are required to periodically pursue further education in order to update their knowledge system and extensively improve their teaching skills. The tutors are also required to complete 36 credits within the first five years and 24 credits after five years. Moreover, KYC irregularly arranges a variety of professional lectures and each lecture accounts for one credit. The delivery of a lecture is a knowledge exchange field, in which tutors within the organization will work on the knowledge transfer together.

The major content of the study of tutors include communication skills, workshops run by professional, tutoring on the topic of business operations, and guides on the editing of the teaching materials. With district conferences and workshops, annual knowledge sharing activities and annual meetings enhance interactions and the sharing of experiences between peo-

ple. At the same time, the professional workshops also increase the information flow from outside of the organization.

*Externalization (transform tacit into explicit knowledge).*

Although tacit knowledge is valuable, it tends to be concealed and is hard to find and transfer. It is only when knowledge has been shared between members and the managers of knowledge projects have analyzed and organized highly repetitive knowledge, can such tacit knowledge be transformed into written materials. The district administrators (managers of knowledge projects) of KYC work to observe the operational process in each tutor room in order to analyze the advantages and disadvantages and, as a routine, put forward these points for members to discuss, modify, or self-examine.

In this way, we can know that the major function of district administrator is to discover and raise problems as the starting point for the tutors to externalize their tacit knowledge. In this stage, tutors are encouraged to externalize their tacit knowledge. Some more concrete knowledge could then be generated, like child tutoring handbook and special child tutoring.

*Combination (transform explicit knowledge into explicit knowledge).*

In this stage, the explicit knowledge is conceptualized, textualized and structured, so that the knowledge can be disclosed within the organization and treated as the substance of important knowledge for transfer. It can then be further reorganized and applied so as to achieve a new depth or width of knowledge, or the creation of new knowledge. The educational organization of this study produces a variety of explicit knowledge through socialization and

externalization and then the formed explicit knowledge is transformed into a handbook or instructional manuals. The manuals are then delivered to the knowledge management team/managers by district administrator. In this way, the valid technological and experiential knowledge is edited into handbooks as the basis for the development or modification of teaching materials in the future. Moreover, these handbooks are provided to the entrants as the most available technological guide.

*Internalization (transformation from explicit into tacit knowledge).*

In the process of training, to transfer the existing organizational explicit knowledge to the entrants, allowing it to become the individual's tacit knowledge. As the explicit knowledge tends to be the fastest available experiential knowledge after combination, this case organization, when training newcomers, facilitates the given knowledge tank, using such explicit knowledge as a handbook, tutor guidebook, and teaching manuals, to transfer the required knowledge to the newcomers. In addition, the knowledge transfer at this stage can become a new starting point for the knowledge workers' personal development.

## Conclusion

In different stages of the knowledge spiral, we can clearly discover that organizations have different focuses, which can allow smoother knowledge transfer and creation. In KYC, tutors are the main knowledge management workers, and responsible for the first-line' teaching jobs. Therefore, how to help tutors effectively accumulate knowledge assets through various human resources management systems has become an important subject. With this case study, we can see that excellent educational training, conference and workshop systems, and

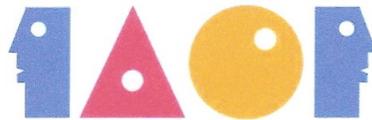
formal or informal social interactions, can all have a positive influence on knowledge transfer between tutors.

Additionally, it can be clearly noted that tutors are the major sources of knowledge creation in the organization so the organization can achieve a more perfect teaching system by analyzing the teaching experience of their tutors in different areas. In such a knowledge creation process, the district administrators play a significant, mediating role, whose key job is to effectively explore and integrate the heterogeneous knowledge possessed by the tutors. Then, using this knowledge as a basis, we can produce new items of knowledge.

Finally, this study also finds that KYC failed to effectively utilize external expert knowledge in its process of internal knowledge creation. In fact, the introduction of external expert knowledge helps to supplement and reinforce the existing internal knowledge, thereby enhancing the production of new knowledge (Cohen and Levinthal, 1990; Wu and Lee, 2012). Generally speaking, the top management team of KYC should play a more active role in introducing external expert knowledge.

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RETHINKING THE FUTURE OF LEARNING: THE POSSIBILITIES AND  
LIMITATIONS OF TECHNOLOGY IN EDUCATION  
IN THE 21<sup>ST</sup> CENTURY

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Abstract

Many scholars agree that the way we carry out the task of educating learners needs to be re-examined. Understanding that the process of education needs to change is different from knowing how best to help effect that change. Recurrent themes in education reform include such topics as student centric learning and the need to use technology to assist with the learning process. This paper will discuss how technology can assist in student centric learning, considering potential future educational innovations while being mindful of technology's limitations, and noting the need for educational systemic reform that will support successful technological instruction in the 21<sup>st</sup> century.

Key Words: Education, Education Technology, Educational Change, Educational Reform, Futures, Innovation, Postsecondary Education, Technology

## Introduction

Many scholars agree that the way we carry out the task of educating learners needs to change (Christensen, Johnson, & Horn, 2010; Kaku, 2012; Bach, 2012; Facer & Sandford, 2010). As Facer & Sandford (2010) noted, "Around the world, there are foundations, public-private partnerships, government initiatives and commercial entities leading calls for a redesign of '21<sup>st</sup> century education'." (p. 75). The "Why?" behind this call is becoming more obvious as the years pass. Kaku (2012) has declared that intellectual capital will be essential for those seeking to meet the challenges of the twenty first century, allowing them to fill jobs for skilled workers that, even with technological advancements, humans will still be needed to do (pp. 366-369). At the same time, Bach (2012) noted that there are many factors poised to reshape the world of education. He cites technology, global debt, demographic change, rapid urbanization, natural resource constraints and the geographic shift of economic power as change agents that will restructure education (p. 20). As he stated, "I believe that each driver of change has the potential to cripple schools and programs – and the equal potential to bring about renewal, transformation, and new value creation" (p. 20).

Understanding that education needs to change is different from knowing how best to help effect that change. Two continuous themes seem to appear in discussions on reforming and rethinking education. The first has to do with how students learn and the way education is presented to them. Christensen, Johnson & Horn (2010) pointed out that "Every student learns in a different way ... A key step toward making school intrinsically motivating is to customize education to match the way each child best learns"

(pp. 10-11). They described this as student centric learning (p. 11).

The second theme has to do with technology, particularly the need to use it in specific ways to assist in effective learning. The "edtech" (education technology) field brings together experts in education and technology to examine the multiple ways technology can create more efficient, effective, sustainable models of education. Technology in education includes everything from online learning (also e learning or distance learning) to virtual reality and all the future possibilities that have yet to arrive on the market.

This paper discusses these two themes connected to educational reform and presents some possibilities related to how the second point may have great bearing on the first. It will posit potential future technological innovations in education while being mindful of technology's limitations and the need for educational systemic reform that will support successful technological instruction in the 21<sup>st</sup> century.

### *Disruptive, Student Centric Learning and How Students Learn*

To fully understand disruptive, student centric learning as described by Christensen, Johnson & Horn (2012), one must first understand the current structure of education in the United States. They added, "Today's system was designed at a time when standardization was seen as a virtue. It is an intricately interdependent system" (p. 38). In such a system, when someone makes changes to a portion of the interdependent system, it is necessary to make complementary changes to the rest of the system. This makes customization within the system, such as customized student learning in education, costly. Therefore, in our interdependent school systems, it makes more

economic sense to standardize student instruction and assessment as much as possible (pp. 31, 34).

What Christensen, Johnson & Horn (2012) have argued is that because students learn in different ways, the monolithic, standardized approach to education does not serve students well. The key to “every student learning in a different way” has to do with learners having multiple intelligences. It is not simply about “how” you learn but what things you “know”. As Deresiewicz (2008) observed, there are many forms of intelligence beyond the highly valued analytic intelligence, such as social intelligence, emotional intelligence and creative ability. Unfortunately, teaching to multiple intelligences can prove very problematic.

While a truly customized twenty first century educational experience may be some ways off in the United States, technology is providing a path toward that vision. Computer based learning is already changing education, “emerging as a disruptive force and a promising opportunity” (Christensen, Johnson & Horn, 2012, p. 38).

#### *How Technology May Change Education*

To understand where technology may take us, it is crucial to have an understanding of the current trends in education related to technology. Technology, in many institutions of higher education, has become a part of college life (Goode, 2010). Students apply for college online, choose their courses online, read electronic text books, perform research online, complete homework assignments electronically and submit them via online learning management system software, review grades online, manage their student accounts and receive all university related communication through email. As Goode (2010) reported, already universi-

ties expect students to have a certain level of comfort with and skill related to technology in order to perform in these digital environments.

The field of educational technology is expanding, and researchers now ask questions about where will technology take us in the decades to come. Driving the belief that technology will play a major role in human life in the future is the belief that computing power will continue to become cheaper to produce. Kaku (2012) stated, “Moore's law simply says that computer power doubles about every eighteen months” (p. 22). Facer and Sandford (2010) saw this as one of several scientific and technical trends that will drive change. Other trends include the likelihood of ubiquitous computing, engineering computers from biological material (bioscience), psychopharmacology (cognitive enhancement or smart drugs), and “invasive and non invasive brain machine interfaces – enabling prosthetic enhancement and externalizing cognitive functions to external devices” (p. 80). The last trend, said another way, speaks to the possibility of wiring hardware to your brain or connecting to the hardware without surgical grafting to allow enhanced learning and thought – one small step shy of students' historic desire to learn the material in their textbooks by osmosis while napping on them.

Nevertheless, the authors cautioned that “despite the continued demand for quick fixes, neuroscience, computing and bioscience are not expected to provide easy solutions to educational issues over the coming two decades” (p. 85). They did agree, however, that current trends (such as a looming scarcity of financial resources) point to it being unlikely that the process of education can continue to be done in the same way for much longer. It becomes increasingly more

apparent that educational institutions as we know them may morph into entirely different entities or may disappear altogether. Technology, while not a silver bullet, will allow education to expand beyond the formal classroom and into the society that learners interact with every day (pp. 86 87).

Along with scientific developments and technological innovations, educators must also contend with increased societal concern about environmentally sustainable products and services. Bach (2012) suggested that constrained natural resources will require a “greening” of post-secondary institutional operations. Part of this effort to decrease schools' environmental footprint will certainly include consideration for how student travel impacts the environment, which becomes an excellent driver for increased focus on online education and distance learning. In the future, students may not only take all their courses online but may do this while engaging in other activities. Mobile devices will become obsolete as students connect to the internet via glasses (Kaku, 2012, pp. 27 30) or the walls (pp. 34 35) or in virtual reality (pp. 37 39).

Already virtual reality is being employed by educators to assist students in having a deeper understanding on how theoretical problems are solved in real world examples. Abulrub, Attridge and Williams (2011) reminded us that virtual reality is already used in military training, automotive and aerospace design, medical training and entertainment. It is not hard to imagine a world where virtual worlds are used to teach English concepts and general math problems. Anthropologists and sociologists could practice ethnographic interviews in virtual settings with people from anywhere else in the world or via specially designed software programs. Foreign language students could immerse themselves

among speakers of Spanish, Chinese or Farsi for hours at a time. History students could step into elaborately created models of ancient civilizations' cities, reconstructed to appear as they would have looked during the height of their glory. Speech class could be performed in front of virtual audiences to help students calm their nerves and prepare them to speak to live audiences. In the years ahead, artists and musicians could create masterpieces in virtual worlds by thought alone.

Brick and mortar facilities will gravitate from functioning as housing for classrooms and offices to multi functional, collaboration spaces. Faculty members will operate in swing spaces, meeting with students face to face and working closely with intra and interdepartmental colleagues while taking advantage of additional time outside the classroom to collaborate with other academics on critical research, program development, curriculum creation, and other varied projects. Students will gather for group work and to interact live while at the same time perhaps connecting with absent group members via the walls of their study cubes. Hallways will relay key institutional messages that are also pushed out the a student's glasses or study cube walls or even their virtual realities, in the case of the latter causing students to recall and connect with the real world again.

Implementing student centric education in conjunction with possible future advances in technology may help education institutions do away with rigid class time requirements and allow students to have more time for meaningful projects and research with fellow classmates and professors.

These predictions may seem like flights of fancy, yet scientific and technical trends are showing that what was

once considered science fiction is ever closer to becoming reality. These technological innovations have the potential to completely disrupt the educational experience. Academics, however, must remember that technology is a tool, not a goal. Giving new knowledge to individuals, which allows them to gain specific competencies and skills while completing their personal educational goals, is the primary purpose of education. Technology can be an incredibly powerful tool in assisting students to learn in a way that suits them best, but administrators must be careful not to give greater priority to having technology than to using it effectively. Bennett and Oliver (2011) noted that while a great amount of funding has been directed toward the purchase of technology little research has been done on the “patchy and inconsistent patterns of use that typically follow such investment” (p. 180). It is clear that many administrators feel that “to have is to do”. Without careful consideration of how technology fits into the larger institutional goals around education, technology will never reach the full potential outlined above.

#### *The Limitations of Technology in Education*

"...Although people have spent billions of dollars putting computers into U.S. schools, it has resulted in little change in how students learn...

...A class does not look all that different from the way it did a couple of decades earlier, with the exception that banks of computers line the walls of many classrooms. Lecturing, group discussions, small group assignments and projects, and the occasional video or over head are still the norms. Computers

have not increased student centered learning and project based teaching practices...Computers have made almost no dent in the most important challenge that they have the potential to crack: allowing students to learn in ways that correspond with how their brains are wired to learn, thereby migrating to a student centric learning environment." (Christensen, Johnson & Horn, 2010, pp. 65, 83 84).

As the authors above lamented, adding technology to traditional education models will not automatically bring about the types of educational reforms and advancements desired to help students successfully complete their educational goals. Technology is only as good as the humans that develop it, and while great scientific and technological advances are being created all the time, the human brain is still better at critical thinking and complex communication than any machine yet made (Christensen, Johnson & Horn, 2012, p. 68).

Furthermore, simply adopting various technological education models within traditional curriculum does not guarantee success.

Highlighting the theme of technology only being useful when it helps meet students' learning needs, Bickerstaff & Monroe Ellis (2012) have stated that “no innovation can result in significant student gains without continuous attention to the *process* of implementation” and that in the course of examining this process educators must link what is happening in the classroom with student needs (p. 1). It does no good to install technology into systems and classes without first having a firm understanding of whether the chosen approach will produce the desired results. Again,

having technology is not the goal; rather, understanding students' challenges and meeting students' learning needs so that they can be successful must be the goal of all education faculty and administrators. Technology may be *a part* of the process, but it is not the process itself.

Technology can only improve an educational system that is changing comprehensively. Technology by itself will not make the difference placed in our current educational system. As Garrison (2011) observed, "The greatest mistake is to try to integrate new communications technology into passive educational approaches . . . We must be prepared to rethink current dominant approaches and be clear about what type of learning experiences we wish to design" (p. 1).

At the same time educators focus on incorporating technology into their educational strategies, they must be mindful of students' responses to new technology in education. Not all students have experience or are comfortable with using technology in its various forms. They have different attitudes towards and motivations for using technology (Goode, 2010). Students who do not use technology regularly either because of lack of access, interest or pre-post secondary digital curricular experiences – are potentially disadvantaged academically and this can be especially true for low income students, racial minorities and females (Goode, 2010, p. 584). Goode (2010) reported "students with the lowest levels of technological proficiency actually avoid courses with heavy technology components, while the techiest students reap the academic and social rewards, including time and money, of knowing about technology" (p. 615). In order for students to fully reap the benefits of digital learning, digital

literacy issues must be taken into account earlier in education and addressed before a student finds them selves at an academic disadvantage during their postsecondary years.

## Conclusion

It is clear that for the United States to remain competitive in the century going forward, it will need to rethink its strategy for educating its citizens. The current standardized models of education do not serve our students well, allowing few to have true access to education and comprehension of the subject matter. Education must be designed to match the reality that students learn in different ways and have different learning needs.

To this end, technology is arguably one of the best tools to use to reach this goal. Computer based learning can provide students with the freedom to access information in a flexible environment and to connect with that information in different ways as best suits their learning style. It is a tool that allows for customized instruction in a more cost effective and efficient manner than in class instruction.

Technological and scientific trends point to great changes on the horizon, with technology becoming progressively cheaper to produce. The impact of these trends on education could be significant as students find ways to use technology outside the traditional classroom. While educational institutions will most likely face financial challenges in the future, technology presents a cost effective option for colleges and universities looking to provide students with access to education in a flexible way that also fits their learning style. Various innovative technologies may allow students to connect with their course work not only via computers but on the go via accessories like glasses or on the smart walls or even in virtual reality.

Technology is only a tool, however, and for education to truly change the entire standardized structure must be rethought to allow students to not only gain education through new computer based learning methods but also to interact with education on a personal level that translates into true learning and retention. This can only be achieved by all college stakeholders examining where student learning challenges lie and taking the appropriate steps to provide reforms that specifically addresses those needs. Technology has the potential to drastically change education, but systemic reform is required for technology to be used in a meaningful way, which will allow students to truly be prepared for the requirements of a twenty first century knowledge driven global society.

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THE INFLUENCE OF LEADERSHIP BEHAVIOR AND  
PSYCHOLOGICAL EMPOWERMENT ON JOB SATISFACTION

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Abstract

The purpose of this study is to understand the current conditions of campus security work executives at Taiwan's private universities. The study also explores the relationships between various related factors, including personal background, school background, leadership behavior, psychological empowerment and job satisfaction. Through the administration of a questionnaire survey to a random sample of campus security executives, the study determined that there is a positive correlation among the three variables of leadership behavior, psychological empowerment, and job satisfaction. Regression analysis shows that leadership behavior and psychological empowerment have a significant positive impact on job satisfaction, with psychological empowerment showing a stronger impact than leadership behavior.

Key Words: Leadership Behavior, Psychological Empowerment, Job Satisfaction

## Introduction

A university campus belongs to the public domain. Every school has a different environment, set of demands, quality of staff and funding. The creation of a good learning environment for students is the primary focus of school safety issues nowadays. Therefore, the management of security on campus and the leadership behavior associated with it may affect the attitude and cognition of campus safety task execution staff. This behavior has a huge impact on the success or failure of the work and is one of the motivations of the present study. On the other hand, due to the joining of campus security and crisis management personnel, the features of the campus security organizations in Taiwan have undergone significant changes.

These changes can lead to the variations in the characteristics of a work environment, such as uncertainty about, conflicts in the work, the positioning of roles and vague communication as well as the pressure placed on employees to avoid losing their jobs. These are common situations for campus safety task execution staff, and also produce all kinds of physical and psychological pressure. For this reason, this research undertakes to explore the impact of psychological empowerment and job satisfactions on university campus safety task execution staff.

It explores the influence of the campus security executives on leadership behavior, psychological empowerment and job satisfaction variables under the difficult situation of maintaining campus security. This paper provides the conclusions and recommendations drawn from this study in the pursuit of maintaining campus safety.

The main purposes of this research are as follows: (i). to understand the perceived leadership behavior, psychological

empowerment and job satisfaction status of the campus safety work executives at private universities in southern Taiwan (ii) to integrate the findings of the research and give recommendations to the campus safety task executives and references to researchers.

## Literature Review

### *Psychological Empowerment*

Thomas and Velthouse (1990) described empowerment using the construct of intrinsic task motivation. They defined psychological empowerment as a set of four cognitions reflecting an employee's orientation to his/her role in terms of meaning, competence, self-determination, and impact. Spreitzer (1995, 1996) subsequently developed a scale to assess these four dimensions. Psychological empowerment is also defined as a motivational construct that focuses on the cognitions of the individual being empowered (Spreitzer, 1995; Menon, 2001) and has been shown to play an important role in employees' attitudes and performance (Thomas and Velthouse, 1990; Thomas and Tymon, 1994; Fulford and Enz, 1995; Spreitzer, 1995; Spreitzer, Kizilos and Nason, 1997; Kirkman and Rosen, 1999; Koberg, Boss, Senjem and Goodman, 1999; Menon, 2001). In sum, psychological empowerment is defined as a motivational construct manifested in four cognitions: meaning, competence, self-determination, and impact.

Employees can derive significant benefits from experiences that enhance their personal awareness of the value of their work. These experiences will increase employees' job satisfaction and upgrade their work performance (Koberg, Boss, Senjem & Goodman, 1999). Research related to this topic has shown that employees' psychological empowerment or feelings of self efficacy will exert positive effects on their job satisfaction

(Spence-Laschinger et al, 2004; Luthans et al, 2007). Fulford and Enz (1995) explored the impact of psychological empowerment activities on staff members of a club. They discovered that staff members' awareness of psychological empowerment exerted a positive effect on their degree of job satisfaction.

Kirkman and Rosen (1999) studied the impact of factors that may affect team psychological empowerment and psychological empowerment. The results of their research revealed that psychological empowerment of a team of private employees increased job satisfaction, organizational commitment and team commitment. Dewettinck et al. (2003) studied the impact of psychological empowerment on performance, organizational commitment, and job satisfaction. They found that the impact of psychological empowerment on job satisfaction is most apparent in low-level employees. Other scholars have studied the impact of psychological empowerment on job satisfaction research (see Bowen et al, 1992; Thomas & Tymon, 1994; Fulford & Enz and, 1995; Menom, 1995; Kirkman & Rosen, 1999; Eylon & Bamberger, 2000). These academic studies have shown that psychological empowerment can be positively correlated with job satisfaction. Thus, we have devised the first hypothesis:

*H1: Psychological empowerment will positively affect job satisfaction.*

### *Job Satisfaction*

Job satisfaction was defined by Locke (1976) as "a pleasure or positive emotional state resulting from the appraisal of one's job or job experience". In addition to being satisfied or dissatisfied with various specific aspects of a particular job (such as pay, coworkers, leadership, and so on), employees can also have a general affective response to their jobs (Lucas, Babakus and Ingram, 1990; McFarlin and Rice, 1992).

Numerous researchers have concurred that job satisfaction is a consequence of psychological empowerment (Thomas and Tymon, 1994; Fulford and Enz, 1995; Menon, 1995; Kirkman and Rosen, 1999; Bishop, 2000; Eylon and Bamberger, 2000) and various components of psychological empowerment have been shown to be particularly associated with job satisfaction. These included (i) self efficacy (Liden, Wayne and Sparrowe, 2000; Walumbwa et al., 2003; Carless, 2004); (ii) meaning (Gorn and Kanungo, 1980; Spreitzer et al., 1997; Liden et al., 2000; Sparks and Schenk, 2001; Carless, 2004); (iii) goal internalization (Menon, 1995); and (iv) choice (Spector, 1986).

### *Leadership Behavior*

Leadership behavior has a direct and matchless impact on the work environment, work outcomes and the success of organizations (Kritsonis, 2004). Many previous studies show that consideration of leadership behavior is positively related to employee job satisfaction, while a negative relationship has been reported between job satisfaction and initiation of structure leadership behavior (Greene & Schriesheim, 1977; House & Filley, 1971). However, other studies have found a negative relationship between consideration of leadership behavior of and job satisfaction (Hodge, 1976; Patchen, 1962).

Some studies indicate that both consideration and initiation of structure leadership behavior are positively related to job satisfaction (Bartolo & Furlonger, 2000; Katerberg & Horne, 1981; Cristina et al., 2012). The results of previous studies from different countries show that different styles of leadership have different impacts on job satisfaction (Stogdill, 1970; Walder, 1995). The importance of leaders' role in influencing employees' behavior have been shown by previous studies (Asgari, Silong, Ahmad and Samah, 2008;

Bhal, Gulati and Ansari, 2009). Leadership style has been investigated for its relationship with various organizational variables such as innovative work behavior (Lee, 2008) and many more.

A great deal of research has been conducted to examine the relationships that exist between leadership behavior and job satisfaction. Many studies have shown that the relationship between leadership behavior and job satisfaction can be positively correlated (House, Filley & Kerr, 1971; Szilagyi & Keller, 1976; Petty & Bruning, 1980; Yousef, 2000). Holdnak, Harsh and Bushardt (1993) found a significant positive correlation between compassionate leadership and job satisfaction. Based on the results of these previous studies, we devised the second hypothesis:

*H2: Leadership behavior will positively affect job satisfaction.*

## Methods

### *Scope and Object of Study*

This study is aimed at campus safety task executives at private universities in the southern part of Taiwan, specifically military training instructors and the campus security crisis management staffs. It includes eight private universities, at which military training instructors and campus security crisis management personnel are used as sampling.

The sample size of the study issued a total of 120 questionnaires. The major sampling subjects contain two levels of the military training instructors and school safety and crisis management personnel. And 88 questionnaires were received. After discounting invalid questionnaires, there were 84 valid questionnaires. The effective recovery rate was 70%.

In this study, using the analysis tool statistical software SPSS (Statistical Pack-

age for the Social Science). Analysis methods include reliability and validity analyses, Pearson correlation analysis, hierarchical regression analysis and so on.

### *Operational Definition Of The Study Variables*

#### *Leadership Behavior.*

As to the operational definition of leadership behavior, this study adopts Bass's (1990) term "transformational leadership", which is defined as the unique relationship between leaders and subordinates and which explains why the individual, team or large organization has an unexpected performance (Burn, 1978; House, 1977). Therefore, this study measures private university campus safety task executives' degree of the consent to the leadership behavior of their supervisor, including Dean of Student Affairs or Directors of Military Education Office.

The leadership behavior scale in this study is applied using the research tools from Cheng Yen-Mei's (2003) empirical study, which is based on the MLQ Scale created by Bass and Avolio (1994). The scale was partially revised by the researchers for research purposes, including changes to campus security features and measurements of certain characteristics. It also extracts factors dimensions through the principal component factor analytic approach. After analysis, the data is divided into the three dimensions: stimulation pattern leadership, charismatic pattern leadership, and consideration pattern leadership.

#### *Psychological Empowerment.*

Spreitzer (1995) asserts that psychological empowerment is a task motivation that can increase the intrinsic part of the individual. Through personal evaluation and cognition of task significance, it enables individuals to take the initiative to

complete the organization's objectives. It aims to stimulate the intrinsic motivation of personnel, prompting the use of one's abilities and elevating one's willingness to serve the unit. Psychological empowerment is a concept that can give members of the unit power, freedom and information for decision making and participation in organizational affairs.

This study refers to the concept of psychological empowerment proposed by Spreitzer (1995) who adopted the theory of Thomas and Velthouse (1990). From the point of view of management psychology, the present research sums up the view of the literature by conducting a psychological empowerment questionnaire with campus security work execution staff. The study is divided into four dimensions: impact, self-determination, competence, and meaning. The significance of its operational definition is as follows:

- (i) **Impact:** The degree of influence that an individual has on the direct work environment.
- (ii) **Self-determination:** The degree of influence that an individual has on how the job can be performed.
- (iii) **Competence:** The extent to which an individual feels confident about his/her capability of performing the task.
- (iv) **Meaning:** The extent to which an individual experiences a task to be personally meaningful.

#### *Job Satisfaction*

Job satisfaction refers to workers who can balance satisfaction and dissatisfaction to from collective satisfaction. This study refers to the concept introduced by Wu Ching-Chi and Liao Suhua (1978), who adopted the notion of the Minnesota Satisfaction Questionnaire (MSQ), a 20question scale compiled by Weiss, Davis, English

and Lofgurist (1967). The questionnaire encompasses five satisfaction factors: spirit, material, ability, service and leadership. The operational definition of each dimension is as follows:

- (1.) Spirit satisfaction refers to the development of the work and the satisfaction gained from appreciation won by work performance.
- (2.) Material satisfaction refers to salary, income and material rewards.
- (3.) Ability satisfaction refers to the degree of control and expertise that employees have in their work, including the moral value of the work itself.
- (4.) Service satisfaction refers to the satisfaction in customer service, including the opportunities present by the work itself, and the satisfaction of being evaluated.
- (5.) Leadership satisfaction refers to the ability to be a leader in one's work and the strength of one's guiding ability. After designing and measuring the characteristics of the campus security organization, the researchers consolidated these factors into three dimensions: (i) opportunity and material satisfaction (ii) service and spirit satisfaction and (iii) leadership satisfaction.

### Results and Discussion

#### *Reliability and Validity Analyses*

After a factor analysis was conducted, a reliability analysis was carried out in order to understand the reliability and validity of the research questionnaire. Reliability refers to the consistency and stability of the test results. A high reliability coefficient represents the high stability and reliability of the test, and anticipates more consistent results. Yang Shiyong (2007) points out that in the practice of the SPSS statistical analysis, if Cronbach's alpha

coefficient is higher than 0.7, the reliability has a fairly good consistency. In this study, the reliability analysis results of the questionnaire are as follows: Cronbach's alpha for the research variables leadership behavior, psychological empowerment, and job satisfaction and relevant dimensions were higher than 0.721, which indicates that the scale has good reliability, and convergent validity dimensions were greater than 50% showing that the attributes of this research questionnaire are within a reasonable range.

#### *Pearson Correlation Analysis*

In order to further test the degree of correlation between the research variables and the validity dimensions, this research examines leadership behavior, psychological empowerment, and job satisfaction through person correlation coefficient statistical methods, in order to observe whether or not there is a significant positive correlation existing between the three variables. The correlation coefficient of leadership behavior and psychological empowerment is 0.246; the correlation coefficient of leadership behavior and job satisfaction is 0.522; and the correlation coefficient of psychological empowerment and job satisfaction is 0.739. There is a visible positive correlation between the three variables. The intensity of the correlation of psychological empowerment and job satisfaction is the strongest with a Pearson correlation coefficient of 0.739. Hence the higher the identity to psychological empowerment of the campus security work executive, the higher the intensity of his/her job satisfaction.

#### *Hierarchical Regression Analysis*

This study investigates the impact of the aforementioned research variables on job satisfaction through a hierarchical regression analysis using the following models.

Model 1. posits leadership behavior as the independent variables and job satisfaction as the dependent variable, and finds that leadership behavior has a very significant impact on job satisfaction. ( $B = 0.170, p < 0.001$ ).

Model 2. Adds psychological empowerment variables for the sake of comparison with Model 1. and finds that psychological empowerment also has a very significant impact on job satisfaction. ( $B = 0.414, p < 0.001$ ). Indeed, the impact of psychological empowerment on job satisfaction is greater than the impact of leadership behavior on job satisfaction. (adjusted  $R^2 = 70.4\%, p < 0.001$ ).

#### Conclusions

The purpose of this study is to understand the impact of the relevance between the leadership behavior, psychological empowerment and job satisfaction on campus safety task executive at eight private universities in southern Taiwan, and to analyze the differences between the effects of these variables. The results of the statistical analysis and the verified hypotheses in this chapter will be compiled in order to provide suggestions for school campus safety authorities regarding the direction of practical management and will be provided to researchers as a reference.

This study found that there were no significant differences in the cognition of leadership behavior in campus security work executives due to the difference gender, current position, school history, marital status, age, education, years of service, main business, monthly salary, number of staff and number of student. Secondly, there are significant differences in the cognition of psychological empowerment among campus security work executives due to the differences in gender and years of service. There are no significant differences in the cognition of psychological empowerment among campus security

work executives due to the differences in current position school history, marital status, age, education, years of service, main business, monthly salary, number of staff, and number of student. Third, there are significant differences in the cognition of job satisfaction among campus security work executives due to the difference in current positions school history and years of service. There are also no significant differences in the cognition of job satisfaction among campus security work executives due to the differences in gender, marital status, age, education, main business, monthly salary, number of staff, and number of student, In addition, leadership behavior and psychological empowerment appear to have a significant positive impact on job satisfaction of the campus security executives examined in this research.

Regarding psychological empowerment, the study reveals that there is a significant negative impact of the two dimensions of competence and meaning and that there is a difference between perception and reality of campus security work executives, specially regarding the conditions of the operation of mechanical organization and militarized management behavior.

Finally, there are significant differences in the cognition of leadership behavior, psychological empowerment and job satisfaction in different leadership behavior cluster. There are more significant differences between the high recognition of leadership behavior and diverse variables than between middle and the low recognition. On campus security managerial implications, the higher recognition of a leadership behavior cluster yields has a higher cognition in the factors of leadership behavior, psychological empowerment and job satisfaction.

There can be a number of possible implications for Taiwan school campus security work executives from this study.

School managers need to realize the impact of leadership behavior and psychology empowerment can influence their school campus security work executives' job satisfaction in the workplace. In other business organization managers, may be through their leadership behavior actions, help to create psychology empowerment for their employees to be motivated, there by would result in high job satisfaction which, in turn, can contribute to higher productivity, gain competitive advantage.

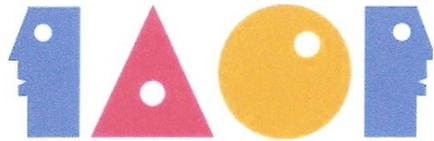
The results of this study suggest that school campus security work executives and managers can increase the level of employees' job satisfaction through a leadership behavior and strong psychology empowerment.

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## A CASE STUDY ON THE MODEL OF STRATEGIC ENTREPRENEURSHIP

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### Abstract

This study aimed to explore the contents of strategic entrepreneurship with a case study on Giant Manufacturing Co., Ltd, a leader in the Taiwanese bicycle industry. The research structure was based on the framework developed by Ireland *et al.* (2003). The researching findings suggested five key issues of strategic entrepreneurship: (1) an entrepreneurial mindset consisted of entrepreneurship opportunity recognition, entrepreneur awareness and actual decisions; (2) an entrepreneur culture and leadership involved three stages of global deployments and group leadership; (3) decision-making resources management included the establishment of barriers to imitations and the construction of value chains, sports marketing, and A-Team success factors with maximum differentiation; (4) creativity, development, and innovations encompassed three spirits of “globalization” management: five convictions, four branding personalities, fault tolerance and learning; (5) competitive advantages comprised of strong branding, comprehensive product lines, global marketing networks, branding advantages, and the building of the “GIANT way”.

Key Words: Strategic Entrepreneurship, Corporate Entrepreneurship, Entrepreneurial Orientation

## Introduction

Recent studies suggest that strategic management and entrepreneurship should be studied together and hence the research on strategic entrepreneurship emerged (Choi & Shepherd, 2004; Companys & McMullen, 2007; Covin & Miles, 2007; Hitt, 2005; Luke, 2008). This is also due to the effects of discussions of corporate entrepreneurship, corporate ventures, entrepreneurial posture and entrepreneurial orientation (Luke, 2008).

Entrepreneur models are a new topic. Some scholars think it is the coordination, balanced development, and workings of individual factors (Hitt and Ireland (2000), Ireland *et al.* (2001), Luke and Verreynne (2006), Wickham (2006)). Others have argued that it is the existence and influence of some primary factors, and interactions with secondary factors, and, ultimately, they affect entrepreneur outcomes (Eisenhardt *et al.* (2000), Ireland *et al.* (2003), Ireland and Webb (2007), Zahra and George *et al.* (2002)). However, these studies on strategic entrepreneurship only present the discussions of conceptual frameworks without empirical evidence. Such an academic gap is the motivation of this study.

Giant Manufacturing, since inception in 1972, has been operating with the philosophy of “Branding globally, marketing locally”. It is now a synonym of international fashion and state-of-the-art technology. Giant Manufacturing is one of the largest producer and marketer of bicycles in the world. Its marketing channels extend throughout over 50 countries on five continents, with the number of distributors exceeding 10,000. Its entrepreneur history and strategies over the past four decades are a topic worthy of attention.

The main purpose of this study was to analyse Manufacturing in Taiwan in a case study, aiming to gain an understanding of the processes and details of its strategic entrepreneurship.

## Literature Review

### *Background of Strategy and Entrepreneurship*

The fusion or cross-over of entrepreneurship and strategic management (Luke, 2008) can be generalized into three points, i.e. interface, integration, and contents. In terms of the interface, there is a cross-over and interaction between entrepreneurship and strategic management as two independent research domains. As far as the integration is concerned, entrepreneurship and strategic management share certain elements, research contents, and management goals. Regarding the contents, strategic management contains entrepreneurial management and administrative management, and entrepreneurial management is the future focus of strategic management studies.

### *Definition of Strategic Entrepreneurship*

Strategic entrepreneurship is a strategic perspective of entrepreneurial activities. It is also a strategic activity with an entrepreneurial mindset. Entrepreneurship management emphasizes innovations, creativity, and opportunity seeking. Strategic management focuses on the establishment of competitive advantages for an organization. Entrepreneurial activities are the identification and pursuit of the opportunities competitors fail to spot or capture. They are explorative in nature and aiming to establish future competitive advantages. Strategic activities are the development and exploitation of existing competitive advantages for entrepreneurial activities. Hence, strategic entrepreneurship is the combination of entrepreneurial oppor-

tunity seeking and strategic advantage seeking to pursue competitive advantage and wealth creation. In other words, strategic entrepreneurship is the process of exploratory and development activities in growth seeking and wealth creation (Choi & Shepherd, 2004; Ireland & Wedd, 2007; Luke, 2008; Steffens, Davidsson, & Fitzsimmons, 2009).

### *Strategic Entrepreneurship Models*

Entrepreneurship models can be classified into two categories, i.e. the content model for strategic entrepreneurship and the process model for strategic entrepreneurship. The content model for strategic entrepreneurship mainly deals with coordination, balanced development, and workings of individual factors (Hitt and Ireland (2000), Ireland *et al.* (2001), Luke and Verreynne (2006), Wickham (2006)). In contrast, different factors in the process model for strategic entrepreneurship are no longer about balance and coordination. Rather, this model argues that a certain factor is domineering in the relationship about other factors. In other words, this major element affects the presence and interactions of other factors and ultimately affects entrepreneurial outcomes (Eisenhardt *et al.* (2000), Ireland *et al.* (2003), Ireland and Webb (2007), Zahra and George (2002)).

This study refers to the entrepreneurship model developed by Ireland *et al.* (2003) in the context of strategic entrepreneurship. Ireland *et al.* (2003) base on the theoretic foundations of firm resources, social capital, organizational learning, and creative cognition in the building of a model of strategic entrepreneurship. They clarify the structural concepts of entrepreneurship, such as an entrepreneurial mindset, entrepreneurial culture, entrepreneurial leadership, strategic management of resources, and, finally, application of creativity and

development of innovations. These are all important dimensions of strategic entrepreneurship. They influence each other, and interact with each other in the seeking of opportunities and advantages and the creation of wealth.

### *Entrepreneurial mindset*

This is an awareness to look for opportunities amid uncertainties. It is also the way to think and act with an entrepreneurial spirit for an individual or all the employees in a firm. An entrepreneurial mindset comprises of the recognition of entrepreneurial opportunities, entrepreneurial alerts, actual decisions, and entrepreneurial frameworks.

### *Entrepreneurial culture and entrepreneurial leadership*

An entrepreneurial culture is the expectation for new ideas and creativity. It encourages risk taking and tolerates failures. It promotes learning and prioritizes products, processes, and management innovation. It is a belief that constant changes are the carrier of opportunities. Entrepreneurial leadership is the seeking of opportunities and advantages by influencing others strategically in the capacity of resources management. Entrepreneurial leadership exhibits six characteristics, i.e. (1) the nurturing of entrepreneurial capabilities; (2) the innovations that threaten existing business models; (3) the reasonable interpretation of opportunities; (4) the questioning of mainstream logics; (5) re-thinking; (6) what-if questions. It is the combination of entrepreneurship and strategic management. An entrepreneurial mindset and an entrepreneurial culture are intertwined. An entrepreneurial culture comes from the encouragement of entrepreneurial leadership. Entrepreneurial leadership, in turn, is built on top of an entrepreneurial mindset. This is the only way that an entre-

preneurial culture can grow and develop in an organization.

#### *Strategic management resources*

This refers to the effective construction of a resources bank, the integration of resources, and the optimization of resources utilization to enhance firm performances. When resource allocations and utilization are aiming to facilitate opportunity-seeking and advantages-identification, it is the strategic management of resources. The strategic management of resources can be divided into three stages, i.e. the construction of a resources bank, the integration of resources, and the optimization of resource allocations.

#### *Applications of creativity and development of innovations*

Innovations can be divided into destructive innovations and maintenance innovations. Innovations are the process of pursuing opportunities with actions and responses in a free market. Creativity is the underpinning of innovations. It has influence over the quality and quantity of destructive innovations and maintenance innovations. It is also supported with strategic management of resources. Both destructive innovations and maintenance innovations are the driver for wealth creation. The balance and integration of these two is an important characteristic of strategic entrepreneurship. Strategic entrepreneurship is about the innovation activities under risks and uncertainties. A new economic organization is established with entrepreneurial opportunities and strategic management of resources to create profits for entrepreneurs. In the process of wealth creation, some companies seek and build competitive advantages via strategies and entrepreneurial opportunities, but others fail to so do (Ireland *et al.*, 2003; Ireland & Webb, 2007).

## Research Method

Case studies are a qualitative research method. The issues studied in a case study are “how” and “why”. The advantages of this approach are the ease of identification of key variables, processes, and interactions, and these findings are the foundation of the establishment and validation of presumptions. This study followed the procedures developed by Yin (1994) which conduct the research in six steps: (1) the research topics and purposes; (2) the establishment of the research structure; (3) the selection of analytic units; (4) the determination on the number of case studies and the selection of research objects; (5) the decision over data sources and collection methods; (6) data analyses, interpretations, inferences and conclusions. Research topics and purposes of this study were described above. The following was an explanation of subsequent procedures.

#### *Research Structure*

This study adopted the framework developed by Ireland *et al.* (2003) regarding strategic entrepreneurship demonstrated in Figure 1.

#### *Selection of Analytic Units*

This study referred to firms as analytic units. It explored the process of strategic entrepreneurship of the company in the case study. All the data collections, analyses and interpretations were focused on this level.

#### *Decision over number/selection of the research objects*

This study selected Giant Manufacturing Co. as a study object. The company has forty-years of operation history and is a learning model for the bicycle industry. The richness and complexity of its history and

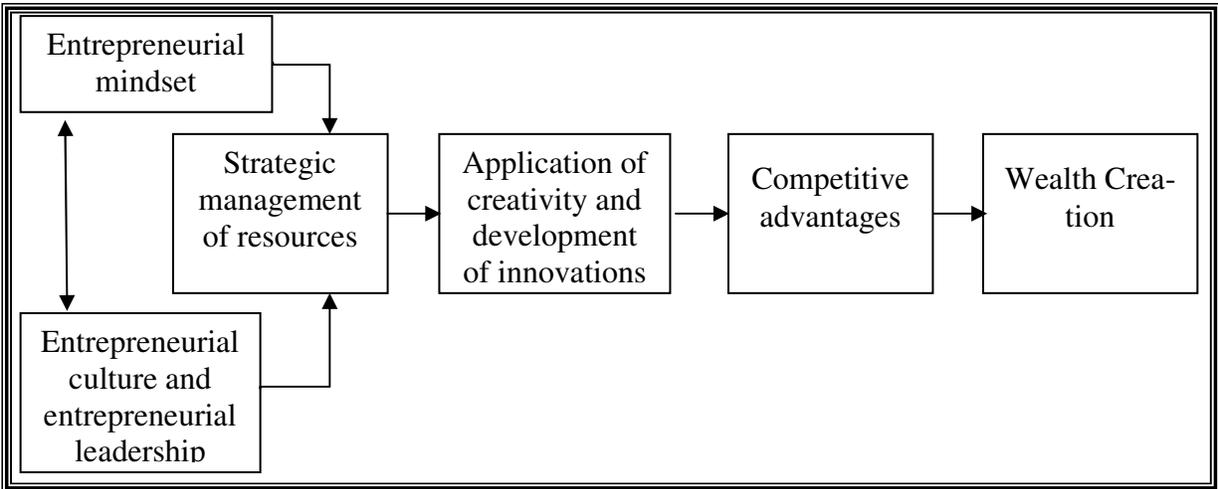


Figure 1. Framework of Strategic Entrepreneurship  
 Source: Ireland, Hitt, and Sirmon (2003)

background helps to shed light on the relationships between factors in the context of strategic entrepreneurship.

*Data Sources*

This study sampled multiple sources of data, including documentations, archival records, physical artifact, and direct observations. No single source of data can represent the complete truth or phenomenon and different data sources are in fact complementary (Yin, 1994).

*Data Analysis*

There are two strategies of analysing data in a case study. One is to analyse the case study by anchoring on hypotheses and the other is to develop case descriptions to connect a complex series of dots in the case study (Yin, 1994). This study adopted the second approach. In this study, the collection and analysis of data happened concurrently. Gathered data was immediately collated and summarized. The result of the previous literature review served as a guideline for data analyses and all the data concerning the case-study company was generalized and

synthesized. Clarifications were made concerning relationships between various factors and related procedures were linked. Finally, this study compared the outcome of strategic implementations by the case-study company with the findings in relevant literature.

*Research Analysis*

*Company Profile*

Giant Manufacturing was founded in 1972 in Taiwan. In 1986, the company set up an office in the Netherlands. Giant Manufacturing started operations as an OEM for bicycle parts and its main client was SCHINN, a bicycle manufacturer in the U.S. Attracted by the cheap labour in China, SCHINN decided to place OEM orders with Chinese manufacturers and this put Giant Manufacturing at the verge of bankruptcy. At that juncture, Chairman Liu decided to create his own brand, Giant.

Giant Manufacturing had a tough ride in promoting its own brand in the early days, as the international perception of products made in Taiwan was negative. However, Giant Manufacturing constantly improved its

international profile, after-sale service, and brand marketing, and began to make tractions in Europe where consumers demanded high quality. Meanwhile, the company made a major breakthrough in materials sourcing. In the middle of 1980s, the Taiwanese bicycle industry imported most of the carbon fibre required for high-end racing bikes from Japan at an unreasonably high cost. At that time, Giant Manufacturing approached Industrial Technology Research Institute for help. Soon after, Giant Manufacturing took the world with surprise by launching its first carbon-fibre bicycle in 1987 at an average selling price below \$3,000 in the U.S., 70% lower than the prevalent market price. In 2007, the company set up a branch in Tianjin and its consolidated revenue broke over a billion for the first time.

During the same year, Giant Manufacturing received the golden award from IF Eurobike and a design award from RedDot in Germany. In 2008, the company received an award from the Ministry of Economic Affairs for its excellence in technology & development. It was also ranked as the 11<sup>th</sup> of the top 20 Taiwanese brands. Its model “Expedition RSO” was rated as the best bicycle of the year in the Netherlands and its model “Twist Comfort” won a Taiwan Excellence Award. During the same year, its revenue exceeded NT\$40 billion, more than that of the major domestic automakers. With a global footprint rooted in Taiwan, Giant Manufacturing has become a learning model for Taiwanese entrepreneurs. Giant Manufacturing is more than just a maker of bicycles. It has created a culture of its own.

#### *Analysis & Discussion*

This study referred to the framework developed by Ireland *et al.* (2003) regarding strategic entrepreneurship, and conducted analyses and discussions with references to Lin (2008). The analysis dimensions were:

- (1) entrepreneurial mindset;
- (2) entrepreneurial culture and entrepreneurial leadership;
- (3) strategic management of resources;
- (4) application of creativity and development of innovations;
- (5) competitive advantages.

#### Entrepreneurial Mindset

##### *Entrepreneurship Opportunity Recognition.*

Giant Manufacturing started as a dedicated OEM maker for bicycles. It created its own brand “Giant” in the 9<sup>th</sup> year of the company’s history. Back in 1969, the Taiwanese government provided incentives for exports to the US market and this brought about a raft of bicycle manufacturers in Taiwan keen to export products. In 1972, the number of bicycles exported from Taiwan exceeded 10 million units. At that juncture, Chairman Liu and his eight friends put together NT\$4 million to establish Giant Manufacturing, and positioned the company as an OEM for the US market. Giant Manufacturing started operations with a total of 38 employees and all the investors were novices to bicycles. The founders were graduates majoring in machinery from vocational schools and they had another factory before. They thought the assembly of bicycles should be a piece of cake, i.e. the piecing together of two wheels and some components. However, they went through a lot of troubles assembling the bikes, but their bikes were so unstable that they could disintegrate at any time. People made fun of the company by calling them “Institute of Bicycle Studies” because their delay in delivering bicycles to clients.

The energy crisis in 1973 put the global economy into a recession. The US market also slowed down. At that time, bicycle shops in the US collectively refused to sell

or repair bicycles made in Taiwan. Giant Manufacturing received no orders as a result. With no cash, no clients and no markets, the company was on the verge of closing down. However, Chairman Liu did not give up. He led the team and continued. He and the CEO, each with a bicycle, went to Japan, the US, and Canada looking for outsourcing orders. To fight the negative perception about products made in Taiwan, he went to Japan for expertise and took home a copy of “Japanese Industrial Standards” with a red cover. After years of efforts, Giant Manufacturing won orders from SCHWINN, a US brand name with over a century of history, and became the major supplier to SCHWINN.

#### *Entrepreneur Awareness.*

Chairman Liu actually had the idea of creating his own brand when Giant Manufacturing entered its second year. Shortly after the decision over the joint venture between Giant Manufacturing and SCHWINN, SCHWINN terminated this project with an eye on the cheap production costs in China and switched orders to bicycle makers registered in Hong Kong. Understandably, Giant Manufacturing was the last one to learn of these decisions by SCHWINN. SCHWINN’s orders would start to cut back gradually and at the latest Giant Manufacturing would receive no orders from SCHWINN. It was difficult to source any major client who could account for 70~80% of Giant Manufacturing’s capability and there was no guarantee that the same thing would not happen again. Changes were necessary for survival. At that juncture, Giant Manufacturing decided to create its own brand “Giant” for the international markets.

#### *Actual Decisions.*

In 1986, Giant Manufacturing created its own brand and embarked on its three

stages of a development plan to establish a global footprint. The company stepped up its R&D activities and built distribution networks throughout the world. Giant Manufacturing set up a large network of distributors and established the division of labor across the Taiwan Strait. The company combined its strengths in Taiwan and China and constructed a barrier to entry. The status as No. 1 is nothing significant because competitors might catch up. Giant wants to be the only one by creating technological barriers impossible for competitors to catch up. It also endeavors to enhance brand values and set a standard for the global industry. Meanwhile, Giant Manufacturing emphasizes team spirits and grants autonomy to local subsidiaries so that they can combine local talents and attack the local markets by addressing cultural specifics.

#### *Entrepreneurial culture & entrepreneurial leadership*

#### *Three-Stage Plan to Establish an Entrepreneurial Culture.*

First Stage (establishment of entry barriers and rapid development of global presence): Giant Manufacturing chose to set up its first overseas branch in the Netherlands for three reasons. Firstly, all of its major clients for outsourcing were based in the US so an entry to Europe avoided direct competition with clients. Secondly, the Netherlands is the origin of European-style bicycles. The Dutch consumers are the most difficult to please and the country reports the highest popularity of bicycles. The experience in the Netherlands could help Giant Manufacturing understand the requirements from local consumers. Thirdly, Amsterdam is a major harbor in both European and global terms. Multiple languages are spoken here and Amsterdam is like a window to Europe. To make up the gap of disappearing orders from SCHWINN, the first stage of Giant Manu-

facturing's global strategy was to insist on 100% ownership of its subsidiaries, the recruitment of local talents, and the establishment of IA (Industry Art) production lines to meet with the high standards in Europe. Second Stage (establishment of division of labor across the Taiwan Strait): The division of labor across the Taiwan Strait built in the 1990s is one of the major reasons why Giant Manufacturing became the largest bicycle assembler in the world. The company adopted a two-pronged strategy in China, with an equal emphasis on both export opportunities and the Chinese market. It chose the site for production facilities not based on the clustering of the industry (and focus on exports only), but with an eye on the market potential in China. The most decision for Giant Manufacturing was about the creation of its own marketing and distribution channels. As local distributors did not know how to sell Giant bicycles and there were issues associated with the recovery of receivables, Giant Manufacturing decided to set up its own channel. The largest distributors in China at that time were all controlled by Shenzhen China Bicycle Company and other four leading brands. Giant Manufacturer hence approached the second largest distributors in different regions and recruited bicycle lovers, such as racers and coaches, who were honest and trustworthy. Giant Manufacturing accumulated experience and pursued localization in its China strategy for the recruitment of both management and design talents.

The localization strategy in China was the local management of local talents, materials, and finance. Giant Manufacturing fosters a fault-tolerant culture because it seeks constant innovations. Mistakes are fine as long as they are identified immediately and amends are made instantly. Mistakes are forgiven as long as they are not to be repeated and experience is learned from these mistakes. Giant Manufacturing came up with

the slogan "March on with a different pace" when China started its economic reforms. This catchy slogan echoed the pulse of the Chinese society and consumers remembered this international and fashionable brand immediately. Giant Manufacturing launched a series of trendy, colourful and light bicycles in China. It also sponsored cycling teams in Beijing, Henan, Hebei and Jiangsu. It ran cycling clubs by leveraging the presence of the shops it owned and cultivated a culture of cycling for fun rather than using bicycles for transportation. Giant Manufacturing constantly comes up with new designs on the basis of its global resources and competitors can only play catch-up. The company believes that the competitive advantage on the global scale will naturally lead to the competitive advantage in China. Giant Manufacturing has a team of designers from the US and Europe and access to advanced materials in Japan. The company leads the cycling fashion with innovative products. China is the most competitive market in the world so the loss of the Chinese market is like the loss of the global market. In 2004, Giant Manufacturing established a division for electric bicycles. In 2005, the company set up its global R&D and manufacturing center for electric bicycles in Kunshan, Jiangsu. Giant Manufacturing planned to sell electric bicycles to China and the rest of the world. The division of labour across the Taiwan Strait and the establishment of international R&D efforts were the reasons why Giant Manufacturer became the largest producer of bicycles in the world.

Third Stage (synergies and global logistics): After the establishment of global production and channel networks, Giant Manufacturer started in 2000 to set up a global logistics management model from its headquarters in Taiwan. The company continued to strengthen its capabilities in cross-country R&D, procurement, manufacturing, market-

ing, and resources integration, in order to ensure the agility of its value chain.

The headquarters in Taiwan manage strategies, support, and services, with logistics and management over R&D, branding, auditing, information, finance, knowhow, intellectual properties, and support. Strategies are devised at the headquarters to pursue long-term goals. The headquarters provide subsidiaries with tangible resources and intangible services, i.e. the deployment of information systems between the headquarters and subsidiaries, and the integration of procurement as well. As the largest bicycle maker in the world, the headquarters of Giant Manufacturers review the strengths and weaknesses of individual subsidiaries and facilitate the sharing of lessons and the learning from each other. The headquarters also lead on the direction of developments and the duplication of successful experience throughout the world.

A 100-people team services a global company: The headquarters in Dajia Township, Taichung, Taiwan, only have over 100 employees. However, this team manages 12 subsidiaries, 8 manufacturing sites in Taiwan and overseas and more than 10,000 distribution premises in over 50 countries. Giant Manufacturing does not centralize all the decisions to its headquarters. The small-but-beautiful headquarters allows autonomy to its subsidiaries and fosters trust between the headquarters and local branches.

#### *The Team Leadership Sets up an Entrepreneurial Foundation.*

Giant Manufacturing is a team of ordinary people who are pragmatic and consistent. Anything simple but well done is extraordinary. An organization with team spirits finds it easier to adjust to the rapidly changing world. A team approach is why Giant Manufacturing can stand out in the

knowledge economy. The team of Giant Manufacturing operates as if it were a cycling team. The front wheel is marketing, and the back wheel is manufacturing. The frame is management. The handlebar is strategic planning. The brake is financial hedging. The cyclist is the manager who thinks about when to brake, when to speed up and which grounds to avoid. Perfect performance is the result of day-to-day operational practices and constant improvements. Team spirits hinge on value and corporate culture. Team spirits should be ingrained into the culture and top leaders play a pivotal role in this process. Giant Manufacturing encourages mutual support within the team. After the creation of Giant as a brand, Chairman Liu has been focusing on the best-of-the-breed manufacturing quality and Antony Lo has been involved in the development of channels around the world. They worked together to make Giant a global brand. As far as the cross-country cooperation, the R&D centers in Europe and the US are responsible for the planning and exterior design of products for their respective local markets. The headquarters in Taiwan manages the technical innovations, design certifications, and the efforts to make cycling part of the modern life. The R&D center in China is responsible for the development of models for the Chinese market and the development of foldable bikes and electric bikes.

#### *Strategic Management of Resources Establishment of barriers to imitations.*

It is critical for a consumer brand to keep imitations at bay, and the only way to do so is to stay ahead of the game. Giant Manufacturing knows that being No. 1 is not a safe place so it decides to be the only one of the word with continuous innovations and differentiation. Giant Manufacturing wants to do something different so that it can create competitiveness that opponents cannot

copy. It takes foresight, courage, and speed to stay ahead of competitors. The best example was its decision in 1985 to develop carbon fiber frames by working with Industrial Technology Research Institute in 1985. This enlarged the gap with its competitors.

#### *Construction of the value chain with maximum differentiation.*

Giant Manufacturing is the only bicycle maker in the world with a complete value chain. It runs a dual ladder system of ODM businesses and its own branded products. Its marketing channels extend throughout the world but it also undertakes outsourcing orders from brands in Europe and the US. These international brands, e.g. TREK (No. 1 brand in the US), Specialized, and SCOTT, have global presence and channels but are outsourcing most of their productions to Taiwan. Chinese bicycle manufacturers are good at making bicycles but have no branding power. In contrast, Giant Manufacturing boasts expertise in R&D, prowess in manufacturing, strengths in branding and marketing channels around the world. All these elements contribute to its maximum competitive advantages.

#### *Sports marketing.*

Giant Manufacturing spends 8% of its revenue on branding and promotional campaigns, mainly in the form of sports marketing. The company has been very active in cycling events and competitions around the world. If the sponsored cyclists or teams win, it can effectively enhance Giant publicity and branding profile. In fact, sports marketing campaigns also boost R&D expertise and enlarge the gap between Giant and its competitors. For example, its carbon-fiber cycles were developed by working with cyclists. This dedication has made Giant a global brand name difficult to match.

#### *Four success factors for A-Team.*

Leadership in the nurturing of a shared passion: Members of A-Team should think about the benefits of the industry. In the beginning, some members were reluctant to share or wished to prioritize their own interests. However, the leader started to share experience and knowhow, and this made all the members realize that only cooperation ensures future prosperity.

Deepening of the friendship with suppliers: The relationship and friendship with suppliers over years are one of the factors that contribute to the success of A-Team. Years of knowledge sharing makes the relationship more solid than in other industries. The trust accumulated over the years makes it easier to share knowledge between companies and to create win-wins.

Influential figures to lead by example: Chairman Liu is called “Godfather of Bicycles”. His foresight has brought the Taiwanese bicycle industry to the forefront of high-end bicycle manufacturing. He was the best consultant to quality issues, free of charge, and always offered to help. He believed that it is important to align the management philosophy of suppliers. As long as the goals are the share, Giant Manufacturing will spend resources on joint developments.

Gradual approach to the building of trust between members: A-Team is a learning alliance composed of suppliers to Giant Manufacturing and Merida, two largest bicycle makers in Taiwan. They foster the trust between alliance members in a gradual manner, by starting with TPS and then moving to development, marketing and learning. Meanwhile, an exit mechanism was put in place to eliminate the companies not showing sufficient dedication.

*Application of creativity and development  
of innovations*

*Globalization.*

Giant Manufacturing goes through great troubles in finding the right people for its subsidiaries around the world, to make sure the hired managers share the same philosophy. The company gives autonomy to the right people, regardless whether they come from. An organization needs various talents and the leaders are the backup of this talent pool. Giant Manufacturer recruits locally and considers all the employees a part of this big family, whether they are male or female and no matter what their nationalities are. The headquarters believe in the power of “global support and local success” regarding its relationship with subsidiaries. The parent company and the subsidiaries are in fact partnerships. Giant Management System is built on the belief of “globalocalization”. The two winning secrets are the autonomy and collaboration with a global perspective.

**Autonomy & professional management:** All the members of the group have the capabilities to take initiatives. Subsidiaries are profit centers and provide assistance to Giant’s own shops and its distributors to attain targets. The sharing of a common goal allows individuals to maximize their values and create the most benefits for the group. Brand re-engineering is the second important secret of Giant as a leading brand. It extends the reach of existing branding resources and creates the branding value in the future. Branding continues on the foundation of Giant’s DNAs and stays on top of the global trends. This approach maintains the innovative spirits that set Giant apart from its competitors.

*Five convictions and four branding  
personalities.*

The five convictions are the celebration of a riding experience, the expansion of unlimited possibilities, the challenge to oneself, the presentation of the reality, and the love of nature. The four branding personalities are the pursuit of challenges and adventures, sincerity and enthusiasm, constant progression, and dedication for excellence. The five convictions and the four branding personalities make Giant a lively and colorful brand in the minds of consumers. Starting in 2007, Giant started a branding campaign “Exploration of Passions”. The Giant brand is perceived to be professional, reliable, and trustworthy. Giant Manufacturing is more than just a bicycle manufacturer. It listens to the needs of consumers and keeps consumers company in their adventures and explorations.

*Fault tolerance for a learning organization.*

Innovations are the result of tries and attempts. Giant Manufacturing maintains certain flexibility to create a learning environment. In 2000, the company set up Technology Center as its innovation engine. The center undertakes 40~50 projects per year. To respond to the global competition, Giant Manufacturing has developed “The Giant Way” with the experience of over 20 years. For example, “globalocalization” is one of “The Giant Way” philosophies. The company recruits local talents to manage its overseas subsidies and this resolves the issues associated with the difficulties for Asian companies in managing Western employees who tend to have strong sense of self-esteem. It also allows local professionals to rapidly grow market shares for Giant Manufacturing.

*Competitive advantages*

*Strong brand.*

In 2001, the company sold more than 340,000 bicycles in Europe, and became one of the top three brands in Western Europe. It sold 280,000 bicycles in the US and was considered the second largest brand. In Japan, Giant Manufacturing sold about 70,000 bicycles and was the No. 1 brand in the mountain bike segment. In Australia, Giant was the largest foreign brand. In Taiwan, it sold 130,000 bicycles, and its market share exceeded 25%, the largest brand in the domestic market. The Giant brand is valued at \$211 million. Chairman Liu believes that the brand is Giant Manufacturing's assets. It is the result of years of efforts and reputation. Over the past decade, the company has been emphasizing the importance of its own brand, long-term goals, and risk mitigations. The focus on quality and the management of branding are critical to production and marketing. Giant Manufacturing developed its branding advantage in two stages. In the first stage of 1986~1998, the company rapidly set up its global reach and extensive distribution networks around the world on the basis of its quality manufacturing. In the second stage of 1998~2006, Giant Manufacturing focused on sports marketing by sponsoring two champion teams, i.e. ONCE Team in Spain and T-Mobile team in Germany, in Tour de France. The sponsoring of winning teams creates brand images. Giant Manufacturing became the leader in the global bicycle market with efforts in these two stages.

#### *Complete product offerings.*

Giant Manufacturing's current product portfolio comprises of mountain bikes, road racing bikes, bikes for women, bikes for children, bikes for fun, and newly developed electric bikes and foldable bikes. The complete product offerings address different needs in different markets.

#### *Global marketing networks.*

Giant Manufacturing is an early starter in the pursuit of sustainability. It adopts a dual system in marketing strategies because it serves the demand from ODM clients and the demand for its own branded products. The company designs and manufactures for leading global brands but also establishes a marketing network for its own branded bicycles.

#### *Global service networks.*

Giant Manufacturing offers global services no matter where consumers purchase their Giant bikes. The company provides five-year quality warranty and one-year warranty for perishable parts for all of its products. Its comprehensive after-sale service network consists of its local distributors and 10,000 directly-owned shops. This global service network provides the fastest and most convenient services to customers. Meanwhile, Giant Manufacturing purchases \$30 million worth of product liability insurance each year.

#### *The GIANT way.*

This includes "Globalization" in its global management, "Inspiring Adventure" in its re-branding, "Action" in the pursuit of best practices, "Navigator" in the response to constant challenges and "Total Cycling Solution", a revolution in the channel network of the bicycle industry in the 21<sup>st</sup> century. Table 1. summarizes Giant Manufacturing's model of strategic entrepreneurship.

### Conclusions and Suggestions

#### *Conclusions*

This study examined Giant Manufacturing in a case study and explored the company's process of strategic entrepreneurship. The research findings suggested the following

Table 1. Key Issues Regarding Strategic Entrepreneurship in Case Study

Theme	Presentation of the case study
1. Entrepreneurial mindset	<ul style="list-style-type: none"> <li>● Entrepreneurship opportunity recognition: The Taiwanese government offered incentives to exports to the US and this prompted the bicycle industry in Taiwan to sell to the US market. Chairman Liu and eight of his friends put together NT\$40 million to establish Giant Manufacturing, with an eye on the demand from the US.</li> <li>● Entrepreneur awareness: The departure of its largest OEM client, SCHWINN, was a crisis for Giant Manufacturing, as well as an opportunity for the creation of its own brand.</li> <li>● Actual decisions: Giant Manufacturing started in Taiwan for the development of its own brand and used this experience to attack the overseas markets.</li> </ul>
2. Entrepreneurial culture & entrepreneurial leadership	<ul style="list-style-type: none"> <li>● Three-stage plan to foster entrepreneurial culture: (1) the establishment of global footprint for Giant as a brand in the global market; (2) the division of labor across the Taiwan Strait and the operations in China with a global perspective; (3) synergies and global logistics management.</li> <li>● Team leadership to build entrepreneurial foundation: Top leaders playing a key role in the fostering of team spirits. Experience sharing and mutual support as the key factor for Giant Manufacturing's success as a global power house.</li> </ul>
3. Strategic management of resources	<ul style="list-style-type: none"> <li>● Establishment of barriers to imitations: Being the only one in the bicycle market as the key to survival and irreplaceable competitiveness</li> <li>● Construction of value chain with maximum differentiation: Giant Manufacturing as the only bicycle maker in the world with a complete value chain, with a dual focus on ODM business and its own brand.</li> <li>● Sports marketing: 8% revenue spent on sports marketing each year.</li> <li>● Success factors of A-Team: Industry leaders starting with experience sharing so that all the members acknowledge the importance of team work for future prosperity.</li> </ul>
4. Application of creativity and development of innovations	<ul style="list-style-type: none"> <li>● Globalization: The recruitment of the right people for local management with local autonomy; local hiring decided by local general managers; all employees regardless of sexes and nationalities all part of the Giant family; training of headquarters personnel with overseas assignments to broaden perspective and experience; the strategy of "global support and local success" regarding the strategic partnerships with overseas subsidiaries.</li> <li>● Five convictions and four branding personalities: The Giant brand standing out with these lively images, and differentiated from others.</li> <li>● Fault tolerance: Flexibility in system design to create a learning environment.</li> </ul>
5. Competitive advantages	<ul style="list-style-type: none"> <li>● Strong brand: The Giant brand, valued at \$211 million, established in two stages.</li> <li>● Complete product offerings: comprehensive product portfolio catering to specific needs of different markets around the world.</li> <li>● Global marketing network: Dual-ladder marketing strategy in pursuit of the demand from ODM clients and the demand for Giant branded products.</li> <li>● Global service network: the provision of comprehensive after-sale services via global distribution networks.</li> <li>● Construction of a unique Giant quality: A pragmatic and successful model shared by all within the organization.</li> </ul>

key issues for strategic entrepreneurship: (1) an entrepreneurial mindset, including entrepreneurship, opportunity recognition, entrepreneur awareness, and actual decisions; (2) an entrepreneur culture and leadership involved three stages of global deployments and group leadership; (3) decision-making resources management included the establishment of barriers to imitations and the construction of value chains, sports marketing, and A-Team success factors with maximum differentiation; (4) creativity, development, and innovations encompassed three spirits of “globallocalization” management, five convictions, four branding personalities, fault tolerance, and learning; (5) competitive advantages comprised of strong branding, comprehensive product lines, global marketing networks, branding advantages, and the building of “The GIANT way”. The findings regarding Giant Manufacturing’s process of strategic entrepreneurship could serve as a reference to studies on the issues relevant to strategic entrepreneurship. In addition, the construction of a model for strategic entrepreneurship should help the bicycle industry in Taiwan to gain an understanding of the opportunities, resources, and processes associated with strategic entrepreneurship.

#### *Suggestions to Follow-up Studies*

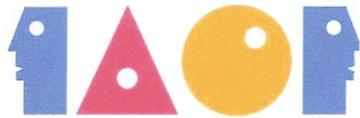
This study examined the entrepreneurial mindset of a company in the case study and delved further into its process of strategic entrepreneurship. Future studies might apply other research methods in the construction of a complete model for strategic entrepreneurship. It took a long period of time to observe and study to determine the success of strategic entrepreneurship. Due to limitations in resources and time, this study started with a literature review. Subsequent studies might enlarge their sampling pools in order to enhance the depth of the research work. Kuratko & Audretsch (2009) indicated five organizational types of strategic entrepre-

neurship, which they are sustained regeneration, organizational rejuvenation, strategic renewal, domain redefinitions and business models. These might be a reference for future studies in the analysis and investigation between the organizational types and entrepreneurial performances in the context of strategic entrepreneurship.

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ORGANIZATION ***DEROBOTIZED***: INNOVATION AND PRODUCTIVITY  
IN A WORKPLACE ENVIRONMENT

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Abstract

Standard hierarchical organizations are the ones in which employees perform in robotic modes, Milgram's *agentic* state. Employees become executive agents suppressing their autonomy and creativity. A robotic organizational structure is a foundation for an unhealthy work environment. In this paper, we propose that organization of the future operates on a foundation of a healthy work environment driven by collaboration, teamwork, and unconditional trust. These factors would *derobotize* employees and shift them away from the agentic state. Consequently, employees would create and innovate to the success of their organizations.

Key Words: robotic organization, teamwork, unhealthy work environment, *derobotized* employee, *agentic* state, General Theory of Managerial Hierarchy

## Introduction

Today's society molds employees into divided organizations. Employees compete with one another to be the best and to have the most, yet only the lucky few are able to progress in the workplace. Most people work single-handedly in a fast paced race to the top of their organization. When employees are in competition with one another, they perceive competition to be the optimal route to achieving their goals. This competitive strategy is that the individual is programmed by the corporate culture to be in this mode. She or he is no longer the individual who analyzes alternative practices and makes decisions with thought and creativity.

According to Milgram's famous study, *Obedience to Authority* (1974), "When individuals enter a condition of hierarchical control, the mechanism which ordinarily regulates individual impulses is suppressed and ceded to the higher-level component." These individuals suppress their autonomous, independent functionality and decision making to fit into the hierarchical organizational structure. Consequently, a fundamental *agentic* shift in functioning occurs when, "the person entering an authority system no longer views himself as acting out of his own purposes but rather comes to see himself as an agent for executing the wishes of another person" (Milgram, 1974). Therefore, an employee in a hierarchically structured organization enters a robotic state and acts as an executive agent who fits into the corporate culture. According to a study done by the Families and Work Institute (2006), "a significant proportion of the workforce is not actively engaged in their jobs, to the detriment of their organizations and themselves, because their workplaces lack characteristics of effectiveness."

## Work Environment

An unhealthy work environment is caused by the organizational environment in which workers report to work on their assigned hour and work longer than officially required to progress in their career or to deal with workload. Management never cares about the wellbeing and work-life balance of their subordinates. Management rarely inquires about the emotional and physical health of the workers. This behavior appears to be results-oriented and productivity-focused, yet is inhumane and emotionless towards employees who have feelings. For example, in the Human Resources Administration, New York City, social worker service employees usually work in robotic modes due to case overload. There is no time for communication between employees and management at all.

Employees in an unhealthy work environment are not excited about going to work and coming up with new ideas on how to improve the efficiency of the organization. The workers are there to get a paycheck; they are only happy when they see the paycheck, not while they are at work doing tasks. In most organizations, employees are in the survival mode, battling for themselves and trying to keep their nose down and stay out of trouble. Employees do not work together and do not look out for one another. Instead, they work individually and do not apply the concept of teamwork, because it is not actively encouraged by management.

Employees who are not happy are more passive at work. The workers sense that the organization does not care about their wellbeing, whether they are overwhelmed by the workload or other external factors.

Workplace insecurity and distrust is a major waste of energy that could otherwise be applied towards reinventing or improving the organization. According to Jones

(1998), "If trust continues to deteriorate, a party can no longer take the role of the other and believe in the other's trustworthiness, which results in conditional trust shifting to distrust." Furthermore, employees of an organization who do not trust one another constantly look out for the next "rat" who would tell on them to the manager in an attempt to earn extra recognition.

### *Derobotizing Organization*

A *derobotized* organization of the future stands on a foundation of a healthy work environment. A healthy work environment is one where workers are excited about going to work, where the setting is based on collaboration. In this environment, employees will be productive because the organization will be structured based on the concept of teamwork. Deming (2000) writes, "Teamwork is sorely needed throughout the company. Teamwork requires one to compensate with his strength someone else's weakness, for everyone to sharpen each other's wits with questions." In such a work environment, employees may work together better and look out for one another, instead of working individually and competing for promotion. Ivanov (2012) describes the competitive environment as *feararchy*, in which the organization is stagnating in paralyzing fear. Ivanov's studies find that most employees do not trust their organizations, do not put forth new ideas, and are paralyzed by fear.

When employees work in a team, they work together to create and innovate new products and deliver products together. Pentland (2012) notes, "The best team players also connect their teammates with one another and spread ideas around. And they are appropriately exploratory, seeking ideas from outside the group but not at the expense of group engagement." Instead of one person being rewarded,

success is viewed by management as a group effort.

The modern organization must operate on a foundation of honor and trust. When employees feel that they can trust one another, they do not waste energy on constantly trying to figure out who will stab them in the back next. Harvey (1999) explores the stabbing in the back paradigm of the modern organization. Jones (1998) states, "When unconditional trust exists, the exchange relationship is infused with meaning and positive affect derived from value sharing." Positive energy is then applied towards innovation. Employees, who do not fear being fired, feel part of the organization and want the organization to succeed by being involved in the process of improving the organization.

Ivanov (2012) argues that for the organization to innovate, its structure must be founded on trust. Ivanov (2001, 2006, 2011, 2012) puts forth the new theoretical propositions for the trust based organizational structure based on Jaques' General Theory of Managerial Hierarchy (Jaques, 1990, 1996, 2002). This new structure is based on the complexity of working roles and relationships, in which managers and subordinates work in value-adding relationships. This theory allows for measuring such relationships, and remove all non-value adding relationships, for example, micro-management, out of the organization.

When employees are placed in a group environment, which is properly structured, the individuals will figure out how best to work with one another to achieve a common goal. Employees will feel responsible for completing the project from start to finish in a collaborative effort and will develop a connection with the project and the team members.

Employees are the key to providing answers on issues at the organization. Because they are more directly involved with challenges at hand, employees have creative ideas on how to correct the problem given the proper resources and backing by management.

Employees want to improve the system, because it is also in their own best interest. A more efficient system would make employees happier and willing to come to work every morning where their lives will be easier and less stressful.

Additionally, the organization should increase the employee retention rate. Employees should want to stay and contribute to the success of the organization and not run away at the first opportunity for another job. To achieve this goal, management must implement the concept of working together as a unit. In this structure, employees and supervisors would care about each other and work together towards a common goal, to eliminate inefficiency and achieve strides through innovation.

The outcome is the derobotized organizational structure without fear, where the workers are content and excited to come to work. This in turn would unleash innovation and move the organization forward.

Under the current structure, employees are short-term contractors, not expected to contribute to the long term goals of the organization. The organization, instead, must hire employees with the goal of retaining them and setting the conditions for employees to stay long term to contribute to the organization's improvement. Jaques (1990, 1996, 2002), Ivanov (2001, 2011, 2012), and others elaborate in detail on the organizational structures to achieve these goals.

Permanent employees will develop greater affection towards the organization and will be willing to work on making the place better for all members, the family at work. Furthermore, employees will be held to a higher standard of responsibility, which means not only solving immediate problems, but working with managers to set achievable goals for the organization.

In the traditional approach managers and subordinates stand alone. They see themselves in separate classification systems. In the new approach, the manager will be accountable for the results and behavior of his or her team (Jaques, 1990, 1996, 2002). To succeed, the manager must encourage subordinates to come up with new ideas. It would be the manager's responsibility to make sure that employees have the time to sit down and come up with new ideas and present them with passion and enthusiasm. Therefore, the role of the manager must include the goals to get the employees to collaborate and work as a team to achieve the common purpose. The director, similarly, must be responsible for clearly articulating expectations, tasks, deadlines and timelines to the subordinates. In most organizations, presently, Ivanov's organizational studies find that it is not being done (2012).

## Conclusion

Employees want to feel secure, important, and part of the organization. Levering, Co-Founder of the Great Place to Work Institute, suggests that "A great place to work is one in which you trust the people you work for, have pride in what you do, and enjoy the people you work with." Innovating as a team moves an organization forward, because the output is a creative product of a collaborative effort.

Managers are to encourage innovation and not see it as a threat to their position. They are to trust that if everyone

works together, the organization would work more efficiently. Employees are to be viewed as key holders to solutions to inefficiency issues. Precisely because employees are in the front lines dealing with issues on a daily basis, employees have key insights on how to improve the current processes.

Employees are to be viewed as valuable because they have the most experience gained by working to resolve issues first hand. Managers are to view employees as a long term investment and not as readily disposable and easily replaceable. Only when employees are regarded as valuable, irreplaceable, and long term, they would take the time to think of creative ways to innovate and embrace the missions of the organization. It would be the role of the manager to create such an environment.

It is essential that the new approach engages a feedback process. Collin and Amabile state (as cited in Taggar, 2002) "Evaluation or feedback that is informative or constructive can be conducive to creativity." In this process, the manager communicates the vision and goals to the subordinate and the subordinate communicates the challenges to the manager. The feedback process is illustrated in the Collaboration Cycle chart in Figure 1. below.

In order for the organization to be a successful and high-performing system, upper management must empower the subordinate. Although the manager might have a goal or a vision for the organization, the subordinate has the feedback required to turn vision into practice. Through teamwork and proper structure, the organization can function in the derobotized mode, implementing the idea of working together to achieve the common goals.

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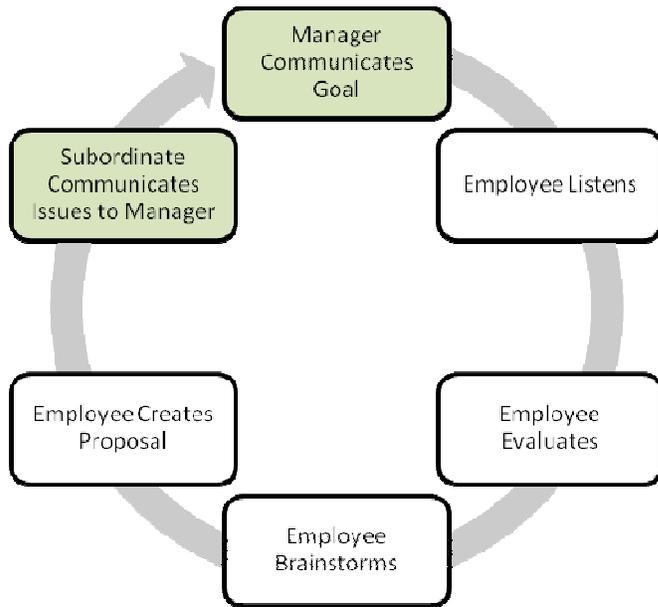
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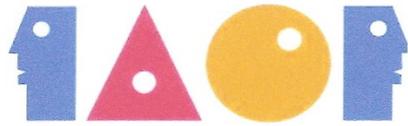
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Figure 1. Collaboration Cycle Chart  
**COLLABORATION CYCLE**





## A MULTI-CASES COMPARATIVE APPROACH ON FORMING ELEMENTS OF DYNAMIC CAPABILITY

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### Abstract

The main objective of this study is to investigate the forming elements of Dynamic Capability. Through the case comparison of four companies in Taiwan's Electric Scooter industry, it was found that: (1) Sensing capability can be divided into proactive and responsive type. Proactive sensing capability has more competitive advantage than responsive sensing capability. (2) Relationship capability can be divided into dense and sparse type. Dense relationship capability has more competitive advantage as compared to the sparse relationship capability. (3) Absorptive capability with cumulativeness and stage characteristic and integration mechanism will have competitive advantage. (4) Adaptive capability can be divided into industry integration and resource integration. Industry integration has more competitive advantage as compared to resource integration. Finally, practice meanings and future researches are proposed.

Keywords: Dynamic Capability, Strategic Management, Forming Elements

## Introduction

How an enterprise creates and maintains sustainable competitive advantage is usually a core topic in strategic management. Competitive advantage theory has experienced four development stages such as the early stage of competitive advantage, the externally born theory of competitive advantage, the internally born theory of competitive advantage and the dynamic theory of competitive advantage (Eisenhardt and Martin, 2000; Teece, Pisano and Shuen, 1997; Wang and Ahmed, 2007; Zollo and Winter, 2002; Zott, 2003). The externally born theory of competitive advantage makes the study from the external environment of an enterprise. The internally born theory of competitive advantage starts from the internal resource and capability of an enterprise. Dynamic theory of competitive advantage starts from the dynamic match of the internal and external environment of an enterprise to study the competitive advantage. The dynamic theory of competitive advantage thinks that Dynamic Capability is the capability for an enterprise to integrate, construct and re-build enterprise's internal and external capability so as to adapt to fast changing environment. Finally, it will bring sustaining competitive advantage to the enterprise (Ambrosini, Bowman, and Collier, 2009; Teece, 2007).

The dynamic capability needed by ambidexterity organization includes market sensing, opportunity seizing and reconfiguring which further explains the change mechanism that Dynamic Capability replies to the environmental change (Teece, 2007). The investigation of the evolution of Dynamic Capability layer further explains the importance of strategy change and Dynamic Capability (Helfat et al., 2007). The Dynamic Capability research architecture in the value creation process has proposed four possibilities of competitive advantage, short time, equality and failure to the output of

Dynamic Capability (Ambrosini and Bowman, 2009).

Although Dynamic Capability has been developed for more than 10 years and has caught extensive attention from many scholars, the research architecture of Dynamic Capability is always the focus of academic investigation (Ambrosini and Bowman, 2009; Wang and Ahmed, 2007). The definition of Dynamic Capability is gradually integrated (Easterby-Smith, Lyles, and Peteraf, 2009). However, the forming elements of Dynamic Capability usually lead to different viewpoints (Pettus, Kor, and Mahoney, 2009; Teece, 2007; Wang and Ahmed, 2007; Hou, 2008). In the meantime, Dynamic Capability directly provides the operation performance of an enterprise (Bowman and Ambrosini, 2003; Cepeda and Vera, 2007; Zahra et al., 2006) or indirectly affects competitive advantage. It also causes different opinions among the scholars (Helfat et al., 2007; Kor and Mahoney, 2005; Zott, 2003). Therefore, the motive of this study is to investigate the elements of Dynamic Capability. Several examples of Electric Scooter manufacturing companies of Taiwan will be taken to derive research propositions with academic research values to be used as reference for future academic research. Suggestion with management meaning of practice is proposed to be used by the industry.

## Literature Review

### *The Definition of Dynamic Capability*

Teece et al. (1997) first proposed typical "Dynamic Capability" view point to claim that an enterprise should build, integrate and re-allocate its resource and capability so as to respond to fast change of the environment. Among them, "dynamic" means the updating capability of an organization to cope with external environment change. The term "capability" emphasizes on the ability of correction, integration and re-deployment of the internal and external

skill and resource of an organization to adapt to the environmental change need.

Based on the definition of Teece et al. (1997), more exploring from many scholars have been obtained. Dynamic Capability not only is the necessary organizational capability of an enterprise in a relatively stable environment but also is a group learning model in complicated and variant environment. It is the capability of the enterprise to create, expand and correct its business operation regular regulation (Ambrosini, Bowman & Collier, 2009; Danneels, 2008; Helfat et al., 2007; Zahra and Georg, 2002; Zollo and Winter, 2002). Dynamic Capability is organization process or common practice. The enterprise adapts or creates market change through acquisition, release, integration or re-organization of its own resource (Ambrosini and Bowman, 2009). Through the organization regular regulation, the enterprise continuously updates resource deployment (Helfat and Peteraf, 2003; Zahra et al., 2006). Dynamic Capability contains market sensing to the external environment, the maintaining of enterprise structure and procedure, and the process of effective deployment of resource (Teece, 2007). Enterprise should have the capability to integrate, re-structure, update and re-build its resource and capability. It should be able to enhance its core competence so as to respond to changing environment and to maintain competitive advantage (Wang & Ahmed, 2007).

#### *The Forming Element of Dynamic Capability*

In this study, four perspectives summarized by Hou (2008) are used to describe the forming element of Dynamic Capability including sensing capability, relationship capability, absorptive capability, and adaptive capability.

**Sensing capability:** It is the market response capability when an enterprise senses environmental change and understand cus-

tomers' need. This market response capability makes an organization focus on continuous collection of the need of target consumer and the competence of the competitors. Meanwhile, through the use of the collected information, great customer value can be created (Slater and Narver, 1995). Pavlou (2004) is the major representative of sensing capability viewpoint, and he thought that market response capability can enhance the resource re-deployment capability through confirmation, propagation and market information leverage action. However, to select the resource deployment effectively, it is needed to understand first customer need and market trend, environmental judgment, market information, implementation and action are the core of the Dynamic Capability viewpoint (Teece et al., 1997).

**Relationship capability:** It is opportunity to use resource and the goal of the enterprise is fulfilled through the acquisition of resource, knowledge and technique (Alder and Kwon, 2002; Money, Gilly, and Graharm, 1998). Blyler and Cooff (2003) were the major representatives of network relationship viewpoint. They thought that social capital was a capability to manage resource and it should be seen as one of the key elements of Dynamic Capability. Meanwhile, it can help an enterprise to get the resource to integrate and re-arrange the resource and to release the resource. However, to the Dynamic Capability viewpoint, market barrier is hazy and unpredictable under high dynamic market. Hence, successful business model is difficult to be built. The participators on the supply chain are also hazy and movable at any time. The industry stays in dynamic and complicated state (Eisenhardt and Martin, 2000). Therefore, the relationship that lacks of social capital is going to be difficult to get effective resource. Therefore, to cope with the evolution of industry network value system under high environmental change, network

organization must use Dynamic Capability to respond (Luo 2000).

**Absorptive capability:** It is the exploitation of the acquisition of knowledge, assimilation and transformation to generate competitive advantage (Eisenhardt and Martin, 2000; Zahra and George, 2002; Zollo and Winter, 2002; Zott, 2003). Through the procedure viewpoint of Dynamic Capability, absorptive capability is re-explained. It is thought that absorptive capability is a procedure to analyze the knowledge accumulation and flow in an organization. Through the incubation of Dynamic Capability, the competitive advantage of the organization is created and maintained.

**Adaptive capability:** Under fast environment change, it is the adaptive capability for an enterprise not only to contribute the total performance and value but also to display individual's adaptation, individual's knowledge conversion and reconfiguration through all kinds of different input conditions. Teece et al. (1997) was the major representative of adaptive capability viewpoint. Three elements such as organization process, asset location and development path can be used to analyze Dynamic Capability. Dynamic Capability is a process for an organization in integrating, reconfiguring, acquiring and releasing resource. It can reach the re-adjustment of the resource of the organization so as to get adapted to or create market fluctuation. Dynamic Capability is a capability embedded in the organization process so that within the shortest time an organization can re-organize the resource of the organization and create the competitive advantage of the organization (Zott et al., 2007). Therefore, an enterprise needs to integrate three basic elements such as human resource capital, social capital and management recognition so as to build, integrate and re-allocate the resource (Ander and Helfat, 2003). In the mean time, enterprise should focus on organizational capability evolution such as capability acquisi-

tion, capability deployment and capability updating (Helfat and Peteraf, 2003; Luo, 2000). The enterprise can cope with the fast changing environment (Bierly and Chakrabarti, 1996). Among them, knowledge integration is the most important one (Leonard-Barton, 1995). Knowledge integration can enhance an organization's capability of using the resource and organization's core competence. Meanwhile, it can help the organization to make correct decision so as to acquire competitive advantage (Eisenhardt and Martin, 2000).

## Research Method

### *Overview of the Research Target*

This study has selected four Electric Scooter manufacturers for the study. There are three reasons for the selection: First, four case study companies include success and failure cases. For example, SP Co. Ltd. has turned from deficit into surplus. CP Co., Ltd. has encountered bankruptcy. LD group is the industry paradigm. BT Co., Ltd. is in its continuous growth. Second, the organization scales of four case study companies are different. For example, SP Co., Ltd. is a case of smaller organization scale. CP Co. Ltd., BT Co., Ltd. and LD group are cases of larger organization scale. Third, all four cases get involved in the manufacturing of Electric Scooter, and such selection is to delete influential factors such as technical difference and industrial structure. In the mean time, four enterprises include all stages of enterprise growths, for example, CP Co., Ltd. and SP Co., Ltd. are enterprises in the growth period. LD and BT are enterprises in the mature period. Hence, the cases are filled with richness and complexity which is helpful to the understanding of the relationship between Dynamic Capability and Change Strategy.

### *Data Collection Method*

In the data collection aspect of this study, multiple data sources are adopted. In

addition to direct collection of related literature and the internal data of the case study company, it is also accompanied with direct observation on the individual case from the researcher, the actual experience of participation in the real business operation (CP and SP Co., Ltd.) and more than two years of experiences of acting as consultant (LD and BT Co., Ltd.). It is hoped that data correctness and completeness can be well taken care. Therefore, five data such as the observation, the internal data within the organization, written document, the actual participation in business operation and management by the author and more than two years of experiences in acting as consultant are taken as the data sources in this research.

#### *Data Analysis, Explanation and Deduced Conclusion*

The case data analysis of this research is carried out based on "Description of case under development". Through research analysis, the complicated relationship among cases is linked together. Therefore, this study has adopted models such as actual participation of business operation and management, consultation history and observation to collect data such as interview, observation, internal data of the organization and written document. Then according to the needed Dynamic Capability item, it is summarized and classified according to the individual case so as to make individual description on each research target. Then the analysis on each individual case has been summarized so as to get the comparison and analysis results on multiple cases.

#### *Research Results*

##### *Analysis and Discussion on Dynamic Capability*

According to four individual cases of this research, it can be seen that the sensing capability of the enterprise can be divided

into proactive and responsive sensing capabilities.

Proactive sensing capability means that enterprise tries to find out and understand how to satisfy the potential expectation of the customer. The potential expectation of customer is the demand or product that customer cannot clearly express or something that the service provider cannot easily explore it. However, from the behavioral data of the customer and consumer and from the circulation speed of the product, we can observe customer's potential need (Linder, 2006; Millson and Wilemon, 2002). For example:

The methods used in market information processed by LD group include the generation of market information, information communication and customer's reply. It emphasizes on the concept of "Customer value center". Proactive sensing capability is expressed in the process to expand from children's market into elderly people's market.

The sensing capability of BT Co., Ltd. is the capability to satisfy customer's potential expectation. Proactive sensing capability was displayed on the investment in the development of Electric Scooter in 1989. In 2005, its development field has been extended to the market of battery technology and electric bicycle. In 2008, to enter the electric motorcycle and electric car field, self-brand and distribution channel strategy of Green Runner was created.

The competitive advantage of sensing capability of SP Co., Ltd. was set up through customer's value. The methods of proactive sensing capability include the satisfaction of customer's need and service, industry analysis and competitor's analysis, and the reinforcement of the enterprise's functional department within an organization to satisfy customers.

Responsive sensing capability means that enterprise tries only to understand and satisfy customer's current and clear need. Clear need means that customer knows his need and problem and can express it, but the mutual resource application and integration within the enterprise cannot fulfill and show its response capability (Narver and Slater, 1990; Kahn, 2001). For example, for CP Co., Ltd. in the growth period from 1981 to 2001, the real actions such as customer, need and satisfaction as shown by sensing capability in customer management aspect all showed very good fulfillment. But in the decay period of 2002 to 2005, its responsive sensing capability lacks of implementation power and is not operated based on customer center concept. The collaborative and coordination function and real action of an enterprise has resulted in internal conflict. Hence, its relationship to customer has changed. Although the customer of CP Co., Ltd. does not reduce its purchase order to CP Co., Ltd., the customer complaint value of CP Co., Ltd. is too high. Moreover, the control on the Mainland China's market is not well implemented, and the inventory as well as rejection value are both too high.

Recent research has pointed out that proactive response capability, as compared to responsive response capability, has more influence on creativity (Atuahene-Gima et al., 2005; Narver, Slater, and Maclachlan, 2004). Enterprise with proactive response capability can perceive the potential need of customer, can forecast future market trend, and is capable of providing product of higher creativity to satisfy customer's need.

*Proposition 1:* Sensing capability can be divided into proactive and responsive type. Proactive sensing capability has more competitive advantage than responsive sensing capability.

#### *Analysis and Discussion on Relationship Capability*

According to four individual cases of this article, it can be seen that the scope of relationship capability of an enterprise includes three aspects of relationship among customer, partner and employee. Relationship capability is a long term and stable network relationship. It is the co-owned capital among the members. Meanwhile, it gives resource acquisition opportunity to employee and enterprise of internally relationship, or enterprise and supplier of externally relationship, or the relationship between enterprise and customer (Alder and Kwon, 2002). For example:

**Customer relationship:** The customer relationship of LD group emphasizes on "customer value as the center". BT Co., Ltd. focuses on brand marketing and customer buildup, and it is carried out in two complementary ways of self-brand and ODM. Meanwhile, it is implemented through the ways of confirmation of customer, partition of market, interaction with customer and customization. Although the internal organization factors of CP Co. Ltd. decay, it has long term relationship with customer. SP Co., Ltd. pays specific attention to four stages of individual customer relationship development which includes exploring, construction, maturity and decaying stage.

**Partner relationship:** The partner relationship of LD group is expanded through Taiwan's association. In 2005, CP Co. Ltd. has certain change in its relationship to its supplier. SP Co., Ltd. and its relationship to strategic alliance organization have a chance of resource increase.

**Employee's relationship:** The relationship to employee in LD group is based on humanity spirit, and LD group focuses on four aspects such as "Complete incubation system, localized dialogue, implementation power and rich payment". There is very large difference between the Mainland plant and Taiwan plant of CP Co., Ltd. Three aspects of employee's relationship such as Taiwan's managing personnel have very

different viewpoints to the top management level, the high level managers have leadership problem and the loss of harmony to the top management level have created barrier to the change. The performance-oriented wage system of SP Co., Ltd. has set up strong employee's relationship.

According to four individual cases of this study, it is found that the relationship capability of an enterprise can be divided into two types such as dense and sparse types.

Dense network type focuses on depth and adopts cooperative type relationship capability. Dense type network type has high reliance, trust and cooperation: Reliance means that for both sides of enterprises, in order to satisfy their goals and due to the need of the related resource from the opposite side, they have to rely on the opposite side. Trust means the belief on the intention or behavior of the opposite side. Since under the viewpoints of many people, it is fair, originating-from-good-will and efficient/capable, confidence is thus generated on it. Cooperation means a situation that both sides collaborate to fulfill the common goal. When the relationship is of high reliance, trust and cooperation, they are more willing to make social exchange and interaction, and they are more willing to take risk (Nahapiet and Ghoshal, 1998). For example, the relationship capability of LD group, BT Co., Ltd. and SP Co., Ltd. belongs to dense type.

Sparse network type emphasizes on breadth and adopts transaction type relationship capability. Sparse network type has transaction type relationship capability, both transaction sides make contract through "price" mechanism. Meanwhile, due to the existence of specific usage characteristic of the asset, the limited rationality, under the action of opportunism behavior, uses the smallest transaction cost to keep its relationship. For example, the relationship be-

tween CP Co., Ltd. and its employee belongs to sparse type.

Relationship capability is certain resource management capability, which will affect the information propagation, search and transfer within an organization (Blyler and Cooff, 2003; Carolis, 2002)

*Proposition 2:* Relationship capability can be divided into dense and sparse type. Dense relationship capability has more competitive advantage as compared to the sparse relationship capability.

#### *Analysis and Discussion of Absorptive Capability*

According to four cases in this study, it was found that absorptive capability of an enterprise is described through "the influential factor of absorptive capability", "absorptive capability with cumulateness and stage characteristic" and through the conversion of the conversion of "integration mechanism" to the real application.

The first is the influential factor of absorptive capability. According to four individual cases studied in this article, the influential factor can be divided into external influential factor and external influential factor: In the external influential factor, it includes external environmental feature (Cohen and Levinthal, 1990), external source and knowledge complementary characteristic and external stimulating factor (Zahra and George, 2002).

The second is absorptive capability that has cumulateness and stage characteristic. Absorptive capability is a function of an organization in the prior related knowledge field, the development of absorptive capability and its subsequent innovative performance display shows the "history-and-path-dependence" phenomenon. This means that absorptive capability has cumulateness characteristics. After accumulating related knowledge in the same field, the

subsequent R&D and application of the organization can be further promoted (Cohen and Levinthal, 1990). Therefore, an organization must acquire knowledge first before it can take full use of knowledge. Similarly, if an organization has acquired knowledge but does not take full use of it, it won't be able to construct its competitive advantage (Zahra and George, 2002).

The third is through "integration mechanism". It is converted into real application. Integration mechanism means that the organization member is willing to share each other the related knowledge, hence. All the organization members will be able to apply new knowledge into the organization operation. Integration mechanism has mediating effect to the process of transformation of knowledge from internalization to real application process. Therefore, through the proactive sharing of knowledge among organization members, the opportunity for an organization to use the new knowledge can be effectively enhanced. When all the members of an organization are more willing to share knowledge to each other, the difference between knowledge internalization capability and knowledge utilization capability among the organization members will be reduced more (Zahra and George, 2002). For example,

The influential factors of absorptive capability of LD group come from the promotion of all kinds of projects. Capabilities of acquiring, digesting, transforming and utilizing knowledge are used to re-construct regular organization regulation and to integrate its core competences. For example, related knowledge can be obtained through the promotion of "total quality management" project, the promotion of "IPO" project, the promotion of "lean production" project and the promotion of "front end innovative model" projects.

The influential factors of absorptive capability of BT Co., Ltd. come from three aspects such as R&D budget, the core key

components in the past few years and technical development and learning. On the average, the annual R&D budget is more than 50 million NT dollars. Moreover, it has seized the key component and technology which includes the most advanced LiMPO4 environmental protection battery technology. The application of learning methods such as ISO, ERP and technical social network operation.

The absorptive capability of CP Co., Ltd. is insufficient for the past few years in terms of special project promotion, R&D investment and educational training. The cumulateness and stage characteristic of absorptive capability is insufficient. For example, its research budget is only 0.18% of the revenue. The patent application is less than one case in one year. Its special project promotion is only the "IPO" one performed in 1995. The promotion in other management creativity or special project is insufficient. In the mean time, it also lacks of the governance thinking in the management level.

The influential factors of absorptive capability of SP Co., Ltd. include R&D investment, educational training and stimulating factors. R&D expense occupies about 4.08% – 8.82% of the revenue. The external knowledge is absorbed through the educational training of the employee. Only stimulating factors such as the consciousness and industrial technology variation will affect its absorptive capability.

Absorptive capability can be thought of as the source of Dynamic Capability. In the mean time, it is also the key to maintain corporate competitive advantage.

*Proposition 3:* Absorptive capability with cumulateness and stage characteristic and integration mechanism will have competitive advantage.

### *Analysis and Discussion of Adaptive Capability*

According to four cases of this study, adaptive capability can be divided into two types of industry integration and resource integration in accordance with industry chain and supply chain direction.

Industry integration is the industry chain integration, and it is to gather industry, to merge or recombine an industry or to expand into other industry. Industry adaptive capability means that an enterprise is capable of grouping the existed knowledge and is capable of gaining new knowledge. It is a capability to transform and re-group knowledge, and it is combinative capability, too (Zahra and George, 2002). For example,

The adaptive capability of LD group comes from internal and external resource deployment. Internal integration includes procedure and capital integration, and external integration includes customer and technological integration. Adaptive capability is specific characteristic belonging to LD group. It creates mutual interaction among resources and it develops as time passes by. Its enterprise resource can be re-deployed, grouped and applied in its procedure, and it can reach the transformation and change to cope with environmental change. For example, in external integration aspect, starting from 2001, it has developed its customer and technology integration which include its policies in children's product business, medical assisted business and Electric Scooter business. The internal integration includes total quality management, lean production project, front end innovative model and Hong Kong's IPO project.

The adaptive capability of BT Co., Ltd. is displayed in product integration and market integration. Product integration comes from "Autonomous R&D and manufacturing", "Patent right and key component seizing" and "Test equipment completeness and total quality control". Market integration

actions include the market partitioning, enhancement of self brand image and distributor service network, and the providing of consultation to the distributor to ensure the service quality and satisfaction. In the resource distribution of 2008, it was shown that the future direction of adaptive capability of BT Co., Ltd. include the self construction or direct purchase of the distributor channel, the review of the assessment operation, vertical integration and planning, capital increase by cash and 100% transfer investment of electrical power.

Resource integration is the integration of value chain, enterprise reorganization and resource integration. Resource integration is a "strategic" adjustment process in enterprise through interaction, communication and educational training. It is a capability that the existed knowledge is integrated into new knowledge. It is a capability that is embedded in the organization flow. Therefore, the organization within the shortest time can re-organize its resource so as to create the organization's competitive advantage (Ander and Helfat, 2003; Helfat and Peteraf, 2003; Luo, 2000; Wang and Ahmed, 2007; Zott, 2003). For example, the quality system of SP Co., Ltd.: It is a system formed by project plan, standard procedure and standard. It integrates the existed technology, capability and knowledge into new knowledge and capability. SP Co., Ltd. has only enterprise resource's adaptive capability. Since the enterprise is still under growth, the industry chain integration still needs to be reinforced.

For CP Co., Ltd., from 2002 to 2005, adaptive capability due to bad communication, the incapability of the reduction of internal political behavior through the operation of organization structure, and bad absorptive capability, it finally goes to destruction.

Adaptive capability is a sum of systematic capability, coordination capability, and socialized capability.

*Proposition 4:* Adaptive capability can be divided into industry integration and resource integration. Industry integration has more competitive advantage as compared to resource integration.

## Conclusions and Suggestions

### *Major Research Conclusions*

Through literature review and the comparison analysis of cases of four representative enterprises of Taiwan's Electric Scooter industry, it was found that only when the enterprise possesses Dynamic Capability to set up its competitive advantage and the pursuit of growth and profit. The major conclusions of this study are:

*Proposition 1:* Sensing capability can be divided into proactive and responsive type. Proactive sensing capability has more competitive advantage than responsive sensing capability.

*Proposition 2:* Relationship capability can be divided into dense and sparse type. Dense relationship capability has more competitive advantage than relationship capability.

*Proposition 3:* Absorptive capability with cumulateness, stage characteristic and integration mechanism will have competitive advantage.

*Proposition 4:* Adaptive capability can be divided into industry integration and resource integration. Industry integration has more competitive advantage than resource integration.

### *Implications for Practice*

The dynamic change of external environment is the real background provided by Dynamic Capability theory. Dynamic Capability is the capability to cope with the fast change of the external environment. It is the capability of an enterprise to con-

struct, integrate or re-construct internal and external capability. It can be seen as one type or organization process or strategic common practice to cope with change. It is the way that an enterprise acquire, release integrate or re-organize its own resource to cope with market change. The enterprise uses continuous adjustment of its strategy and common practice to update its resource deployment so as to the need of environmental change. Dynamic Capability is intrinsically a change oriented capability, especially resource creation, resource integration and resource re-construction capabilities. Therefore, Enterprise should, through aspects such as sensing, relationship, absorptive and integration, perform the incubation of Dynamic Capability. Proactive sensing capability, dense relationship capability, absorptive capability with cumulateness, stage characteristic and integration mechanism and industry integration capability will have superior competitive advantage.

### *Future Research Direction*

Although this research tries to take stringent attitude, there are still lots of insufficiencies and difficulties to be surmounted. If the subsequent researchers can continue the research aiming at this, the research results is for sure to be more complete and mature. Hence, the following three suggestions are proposed for the subsequent researchers:

First, the forming elements and research architecture of Dynamic Capability are still under construction (Ambrosini and Bowman, 2009; Easterby-Smith et al., 2009). In the investigation process of its relationship in this process, in addition to related literature arrangement and case studies, it is hoped that the scholars can further through the integration of all kinds of qualitative and quantitative methods such as in-depth interview method, focus group method, expert's opinion consultation method, exploratory factor analysis method,

confirmatory factor analysis method and hierarchical analysis method. By setting up the index of each hierarchic perspective and constructing the evaluation model, it is helpful to the enhancement of model development preciseness. Meanwhile, the perspective within the model and the validity and reliability of the index can all be ensured.

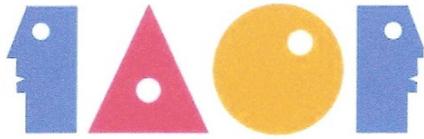
Second, this research has selected four cases in Electric Scooter industry as the targets of this research. From the research result, it was found that the organization scale of four cases in Electric Scooter industry does not have effect on the enterprise performance of Dynamic Capability. Enterprise growth stage does not have effect on the enterprise performance of Dynamic Capability, either. However, will the previous performance of an enterprise organization affect the performance of strategy change? Therefore, the investigation of the effect of industry form, market position and previous performance on Dynamic Capability and Change Strategy is also topic worth of more discussion.

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THE RELATIONSHIP BETWEEN CORPORATE SOCIAL  
RESPONSIBILITY, JOB SATISFACTION AND  
ORGANIZATIONAL COMMITMENT

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## Abstract

Many scholars explore the scope of Corporate Social Responsibility (CSR), mostly based on the perspective of the enterprise management or the customers. However, this study explored and analyzed this topic from the employee's point of view, by investigating whether businesses' investment in social responsibility could affect the job satisfaction and organizational commitment of employees. The aims of the study were to explore if CSR inputs would affect the correlation between employee job satisfaction and organizational commitment. The subjects of this study were employees from the business department of an insurance company. As a result of using Statistica software to process 380 questionnaires, it was shown that business investment in social responsibility had a significant impact on job satisfaction and organizational commitment of the employees. In addition, staff job satisfaction had a significant impact on organizational commitment. While exploring the influence of business investment in CSR on the job satisfaction of the employees, the study found that it also affected the employees' organizational commitment through the intermediary of the worker's job satisfaction.

Keywords: Corporate Social Responsibility (CSR), Job Satisfaction, Organizational Commitment

## Introduction

The Job Satisfaction of an insurance agent is the key for an insurance company to display performance and profit. Therefore, the capability to seize the Organizational Commitment of the insurance agent to the enterprise is a guarantee of reducing the demission rate and of reducing the labor cost of the human resource. However, in the long term, the demission rates of insurance agents usually stay very high. Hence, the business departments in the insurance industry have to design all kinds of sale and competition activities to encourage the insurance agents whom they care for and rely on. For example, the award meetings of performance competition, the issuance of bonus for competition, overseas tours, and education training for special projects are all mainly conducted for insurance agents.

On the external side, the insurance agent acts on behalf of the insurance company to sell insurance policies. In addition to the requirement of a good image and professional knowledge of the insurance agent, when the enterprise gains a good enterprise image due to its investment in CSR, it could bring honor to the insurance agent too, and it could bring recognition and approbation to the enterprise from consumers and the public. It will also help the promotion of the performance of the insurance agent, the smooth progress of the agent's insurance business and the acquisition of respect and good treatment as well. Moreover, the Job Satisfaction part for the insurance agent can also be enhanced. When Job Satisfaction is enhanced, it will be helpful to the persistence of the insurance agent with Organizational Commitment, and the insurance agent will give more support to the investment of Corporate Social Responsibility (CSR) by an enterprise. In this study, the correlation between an enterprise's investment in CSR as well as the enhancement of corporate image and the Job Satisfaction of the insurance agent will be investigated. Meanwhile,

its influence on the Organizational Commitment of an enterprise will be studied too.

The main research objectives of this study are listed as in the following:

1. To investigate the correlation between the CSR of an insurance company and the Job Satisfaction of the insurance agent.
2. To investigate the correlation between the CSR of an insurance company and Organizational Commitment from the insurance agent.
3. To investigate the correlation between the Job Satisfaction of the insurance agent and the related Organizational Commitment.
4. To investigate the mediating effect of Job Satisfaction of the insurance agent on CSR and Organizational Commitment of the insurance company.

## Literature Review

### *Corporate Social Responsibility*

Although the concept of CSR is widely accepted by countries, enterprises and the public around the world, yet its definition is still difficult to confirm despite many discussions. These definitions are very broad and lack consensus and standards. Different organizations have different definitions of CSR. Its content is mainly, under the pursuit of the maximal profit, to ask the enterprise to follow some moral standards in addition to meeting the law and regulation requirements. The enterprise should also be connected with employees, the local community, and society so as to enhance the quality of life.

Briefly, the concept of CSR is that "the enterprise takes it from the society and should use it in the society too". It can point out the correct direction and pursuit target for the growth and development of the enterprise, and it is also the necessary strategy

for the sustained operation of an enterprise. Broadly speaking, CSR means that an enterprise, in addition to pursuing the maximal interest of a shareholder, should also take care at the same time the interests of related persons (stockholders) that include the employees, consumers, suppliers and the community environment, etc.

The concept of CSR was first proposed by Dodd in 1932 and in the period 1950-1960 (Bowen, 1953) this term was first adopted. It was thought that CSR is a responsible and obligatory way to solve social issues. After the 1960s, some groups started to be concerned whether weak groups and minority groups were treated fairly. This urges the managers, when they are making decisions, to start to consider the social impact on the social responsibility issues.

### *Job Satisfaction*

Job Satisfaction was first proposed by Hoppock (1935) in the book "Job Satisfaction", which means that Job Satisfaction is the level of satisfaction felt by the employee in two aspects of psychology and physiology on the environmental factors. That is, it is the subjective response from the employee to the working situation. After this, most scholars have proposed their own views based on this concept.

Porter and Lawler (1968) thought that the level of Job Satisfaction depends on the difference between the actual return and expected return an individual gets from a specific job. The smaller the difference is, the higher the level of satisfaction will be. On the contrary, if the satisfaction is larger, the dissatisfaction will be smaller. Smith *et al.* (1997) thought that Job Satisfaction means the feeling or emotional reaction of an individual to all the aspects of the job. The worker evaluates satisfaction based on five reference architectures of the job itself, return, promotion, monitoring and colleagues.

Locke (1976) thought that Job Satisfaction means the pleasant or positive emotional response obtained by an individual from the job or job experience. It is specifically pointed out that the target of Job Satisfaction is the individual worker, not the work group. That is, it is present or past oriented, not future-oriented. In addition, Price (2001) thought that Job Satisfaction is the emotional attitude of a worker to the job. Hence, Job Satisfaction means the level of satisfaction or dissatisfaction of a person with all the internal or external aspect of a job (Bhuiyan and Menguc, 2002; Hunt *et al.*, 1985).

### *Organizational Commitment*

Organizational Commitment is the strength an individual recognizes, and participates in, in an organization. In the field of organization theory, from the scholar's research and the empirical study, it was found that Organizational Commitment can be explained as the behavioral display for the interaction between an individual and a group (Becker, 1960). It can also be used as the better index of demission rate as compared to Job Satisfaction. In corporate management, if you want to create a work team with high loyalty and high performance, and if you want to exploit the maximal competence of the employees so that an enterprise can effectively use its rich human resource to achieve the operation performance goal as set up by the enterprise organization, then the influence of Organizational Commitment indeed stays in very key position, and it is also a very important index of the organization performance.

Whyte (1965) proposed the concept of Organizational Commitment, which means the loyalty and contribution of an individual to the organization. The reason Organizational Commitment catches so much attention from the scholars is mainly based on the hypothesis that "High Organizational Commitment is beneficial to the organization". For example, Porter, Streers, Mow-

day, and Boulian (1974) pointed out that Organizational Commitment can effectively predict the demission behavior of the employees. Morris and Sherman (1981) thought that Organizational Commitment, in addition to predicting the demission behavior, can also predict the performance of the employee. Ferris and Aranya (1983) also thought that Organizational Commitment can be used as an effective index for the assessment of organization performance.

Organizational Commitment theory is set up mainly based on the benefit it can bring to the organization. Allen and Grisaffe (2001) pointed out that most researchers thought that Organizational Commitment is the mindset of the employee to the job or organization. It represents whether the employee will select to stay in the organization or not in the future.

Organizational Commitment is mostly defined as the emotional adherence of an employee to the organization. It represents the interest from the employee in the organization and the hope of the employee to be linked to the organization (Hunt, 1989; Mowday *et al.*, 1979). Hunt (1989) pointed out that if the employee has higher Organizational Commitment, he/she will show recognition of the goal and value of the organization and will hope to continue to be a member of the organization. Porter et al. (1974) described the characteristics of Organizational Commitment as listed below:

1. Strong belief and the acceptance of the goals and values of the organization;
2. Willingness to give pay the highest efforts to the organization;
3. Strong willingness to become a member of the organization.

According to the viewpoint of Buchanan (1974), an individual's emotions are attached to the goals and values of the organization, personal role involvement related to

these goals and values, and the organization's objectives in addition to personal values. Steers (1977) thought that Organizational Commitment can effectively predict an employee's demission behavior, and it can further predict an employee's performance in the organization, moreover, its prediction effect on an employee's demission rate or truancy rate is even better than that of Job Satisfaction.

## Research Method

According to the literature review, this research supposed that CSR would affect Job Satisfaction and Organizational Commitment, and CSR would, through Job Satisfaction, affect Organizational Commitment; whereas "Employee's Job Satisfaction" is used as the mediating variable of this research and, through the employee's Job Satisfaction, it could affect the employee's Organizational Commitment. The framework of this research is demonstrated in Figure 1.

## Measurement

The questionnaire in this study includes three sections of "corporate social responsibility," "job satisfaction," "organizational commitment". A five-point Likert scale ranging from (1) mostly false to (5) mostly true was used. If the score is high, it means that they agree with the questionnaire content to a greater extent. Completed data were entered and processed by using the software of the Statistical Package for the Social Sciences (SPSS) version 12.0, and the questionnaire sources and results of factor analysis and reliability are as follows.

The Corporate Social Responsibility Questionnaire refers to the study by Carroll (1979), with 16 questions. The Job Satisfaction Questionnaire refers to the scale by Cellucci and DeVries (1978) and includes 23 questions. The Organizational Commitment Questionnaire refers to the study by

Meyer and Allen (1991) and includes 18 questions.

The KMO values of the three variables in this study (CSR, job satisfaction, and organizational commitment) are all greater than 0.8, and the Bartlett's sphericity test is lower than 0.005, which is suitable for factor analysis. Principle components analysis was employed and Varimax was used as an orthogonal rotation to extract eigenvalues of factors equaling or exceeding 1 and factor loadings equaling or exceeding the accepted criterion of 0.5 (Hair et al. 2006).

The Corporate Social Responsibility Questionnaire was used to extract 4 factors. The cumulative percentage of variance was 62.889 and the Cronbach's alpha ranged from 0.669 to 0.836, which shows that the scale has good reliability. The factors represented the four different dimensions of CSR: (a) economic responsibility, (b) legal responsibility, (c) ethical responsibility, and (d) philanthropic responsibility. The factor analysis, reliability, and validity analyses are presented in Table 1.

The Job Satisfaction Questionnaire was used to extract 3 factors. The cumulative percentage of variance was 59.925 and the Cronbach's alpha ranged from 0.728 to 0.885, which shows that this scale has good reliability. The factors represented the three different dimensions of service quality: (a) promotion, (b) supervisors, (c) work itself. The factor loadings and coefficient alpha of service quality scale are presented in Table 2.

The Organizational Commitment Questionnaire is used to extract 3 factors. The cumulative percentage of variance was 66.062 and the Cronbach's alpha was from 0.639 to 0.879, which means that this scale has good reliability. The factors represented the three different dimensions of service quality: (a) affective commitment, (b) continuance commitment, (c) normative commitment. The factor loadings and coefficient

alpha of corporate image and purchase intentions scales are presented in Table 3.

### *Hypothesis*

Previous study has focused mostly on the relationship between CSR and the customer, but currently there are more and more scholars who have focused their research on the study of the influence of CSR on the internal related person of the enterprise, namely, the employee. Therefore, this research aims to study the influence of CSR perceptions of the job satisfaction and organizational commitment of employees.

Ho (2007) found that when the company values emphasize CSR and let the employee understand its current implementation status within the company, the employee's job satisfaction and organizational commitment tend to be enhanced. Wu (2009) found that when an enterprise fulfills its duty of CSR, the employee's job satisfaction and organizational commitment can be enhanced and, accordingly, the employee's work performance can be enhanced as well. Thus, based on the above research, this study proposes the following hypothesis:

*H1: The level of perception, from an insurance agent, of the CSR of an organization, shows a positive influential relationship to the Job Satisfaction of the insurance agent.*

Peterson (2004), from the viewpoint of social recognition theory, thought that an employee will feel proud of the acquisition of a good reputation due to organizational participation and social responsibility. This will, in turn, have a positive influence on the working attitude of the employee and lead to higher organizational commitment to the organization from the employee. Brammer et al. (2007), based on social recognition theory, found a positive correlation between

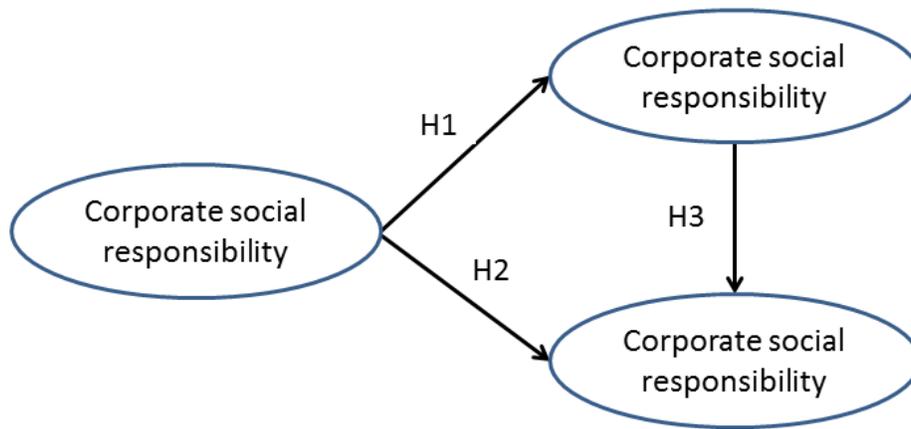


Figure 1. Research architecture chart

Table 1. Factor loadings and coefficient alpha of corporation social responsibility

Factors	Items	Factor loading	Item-to-total Correlation	Cumulative percentage of variance	Cronbach's $\alpha$
Philanthropic responsibility	CSR14	0.755	0.771	21.363%	0.828
	CSR15	0.718	0.744		
	CSR18	0.689	0.744		
	CSR03	0.672	0.710		
	CSR17	0.571	0.669		
Ethical responsibility	CSR16	0.547	0.761	39.792%	0.836
	CSR12	0.780	0.742		
	CSR09	0.741	0.752		
	CSR13	0.666	0.812		
	CSR11	0.611	0.798		
Legal responsibility	CSR10	0.543	0.797	52.854%	0.729
	CSR05	0.810	0.758		
	CSR07	0.771	0.816		
Economic responsibility	CSR06	0.736	0.841	62.889%	0.669
	CSR02	0.886	0.853		
	CSR01	0.644	0.882		

Table 2. Factor loadings and coefficient alpha of job satisfaction

Factors	Items	Factor loading	Item-to-total Correlation	Cumulative percentage of variance	Cronbach's $\alpha$
Promotion satisfaction	JSQ28	0.755	0.682	22.624%	0.885
	JSQ33	0.718	0.729		
	JSQ31	0.689	0.748		
	JSQ25	0.672	0.703		
	JSQ26	0.571	0.712		
	JSQ29	0.547	0.760		
	JSQ32	0.780	0.768		
	JSQ35	0.741	0.726		
Supervisor satisfaction	JSQ36	0.666	0.690	44.906%	0.885
	* JSQ23	0.772	0.771		
	* JSQ27	0.729	0.780		
	* JSQ34	0.721	0.806		
	* JSQ39	0.716	0.787		
	* JSQ24	0.696	0.788		
Work itself satisfaction	* JSQ38	0.617	0.755	59.925%	0.728
	JSQ19	0.511	0.706		
	JSQ41	0.783	0.884		
	JSQ40	0.712	0.889		

\* these items are reverse coded

Table 3. Factor loadings and coefficient alpha of organizational commitment

Factors	Items	Factor loading	Item-to-total Correlation	Cumulative percentage of variance	Cronbach's $\alpha$
Affective commitment	* OCQ46	0.783	0.808	27.090%	0.879
	* OCQ44	0.758	0.612		
	* OCQ54	0.743	0.822		
	* OCQ45	0.727	0.803		
	* OCQ52	0.666	0.829		
	OCQ42	0.560	0.737		
	OCQ47	0.557	0.760		
Continuance commitment	OCQ51	0.794	0.839	48.122%	0.813
	OCQ50	0.784	0.855		
	OCQ59	0.775	0.724		
	OCQ56	0.682	0.784		
Normative commitment	OCQ57	0.781	0.821	66.062%	0.639
	OCQ55	0.751	0.897		

\* these items are reverse coded

the level of CSR implemented by the enterprise on the external stakeholders and employees' commitment. From the above research results, it can be seen that when the employee has higher recognition of the CSR, the employee's commitment to the organization will be further enhanced.

Thus, based on the aforementioned findings, this study proposes the following hypothesis:

*H2: The level of perception, from an insurance agent, of the CSR of an organization, shows a positive influential relation-*

*ship to the Organizational Commitment of the insurance agent.*

From the research of Rusbult and Farrell (1983), Mathieu and Zajac (1990), and Meyer and Allen (1997) on job satisfaction and organizational commitment, it was pointed out that a positive correlation exists between them. Bhuian et al. (1996) used 780 employees in banks, travel agencies, the retail industry, traditional manufacturing industry and service industry as research targets. It was found from the research that job satisfaction shows a significant positive influence on organizational commitment. Lok and Crawford (2001) used 251 nurses in medical work stations as research targets, and it was found from the research that job satisfaction shows a significant positive influence on organizational commitment. Williams and Hazer (1986) thought that job satisfaction is the emotional response from an individual to a specific perspective of the job, and organizational commitment is the emotional response from an individual to the entire organization. An employee must be satisfied with other perspectives such as the job itself, the work environment and the salary and welfare before he/she can have a further stable and long term recognition conception of the organization (Mathieu and Zajac, 1990; Meyer and Allen, 1997).

Therefore, this research has referred to the research results from the above scholars and expected that job satisfaction will positively affect organizational commitment. Finally, the following research hypothesis is proposed:

*H3: The Job Satisfaction of an insurance agent shows a positive influential relationship to his Organizational Commitment.*

#### *Sampling*

A total of 380 questionnaires were distributed to four insurance companies

and the returned questionnaires came to a total of 311 copies. After removing the incomplete and invalid questionnaires, a total of 234 valid questionnaires were collected, making the response rate 75.24%. The majority of the respondents were female (73.9%). Most subjects (68.4%) were more than 36 years old. The predominant education level was College or University (49.6%), and their average wage per month was more than NT\$ 50,000 (50.9%).

#### Research Results

##### *Regression Analysis*

From the regression analysis results of table 4, it can be seen that the independent variable of CSR explained 52.1 percent of the variance of job satisfaction ( $R^2=0.478$ ). From equation 1 it can be seen that CSR ( $\beta=0.693$ ,  $p<0.001$ ) has a significantly positive effect on job satisfaction, which means that if employees have a higher perception of CSR, they will have higher job satisfaction. Thus, Hypothesis H1 is supported.

As shown in Table 4, it can be seen that the independent variable of CSR explained 24.8 percent of the variance of job satisfaction ( $R^2=0.478$ ). From equation 2 it can be seen that CSR ( $\beta=0.051$ ,  $p<0.05$ ) has a significantly positive effect on organizational commitment, which means that if employees have a higher perception of CSR, they will have higher organizational commitment. Thus, Hypothesis H2 is supported.

As shown in Table 4, it can be seen that the independent variable of CSR explained 34.6 percent of the variance of job satisfaction ( $R^2=0.346$ ). From equation 3, it can be seen that job satisfaction ( $\beta=0.591$ ,  $p<0.001$ ) has a significantly positive effect on organizational commitment, which means that if employees have a higher job satisfaction, they will have

higher organizational commitment. Thus, Hypothesis H3 is supported. As shown in Table 4, it can be seen that the independent variable of CSR explained 36.0 percent of the variance of job satisfaction ( $R^2=0.360$ ). From equation 4, it can be seen that both CSR ( $\beta=0.469$ ,  $p<0.001$ ) and job satisfaction ( $\beta=0.176$ ,  $p<0.05$ ) have a significantly positive effect on organizational commitment.

## Conclusions and Suggestions

### Conclusions

According to the results of the regression analysis of this research, it can be seen that a positive correlation exists between CSR and job satisfaction. Therefore, when the enterprise has more involvement in the CSR, then the insurance agent will have more job satisfaction. In the research of Bhattacharya et al. (2008), it was pointed out that when an enterprise has fulfilled its CSR and has associated it with the daily management, it will then bring a positive effect to the company; for

example, the enhancement of the employee's loyalty, the reduction of slow-downs, the enhancement of job satisfaction and the enhancement of job loyalty, etc. In addition, it was found from this research that a significant positive correlation exists between CSR and organizational commitment. It means that the level of recognition of corporate social responsibility by the insurance agent on the organization will have a positive influence on organizational commitment. Therefore, when the employee has conceived more from the involvement of the enterprise on corporate social responsibility, the employee will tend to have stronger organizational commitment to the company. Peterson (2004), from the viewpoint of social recognition theory, thought that employees will feel proud of the good reputation acquired due to organizational participation in social responsibility, which in turn will bring a positive influence to the work attitude and will enhance the organizational commitment from the employee to the organization too.

Table 4. Results of Regression Analysis

Independent variable	Dependent variable	$R^2$	$\beta$	F
CSR	Job Satisfaction	0.478	0.693***	214.235***
CSR	Organizational Commitment	0.248	0.051*	77.698*
Job Satisfaction	Organizational Commitment	0.346	0.591***	124.513***
CSR	Organizational Commitment	0.360	0.469***	66.482***
Job Satisfaction	Organizational Commitment		0.176*	

\* $P<0.05$ ; \*\* $P<0.01$ ; \*\*\* $P<0.001$

Finally, according to the result of the regression analysis of this research, it can be seen that a significant positive correlation exists between job satisfaction and organizational commitment. Therefore, when the employee has higher job satisfaction, his/her organizational commitment will be accordingly higher. Therefore, only after the employee has satisfaction with other perspectives such as the work itself, the work environment, salary and welfare, and job promotion, can the employee have further stable and long term recognition of the organization. In addition, the employee's willingness to stay in the organization can be enhanced too. This research result is consistent with the result verified by many scholars that job satisfaction has a positive influence on the organization (Mathieu and Zajac, 1990; Meyer and Allen, 1997).

#### *Suggestions*

From this research it is clear that, when an enterprise fulfills CSR, it gives significant enhancement to the employee's Job Satisfaction and Organizational Commitment. When an enterprise gains a good enterprise image due to the investment of CSR, the insurance agent will feel honorable and receive approbation from the consumer and the public in the society. Meanwhile, it would also be helpful to the enhancement of the sales performance of the insurance agent. Hence, the insurance sale business of the insurance agent will be smoother, and the insurance agent will gain more respect and courtesy. Moreover, the Job Satisfaction part of the insurance agent is enhanced too. When the Job Satisfaction is enhanced, the insurance agent will be more positive towards Organizational Commitment. Hence, the insurance agent would support and participate more in corporate investment in CSR.

Therefore, an enterprise could, in many ways, enhance the employee's investment and understanding in CSR, for example through training for new recruits, a special

topic forum for corporate culture, commonwealth advertisement for CSR, or through the intranet of the enterprise to transfer the investment message of CSR to the employee so that he/she can understand enterprise's contribution in implementing CSR. When an enterprise holds related CSR activities, it could even encourage employees to co-participate all kinds of activities related to CSR so that they can have strong feelings of participation and mission. Moreover, through such participation, employees could gain more recognition and Job Satisfaction in his work.

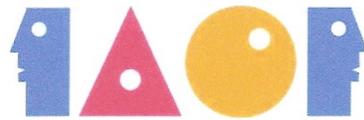
This research was limited to insurance agents in the insurance industry, since the same research hypothesis would not necessarily have the same result with research targets in different industries. Hence, it was suggested that the research scope of this study could be expanded to enterprises of different industries, for example the service industry, financial industry, high-tech industries, traditional industries, or small- and medium-sized industries.

This research used the feeling from insurance agents in the insurance industry to observe the correlation between CSR, Job Satisfaction, and Organizational Commitment. The leading way of the supervisor, system of the company, harmony among colleagues and moral and legal factors would all affect perception of CSR, which in turn would lead to different feelings among employees. Therefore, this research suggested that subsequent researchers could perform the investigation of correlation between CSR, Job Satisfaction, and Organizational Commitment by aiming at other factors, because this could make the research result richer and more complete.

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## A REVIEW AND CRITICAL ANALYSIS OF THE PRINCIPLES OF SCIENTIFIC MANAGEMENT

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### Abstract

The study examines the various principles of Taylor's Scientific Management theory and the challenges that the theory faces in modern times. Taylor proposed four main principles of scientific management. The principles are as follows: development of a true science, the scientific selection of the workman, the workman's scientific education and development and the intimate relationship between the management and the men. Essentially, Taylor attempted to zero in on the efficiency of the workman at the work place. He intimated that scientific methods were indispensable in improving the efficiency of the workman. He averred further that the profitability of any business organization depended on the efficiency of the workman. Nevertheless, Taylor faced a number of challenges and setbacks in his propositions.

Keywords: Scientific Management, Taylorism, Task Allocation, Dehumanization

## Introduction

It is important to understand where the organization of work is headed. Therefore, we examine the development of Taylorism in this regard. It is also critical to determine whether Taylor's paradigm is superseded by a new paradigm or if it is simply being modified. This paper explores the logic in Taylor's theory of scientific management, and the challenges that face the continuity of the application of the theory.

The central theme of Taylorism is focused on the delinking of conception from execution (Evangelopoulos, 2011; Blake & Moseley, 2011). Managers achieve this through application of three principles. The first principle of scientific management entails the decoupling of the labor process from the skills of the workmen. The managers assume the burden of bringing together all of the traditional knowledge which in the past was possessed by the workmen. They then classify, tabulate, and streamline this knowledge into formulae, rules and laws that are scientific in nature (Blake & Moseley, 2011; Zuffo, 2011; Pruijt, 2003).

The second principle prescribes that all possible analytical brain work should be aimed at planning or layout department (Wren, 2011; Pruijt, 2003). The third principle explains that the management team should not rely on the workers to decide how they carry out their tasks. Instead, the management should define exactly how rapidly the tasks must be executed and completed (Prujit, 2003). The context in which these principles are located is in logistical streamlining and standardization of components (Paton, 2013; Pruijt, 2003). Taylorism is, therefore, a refinement of the management strategy of the division of labor.

To understand the division of labor and specialization is critical. Through spe-

cialization, workers can upgrade themselves in their crafts or professions. In contrast, detailed division of labor reduces people to performers of routine tasks. Detailed division of labor entails analyzing a production process and breaking it down into multiple tasks performed by different workers. In this way, a craft-based labor process that was once controlled by the workers themselves may be divided into pieces (Prujit, 2003; Buenstorf & Murrmann, 2005). Then, managers assemble the pieces to define a process that is controlled by management. The financial advantage of this strategy is that it is possible to hire less well-paid workers (Prujit, 2003; Tolsby, 2000). Taylorism carries the detailed division of labor to new extremes, where the task is evaluated in seconds. It is said Taylorism presents low-trust relations between employers and employees (Prujit, 2003).

The study also raises the various challenges facing Taylorism. These include lack of education, the concept of task allocation and the dehumanization of the workers. These challenges have various implications on the theory as a whole and its adoption by organizations.

### The Principles of Taylor's Scientific Management

Taylor places a lot of emphasis on the need for a scientific approach to the management process. Taylor clearly sees the necessity to merge management with science. This is seen when he proposes that a business manager and an engineer be one and the same person. He consequently proposes four principles of scientific management.

The following describes the development of a true science. It includes the scientific selection of the workman, the workman's scientific education and development and the intimate relationship between the management and the men.

The first principle addresses the development of a true science in the field of management. This can be applied to the art of bricklaying (Myers Jr., 2011). The process of bricklaying can be significantly enhanced if scientific principles are employed. This may be implemented through the enactment of rules that will govern the motion of every workman involved in the process of bricklaying (Bell & Martin, 2012).

Secondly, the bricklaying process would also be more efficient through the perfection and standardization of all implements and working conditions (Paxton, 2011). This would ensure that the bricks are of uniform size and shape. This would enhance the efficiency of the bricklaying process. As for the working conditions, it is necessary to provide a favorable atmosphere for employees engaged in the bricklaying process.

Employees tend to work better if the management implements various mechanisms to motivate them (Phelps & Parayitam, 2007). Money is one major medium for motivating employees. Employees need to feel they are getting value for their labor and that they are being compensated adequately. However, there are other factors that may come into play in the motivation of employees. This is where science comes in. An organization may need to draft appropriate policies and rules that would spur efficiency in the services rendered by employees.

The development of a true science is crucial in the management process. A true managerial science would ensure the efficiency of the workman in various ways. First, it makes it possible for the standardization and perfection of the working equipment. This ensures the uniformity of goods and services being produced and may increase the demand for such products as they will be more appealing to customers (Giannantonio & Hurley-Hanson,

2011). A true science would also define appropriate rules and regulations which should be adopted in the process of creating goods and services.

The second principle is the scientific selection and training of the workman. The success of any business organization depends on the selection of personnel to work in the organization. Consequently, many organizations go to great lengths to ensure that only the best talent is selected and hired for a given job. Organizations have sought to develop their human resource departments so that they can be effective in the staffing process. This is a critical task that may be made easier through the use of scientific methods in the selection of the workman.

Organizations, therefore, have drafted various meticulous ways of selecting the right man for the job. This includes careful scrutiny of the professional and academic qualifications of all prospective employees. The next stage is a thorough interview of the shortlisted candidates for the post before settling on the most qualified individual. Scientific methods of selection are, therefore, quite handy in the recruitment process.

It is also important to release any workers who do not live up to the expectations of the organization. Those employees who are unable to adapt to the new methods of production become unnecessary baggage to the organization and have to be weeded out. Each employee, therefore, strives to work harder and more efficiently in order to avoid being eliminated from the organization. The basis for determining which employee is less effective can be established through scientific methods of selection and recruitment (Maqbool et al, 2011).

However, Taylor contends that it is the responsibility of the employer to train employees and ensure they are fit to

handle the responsibilities assigned to them. Instead of the management letting each employee figure out his tasks and goals, it has to guide the workers in their daily activities in the organization. Reliance on the old rule of the thumb may be inefficient in improving the performance of the employees (Blake & Moseley, 2010).

The third principle calls for the workman's scientific education and development. It is the responsibility of the organization to ensure that employees remain relevant at their jobs (Wagner-Tsukamoto, 2007). In order for the organization to remain profitable, it is crucial that each employee continue dispensing their duties in accordance with the principles laid down for them. The implication of this principle is that workers have to constantly undergo training and development in order to be more efficient in performing the tasks assigned to them.

It is for this reason that collegiate education has been put into place. This has arisen out of the need to constantly refresh the knowledge and skills of employees, especially in the fast-changing markets that characterize modern business. Some organizations provide in-house training for their employees, while others allow for study leaves so that their employees can gain more knowledge.

There are some cases in which employees take it upon themselves to upgrade their education. In such cases, employees may quit their jobs in order to pursue further studies, hoping to land better jobs on completion of their studies. Such employees usually have to finance their own education and, though it may be expensive, they find it a worthwhile investment as they are able to land better paying jobs in future.

The fourth principle postulates the cooperation between employees and the

management. Taylor explains that his intention is for a clear division of labor between the groups, with the management team responsible for all the planning and cognitive functions. Taylor warns managers that they would run into significant risk if they try to quickly adjust from the old approaches of doing things to his new system. He cautions that the most significant danger in introducing new methods is devising a way to transform the psychological attitudes and habits of the management team, as well as those of the workers (Blake & Moseley, 2010, 2011).

Taylor contends that it is possible to determine the best way to perform a task to maximize its efficiency. This can be achieved through a scientific study. According to Taylor, all a manufacturer needs is a man with a stopwatch and a properly ruled book. Then, you only need to select ten to fifteen men who are skilled in a particular task for a scientific analysis. The next step is to analyze the exact series of operations needed while doing the work under investigation, as well as understanding the tools which are used. A stopwatch is utilized to measure the required time for each of these elementary steps to select the quickest way of doing each step. Finally, the subsequent tasks are to eliminate all false, slow, and useless movements, collect the quickest and most efficient movements, and implement them into one series (Blake & Moseley, 2010, p29).

Division of labor takes a central position in Taylor's fourth principle. This is because the cooperation between employees and the management provides a suitable working environment for distribution of tasks among the employees according to their skills and qualifications. This works best if there is a common understanding between the management and the employees.

Taylor's theory of scientific management revolutionized the management of

organizations locally and internationally. However, Taylor's theory faced various challenges (Peaucelle, 2000). Some of the challenges included a lack of education among the lower levels of supervision and within the ranks of the workers. Another challenge is the concept of task allocation in which a task is broken down into smaller tasks. This allows planners to determine the best approach to go about accomplishing tasks. Then, there is the reductionist approach which may dehumanize workers.

Taylor's legacy contribution to the field of business management and its various disciplines is still thriving today (Myer Jr., 2011; Wren, 2011). Taylor's contributions have survived the management evolution that has progressed from the industrial age into the information age, and is now poised to enter into what some authors hypothesize as the virtual age. This possible entry into the virtual age suggests that many new applications of Taylor's principles will be put into practice in the future (Myer Jr., 2011, p11).

#### Challenges of Taylorism in Modern Managerial Practice

##### *Lack of Education*

Lack of education presented a major challenge to the early use and adoption of scientific management. This was an especially noteworthy issue with the lower levels of supervision and laborers. Taylor noted that most of the factory workers had insufficient education levels because most were recent immigrants. In addition, many workers were not even fluent in English, which rendered communication to be difficult (Blake & Moseley, 2010).

Taylor was unconvinced that low level supervisors and line workers were sufficiently qualified to handle effective planning. This was because they had low levels of education as most had not under-

gone proper training. Although the workmen were best suited for their jobs, they were incapable of comprehending the science of management. Since they did not have the relevant educational background, they lacked the mental capacity to work (Blake & Moseley, 2010). Lack of education was, therefore, a key challenge in the adoption and use of scientific methods of management. Since most of the lower cadre workers lack the necessary education to enable them to comprehend the scientific aspects of management, it would be difficult even to train them. This is compounded by the problem of language, considering that most of them were recent immigrants.

Nevertheless, Taylor attempted to meet the challenge of lack of education by making a proposition. He proposed that there should be a separation of powers between planning and execution. To this end, Taylor suggested the creation of departments for planning, and these departments would be run by engineers.

These engineers would be tasked with four basic responsibilities; namely, developing scientific methods of doing work, establishing goals for worker productivity, setting up systems for worker rewards and teaching and training personnel on how to use scientific methods of management (Blake & Moseley, 2010, 2011; Paxton, 2011).

##### *The Concept of Task Allocation*

Another challenge facing Taylor's scientific management methods lay in the concept of task allocation. Task allocation has drawn sharp criticism over the years and it involves the splitting a huge single task into several smaller ones that allow the planner to determine how best the task can be handled. The implication here is that a single task will be accomplished by a series of persons, ranging from top management to workers.

Task allocation, which leads to division of labor, has made Taylorism an expensive system of management. This is because it creates redundant positions for non-value adding workers such as supervisors and other indirect workers (Pruijt, 2002). Taylor subdivided the work meant for one gang boss among eight men. The eight men included different categories of clerks, gang bosses, speed bosses, inspectors and shop disciplinarians.

This means that Taylorism not only vouches for efficiency but also for the provision of middle class jobs. This makes it very expensive to implement and run. It is for this reason that the US Steel Corporation laid off 60 specialized foremen (Pruijt, 2002). This dismayed Taylor but there was no other choice for the steel corporation as it had too many non-value adding supervisors in its organization. The emergent high costs of operations due to unnecessary personnel led companies to dilute Taylor's model of scientific management.

The concept of task allocation has been criticized for its lack of flexibility. It is complex or impossible to increase the time allowed for operations as the time cycle is clearly stated in the standard worksheet of operations (Prujit, 2002). This becomes a major dilemma for older workers, especially when timelines have been set to accommodate the more youthful workers in the organization. The older workers, consequently, may find it difficult or impossible to keep up with the company's expectations, objectives and goals.

#### *Dehumanization of Workers*

Dehumanization of workers is yet another challenge to Taylorism (Blake & Moseley, 2010). This can be attributed to Taylor's reductionist approach to scientific management. The general perception was that the individual worker had no chance

to excel or think on his/her own. This criticism arose from later writings based on Taylor's research by other authors as opposed to Taylor's own words and theories (Maqbool et al., 2011).

Actually, Taylor had considered and discussed worker's happiness throughout his monograph. He stressed that the task was always regulated so that the worker who is well suited to his job will thrive while working at this rate during a long time period. The worker will grow happier and more prosperous, instead of being overworked (Taylor, 1911, p15). Taylor's concept of human motivation was extremely limited. Taylor had a strong conviction that the only way to motivate workers was through monetary incentives (Brogan, 2011). Although the study of human motivation would not become popular for several decades to come, it still seems naïve to contend that money is the sole motivator for employees (Blake & Moseley, 2010, p30). Taylor frequently came under sharp criticism for having his work being exclusively beneficial to the management team. This was despite the fact that he tried to establish a common ground between management and laborers.

Taylor further indicated that the majority of these men hold that the fundamental interests of employees and employers are necessarily antagonistic (Zuffo, 2011; Blake & Moseley, 2010). Scientific management, in contrast, has its basis that the interests of the employees and employers should be necessarily the same. The employer's prosperity cannot subsist through a long time period unless it is accompanied by the employee's prosperity and vice versa. It is possible to give the worker what they want most, which is high wages, and the employer what they want, which is low labor costs—for their manufactures (Caldari, 2007).

Nevertheless, Taylor showed concern for the well-being of the workers through

out his research despite exhibiting an attitude that was often biased against workers (Taylor, 1911; Blake & Moseley, 2010). For instance, he contended that naturally, man strives to do as little work as is safely possible in the majority of cases. The implication of this assertion is that man has to be given timelines for them to meet goals and obligations.

His directions were geared toward the uneducated. As an example, during his case study explanation at Bethlehem Steel, he directed a pig iron worker to obey his supervisor by saying “When he tells you to pick up a pig and walk, you pick it up and you walk, and when he tells you to sit down and rest, you sit down. You do that right straight through the day. And what’s more, no back talk” (Blake & Moseley, 2010, p30; Taylor, 1911, p18). This attitude from management would not be acceptable in modern work environment, but it was commonplace during Taylor’s time.

### Conclusion

Taylor’s principles of scientific management still remain relevant in modern times, although they have undergone some modifications. Some corporations have made some revisions on the principles and have been able to experience continued success in the fast-changing world of business. There are three essential principles that underlie Taylor’s scientific approach to management. They are the development of a true science, the scientific selection of the workman, the workman’s scientific education and development and the intimate relationship between the management and the workers.

However, Taylor’s principles of scientific management have faced various challenges. The most prominent among them is lack of education, dehumanization of workers and the concept of task allocation. Lack of education cripples the workers’ ability to understand the scientific

methods of management. Dehumanization of the workers occurs due to Taylor’s assumption that the individual worker cannot excel or think on his/her own. This is the implication created when Taylor vouches for the creation of middle class jobs. The jobs are for supervisors who guide the workers in dispensing their duties. The concept of task allocation pushes the organizational costs of operation to higher levels.

Essentially, the principles of scientific management as presented by Taylor have withstood the test of time and are poised to enter the next age, which pundits refer to as the virtual age. However, some modifications may be needed in order to make Taylorism more efficient and profitable to companies.

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A DEEPER LOOK INTO EDUCATION FROM THE U.S.A.  
TO AMMAN, JORDAN\*

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Abstract

This opinion paper compares and contrasts the education from The United States of America to Amman, Jordan. I discuss the pros and cons of the system of education in both places, and what makes a good quality education. I have had the opportunity to evaluate the education systems through two lenses, making me a better student and educator.

Key Words: Education, Quality, Limited Resources, Tawjihi, USA, Amman, Jordan

## Introduction

Growing up in the United States as an Arab-American I came to understand and appreciate a good education in the 21<sup>st</sup> century. Not just as a student but as an educator myself in our Nation's Capital. I am a proud and dedicated Pre-K3 teacher at Community Academy Public Charter School in the District of Columbia. In this paper I compare and contrast education in Washington, DC compared to the Middle East, in particular my home town Amman, Jordan.

As a child I remember going to school in downtown Amman Jordan where I passed the goats and sheep in herds walking along the street as anyone else. The aroma of coffee filled the air as you knew it was morning time and everyone had to have the dark Arabian coffee. My school was all girls which had grades Kindergarten through high school. I couldn't imagine being in an all girls school from K through high school.

For cultural purposes, I understood why it was that way but in my mind I had other ideas of how it should have been. My school was called "Bab El Wad." I knew "bab" meant door in Arabic. I still can sit back and remember my sixth grade school year at Bab El Wad. We had an empty classroom with only desks and chairs. Not the most comfortable chairs but enough for all the students. It was an overcrowded class with big huge windows everywhere. I felt at times that we were like sardines packed next to each other. We didn't have many resources but respect for a teacher meant a whole lot in the Middle East especially at my school Bab El Wad. I remember when the teacher walked in the class as a form of respect we all stood up and greeted her - that was the traditional way. There were consequences if you did not stand when the teacher walked into a classroom. I thought

the consequences were extremely harsh at times because you had to stick your hand out and get spanked with a ruler. Not the thin ruler everyone knows but a thick ruler that just existed in school. It was the norm to get spanked in school in the Middle East if a child or teenager were not following rules, not being respectful, or talking back to the teacher. In the United States that kind of punishment will result in a teacher losing her job and ending up in jail. I don't believe children should be punished in that kind of way.

Although resources were limited, we got great use of the huge chalk board in the classroom. I remember everyone was engaged and actively learning. I mean we were leaning math on an 8<sup>th</sup> grade level in the sixth grade. We were always told that in life you must read and write to succeed. So the teacher always made sure everyone got a turn to read and everyone took a turn to visit the chalk board and write. I remember strong ethics and learning with no text books. Years later my family immigrated to Washington, DC where I continued my education in the District of Columbia. I attended all DC public schools. Of course this was a different experience. I didn't see a herd of sheep as I walked to school but I started to smell Starbucks coffee as I walked to school. It was more of a different kind of atmosphere. Something out of the norm for me because everyone was speaking English where in Jordan all I was used to was Arabic.

In school we had more resources than what we had back home. Lots of hands on activities, computers, individual seats, rugs, crayons, school supplies, white boards, projectors, nice playgrounds, took field trips and so much more. I was impressed because I wasn't used to seeing all of these resources. But although we had all these re-

sources we still were behind in testing and meeting certain requirements. I ask myself was there a different quality in education from Jordan to DC?

One of the highest and excellent schools in Amman called Amman Academy. Their mission was all about excellence and creativity. The core strategic objective is to produce graduates qualified to join the finest Jordanian and foreign universities. This school prepares its students for responsible adulthood and leadership, and raises students as self-disciplined, productive, self-motivated individuals capable of making their own decisions. Students are made aware of their national heritage and its cultural contributions while interacting with other cultures.

Here is the mission and vision statement for my school in Washington, DC. "The mission is to create a caring learning community where students acquire the knowledge, skills and habits of mind to think critically; to read, write, speak and listen effectively; to reason mathematically; to inquire scientifically; and to develop the social competence that ensures meeting the qualifications for acceptance to a competitive high school. To raise children to become competent, responsible adults who actively pursue lifelong learning opportunities."

When I compare these two missions I see slight differences in the ways of thinking. These are great missions for two different schools in different parts of the world. In Jordan, it is important to be aware and recognize your own culture; who are you as a student and where you come from is very crucial to a Jordanian student. The mission for DC was to raise children to become competent responsible adults. I feel that it is necessary and important to grow-up knowing who you are and where you came from.

It brings value to your life as an adult. Although I have lived in Washington, DC for many years, I still am aware of where I came from, my culture, native language, different values that make me unique and different. I bring that experience to my Pre-K3 classroom. I am proud of who I am and how my parents raised me. I think students in Washington, DC should learn more about their heritage and who they are from a very early age because it shapes you as an adult.

The Hashemite Kingdom of Jordan is an Arab kingdom, on the East Bank of the river Jordan. The country's leader is King Abdullah II and Queen Rania. The country borders Saudi Arabia to the east and south-east, Iraq to the north-east, Syria to the north and the west bank and Israel to the West sharing the dead sea with the latter. Amman is the capital of Jordan. The native language that is spoken in Jordan is Arabic. The structure of the educational system in Jordan consists of a two-year cycle of pre-school education, ten years of compulsory basic education, and two years of secondary academic or vocational education after which the students sit for a general certificate of secondary education exam which is called "*Tawjihi*." Students in this education level are required to take nine subjects; Arabic, English, Mathematics, Social Studies, Computer Studies, Earth Science, Chemistry, Biology, and Physics. Islamic studies are also mandatory for all students except for Christian students. Jordan's population is Christian and mostly Muslim.

The Secondary Education level consists of two years' study for students aged 16 to 18 who have completed the basic cycle (10 years) and comprises two major tracks: Secondary education, which can either be academic or vocational. At the end of the two-year period, students sit for the general secondary examination (*Tawjihi*) in the appro-

priate branch and those who pass are awarded the Tawjihi (General Secondary Education Certificate). The academic stream qualifies students for entrance to universities, whereas the vocational or technical type qualifies for entrance to Community Colleges or universities or the job market, provided they pass the two additional subjects. Vocational secondary education, which provides intensive vocational training and apprenticeship, and leads to the award of a Certificate (not the Tawjihi).

Schools in Jordan have two main categories, public and private. The private education sector accommodates more than 31.14 percent of the student population in the capital of Jordan, Amman. This sector is still heavily taxed, up to 25%, although it takes a high burden off the government of the Kingdom, which makes school fees relatively high, starting at \$1000, and going up to \$7000. These values for private education fees are extremely high when compared to the average family incomes.

Education in the United States is mainly provided by the public sector, with control and funding coming from three levels: local state, and federal, in that order. Child education is compulsory. There are also a large number and wide variety of higher education institutions throughout the country that one can choose to attend, both publicly and privately administered.

Children enter the public system around ages five. In charter school children enter school at age three. The school year begins at the end of August or the day after Labor Day in September, after the traditional summer recess. Children start school at preschool, followed by kindergarten and culminating in twelfth grade.

As an educator in the District of Columbia I have come to realize that in our nation's capital there is a lot to work on so that we can have students competing in the world as they grow older. Although resources were limited in Jordan and the walls were bare there was a lot of learning taking place and advanced education I must say. Now a day's schools are too busy focused on assessment and tests and real learning is being pushed to the side. It can be done in schools in the U.S.A but there has to be a better system to get things done.

How can we, the United States, be the most powerful country in the world and lack in our education system? In the District of Columbia all public schools are funded by the government. Teacher's lacks on supplies, salaries are not always being met; environment isn't always the best, lack of security and not enough parental involvement. Teachers are working under stress and are not supported as much. At certain schools, teachers are on the bottom of the pyramid as the leaders are on the top. A teacher is a person who takes on plenty of responsibility. Without teachers there are no schools. We wear many hats to ensure the safety of the children as well as educate them. I know we are not in the education field to make a profit because we will be there forever. We are there to educate, nurture and guide students to grow and become successful citizens in the twenty-first century. I want to continue to educate and nurture children in the District of Columbia and especially at my school; Community Academy Public Charter School whose motto is all about excellence. I am a part of excellence and that's what children need in our Nation's Capital. I want my students to grow up and become successful citizens in the US and even all around the world. It takes a village to raise a child so let's get on the same wagon and make it happen. The time has

come and the moment is here so let's put our children first so that they can make the difference in the near future.

### Conclusion

I know that education is the key to success. The quality of education is very important because that's what will help an individual become a successful citizen in the United States or in any country around the world. I know that although the Middle East lacks a lot of resources the United States education lacks a lot of quality education. Teachers should be supported because we are the ones who make a difference. Being fortunate and having received education in two different places in the world is an extraordinary experience. Education is the key to success and I have realized that resources are not always what make an education possible. Resources can be great tools if used properly to support research. I have come to realize that a person can learn on a desert, in a tent with a herd of sheep around you or you can be in the most glorious, prestigious class in the U.S.A.

From my own experience I felt that teachers were serious about teaching in Amman, Jordan. It didn't matter if we were packed like sardines or sitting in a classroom that wasn't air-conditioned. I never recall a moment where teaching wasn't taking place. That is so beautiful to remember as a child and I wish that more schools in the U.S.A took this matter more seriously. Our children are tomorrow's future. Students should be able to compete globally. Let's help our students succeed in the 21<sup>st</sup> century! I will be there and I hope you will too.

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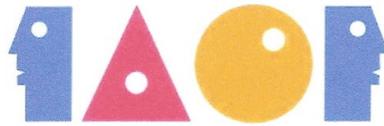
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\*Note: This opinion paper reflects the views of the primary author and does not necessarily reflect the views of the International Association of Organizational Innovation



## BUDGETARY PARTICIPATION AND SLACK ON THE THEORY OF PLANNED BEHAVIOR

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### Abstract

This study employs the theory of planned behavior to explore the constructs affecting manager's budgetary slack. According to the Theory of Planned Behavior (TPB), this study suggests that three antecedents of budgetary slack- attitude toward slack, subjective norms and perceived behavior control will be influenced by budgetary participation. Structural Equation Model (SEM) is used to validate the model and empirical data were randomly drawn from the supervisors of manufacturing department in listing companies of Taiwan Security Exchange. The results show that budgetary slack is positively influenced by attitudes and subjective norms, which are negatively affected by manager's participation. However, the role of perceived slack control is not supported in the study. Furthermore, the results suggest that managers' intention to create slack trends toward the Theory of Reasoned Action (TRA).

**Key Words:** Budgetary Participation; Budgetary Slack; Theory Of Planned Behavior; Theory Of Reasoned Action

## Introduction

In previous managerial accounting studies, the creation of budgetary slack is regarded unsolved in budget related issues. However, many mechanisms are viewed useful to reduce the incentive to create budgetary slack. Dunk and Nouri (1998) suggests that the relationship between budgetary participation and slack is not obviously positive which may be influenced by other variables. Previous studies proposed various viewpoints to interpret the relationship but evidence suggest inconsistent results (Young, 1985; Dunk, 1993; Lowe & Shaw, 1968; Pope, 1984; Onsi, 1973; Bourgeois, 1981; Merchant, 1985; Lukka, 1988).

This study attempts to employ the viewpoint of TPB (Theory of Planned Behavior) to interpret the creation of budgetary slack a planned behavior. Ajzen (1991) indicates that individual's behavior will be influenced by three constructs: attitudes toward the behavior, subjective norms, and perceived behavioral control. Regarding budgetary slack creation, we suggest it is resulted from the intentions of budgetary slack creation which may be influenced by the attitudes toward slack, subjective norms, and perceived slack intention control.

In addition, the study suggests budgetary participation is an important mechanism in budgetary control system. Budgetary participation may affect the three constructs to influence the slack intentions.

## Review of Literature

### *Theory of Planned Behavior (TPB)*

Fishbein and Ajzen (1975) proposed an organizational theory to analysis individual's behavior called Theory of Reasoned Action (TRA). A central factor in the original theory of reasoned action is

the individual's intention to perform a given behavior. Intentions are assumed to influence a behavior. As Ajzen (1991) suggested, the stronger the intention to engage in a behavior, the more likely should be its performance. The theory suggests behavioral intention influenced by two constructs. The first construct is individual's attitudes toward specific behavior which refers to positive or negative feelings on specific behavior. The other is subjective norms which refer to the individual's perceived social pressure on specific behavior. These two constructs positively influence behavior intention and then affect specific behavior.

In addition, Ajzen (1991) proposed Theory of Planned Behavior under TRA basis, because TRA is not able to interpret the behaviors which cannot control under individual's will. TPB is considered appropriate and sufficient to predict individual's specific behaviors. TPB indicates behavior intention (BI) reflect the willingness to conduct specific behavior and is the best indicator to predict individual's behaviors. BI is constructed by three constructs: attitudes (AT), subjective norms (SN) and perceived behavior control (PBC). PBC refers to the difficulty degree of individual perceived to finish specific behavior (Ajzen, 1991). Individuals with more experience and resource will perceived the more control over the behavior. TPB assumed that attitude, social pressure and perceived behavior control will result in positive relationship with behavior intention.

### *Budgetary Slack on Theory of Planned Behavior*

*Intentions to create budgetary slack.*

Budgetary slack refers to a behavior in budget setting which a manager proposes the goals are beneficial for himself and easy to achieve (Dunk & Nouri, 1998).

TPB indicates intention is an important indicator to predict individual's behavior. While TPB is exploited to predict manager's creation of budgetary slack, the slack intention is employed in the model to instead of the 'actual' slack. The study proposes that manager will intent to create slack before their actual budgetary slack. The stronger the intention to create budgetary slack, the more likely should be its actual slack.

#### *Attitudes toward budgetary slack.*

Attitude indicates the positive or negative affection toward a behavior (Fishbein and Ajzen, 1975). The attitude toward budgetary slack refers to manager's affection on their creation of slack. According to TPB, the attitude toward budgetary slack will influence manager's slack intention. In other words, when managers perceived the positive attitude toward budgetary slack, they will have positive incentive to create slack intention and actual slack behavior. Hence, we propose the hypothesis one as follows.

*H<sub>1</sub>: Managers' attitudes toward budgetary slack positively associate with manager's intention to create budgetary slack.*

#### *Subjective norms.*

Perceived social pressure or subjective norms will influence individual's intentions (Fishbein and Ajzen, 1975). In the study, subjective norms of budgetary slack refer to when managers sets a slack budget he (she) may perceive social pressure. Young (1985) also indicate social pressure in budget setting influence manager's slack intention. Hence, the study suggests social norms of budgetary slack will influence manager's slack intention. The hypothesis two is proposed.

*H<sub>2</sub>: Subjective norms positively associate with manager's intention to create budgetary slack.*

#### *Perceived behavioral control.*

As TPB (Ajzen, 1991) suggests, the greater the perceived control, the stronger the individual's intention to perform the behavior. In budget setting, when a manager perceived he (she) is able or easy to setting a slack budget, the incentive to create slack maybe increased. Hence, manager's perceived control over creating budgetary slack will able to predict the slack intention.

*H<sub>3</sub>: Managers' perceived control over creating budgetary slack positively associate with manager's intention to create budgetary slack.*

#### *Participative budgeting's effects on attitudes, subjective norms and PBC*

#### *Budgetary participation vs. attitude.*

When managers participate in the budget setting, the budgetary participation will affect the attitudes toward budgetary slack. Onsi (1973) suggest that participation may reduce the incentive to create slack. Commann (1976) also indicate participation reduce the slack behavior. Budgetary slack will provide the opportunity of information sharing to manager and then reduce his slack intention (Fisher, Maines, Peffer & Sprinkle, 2002). Magner, Welker, & Campbell (1995) suggest that subordinate manager will enhance the perception of budgetary procedure fairness while participating in the budget setting. Hence, we suggested participation reduce the positive attitude toward budgetary slack. The hypothesis is proposed as follows.

*H<sub>4</sub>: Managers' budgetary participation negatively associates with managers' attitudes toward budgetary slack.*

*Budgetary participation vs. subjective norms.*

The study suggests budgetary participation will reduce manager's perception of superiors and colleagues' supports on slack. In budgetary participation process, superior is able to detect manager's slack intention (Low & Shaw, 1968). Budgetary participation also reduces the information asymmetric between superiors and subordinate managers (Young, 1985; Fisher, et al., 2002). Young (1985) indicate participation produce the social pressure to influence manager's slack intention. Hence, the study proposes that budgetary participation reduce manager's perception of colleagues and superiors supports on slack intention.

*H<sub>5</sub>: Managers' budgetary participation negatively associates with subjective norms.*

*Budgetary participation vs. PBC.*

In addition, previous studies suggest participation may reduce manager's perception of ability to slack. Low & Shaw (1968) and Pope (1984) indicate participation provide supervisors opportunities to detect manager's slack. Participation also reduces the information asymmetric between superiors and subordinate managers (Young, 1985; Fisher, et al., 2002). The study suggests budgetary participation provide the opportunities to detect manager's slack which make him perceived limitation of slack and resource. Hence, manager's participation in budget setting will reduce his perceived control over budgetary slack. The full model is shown as follows in Figure 1.

*H<sub>6</sub>: Managers' budgetary participation negatively associates with their perceived control over creating budgetary slack.*

## Research Design

### *Sample and data collection*

This study employed a cross-sectional survey to collect empirical data from a sample of 300 randomly selected manufacturing companies listed on the Taiwan Stock Exchange. A mail questionnaire with a cover letter and a self-addressed, prepaid envelope was forwarded to a sample of 300 subordinate managers. These subordinate managers had a role in the budgeting process and in accountability for budget results.

Questionnaires were returned by 88 respondents; 4 of the responses received were removed for incompleteness, yielding an effective response rate of 17.2%. Therefore, 84 responses were available for data analysis. The average age of the respondents was 41.77 years, and the average time spent in their present organization and current position were 11.75 years and 4.34 years, respectively. The main functional areas in which respondents were employed included accounting (21.43%), production (17.86%), and marketing (19.05%). The majority (82.14%) of the respondents were male.

### *Measures*

According Ajzen (1991), the study employs two items 7-point bipolar scales to evaluate manager's budgetary slack intention. For budgetary slack attitude evaluation, the study uses three items 7-point bipolar scales. In addition, the subjective norms will be evaluated by three items to evaluate manager's perceived the pressure from different groups. Perceived behavior control evaluates manager's ability to control the slack behavior.

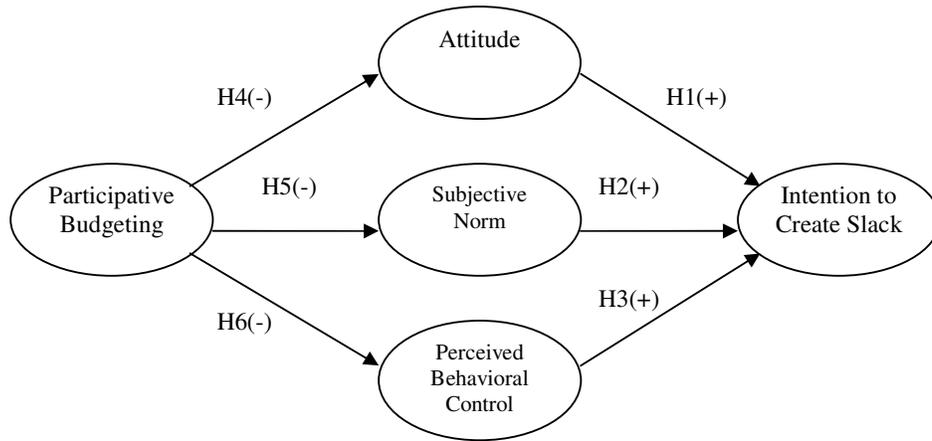


Figure 1. Participative Budgeting and Budgetary Slack: A Conceptual Model

Table 1. Measure correlations, means, and standard deviations for latent variables

Measure	Mean	SD	BP	AT	SN	PC	Cronbach's alpha
BP	28.333	5.016					0.8521
AT	11.881	4.230	-0.339**				0.9529
SN	11.821	2.707	-0.225*	0.558**			0.8217
PBC	11.869	3.393	-0.087	0.169	0.369**		0.8538
IT	7.738	2.420	-0.266*	0.658**	0.640**	0.151	0.9343

Note: n = 84; \*p < 0.05, \*\*p < 0.01; Two tailed significance.

BP, Budgetary Participation; AT, Attitudes; SN, Subjective Norms; PBC, Perceived Control; IT, Intentions.

Table 2. Structural Parameter Estimates

Path	Hypothesis	Coeff.	Standard error	t-value
AT → IT	H1	0.248	0.051	4.879
SN → IT	H2	0.382	0.085	4.499
PC → IT	H3	-0.057	0.056	-1.008
BP → AT	H4	-0.286	0.088	-3.267
BP → SN	H5	-0.122	0.057	-2.139
BP → PC	H6	-0.059	0.074	-0.794
Goodness-of-fit statistics:		$\chi^2=2.022$ , df=2, p=0.3638 GFI=0.990 CFI= 1.000 AGFI= 0.928 RMSEA=0.011 AIC= 28.022 (saturated model = 30)		

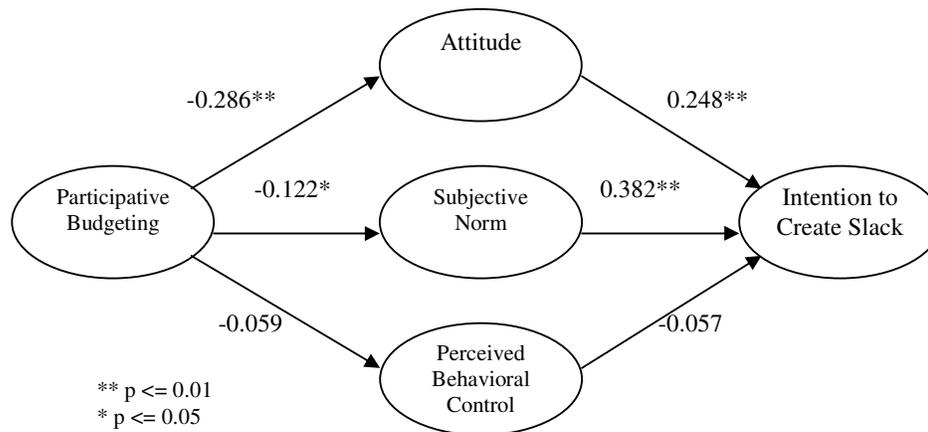


Figure 2. A Path Diagram of Structural Relationships

Regarding budgetary participation, this study used Milani's (1975) six-item scale, which had been employed in prior studies. The instrument assessed the respondent's involvement in and influence on the budget process using a seven-point Likert-type scale ranging from one (very little) to seven (very much). Previous studies report satisfactory validity and reliability for this scale (Brownell, 1982; Mia, 1988; Dunk, 1989, 1993; Nouri & Parker, 1998).

### Results

Table 1. shows the measure correlations, means, Cronbach  $\alpha$  reliability and standard deviations for latent variables. The results show that budgetary participation has significant correlations with all variables except PBC. The association between PBC and IT is insignificant. The Cronbach  $\alpha$  reliabilities of all latent variables are acceptable and above 0.7 criteria (Nunnally, 1978).

In addition, structural equation modeling (SEM) were used to explore the path

relationships among variables and Goodness-of-fit statistics in Table 2. The goodness-of-fit statistics of the model are above acceptable levels which include  $\chi^2=2.022$ ,  $df=2$ ,  $p=0.3638$ ,  $GFI=0.990$ ,  $CFI=1.000$ ,  $AGFI=0.928$ ,  $RMSEA=0.011$  and  $AIC=28.022$  (saturated model = 30). Hence, the model has a good fit among variables, but the path coefficients indicated hypotheses three and six are not supported in this model. The result suggests that the negative relationships of BP vs. AT (H4) and BP vs. SN (H5) are significantly supported. The influences of AT and SN on slack intention are also supported (H1 and H2). The path relationships among variables are shown in Figure 2.

### Summary and Conclusion

The relationship between budgetary participation and slack in previous studies shows inconsistent results. The study proposed the viewpoint of TPB to explore the relationship and achieve a few conclusions. The results show participation reduces the manager's slack intention

through improving the attitudes and social pressure.

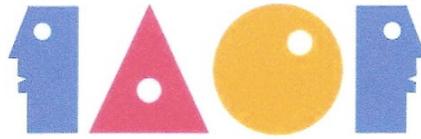
However, budgetary participation is not able to improve the perception of slack control and then reduce slack intention. The results suggest in budget setting process, the ability of superior to detect subordinate manager's slack intention is limited and not able to reduce manager's slack. Hence, the study suggest manager's intention to slack trends more toward TRA model (Fishbein & Ajzen, 1975) than TPB model (Ajzen, 1991). For future research, the study suggests that more independent variables may play important roles in the model, such as budget emphasis.

Furthermore, we suggest the other possible analytic methodologies may be used to examine the role of TPB in management accounting research.

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EMPIRICAL STUDY ON INFLUENTIAL DETERMINANTS FOR ENTERPRISE  
CAPITAL REDUCTION: EVIDENCE FROM CASH  
REDUCTION AND STOCK REPURCHASE

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Abstract

In addition to effective enterprise financing, enterprise reduction of capital tends to enhance the financial statements for promoting and maintaining the shareholder equity. Basically speaking, enterprise reduction of capital contains Cash Reduction, Stock Repurchase, and Loss Reduction. This study aims to discuss Influential Determinants for Cash Reduction and Stock Repurchase, but not Loss Reduction, under non-operation loss to enhance the corporate value. Using a Multivariable Regression Model, the selections of Influential Determinants for Cash Reduction and Stock Repurchase of Taiwan-listed companies are explored under different reductions of capital. Listed companies conducting Cash Reduction and Stock Repurchase within 2002 to 2010 are the research samples. The empirical results show that companies whose share prices are under-estimated or the ones present higher cash flow ratio would select Stock Repurchase, while the others whose managers hold stock options, with higher P/E ratio, whose major shareholders possess higher shareholding ratio, with larger scale would select Cash Reduction. Meanwhile, the research findings present the substitution effect between Cash Reduction and Dividend Pay-out.

Key words: Capital Reduction, Cash Reduction, Stock Repurchase, Treasury Stocks, Shareholder Equity

## Introduction

Enterprise reduction of capital focuses on effective enterprise financing, financial statements enhancement, and shareholder equity promotion and maintenance. Particularly, enterprises precede reduction of capital during a securities market downturn causing the share prices largely drop. Cash Reduction, Stock Repurchase, and Loss Reduction are appropriate methods for enterprise financing. Enterprise reduction of capital in Taiwan is still an emerging enterprise financing operation. Since the first reduction of capital for returning cash in Taiwan's capital market, as the precedent of Cash Reduction in March 2002, such an emerging financing operation has stirred up wide discussion and emphases. Reduction of capital for listed companies in Taiwan contains Make-up Loss Reduction, Cash Reduction, and Stock Repurchase. The first two types of capital reduction are based on the regulations in Company Act. Since the revision of Securities and Exchange Act in 2000, Stock Repurchase provides a different type of enterprise reduction of capital in Taiwan. That is, listed companies could reduce the capital by repurchasing and cancelling treasury stocks. This type of capital reduction, Stock Repurchase, then appears. This study aims to discover the Influential Determinants for Cash Reduction and Stock Repurchase, but not Loss Reduction, under non-operation loss so as to enhance the corporate value.

According to the regulations in the Securities and Exchange Act, listed companies in Taiwan, with the decision of the board of directors, could repurchase treasury stocks from the open market for the enterprise financing purposes of 1) transferring shares to the employees, 2) issuing equity warrant bonds, preferred shares with warrants, convertible bonds, convertible preferred stock, or stock option certificates for share conversion, and 3) maintaining company credit and the share-

holder equity with the cancellation of shares. From the above purposes, 1) and 2) are utilized for share conversion, while 3) allows the company stabilizing the share price by Stock Repurchase.

Both Cash Reduction, which returns the share capital to the shareholders according to Company Act, and Stock Repurchase in accordance with Securities and Exchange Act tend to return the capital to the shareholders with cash for reduction of capital. In other words, Stock Repurchase could be regarded as the means of payment. From the aspect of Stock Repurchase regulated in Securities and Exchange Act, both 1) and 2) aims at transference or conversion, which is inconsistent with the means of payment. Comparatively, 3) presents better information contents, i.e. 3) delivers stronger signal of share price under-estimation. Accordingly, Stock Repurchase in this study refers to 3) considering the maintenance of company credit and shareholder equity as the purpose.

In general, company Cash Reduction is done for the following reasons. 1. There is not a project worthy investing in the abundant cash in the company that Cash Reduction returns the capital to the shareholders. 2. The company tends to properly reduce the share capital and enhance the return on equity in order to promote the share price. 3. Major shareholders need capitals for other investment. On the other hand, company Stock Repurchase has the following reasons. 1. When the share capital is too high, Stock Repurchase allows enhancing the earnings per share. 2. When managers consider the share price being under-estimated, Stock Repurchase could promote the value of shares and deliver the message of the share price being under-estimated to the investors. 3. Managers tend to pump the share price with Stock Repurchase for stabilizing specific people.

In market practice, it is considered complex and time-consuming for enter-

prises in Taiwan to conduct Cash Reduction by following the legal procedure in Company Act. Although there are an increasing number of companies implementing Cash Reduction in recent years, the related research still requires more time and effort investment. Nevertheless, Stock Repurchase according to Securities and Exchange Act merely requires the decision of board of directors that such reduction of capital has been widely utilized by listed companies. The capital market and legal regulations in Taiwan present great differences from other countries, and the information transparency in Taiwan is behind foreign capital markets that the appropriateness of motivation or reasons for Stock Repurchase in Taiwan still requires further discussions.

The past research mainly focused on Make-up Loss Reduction in Company Act or Stock Repurchase in Securities and Exchange Act, little research explored the actual factors in selecting Cash Reduction in Company Act or Stock Repurchase in Securities and Exchange Act. For this reason, this study tends to make up the gap, discussing the real motivation and purpose of the decisions for Cash Reduction in Company Act and Stock Repurchase in Securities and Exchange Act by inspecting different reductions of capital.

#### Literature Review and Hypotheses

In the literature, there are relevant theories, research hypotheses for the decision of enterprise Capital Reduction contain Signaling Hypothesis, Free Cash Flow Hypothesis, Management Incentive Hypothesis, Leverage Hypothesis, Substitution for Cash Dividends Hypothesis, and Moral Hazard Hypothesis. The Signaling Hypothesis is the most supported hypothesis for empirical issues (Vermaelen, 1981). As there is asymmetric information between the administrative authority in a company and external investors, the administrative authority, when considered

the share price being under-estimated, are likely to repurchase the shares for delivering the signal of the share price being under-estimated to the investors (Healy and Palepu, 1993). A number of empirical research studies (Vermaelen, 1981; Netter and Mitchell, 1989; Comment and Jarrell, 1991; Ikenberry, Lakonishok and Vermaelen, 1995; Ikenberry and Vermaelen, 1996; Stephens and Weisbach, 1998) tested American Securities Market and found the positive response to the share price when a company announced to repurchase treasury stocks from the open market. Such a response might be the investors regarding the company outperforming the prediction. In other words, it implied that the market affirmed such a behavior of delivering information so that the market would present positive response to the share price when a company announced to repurchase shares. This conclusion has also been approved for use in capital markets beyond the USA (Ikenberry, Lakonishok and Vermaelen, 2000; Zhang, 2002; Hackethal and Zdantchouk, 2006).

Cash Reduction in Taiwan requires the decision of the boards of directors and shareholders which cannot be conducted till the approval of the central competent authority that it cannot be conducted several times a year, as it takes a long period of time. Stock Repurchase, on the other hand, merely needs filing for the central competent authority's record after the decision of board of directors. From the aspect of legal regulations, Stock Repurchase is considered as the best option for a company promoting the share price in a short period of time. Hypothesis 1 therefore is developed.

*Hypothesis 1: In comparison with Cash Reduction, a company is likely to conduct Stock Repurchase when the share price being under-estimated.*

To reduce agency problem, the administrative authority is likely to allocate the free cash flow to the shareholders. Relevant research (Jensen, 1986; Nohel and Tarhan, 1998; Dittmar, 2000) presented that a company would repurchase treasury stocks or pay out cash dividends to the shareholders when the capital exceeding investments. When a company selected to repurchase stocks with the residual capital, positive abnormal returns could be generated (Easterbrook, 1984; Grullon and Michaely, 2004).

Summing up the above two reductions of capital, Cash Reduction shows higher ratio for reduction of capital, requires large amount of capital, and cannot conduct seasoned equity offering within a year after the reduction of capital, while Securities and Exchange Act is not regulated the upper limit, 10%, of the Stock Repurchase ratio that the company could decide to repurchase the treasury stocks according to the book capital. Nevertheless, Stock Repurchase can be conducted merely by the decision of board of directors and filing for record, and the repurchased subjects are the open market and non-specific people that the company with sufficient capital could repurchase the treasury stocks. Unlike Cash Reduction, the company needs a large amount of money, the legal procedure is complex, and it requires a long period of time from the decision of board of directors to the implementation. Hypothesis 2 is then developed.

*Hypothesis 2: In comparison with Cash Reduction, a company is like to conduct Stock Repurchase when having a larger amount of free cash flow.*

When managers present more stock options, they have more incentive to make decisions for promoting the corporate value as well as to enhance the value of the options (Jolls, 1998). When the administrative authority shows stock options, it is

likely to repurchase treasury stocks for managers exercising stock options, rather than issuing new shares (Dunsby, 1994). Fenn and Liang (2001) discovered that an administrative authority with stock options was likely to repurchase stocks. Related empirical research (Dittmar, 2000; Kahle, 2002) also found that a company repurchasing treasury stocks would not reduce the share value, but could encourage the administrative authority with Employee Stock Option.

Regarding the research subjects in this study, most investors reveal positive attitudes towards the companies with Cash Reduction or Stock Repurchase and consider such behaviors being able to create higher value for the company. Nonetheless, Stock Repurchase is more easily conducted, and the market practice also regards the possibilities of share price control and insider trading. On the other hand, the regulations for Cash Reduction are stricter, and the seasoned equity offering is restricted within a certain period that merely companies with good quality could conduct Cash Reduction. Apparently, Cash Reduction can better benefit a company than Stock Repurchase does. For this reason, managers are likely to conduct Cash Reduction for largely promoting the value of the company and the stock options. Hypothesis 3 is then developed.

*Hypothesis 3: In comparison with Stock Repurchase, the managers in a company with Cash Reduction present more stock options.*

Masulis (1980) discovered that a company repurchasing treasury stocks with debt financing might tend to increase liabilities, reduce tax expenditure, and increase the earnings per share so as to enhance the reward of share price, presenting Tax Shield. Several studies also found that a company could recapitalize by repurchasing treasury stocks in order to achieve an optimal leverage ratio (Dittmar,

2000; Hovakimian, Opler and Titman, 2001). However, such a hypothesis did not achieve a consistent conclusion in the past research. For instance, Bagwell & Shoven (1988) and Dittmar (2000) supported the argument of recapitalization being the reason of repurchasing treasury stocks; however, Chan, Ikenberry and Lee (2004) did not find evidence of a company repurchasing treasury stocks for recapitalization. Nevertheless, the 10% upper limit of Repurchase Stock is regulated in Securities and Exchange Act, while the upper limit of the Cash Reduction ratio is not regulated in Company Act in Taiwan. From the aspect of legal regulations in Taiwan, the effects of Stock Repurchase on capital structure are not as obvious as Cash Reduction in Company Act. Hypothesis 4 therefore is developed as below.

*Hypothesis 4: In comparison with Stock Repurchase, a company tends to adjust financial structure with Cash Reduction.*

Since a company paying out cash dividends to the shareholders might increase individual tax burden, it might repurchase stocks instead of cash dividends pay-out. In this case, the shareholders would reduce the tax burden and the company could promote the earnings per share and the performance with Stock Repurchase. Dittmar (2000) found Repurchase Stock being more flexible than cash dividends pay-out that an enterprise was more willing to repurchase stocks for paying out cash to the shareholders.

From the aspect of legal regulations, it is regulated in Securities and Exchange Act that a company could merely repurchase treasury stocks from Stock Exchange Market, Over-the-Counter Market, or non-specific people, and internal shareholders, directors and supervisors in a company could not sell the shares during repurchase in order to avoid insider trading or share price control. Cash Reduction, on the other hand, is deleted according to the

shareholding ratio. Apparently, when the tax is taken into account for internal shareholders, a company is likely to replace cash dividends pay-out by Cash Reduction. Hypothesis 5 is then developed.

*Hypothesis 5: In comparison with Stock Repurchase, a company tends to replace cash dividends pay-out by Cash Reduction.*

When the directors and supervisors pledge the shares and the share price drops continuously, the pledge value of the directors and supervisors is likely to drop, resulting in deficiency guarantee. Most foreign research regarded the internal shareholding ratio as the proxy variable of Moral Hazard Hypothesis (Vermaelen, 1984; Comment and Jarrell, 1991; Raad and Wu, 1995); while the pledge of directors and supervisors is implemented in Taiwan. This study therefore measures the credit expansion of the major shareholders with the pledge ratio of the directors and supervisors. When the directors and supervisors' pledge is high, the administrative authority is likely to repurchase and cancel treasury stocks for maintaining the credit and the shareholder equity, as it could enhance the share price and the pledged stocks of the directors and supervisors would not be under-valued.

Both Cash Reduction and Stock Repurchase are regarded as good news in the market that the share price would increase obviously. Nonetheless, Cash Reduction requires the agreement of board of directors, the decision of board of shareholders, and the approval of the central competent authority, unlike Stock Repurchase, which merely needs the agreement of board of directors and the filing for the central competent authority's record. Besides, most enterprises in Taiwan are family-owned businesses that the internal major shareholders would simultaneously take the post of directors or supervisors that their shares appear a large proportion.

When the share price continuously dropping, the directors and supervisors would tend to promote the share price for maintaining the pledge value; Stock Repurchase is considered as the optimal method. Hypothesis 6-1 and Hypothesis 6-2 are therefore developed as follows.

*Hypothesis 6-1: In comparison with Cash Reduction, an enterprise is likely to conduct Stock Repurchase when the directors and supervisors show higher shareholding ratio.*

*Hypothesis 6-2: In comparison with Cash Reduction, an enterprise is likely to conduct Stock Repurchase when the directors and supervisors present the higher pledge ratio.*

#### Research Method

##### *Research Period, Sampling and Data Source*

Taiwan-listed companies with Cash Reduction and Stock Repurchase within 2002-2010 were sampled from Market Observation Post System, and the financial information was acquired from Taiwan Economic Journal Database (TEJ). Companies with several observed values of Stock Repurchase were combined as an observed value to reduce the effect. Moreover, special industries, such as financial industry, insurance industry, and securities industry, the observed values with incomplete data, the observed values of not passing the board of shareholders, not being approved by Securities and Futures Bureau, or self-cancelling the reduction of capital, and the observed values with variable extreme value 1% were excluded. Total 668 observed values conducted the reduction of capital within 2002-2010, where 45 with Cash Reduction and 623 with Stock Repurchase.

##### *Research Variables*

##### *Dependent Variable.*

Dummy variable (REPURCHASE) was designed two methods of Stock Repurchase and cancellation; i.e. a company conducting Cash Reduction in accordant with Company Act was marked 1, while the ones conducting Stock Repurchase according to Securities and Exchange Act was 0.

##### *Independent Variables.*

- 1) Signaling Hypothesis (VALUE)  
Having book value-to-market value (VALUE) as the proxy variable of Signaling Hypothesis, negative correlations were expected to appear between VALUE and REPURCHASE, according to Hypothesis 1.
- 2) Free Cash Flow Hypothesis (CASH)  
Having the cash flow ratio (CASH) for operation activities as the proxy variable of Free Cash Flow Hypothesis, negative correlations were expected to reveal between CASH and REPURCHASE, according to Hypothesis 2.
- 3) Management Incentive Hypothesis (OPTION)  
Having the ratio of managers' stock options to the average common shares (OPTION) as the proxy variable of Management Incentive Hypothesis, positive correlations were expected to present between OPTION and REPURCHASE, according to Hypothesis 3.
- 4) Leverage Hypothesis (CAPITAL)  
Having the net worth divided by the total assets (CAPITAL) as the proxy variable of Leverage Hypothesis, positive correlations were expected to show between CAPITAL and REPURCHASE, according to Hypothesis 4.

### *Statistical model*

- 5) Substitution for Cash Dividends Hypothesis (DIVIDEND and STOCK) Having DIVIDEND and STOCK as the proxy variables of Leverage Hypothesis to discuss the alternatives between cash dividends and Stock Repurchase, positive correlations were expected to appear between DIVIDEND and REPURCHASE and between STOCK and REPURCHASE, according to Hypothesis 5.
- 6) Moral Hazard Hypothesis (HOLDING and PLEDGE)  
Since Stock Repurchase could be conducted merely by the decision of the board of directors, negative correlations were expected to show between HOLDING and REPURCHASE and between PLEDGE and REPURCHASE, according to Hypothesis 6-1 and 6-2, respectively.

### *Control Variables.*

- 1) Company size (SIZE)  
Dittmar (2000) discovered that large-size companies were likely to repurchase treasury stocks. From the sample characteristics in this study, most enterprises with Cash Reduction were mature, large-scale businesses, unlike the ones with Stock Repurchase presenting different company sizes. To avoid the effect of company size on the empirical results, Ln (total assets) was regarded as the proxy variable of company size (SIZE).
- 2) Actual repurchase ratio (RATIO)  
The upper limit is regulated in Securities and Exchange Act for Stock Repurchase, but no upper limit is regulated for the reduction of capital ratio in Cash Reduction. Such differences appear great variance on the capital reduction ratio. To avoid the effect on the empirical results, the actual repurchase ratio (RATIO) is included as the control variable.

This study aims to discuss Influential Determinants for enterprises conducting Cash Reduction and Stock Repurchase that the design of statistical models tends to distinguish the two deductions of capital.

Meanwhile, several research variables are included in this study to construct the research model of Multivariable Regression Analysis for statistical control. The following regression model is then established.

### *Descriptive Statistics Analysis*

The Stock Repurchase ratio (RATIO) appears the minimum (0.0000) and the maximum (0.1574), Table 2, showing some companies not repurchasing treasury stocks after announcing Stock Repurchase. The most obvious difference shows on the Cash Reduction ratio (RATIO), the minimum (0.0835) and the maximum (0.7428), presenting that not all companies with Cash Reduction would implement large-scale reduction of capital, but depending on the demands.

In terms of the cash flow ratio (CASH), companies with Stock Repurchase receive the highest cash flow ratio 5.3628, but the mean of Cash Reduction samples (0.6962) reveals higher than it of Stock Repurchase samples (0.4517), and the median of Cash Reduction samples (0.5833) is higher than it of Stock Repurchase samples (0.2583).

Table 1. Definitions of variables and the prediction

Variable	Prediction	Definition
VALUE	—	Book value per share divided by closing price.
CASH	—	Cash flow for operation activities divided by flow liabilities.
OPTION	+	Managers' stock options divided by average common shares.
CAPITAL	+	Net worth divided by total assets.
DIVIDEND	+	Cash dividends divided by closing price.
STOCK	+	Major shareholders' shares divided by average common shares.
HOLDING	—	Directors and supervisors' shares divided by average common shares.
PLEDGE	—	Directors and supervisors' pledged stocks divided by average common shares.
SIZE		Ln (total assets).
RATIO		The actual repurchased stocks to the average common shares ratio.

Table 2. Descriptive Statistics – Summary of two reductions of capital

	Values	Number	Minimum	Maximum	Mean	Median
VALUE	0	623	0.1778	2.9816	1.1728	1.0965
	1	45	0.2531	1.7665	0.8174	0.7854
CASH	0	623	-0.9528	5.3628	0.4517	0.2583
	1	45	-0.3743	1.8761	0.6962	0.5833
OPTION	0	623	0.0000	0.0359	0.0025	0.0000
	1	45	0.0000	0.0179	0.0026	0.0000
CAPITAL	0	623	0.2815	0.9587	0.6173	0.5894
	1	45	0.3629	0.9862	0.7194	0.7471
DIVIDEND	0	623	0.0000	0.1073	0.0189	0.0094
	1	45	0.0000	0.1052	0.0538	0.0686
STOCK	0	623	0.0000	0.5612	0.1437	0.1396
	1	45	0.0000	0.6858	0.2145	0.1882
HOLDING	0	623	0.0324	0.5789	0.2095	0.1916
	1	45	0.0471	0.5649	0.1784	0.1593
PLEDGE	0	623	0.0000	0.9172	0.1189	0.0078
	1	45	0.0000	0.7245	0.1365	0.0602
SIZE	0	623	13.2482	20.1856	15.5883	15.3821
	1	45	13.3056	19.9722	16.1201	15.6472
RATIO	0	623	0.0000	0.1574	0.0406	0.0306
	1	45	0.0835	0.7428	0.2903	0.2311

a: 1 stands for Cash Reduction in Company Act, 0 for Stock Repurchase in Securities and Exchange Act.

b: VALUE is the net worth ratio, CASH the cash flow ratio, OPTION the managers' options to common shares ratio, CAPITAL the capital structure, DIVIDEND the cash dividends ratio, STOCK the major shareholders' shareholding ratio, HOLDING the directors and supervisors' shareholding ratio, PLEDGE the directors and supervisors' stock pledge, SIZE the company size, and RATIO the repurchase ratio.

Table 3. Pearson / Spearman correlation coefficients

	REPURCHASE	VALUE	CASH	OPTION	CAPITAL	DIVIDEND	STOCK	HOLDING	PLEDGE	SIZE	RATIO
REPURCHASE		-0.1408**	0.0935*	-0.0509	0.2033**	0.2754**	0.1382**	-0.0667	0.0024	0.0839**	0.3625**
VALUE	-0.1363**		-0.1882**	-0.0756*	-0.0343*	-0.1639**	-0.0374	0.0571	0.0409	-0.0512	-0.0947*
CASH	0.1048*	-0.2042*		0.0457*	0.4106**	0.0927**	-0.0239	0.0927*	-0.1287**	-0.0815*	0.0655*
OPTION	-0.0596	-0.1071**	0.0535*		0.0226	0.0439*	-0.0414	0.0320	-0.0658	-0.1023*	-0.0296
CAPITAL	0.2031**	-0.0456	0.4257**	0.0373		0.1028	-0.0252	0.1245**	-0.1545**	-0.2212**	0.1678**
DIVIDEND	0.2034**	-0.1925**	0.1118**	0.0430	0.1622**		0.0449	-0.0523	0.0946*	0.2488**	0.1752**
STOCK	0.1247**	-0.0345	-0.0334	-0.1315**	-0.0282	-0.0021		-0.1578**	0.1477**	0.0524	0.1672**
HOLDING	-0.0713	0.0485*	0.1146**	-0.0247	0.1354**	0.0338	-0.0963*		-0.1504**	-0.2698**	-0.0516
PLEDGE	0.0378	0.0509	-0.1368**	-0.0881*	-0.1653**	0.0196	0.0656	-0.2557**		0.3452**	-0.0104
SIZE	0.0901**	-0.0324	-0.0628*	0.0387	-0.2865**	0.2169**	0.0136	-0.3362**	0.2882**		-0.0106
RATIO	0.3772**	-0.0914*	0.0415	-0.0382	0.1394**	0.0366	-0.0134	-0.0573	0.0205*	-0.1342**	

a: 1 stands for the diagonal; the upper right is Pearson correlation coefficient and the bottom left is Spearman correlation coefficient.

b: 5% significance is marked \*, 1% significance \*\*.

Table 4: Factors of reduction of capital in Logistic Regression Model

Variable	Prediction	Coefficient	Std. Error	z-Statistic	P-value
VALUE	—	-1.8128	1.0408	-1.6841	0.0472**
CASH	—	-2.8674	0.9804	-2.9578	0.0054***
OPTION	+	92.5725	56.3721	1.6827	0.0428**
CAPITAL	+	6.8624	3.2158	2.0227	0.0142**
DIVIDEND	+	39.9213	28.7536	1.5018	0.0792*
STOCK	+	7.0825	4.0129	1.7701	0.0386**
HOLDING	—	-4.0062	8.2158	-0.4564	0.1626
PLEDGE	—	-2.1336	2.4667	0.9512	0.1327
SIZE		0.6227	0.3801	1.7119	0.0363**
RATIO		70.0042	11.2779	6.1028	0.0000***
C		-24.1805	8.0255	-2.9463	0.0078
LR statistic (10 df)		214.853			
Probability(LR stat)		0.000			
McFadden R-squared		0.916			

a: one-tailed testing, 10% significance is marked \*, 5% significance \*\*, and 1% significance \*\*\*.

From the book value-to-market value (VALUE), the maximum (2.9816) or the mean (1.1728) of Stock Repurchase samples are higher than those of Cash Reduction samples (1.7665 and 0.8174).

According to the capital structure, cash dividend ratio, major shareholders' shareholding ratio, directors and supervisors' shareholding ratio, and directors and supervisors' stock pledge, such two reductions of capital do not appear large differences on the mean and the maximum; however, the mean of Cash Reduction samples is higher than it of Stock Repurchase samples, in addition to the directors and supervisors' shareholding ratio.

#### *Correlation Coefficient Analysis*

From the correlation coefficient matrix in Table 3, CAPITAL and CASH present higher correlation, 0.4106, in the upper right Pearson correlation coefficients, while CAPITAL and CASH show higher correlation, 0.4257, in the bottom left Spearman correlation coefficients, but not above 0.5. In this case, both the upper right and the bottom left Pearson correlation coefficients do not exceed 0.5 that there is no correlation among variables.

#### *Empirical Results and Analyses*

From the regression results, Table 4, company value (VALUE), cash flow (CASH), managers' stock options (OPTION), capital structure (CAPITAL), major shareholders' shares (STOCK), and company size (SIZE) reveal significant correlations with the reduction of capital.

As the legal regulations in Securities and Exchange Act are comparatively loose, merely requiring the decision of board of directors and the filing for the central competent authority's record, a company is predicted to conduct Stock Repurchase, when the share price being under-estimated, so as to effectively pro-

mote the share price in a short period of time. Such empirical results support Hypothesis 1 that a company tends to Stock Repurchase for enhancing the share price.

The free cash flow indicates that a company needs a large amount of capital to repurchase stocks. When a company applying Cash Reduction, a large amount of capital is required; however, a certain ratio of capital is necessary for operations that the book cash cannot be completely utilized for Cash Reduction. Besides, it requires a long period of time for Cash Reduction that the required capital for Cash Reduction can be acquired from debt financing or realization of assets, rather than the book cash. Contrarily, the trading subjects of companies with Stock Repurchase are Stock Exchange Market, Over-the-Counter Market, or non-internal shareholders; besides, the repurchase period is short that the capital cannot be acquired from debt financing or realization of assets. Such empirical results support Hypothesis 2 that a company with Stock Repurchase holds more free cash flow.

With great incentive, the managers could make the maximized decision for the corporate value; and, numerous stock options are the incentive for the managers making the optimal decisions. The empirical results support Hypothesis 3 that the managers conducting Cash Reduction, as a major decision for a company, at correct time could largely promote the corporate value as well as enhance the value of the stock options. One of the predicted factors in Cash Reduction is recapitalization. The empirical results support Hypothesis 4 that companies with Cash Reduction present high equity structure so that the conduction of capital reduction could reduce the P/E ratio of the company.

The conduction of Cash Reduction requires a large amount of capital that cash dividends pay-out might be affected. The empirical results support Hypothesis 5 that

a company with Cash Reduction presents alternatives with cash dividends. Moreover, the conduction of Cash Reduction needs the decision of board of shareholders that the major shareholders' shares appear remarkable effects on Cash Reduction. The empirical results also imply that the major shareholders in companies with Cash Reduction show higher shareholding ratio, presenting that most companies with Cash Reduction are the share-concentrated businesses whose insiders hold more shares. Furthermore, it is found that companies with Cash Reduction appear larger company size.

Regarding Moral Hazard Hypothesis, the predictions of Hypothesis 6-1 and Hypothesis 6-2 are identical, but not significant, showing that the directors and supervisors' shares and the shares being pledged could not necessarily affect the decision of capital reduction.

### Conclusions

Reduction of capital does not merely focus on effective enterprise financing, but enhances the financial statements, in order to promote and maintain the shareholder equity. When a company appears abundant cash on the book, but no large amount of capital or major investment, like merging, would be paid out in the future, it tends to return cash to the shareholders with Cash Reduction. On the other hand, an enterprise conducts Stock Repurchase to promote the share price; such repurchased treasury stocks might be sold to the employees or cancelled to reduce the common stocks and decrease the scale of share capital. Both methods could promote the shareholder equity, enhance the financial statements, and further promote the company value.

Basically, an enterprise would precede Cash Reduction and Stock Repurchase at proper timing, such as the cash being too much, the company size being

too large, the commercial environment being not free, and the governmental control being increased. The chance of a company selecting Cash Reduction or Stock Repurchase would therefore be increased. On the other hand, when the managers and the directors and supervisors show low shareholding ratio and the market appears downturn, a company is likely to conduct Stock Repurchase. Both Cash Reduction and Stock Repurchase would increase the return on equity and the share return that the share price would present positive performance. Moreover, returning cash to the shareholders could promote the company management, and the P/E ratio could be enhanced.

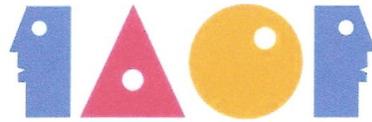
With Logistic Regression Mode for empirical analyses, this study tends to discuss the determinants for Taiwan-listed companies applying different reductions of capital. The empirical results of Logistic Regression Model show that a company is likely to conduct Stock Repurchase for promoting the share price, which is considered under-estimated, corresponding to Signaling Hypothesis. In regard to Cash Flow Hypothesis, it is found that most companies with Stock Repurchase present more cash flow, similar to the prediction in this study. Besides, the managers' stock options, adjustment of capital structure, substitute for cash dividends pay-out, major shareholders' shareholding ratio, and company size appear significantly positive correlations with a company conducting Cash Reduction.

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THE CONSIDERED ADOPTION OF INNOVATIVE FARMING BY  
THE LEISURE - FARM OWNERS IN THE GREATER TAIPEI AREA

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Abstract

The purpose of this study was to investigate the main factors affecting leisure farm owner's innovation adoption In the Greater Taipei Area, including Taipei City, New Taipei City, Keelung and Taoyung County. The factor analysis indicated that three variables were significantly related. These three variables were the owner's perception, behavior and performance. They were not only related but also were direct and positive. The outcome appeared that innovation behavior was the mediator of the other two variables. These findings provide evidence that innovation perception could increase the will to develop innovative products and innovative products could raise the performance of the business. However, it also provided an encouragement for owners deploying the innovation concepts and developing more innovative products and services to persist in an increasingly competitive market.

Keywords: perception, behavior, innovation, leisure farming

## Introduction

Leisure farms development is one of the essential developments in the tourism industry in Taiwan. Its' main purpose is in promoting the rural economy and providing urban visitors with a recreational choice. According to the government's "The Rural Developing Act," leisure farming is managed for recreational agriculture activities (Executive Yuan, 2008). Scholars enriched the definition of leisure farming with various perspectives, including (1) Leisure Farms fulfilling the demands of national tourism for rural scenery; (2) Increasing the income of peasants as well as their life standard; (3) Promoting the interchange between urban and rural, and balancing the development between these two areas; and (4) Protecting agricultural resources and continuing the sustainability of agriculture (Bian, 1989). Hence, leisure farming contains multi-objective functions (Chen, 2007; Tuan, 2006).

However, in Taiwan, leisure farming has been developing for more than 30 years. Currently, fierce market competition is forcing leisure farm owners to become more productive in products and services. In order to maintain their continued competitiveness in terms of service products and quality due to customer's daily new demands, they intend to adopt new ways to overcome this harsh environment. In the academic fields, many researches mainly focused on the impact of innovative products that influence the big corporations, or how the diffusions of innovation applied in large enterprises. In the tourism sectors, majority discussions were about how to develop the new products and service's, marketing strategy and evaluation methods. In adopting innovation reality, some key managers understand the importance of being innovative and learning the new skills of innovation, but still their businesses did not show any major changes. Others who wanted to become innovative lacked the confidence to adopt the innova-

tion concepts. Hence, there are many obstacles to adopting the innovation concept. So, it is important to know what the main concerns are for owners adopting and implementing the innovation. Therefore, understanding the main influential factors can assist the agricultural extension assistants in providing more help to upgrade owner's competitive ability in the tourism markets.

## Literature Review

Normally speaking, human beings learn and do things from their past experience. It shows leisure farm owners are no exception. Hence, the discussions among perception, behavior and performance are the key elements of this study.

Perception originally comes from a Psychology term. The elements of perception are attitudinal opinions or the believe sector. For human beings, the learning process and its development begins from innocent to mature stage. This means that from birth individuals start to collect signals from their surroundings and learn knowledge to build up the perceptive components. (Liu, 1992).

Perception shifts during the experience and learning changes; so there are temporary understandings, recognitions and opinions to the person, of affairs. To sum up, perception means an attitude of understanding toward the affairs of people; those understandings of the opinions, which include, image consciousness, recognition, inference, judgment of complex psychological activities (Lutz, 1991). Marketers recognize that consumer's perceptions of the characteristics of an innovation affect its rate of adoption (Gatignon and Robertson, 1985; Pan and Fesenmaier, 2000). Scholars like Roger distinguish five characteristics that influence the rate of adoption of an innovation: perceived relative advantage; perceived compatibility; perceived complexities; perceived

divisibility and perceived communicability. These characteristics can be considered in relation to leisure farm managers' perception of innovation: (1) perceived relative advantage refers to the degree to which leisure farm innovation is superior to traditional farming; (2) perceived compatibility refers to the degree to which leisure farm innovators perceive leisure farms to match their transformation of agricultural needs; (3) perceived complexity refers to the degree to which managers find leisure farm innovation difficult to understand and to use in practice; (4) perceived trial-ability refers to the degree to which leisure farm innovation can be tried on a limited basis; (5) perceived communicability refers to the degree to which the benefits of the use of leisure farm innovations are observable or describable to others (Roger, 1983).

The definitions of behavior from Psychology are divided into two perspectives. One is only limited in its apparent activities by observation and measurement (narrow sense). In the other sense, behavior is more than outward it is also the inner part of an individual. It also includes both the direct and indirect observation (Chung, 1989). At the same time, Holt (1988) divided innovation into five categories in the management section of the innovation by utilizing the type of the innovation from Rogers. In the following lists were Roger's views: (1) Technological Innovation: Through managing the new knowledge to create or execute the new skills of production. (2) Administrative Innovation: Utilizing the new system or managerial method. (3) Social or Organization Innovation: The new ways in the managing of human being relationships. (4) Financial Innovation: A new method in protecting or utilizing capital. (5) Marketing Innovation: A new way of packing product or service.

Moore believes that innovators are all technology enthusiasts, who will for-

give ghastly documentation, slow performance, and omission in functionality (Moore and Benbasat, 1991). But they did not promise success when they behaved in the innovative way. Another scholar, Howard, mentions innovators being more involved in the product field and engaging in extended problem solving prior to having more innovation ideas and actions (Howard, 1997).

When innovations are introduced, the most desirable outcome from an organization's perspective might well be the routinization of the innovation as part of regular work (Saga & Bud, 1994). In some discussions on evaluating the performance, many people favor enterprise from which they can obtain positive economic and social gains (Ap, 1990; Pizam, 1978; Smith and Krannich, 1998). Economic gains mean the increase of income, revenue, annual average growth rate in sales and employment situations, sales per employee (annual average value), and visitors (Giulio, Rinaldo and Maria, 2004).

In addition to economic reliance, growth rate is another attribute identified in the understanding of resident's perception (Carmichael et al., 1996). Others regard performance as referring to the symbolic interactions, discourses, and signifying practices intimately embroiled in the reproduction of space, habits, group membership (Marcjanna and Tim, 2000).

### Study Design

From the literature reviews, there are three main reasons for the process of adopting innovation. The author will use factor analysis in figuring out main factors and then investigate their relationship. Hence, the research hypothesis and framework were developed as Figure 1. Inside of the frame, there were three individual variables and in the outer position were shown the sampling characteristics.

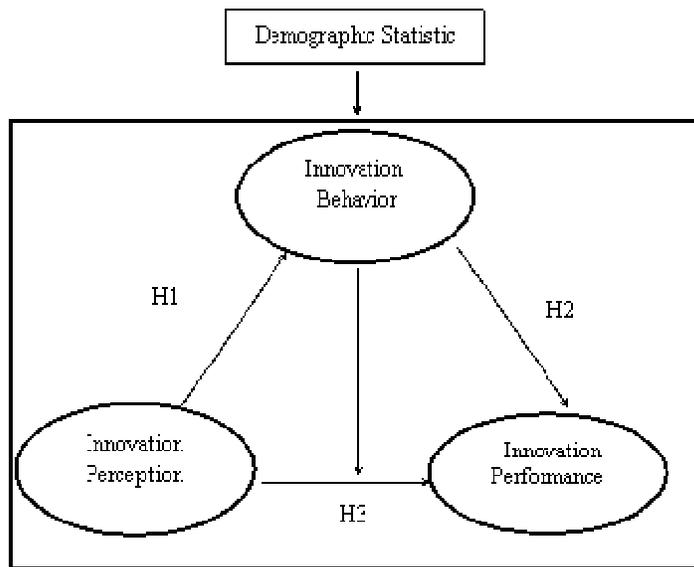


Figure 1. Research Framework.

Hence, three hypotheses were developed in the following lists.

*Hypothesis 1: Perception may influence behaviors.*

*Hypothesis 2: Behavior may affect the performance.*

*Hypothesis 3: Performance may be affected by perception.*

The sample cases were selected from small and medium-sized leisure farms in the Great Taipei region of Taiwan with the assistance from the Taiwanese Agriculture Associations and the Taiwan Leisure Farm Association.

These two organizations also helped to collect the data from leisure farms in the year of 2007. The target region played an important role in the leisure farming industry because it was the back yard of the capital, which is also the commercial center of Taiwan. Most tourists visited the

leisure farms in this region for two major reasons. The first was the travel distance and time and the second was the communication convenience. Around these areas, there were major exits from the high or the expressway and it would not take tourists more than 2 hours of driving. According to the 2004 Census data, the total number of leisure farms was 1102. There were 260 leisure farms in four areas, which accounted for more than one fourth of the population that year. So, the sample could represent some evidence of the recent development in the Taiwan leisure farming industry. Furthermore, the results provided readers with an understanding of urban leisure farm's development. Since the survey focused on the leisure farm managers, interview techniques were designed to be face to face. It took 2 months to finish all the interviewing but two exceptions in the data collection occurred. Due to special reasons, one used the ordinary mail and the other was sent by electronic mail.

In this study the questionnaire was divided into four sections. The first three were structured to gather information about respondent's understanding of innovation perception and behavior, as well as their responses to the performance. The last sector was demographic information. The previous three variables consisted of 20 items. The first and third variables scored on a 5-point Likert scale with an agree/disagree continuum (1. strongly disagree, 2. disagree, 3. neither agree nor disagree, 4. agree, 5. strongly agree). The second sector added one choice "none of the service." As the 6th scale, it counted as no degree of adoption. The rest were in low and strongly continuum scale (1. low degree, 2. lowly degree, 3. average degree, 4. agree, 5. strongly agree). The 20 items instrument accounted for over the average accountability. In addition, demographic information was collected to measure the relationship among perception, behavior and performance, in the samplings.

The tools for statistical analysis were SPSS (stands for statistic package for social science). First, deploying data in the descriptive reliability and validity analysis. Then using the factor analysis to divide all the questionnaire's items into categories. The last step was to use the path analysis to examine their relationship.

The summations of data and demographic characteristics indicate the sample distributions. The descriptive analysis reveals the central tendency of variables that provides the mean differences in each sector. These differential means help readers to have more understanding of the current environment and owner's attitude to innovation.

Examining the reliability means to evaluate the questionnaire on whether the instruments are reliable. Among the academics, there are three kinds of reliability

procedures. This research adopted "inter-rater reliability." The number was in between 0 and +1, the high number indicates as being more reliable. The reasonable alpha value shall exceed the number of 0.6 which is the minimum requirement in the statistic tools. Validity is the measurement of accuracy of questionnaire items. The three most frequently used were content, criterion-related and construct validity. The research adopted the last one, which was supported by expertise's examination of instruments.

Finally, there is the path analysis. This measures the linear cause-effect relationship among those sets of variables. "Path analysis is basically concerned with estimating the magnitude of the linkage between variables and using these estimates to provide information about the underlying causal processes. It makes use of multiple regression analysis to look at the relationship between variables." (Jeremy, Emma, and Christian, 2006).

## Results

From the demographic analysis, it showed that education statuses are central in the high school areas. The first group was located in the senior high category and it accounted for 40.9% of the sample. The following two groups were elementary (16.9%) and junior high school (15.9%). Beside the educational background, the survey also revealed almost 43% (Non-workers and Housekeepers) of the respondents had no other job experience and the rest had working experience. The survey showed that more than 75% of respondents have less than 3 hectares. Their main visitor source was outsiders, which accounted for 86%. Means among these three variables show that perception has the highest (3.9437) then performance (2.9808) and the last is behavior (2.2545).

Table 1. Component Matrix (a)

	Component				
	1	2	3	4	5
R14	.374	.523	.201	-.050	-.218
R21	.257	.636	.092	-.111	-.298
R31	.257	.655	.012	.018	.230
R32	.415	.679	.031	.035	.078
R41	.338	.648	.168	.038	.222
B13	.542	.040	-.422	.322	.238
B14	.609	-.027	-.428	.335	.185
B22	.622	-.011	-.296	.236	-.375
B23	.591	-.098	-.227	.102	-.360
B28	.578	-.037	-.289	.350	.284
B302	.790	-.212	-.014	-.240	.061
B303	.791	-.111	-.003	-.338	-.024
B304	.679	-.209	.303	-.244	.319
B305	.673	-.235	.269	-.255	.345
B306	.743	-.056	-.009	-.046	.124
B310	.747	-.119	-.012	-.125	-.319
B3078	.821	-.071	.042	-.101	-.114
B412	.780	-.089	-.048	-.194	-.188
E101	.380	-.215	.588	.512	-.030
E102	.369	-.141	.613	.514	-.131

Extraction Method: Principal Component Analysis.  
a. 5 components extracted.

Table 1. shows the five categories but the actual division could be divided into only three categories. Sums of loading weights accounted for 66.7%, which indicated that the explanation rate was acceptable. The average reliability value of these three variables was a Cronbach's Alpha of 0.894 that exceeded the minimum requirement (0.7). Hence, the content of the first category was regarded as innovation behavior; the second one correlated with perception and was named as the innovation perception, and the last as innovation performance. The above results imply that the first equation model between perception and behavior, is constructed as  $y = -0.73 + 0.33 x$ . However, the model P value is 0.000 that means the coefficient numbers between these two variables are significant, hence it shows a positive and direct relationship between perception and behavior. Second, the explanatory power of two variables is 11%. Path analysis results are shown in the following Tables 1.1, 1.2 and 1.3.

Table 1.1 The regression relationship of Perception vs. Behavior

Independent Variable	R	Adjusted R Square	Beta	Beta constant	t	F	p
Perception	0.33	0.11	0.76	-0.73	5.03	25.32	0.000

Table 2. The regression relationship of Behavior vs. Performance

Independent Variable	R	Adjusted R Square	Beta	Beta constant	t	F	p
Behavior	0.48	0.23	0.48	2.31	7.93	62.94	0.000

Table 3. The regression relationship of Perception vs. Behavior and Performance

Independent Variable	R	Adjusted R Square	Beta	Beta constant	t	F	p
Behavior	0.48	0.28	0.74	-2.11	7.20	62.94	0.000
Perception			0.55		3.98		

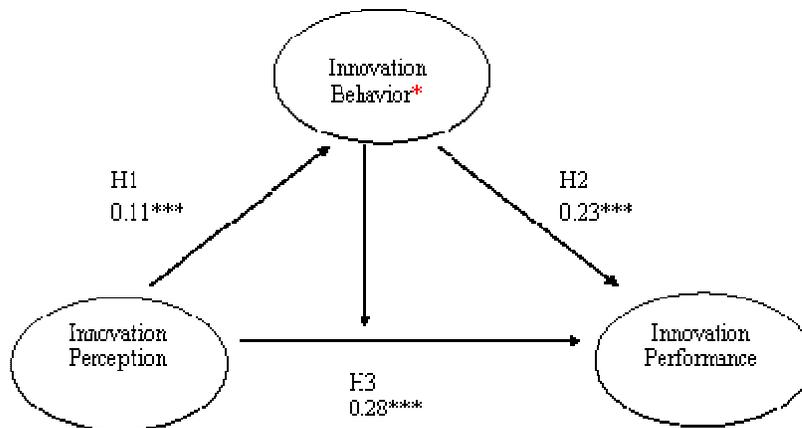


Figure 2. Path Analysis results among perception, behavior and performance

Table 2.2 shows the equation model between behavior and performance is constructed as  $y = 0.48 + 0.23x$ . The P value is 0.000 that shows the significant sign between two variables. Hence two variables show a positive and direct relationship and the explanatory power of two variables is 23%.

The first result shows when the performance is set as the dependent variable and the rest of the variables (perception and behavior) are viewed as the independent ones, the multiple regression equation model is constructed as  $y = -2.11 + 0.23x_1 + 0.28x_2$ . Second, the P value shows the sign as significant; therefore, two positive relationships among perception, behavior and performance are built up. The total explanatory power of this model equation is 28%. So, it can be proclaimed that behavior is the mediator variable (Beta=  $0.74 \times 0.55$ ) between perception and performance, since both independent variables show as significant in the coefficient result (see figure 2). The regression summary result shows that three hypotheses are supported and variables reveal positive with direct impact on each other.

### Conclusion and Discussion

The outcomes of the demographic statistic demonstrate that owners have high levels of innovation perception but have lower results among the behavior and performance sectors. It can be inferred that owners realize the essentials of adopting innovation, but there are hindrances in the implication. Besides that, the average educational background is located in the high school area, but innovation behavior does not show a good result. This indicates that more education and training is needed in helping them with the innovation behavior implication. The overall outcome among innovation perception, innovation behavior and innovation performance show their direct impact on each other. It means that

“perception” will affect “behavior” and “behavior” affect “performance”, too. Hence, more education in innovation concepts and training in developing innovative products can be beneficial to their owners’ businesses.

The outcome of innovation behavior shows far less than innovation perception. This provides evidence that more training and practice is needed to increase competence ability and there is still space to improve in developing innovative products and services.

### Research Limitations and Recommendations for Future Study

Regarding the limited time and managerial perspective of this research, it is urged to do further interviews and broaden the study subjects with the tourists, to see if they can fully receive and be touched by the efforts of leisure farm manager’s innovation. More field evidence is needed to explore whether their products or services are really innovative from the point of view of tourists. Moreover, most innovation reviews and papers focus on other industries such as technology, manufacturing, outlets and tourism services but few studies have been seen on Leisure Farms. If more government or related managerial units were willing to support the relative studies, then managers could receive more information or findings for their future reference.

The statistic results show that innovation behavior does not have good results. There could be a fruitful discussion on why this happens? What are the essential things that hinder the owners? How should they cope with the problems, with the assistance from government, related units or academic fields?

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A STUDY ON THE RELATIONSHIP AMIDST HEALTH  
CONSCIOUSNESS, ECOLOGICAL AFFECT, AND PURCHASE  
INTENTION OF GREEN PRODUCTION

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Abstract

With the popularization of knowledge, the consciousness of health and environmental protection concept are increasingly valued by the consumers. And green consumption is widely discussed in recent years. The purpose of this study is to understand the causal relationship among the college students on health consciousness, ecological affect with green production purchase, and the intermediary effect of ecological affect under the health consciousness and purchase intention. This study used the purposive sampling method to select the related students on seven colleges in Taiwan region. A total of 597 valid questionnaires were collected, and the study processed through structural equation modeling by reviewing the related theories from literatures. The study showed the overall fit is good among the relationship model of health consciousness, ecological affect, and purchase intention. Both the health consciousness and ecological affect indicated a significant positive effect on consumers' purchase intention. And health consciousness will be a significant positive effect on ecological affect. Ecological affect plays an intermediary role between health consciousness and purchase intention.

Keywords : Health Consciousness, Ecological Affect, Green Production, Purchase  
Intention

## Introduction

Green Product is a produce of food following the laws of nature, in line with the natural ecological system, and meet the use of natural resources. (Lee & Zheng, 2004; Schubert & Kandampully, 2010). Green product market continued to increase in recent years in the global (Lockie, Lyons, Lawrence & Grice, 2004; Padel & Foster, 2005), the consumers' not only have multiple choices at the time of purchase and are increasingly concerned about energy consumption and other environmental issues (Crane, 2001; Akgüngör, Miran & Abay, 2010). Environmental concern is an important issue in the current social, with the goal to create a sustainable and healthy environment (Royne, Levy & Martinez, 2011). The concept of green consumption application on eco-environmental protection and health are closely related to people's livelihood, should be an important development trend. Overall, the health of young people has been good. Will the perception of the health consciousness affect their purchase intention of green product and the ecological environment? Will their concern on the ecological environment affect their willingness to purchase the green product? These led to the study motivation of this article.

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With a large scale survey on Taiwan college students by the variables concerning on health consciousness, ecological affect, and purchase intention. In addition, the study will explore the relationships among them, and to understand the impact pathways between the various variables and causalities. The purposes of this study are summarized as below:

1. To explore the impact of health consciousness to purchase intention and ecological affect.
2. To explore the impact of ecological affect to purchase intention.
3. To explore the intermediary effect of ecological affect in health consciousness and purchase intention.

## Literature Review and Hypotheses

### *Green product*

Green product refers to the fresh, nutrient, and can increase the eco-efficiency and reduce the environmental hazards. Many studies have shown that fresh, without chemical additives, nutrient, and

environmentally sustainable food production are the natural foods. (Lockie, Lyons, Lawrence & Grice, 2000; Shaharudin, Pani, Mansor, Elias & Sadek, 2010). Such foods have been called the natural food, or the ecological food (Lin, 2001).

### *Ecological Affect*

Ecological affect refers to consumers concerned about environmental and ecological condition. For consumers, to choose the green product is difficult because they need to consider a number of different factors. Since the 1970s, researchers had already begun to study consumers concern for the environment (Anderson & Cunningham, 1972) and concerned ecological issues (Kinney, Taylor & Ahmed, 1974). The study also found that the ecological environment will affect consumers' choice of food (Tobler, Vivianne Viviance & Siegrist, 2011). Therefore, this study explored the ecological environment effect to the green product from a consumers' point of view. Aim to understand if the consumers' emotional level of the ecological environment will affect their willingness to buy green product.

### *Health Consciousness*

For the purpose to achieve a healthy diet, many consumers considered the diets is no longer the pursuit of sensory satisfaction, may have to be sacrificed, in order to achieve the purpose of health. The health consciousness reflects people willing to do something for their own health, and prepared to carry out the health action (Schiffstein & Oude Ophuis, 1998). Consumer perceived the green product as a substitute for a healthy, because they contain more nutrients (Lea & Worsley, 2005; Lockie et al., 2004; Padel & Foster, 2005), also they believed that the organic products are safer. (Padel & Foster, 2005; Schiffstein & Oude

Ophuis, 1998). A study pointed out that people who have a positive healthy attitude tend to choose green product food (Fan, Li & Yeh, 2009). This study is mainly to investigate whether the increased willingness to buy green product for health reasons.

### *Purchase Intention*

Purchase intention refers to the evaluation or attitude of consumers to the related products, with the stimulation of the external factors, constitutes a consumer's willingness to buy. While consumers are willing to buy some production, the higher purchase intention, the greater the probability of purchase (Dodds, Monroe & Grewal, 1991). Consumer buying behavior can usually predict from their wishes (Bai, Law & Wen, 2008). Basis Zeithaml, Berry & Parasuraman (1996) also agreed that the willingness to buy is a behavioral intention, although the willingness to buy is not the same as buying behavior occurred. However, it is no doubt that consumers usually based on their own experience and search for relevant information to assess by comparison and judgment before arising from the purchase behavior. In other words, the personal willingness to buy green product is likely to be consideration of health reasons and the level of interest in environmental values.

### *Discussion of Health Consciousness, Ecological affect, and Purchase Intention*

Many consumers put the health as an important consideration while buy their food. (Magnusson et al., 2001). In other words, when the consumers have a higher consciousness of health, they prefer to take the healthy functional food (Chen, 2011). The consumers to buy green product appears to be concerned about their own health are stronger than concerning for environmental

issues (Schifferstein & Oude Ophuis 1998; Tregear, Dent & McGregor, 1994). A study by Amyx, De, Lin, Chakraborty & Wiener (1994) identify high-level consumers are willing to pay for green products with a higher prices. Laroche, Bergeron & Barbaro-Forleo (2001) concluded five factors- socioeconomic background, knowledge, values, attitudes, and environmental behavior- which affect the consumers to accept the higher price of purchasing the ecological environment-friendly products. Therefore, the concern for the environment will be an important determinant of food choices. Usually many women and vegetarians are more willing to adopt ecological food (Tobler et al., 2011). From the above stated, not only discuss among the health consciousness, the ecological affect, and the purchase intentions, but also explore whether the ecological affect existed the intermediary effect to the health consciousness and purchase intention.

Based on the above theoretical description and empirical research, this study asked the following hypothesis:

*H1: Health consciousness has a positive effect on the ecological affect.*

*H2: Health consciousness has a positive effect on purchase intention.*

*H3: Ecological affect has a positive effect on purchase intention.*

*H4: Ecological affect has a mediating effect on health consciousness and purchase intention.*

In this study, through the related literatures review and hypothesis, some conclusions showed that the health consciousness will positively impact the ecological affect, and purchase intentions. Ecological affect will also positively affect the purchase intention, and ecological affect would mediate health consciousness and purchase intentions. The conceptual model is shown as Figure 1.

### *Questionnaire Design*

The variables of this study include health consciousness, ecological affect, and purchase intentions, invited three experts to review the content after the completion of the initial questionnaire items. They checked the scales statement and gave the comment, then corrected the revised views, finally, completed the try-out scale. The purpose of the try-out scale included the describing of the statistical test (e.g. mean, standard deviation, and skewness coefficient), missing data inspection, and extreme group comparison (Chiou, 2010). The Cronbach's Alpha test was used for the reliability analysis to investigate the internal consistency, and used the Pearson's correlation coefficient to show the relationship between scale and the criterion measuring. The full scale quantity was formed after modifying the inappropriate, ambiguous, and guide-to- answer type questions. There are total 13 questions, with Likert-type scale, from "strongly agree", "agree", "somewhat agree", "normal", "somewhat disagree", "disagree", and "strongly disagree", were given 7 points, 6 points, 5 points, 4 points, 3 points, 2 points, and 1 point, The higher the score, the more identity, on the contrary, the less identity.

## Study Method

### *Study Framework*

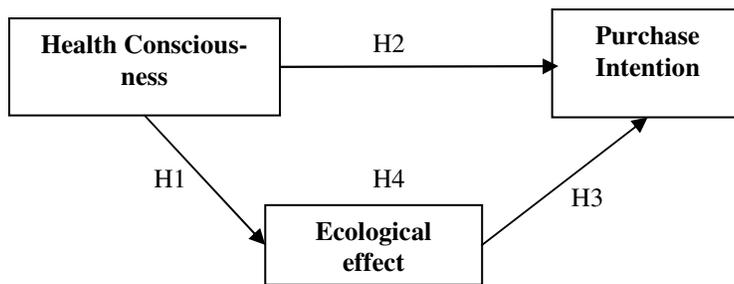


Figure1. Study Framework

A total of five items were given on the dimension of health consciousness, using the Bai, et al. (2008) as reference. Scale on the dimensions of ecological affect was based on the Chan (1999) and modified the different scenarios on the purchase of green product. A total of four items were given. As for purchase intention dimension scales, some ideas came from Zaichkowsky (1986), Blackwe et al., (2001), and Taylor and Todd (1995), and four items were given.

In addition, some background information were asked on the final section of the questionnaire included the respondents' gender, grade, residence, the department, and the average monthly petty cash.

#### *Sampling Design*

This study tried to understand the college students feel for green product, and therefore used purposive sampling to select seven college students from Taiwan's northern, central, southern, and eastern regions as respondents. The questionnaires were distributed, during the students' classroom, by the researchers personally or commissioned the study assistants to the colleges which are recommended by the researcher's friends or colleagues and a brief description of the purpose of the study was introduced before

distributing the questionnaires, so students are more aware of this study. A total recovery of 755 questionnaires were collected, and 597 valid questionnaires after excluding the missing data, the violating, and the inconsistent questionnaires, the valid questionnaires was 79.07%.

#### *Data Processing and Analysis*

This study analyzed the background information of the respondents with SPSS 12.0 statistical software using AMOS 20 to analyze the confirmatory factor analysis and structural equation analysis, by maximum likelihood estimation to estimate the causal relationship among the variables of this study framework.

#### Data Analysis Results

##### *Sample Characteristics*

Slightly more female respondents, accounting for 55.9%, among 597 valid questionnaires, most respondents are freshman or sophomore, whatever college or university, accounting for 69%. Most samples were taken from the central Taiwan students, accounting for 37.9%, 34.0% immediately for the southern students, most respondents are major in hospitality or leisure departments, accounted for 47.9%, and of the institute of

technology are next, accounted for 23.3%. The average monthly petty cash is less than NT\$ 5,000 (35.2%) for each respondents, followed by no fixed petty cash (33.7%).

### Reliability Test

In this study, the confirmatory factor analysis, CFA, was used to detect the scale of validity and reliability. The fit indicators of the overall measurement model showed  $\chi^2 = 282.65$ ,  $df = 62$ ,  $\chi^2 / df = 4.55$ ,  $GFI = 0.93$ ,  $SRMR = 0.050$ ,  $RMSEA = 0.077$ ,  $NFI = 0.96$ ,  $CFI = 0.97$ , the above number of value showed the fit indicators has reached to an acceptable standard between sample

data and model. The results of each construct descriptive statistics and confirmatory factor analysis are shown in Table 1.

As for reliability, the squared multiple correlation, SMC, of the individual observed variables must be at least greater than 0.20, and the composite reliability, CR, of latent variable must be at least higher than 0.60 (Jöreskog & Sörbom, 1989). In this study, the SMC of each observed variable ranged from 0.44 to 0.75, the composite reliability of latent variable ranged from 0.86 to 0.87, it generally represents each scale is with good reliability.

Table 1. Confirmatory factor analysis of scale model

Dimensions	Scale variables	Mean	Factor loading	SMC	CR	AVE
Health Con-sciousness	For my health, I pay attention to any changes in my body.	5.13	0.71*	0.51	0.86	0.55
	I think to know how to eat healthy is a very important event.	5.48	0.70*	0.50		
	I am very concerned about the quality and safety of food.	5.30	0.71*	0.50		
	I eat a balanced diet.	4.88	0.80*	0.63		
	I think I have the sense of health consciousness.	4.92	0.78*	0.61		
Ecological Affect	I think most of the food I eat was contaminated by pesticides, so I am scared.	4.85	0.74*	0.55	0.87	0.63
	The government did not provide more environmental protection measures, I am scared.	5.19	0.83*	0.68		
	I think the polluted animals and plants may cause the hazards of my life, so I am afraid.	5.19	0.82*	0.67		
	I think the food manufacturing industries may be the murderer of environmental pollution, so I am afraid.	5.10	0.77*	0.59		
Purchase Intention	I am willing to buy green production.	5.09	0.81*	0.65	0.87	0.64
	I am willing to spend a little more money to buy green production.	4.63	0.84*	0.71		
	I will continue to buy green production.	4.68	0.86*	0.75		
	I recommend the green production to others.	4.72	0.67*	0.44		

Note : \* represents  $p < 0.05$

As for validity, the factor loading of all observed variables reached to the level of significance ( $t > 1.96$ ,  $p < 0.05$ ), and higher than the criteria of 0.40 (Hair, et al, 1998). The significant factor loadings represent the scale with convergent validity (Bagozzi & Yi, 1988). The latent variables corresponding to the average variances extracted, AVE, of all asked items are more than 0.50 mean with the convergent validity. The AVE values of the scale dimensions ranged from 0.55 to 0.64, pointed out the scale has acceptable convergent validity. The criterion for the validity test of is the AVE square root of each dimension, the correlation coefficient of the dimension must be greater than the other dimensions (Hair et al., 1998). Found from Table 2, the square root of AVE of each dimension is 0.74 to 0.80, are greater than the correlation coefficient between the dimensions, shows the study scale has good differential validity.

#### *Overall Goodness-of-Fit-Index (GFI)*

In this study, the structural equation modeling was used to verify the hypothesis model. Estimation of the theoretical model fit function by the maximum likelihood (ML), and the detection of the causal relationship between the latent variables. Model fit assessment test is necessary in order to determine whether a reasonable interpretation of the actual observed data, Overall GFI test:

- (1)  $\chi^2 / d.f.$  ratio (282.65/62) is 4.55, in line with the value should be less than 5 standard (Chin & Todd, 1995).
- (2) GFI value of 0.93, higher than the recommended value of 0.90, GFI larger value indicates a pattern of overall fit better.

- (3) Standardized root mean square residual, SRMR, 0.050, represents the size of the residuals should be less than 0.08, indicating a goodness of fit. (Hu & Bentler, 1999);
- (4) Comparative fit index, CFI, is 0.97, higher than the recommended value of 0.9, indicating a goodness of fit. (Hair et al., 1998).

Overall, this study's goodness of fit of theoretical model is to achieve the desired level. In other words, the pattern is to be acceptable, having good external quality.

#### *Test of Study Hypotheses*

The  $\beta$  and  $\gamma$  value figured out by the maximum-likelihood method is used to test whether the study hypotheses is up to the level of significance. The test of the study hypothesis are shown in Table 3, and the overall structure model shown in Figure 2, the three hypotheses paths are up to the level of significance ( $p < 0.05$ ), and the details are described as below.

#### 1. The Relationship Among Health Consciousness, Ecological Affect, and Purchase Intention.

This section examined the impact of health-consciousness to the ecological affect, the results showed the standardized estimated coefficient value of 0.37 ( $p < 0.01$ ), up to a significant level, supported the hypothesis 1. In addition, the effect coefficient of the health consciousness to the purchase intention is 0.35 ( $p < 0.01$ ), also reached the level of significance, supported the hypothesis 2. Practically, when an individual has more health consciousness is more help to add personal feeling of ecological affect, as well

Table 2, Correlation coefficient of the each latent variable

	<b>Health ness</b>	<b>Conscious-</b>	<b>Ecological Affect</b>	<b>Purchase Intention</b>
Health Consciousness	<b>(0.74)</b>			
Ecological Affect	0.34*		<b>(0.79)</b>	
Purchase Intention	0.42*		0.38*	<b>(0.80)</b>

Note 1 : Bold faces represent the square root of the AVE

Note 2 : \* represent  $p < .05$

Table 3. Empirical results of hypothesis

<b>Hypothesis</b>	<b>Routine</b>	<b>Standardized Coefficients</b>	<b>t -Value</b>	<b>Test Result</b>
H <sub>1</sub>	Health consciousness → Ecological Affect	0.37	7.74**	supported
H <sub>2</sub>	Health consciousness → Purchase intention	0.35	7.33**	supported
H <sub>3</sub>	Ecological Affect → Pur- chase intention	0.28	5.99**	supported

Note: \* represents  $p < 0.05$ ; \*\* represents  $p < 0.01$

Table 4. Direct and indirect effect analysis of ecological affect

<b>Independent variables</b>	<b>Dependent variables</b>	
	<b>Ecological Affect</b>	<b>Purchase Intention</b>
<b>Health Consciousness</b>		
Direct Effect	0.37**	0.35**
Indirect Effect	--	0.10*
Total Effect	0.37**	0.45**
<b>Ecological Affect</b>		
Direct Effect		0.28**
Indirect Effect		
Total Effect		0.28**

Note: \* represents  $p < 0.05$ , \*\* represents  $p < 0.01$

as to increase their willingness to buy green product.

## 2. The Relationship of Ecological Affect and Purchase Intention.

Eco-positive gave a positive effect on purchase intentions, standardize the estimated coefficient value of 0.28 ( $p < 0.01$ ), reached the level of significance, supported the hypothesis 3. The results indicated when an individual has the higher ecological affect attitude, he/she the higher willingness to purchase the green product. The results confirmed that the factors influenced people to buy green product will contain the health consciousness and ecological affect, which were found to explain 27% of the variance in purchase intention.

## 3. Mediating Effects of Ecological Affect.

This section examined the Ecological affected intermediary between Health consciousness and purchase intention, as shown the analysis of the direct and indirect effects in Table 4.

When both "the health consciousness → Ecological affect", and "Ecological affect → purchase intention" paths' coefficients are significant, then the path of the "health-consciousness → purchase intention" (via the Ecological affect) will reach to the indirect effect 0.10 ( $t = 2.41$ ,  $p < 0.05$ ), and reached a level of significance. In other words, the Ecological affect plays an intermediary role in the relationship between health consciousness and purchase intention that supported the hypothesis 3

## Conclusion and Suggestions

This study mainly investigated the interaction among the health consciousness,

ecological affect, and the purchase intention of college students for green product. Using SPSS software analysis system to process the variables and characteristic, and to validate the hypothesis by using structural equation modeling. The study results are summarized as follows: The higher in ecological affects, the stronger in purchasing intention in green product, confirmed the ecological affects play an intermediary role in the relationship between health consciousness and purchasing intention.

## Conclusion

The above analysis results and discussion to get the following conclusions.

A. College students will purchase green product mainly for their own health, considered that its qualities are more secure and certified. This concept is consistent with previous studies (Alvensleben, 1998; Clare, et al., 2007; Akgüngör, Miran, & Abay, 2010). Knowledge of green product is from TV, newspapers, and magazines mostly.

B. College students' health consciousness will impact the ecological affect. The study presented the significant results ( $p < 0.01$ ) on the main dimensions of the health consciousness to ecological affect. That is the relationship between college students' health consciousness and willingness to purchase is extremely significant. The results in line with the past scholars' study (Manzo & Weinstein, 1987; Tregear et al., 1994; Schiffrstein & Oude Ophuis, 1998; Tobler, Vivianne & Siegrist, 2011).

C. College students' consciousness of health will affect the willingness of green product purchase. The study presented the significant results ( $p < 0.01$ ) on the main dimensions of the health consciousness to purchase intention. In other words, the

higher consciousness of health, the stronger in purchase intention of green product, The results in line with the past scholars' study (Alvensleben, 1998; Chan, 2001; Akgüngör et al., 2010; Mazar & Zhong, 2010; Schubert & Kandampully, 2010). This explained that consumers' health is a very important factor, and will also be reflected in the attitude of food choices.

D. College students' ecological affect will give the influence on the purchase intention of green product. The study presented the significant results ( $p < 0.01$ ) on the main dimensions of the ecological affect to purchase intention. In other words, college students will strengthen their purchase intention on the green product by ecological affect, the higher on ecological affect, the stronger in purchase intention of green product. The results in line with the past scholars' study on the purchase intention (Roberts, 1996; Chan, 2001; Schubert & Kandampully, 2010; Royne, Levy & Martinez, 2011).

E. College students' health consciousness will strengthen their purchase intention through ecological affect. The study presented the significant results ( $p < 0.05$ ), by the indirect effect of ecological affect, on the main dimensions of the ecological affect whether as the intermediary of health consciousness and purchase intention, i.e. the consumer health consciousness will strengthen its purchase intention through ecological affect. This result anticipates to providing an indicator to the green product producer and sales industry, and encouraging the consumers to buy the environmentally and friendly concept of food, and to create a safe and healthy environment for present and future generations.

### *Managerial Implications*

Through the verification of the above theoretical model, the green production businessmen can understand the factors concerned about the potential consumers to purchase green production, through enhancing the ecological impact and health benefits, thus increasing the consumers' willingness to buy green food.

Based on the study results, it is recommended that the businessmen can focus on the protection of the ecological environment and reduce the disease to enhance the importance of green production, and emphasis on quality and certification while they market their green production. Secondly, in terms of the potential demand of consumers, it is recommended that the green production businessmen can design some activities, such as health food, health recipes, and allow consumers to have in-depth contact with green food, thereby affecting their purchase intention. Moreover, environmental protection and health are closely related, government agencies or environmental groups should continue to provide consumers information about how to select the useful green production, and continue to focus on relevant issues. It should be able to enhance consumers' green consumption concept.

### *Recommendations for Future Research*

Based on the sampling of convenience, college students are only the subjects of the research, however, the samples had already covered the whole Taiwan region, the results of the study and analysis will not be exposed to bias, but the limitations of this study can be used as the sampling methods and design.

In order to understand the various consumer groups on the green product consumption intention, the authors recommend the future researchers can study the different consumer groups and other variables including the different age, region, product knowledge, and perceived risk etc.

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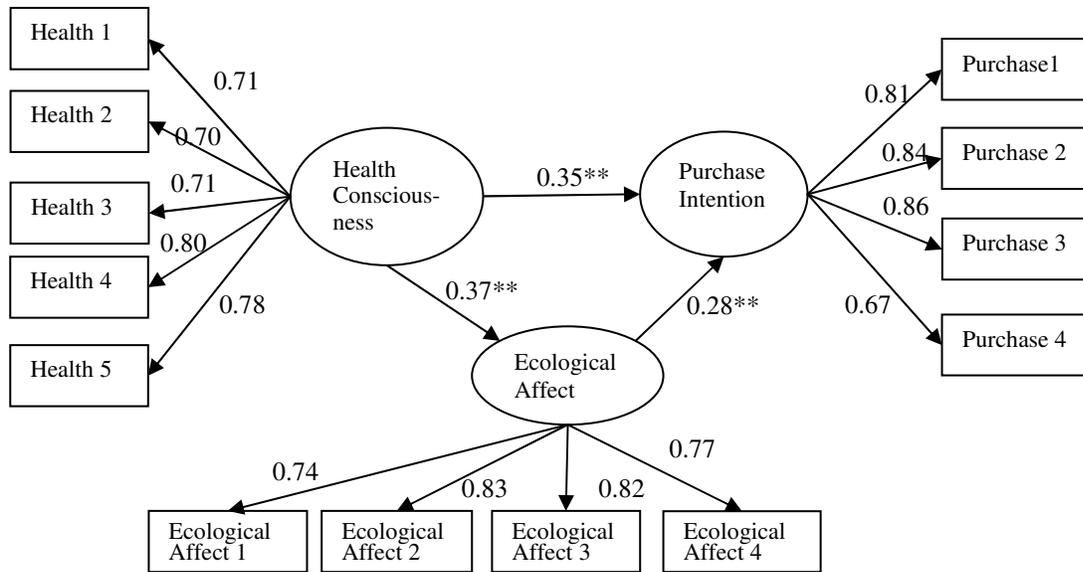
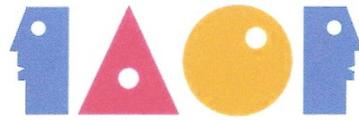


Figure 2. Structural equation modeling



## A REVIEW OF HORTICULTURAL THERAPY AND CAREGIVER'S BURDEN

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### Abstract

Horticultural therapy is the use of plants and gardening activities for healing and rehabilitating humans. A person's engagement in therapeutic gardening is aided by a professional therapist to achieve specified objectives. Although the practice itself is ancient, the profession is relatively new. The benefits drawn by patients working with plants were first documented in the early 19th century by Doctor Benjamin Rush of the University of Pennsylvania. Since then, the practice has spread considerably in use. A growing number of researchers have attested to the unique attributes of horticulture when used as a therapy. This paper will review various literatures on horticultural therapy for persons with social, emotional, mental and physical disabilities, as well as the caregivers' burdens. Most of the literature available is in agreement with the success of the practice as a nonthreatening and non discriminating method. Regardless of the person's age, religion or race, all plants respond well to whoever provides care.

Keywords: Horticultural therapy, caregiver's burden, social disability, physical disability

### Introduction

Within the past decade, awareness has grown among humans about the gains they can get from interacting with gardens and plants (Kimber & Richardson, 2006). The pronounced growth of interest in the interactions in recent times has facilitated the use of specially designed gardens known as healing, restorative or therapeutic gardens. They have defined differences suited to serve specific purposes and heal different conditions. The therapy is administered in various forms or programs. They include horticultural therapy, therapeutic horticulture, social horticulture and vocational horticulture (Simson & Straus, 2003). In horticultural therapy, a person actively engages in horticultural activities,

within the perspective of an established plan of treatment, with the guidance of a trained therapist to realize specified and documented goals of treatment. The process forms the therapeutic activities rather than the final product. Therapeutic horticulture is the process in which plants and activities related to plants are used and those persons taking part endeavour to make better their well being by passive or active involvement (Yalom & Leszcz, 2005). Furthermore, the goals here are not documented or defined clinically. Rather, the leaders possess training regarding horticulture's use as means towards human well being. Social (or community) horticulture relates to activities in gardening for leisure. The treatment goals are not defined and therapists are not available and

the activities emphasise on interacting socially. On its part, a vocational horticulture programs is designed to train people to engage professionally and commercially in horticulture and are available in rehabilitation or residential facilities and schools (Yalom & Leszcz, 2005). The influence of people's interaction with plants in a relaxing and calming atmosphere as found in a greenhouse or garden positively affects both people and plants.

The therapy takes place in various types of gardens including healing gardens, therapeutic gardens, horticultural therapy gardens, and restorative gardens (Resick, Monson & Chard, 2007). Healing gardens are dominated by flowers, green plants and natural settings. Generally, they are associated with hospitals and accessible freely to all. Designed as retreat centers, they aim to benefit most users. Therapeutic gardens are designed to be used as components of treatment programs like physical, occupational and horticultural therapy. Therapeutic gardens are designed to be part of multi disciplinary processes and may exist on their own or as extensions of in-house therapeutic program areas (Resick, Monson & Chard, 2007). Horticultural therapy gardens are designed to primarily support horticultural activities, but can also accommodate therapy causes.

Restorative (or mediation) gardens could be private or public spaces that do not have to be associated with healthcare settings. Rather, they take advantage of the restorative and scenic value presented by nature as a conducive environment for emotional recovery, stress reduction and mental repose (Resick, Monson & Chard, 2007). The design of restorative gardens focuses on social, physical and psychological requirements of the patients.

## Literature Review

### *Horticultural Therapy*

According to the American Horticultural Therapy Association (AHTA, 2002), problems that can be alleviated through horticultural therapy treatment include sensory impairments, substance abuse, age related problems, physical and mental disabilities. In America, the therapy is mostly conducted in institutional environments where therapists work hand in hand with therapy and rehabilitation teams. They help the patients to enhance self esteem, lessen depression and improve their motor skills. This is supported by Simson and Straus (2003) who point out that most conditions and their associated treatments leave patients feeling dependent and passive, but when the same patients are placed in a situation where they nurture living plants, it creates a feeling of reversing roles. Haller and Kramer (2006) add to this point by saying that the patients' social communication and interaction are improved when they feel in charge of living "things" that are flourishing. It also encourages and improves their adjustment to the working environment. Rotherth (1994) suggests that the key role of horticultural therapy is that it provides the patients with an avenue to rebuild their confidence and give them a sense of purpose.

### *Benefits of Horticultural Therapy*

Miller (1992) urges people to consider gardening as more than just a refreshing way of producing their own food, but rather, embrace the benefits it brings forward in terms of improved diet, increased skills and knowledge, and increased physical exercise. Programs in horticultural therapy offer patients life enriching activities and engagement with nature and plants aiming at restorative benefits. In a research he carried out, Fieldhouse (2003) established that humans are able to benefit from horticultural therapy because they have an inherent fascination with plants. Mind (2007) also found that the gardening groups that participated in horticultural therapy achieved the best result when the

leaders and therapists focused on the members' aspirations and skills rather than deficits and symptoms. As offered by Johnson (1999), those who benefit from horticultural therapy include:

- Youth at risk
- Clients of organizations of human advocacy and social services
- Members of the public who seek connecting with nature
- People who have developmental or physical challenges in day centers or hospitals
- The elderly at retirement communities, senior centers or skilled nursing institutions
- Those participating in programs of vocational training
- People who live with illnesses in rehabilitation facilities, hospice agencies or hospitals
- Military personnel and veterans in rehabilitation centers

Although the general benefits of horticultural therapy are intertwined in the results of the exercise, some of the researched specific benefits are reviewed below.

#### *a. Physical Benefits.*

Reflecting the words of a Kansas University professor, Richard Mattson, horticultural therapy provides children with activities that combat obesity, stress and youth violence (Yalom & Leszcz, 2005). These involve simple activities that are practical alternatives to competitive sports and can be done in the family backyard. As per Mattson's opinion, physical exercise is necessary for children to feel better about themselves and that can be achieved through working in gardens. This thought is shared by Page (2006) who believes that the approach employed by horticultural therapy is interdisciplinary and incorporates horticulture with behavioral and social sciences. He opines that the relation-

ship between plants and people built through gardening has the potential to improve an array of ailments like chronic pain, high blood pressure and depression.

An example given by the National Institute for Mental Health in England (NIMHE, 2005) states that some children are prone to fits of anger. If they spend time and energy in garden chopping weeds, they also reduce stress and frustrations at the same time. Another researcher (Meiklejohn, 2003) points out that children that are too obese to participate in team sports end up developing low self esteem and eventual depression. Gardening provides the first step towards improved physical health and weight reduction for such children by increased body mechanics and muscular strength. Underused muscles are stretched and toned (Mind, 2007).

Folkes (2002) contributes that horticultural therapy challenges and encourages participants to develop their strength and balance and promotes their coordination between the eyes and the hands. Their physical endurance and range of motion are also improved. Even for adults with no interest or ability in gardening, Burls and Caan (2004) were able to establish that being in touch with a green space in their neighborhoods enables them to have momentary physical dissociation with their monotonous work offices or therapeutic institutions. The revitalizing and healing effects of staying out in nature, coupled by the scenic surroundings are ideal components for recovery from addiction (Johnson, 1999). As noted by Resick, Monson and Chard (2007), gardening presents the perfect way people in addiction recovery to develop new skills and abilities to focus and meditate. When they witness a garden they have nurtured and developed from an empty plot of soil to a flourishing ecosystem, they develop feelings of accomplishment and satisfaction. According to Folkes (2002), the gardening activities in

horticultural therapy assists individuals struggling with addiction recovery to fill the gap left behind by the inevitable cutting off of contact with old friends. This is in view of the fact that keeping in touch with old friends who were associates in partaking of the addictive habits complicates the recovery program.

A change in routine, as available in gardening, gives the participants new engagements that require energy and attention, driving them further away from their addictions (Haller & Kramer, 2006). In a comparison made by Gerlach-Spriggs, Kaufman and Warner (1998), there are striking similarities in the way patients carefully and slowly nurture life in a garden and the careful and slow path leading to recovery. In the same way the patients create ideal gardening environments for their plants, they also create one for their own recovery.

#### *b. Cognitive Benefits.*

As presented by Kaplan and Kaplan (1989), patients engaging in horticultural therapy benefit from enhanced cognitive functioning, stimulated memory, improved concentration and attention capacity and generally improved goal achievement. There is also an observed improvement in planning and problem solving skills as the memory and mind are exercised and positive thinking is promoted. These views are supported by Buzzell and Chalquist (2002) who give an example of children suffering from autism, a neurological disorder which interferes with the normal activities of the brain. A characteristic of those suffering from autism is a lack of display of affection, although they also have emotions.

Although children suffering from autism are different (Jarrott, Kwack, & Relf, 2002), live plants provide an ideal alternative recipient of their affection. They learn to find joy in planting crops and watch them grow. The memory skills and con-

centration required in nurturing plants can gradually release such children from a depressing world that may have plunged them into developmental brain disorders from as early as three years of age. The socializing involved in the therapy also improves their self esteem, and alleviates communication problems and speech delays which are also characteristics of the condition. According to Pothukuchi and Bickes (2001), patients of autism are easily upset by certain smell and loud noises. Placing them in a controlled environment with specific sounds and smell is soothing and therapeutic to them, creating a suitable atmosphere for relaxing and concentration. Repetition of activities for a prescribed period and planned changes of the surrounding develop the children's coping skills. Kimber and Richardson (2006) showed that horticultural therapy helps people suffering from cognitive challenges to increase and develop their observation skills, encourages their creativity, presents them with the ability and choices to make use of problem solving skills and gives them a way to let out emotions, anger and stress.

Some facilities have created sensory gardens that stimulate sound, touch, sight and smell. The patients develop their cognitive skills by identifying and distinguishing different types of these senses. These senses are necessary components of the activities in the programs aimed at sensory stimulation. Pothukuchi and Bickes (2001) contributed that sensory stimulation can be achieved by interaction and use of plants with interesting textures and tastes, the color and fragrance of flowers. The expertise of dirt therapists is also employed to give guidance on organizing thoughts as well as activities. Patients are able to learn new skills while regaining the lost ones. Kaplan and Kaplan (1989) note the development of courage and confidence in initiating new tasks and the ability to pay attention to details. The ability to arrange, for example, flowers, shows considerable

positive results of the whole exercise. There is also a noted decrease on dependence on others to make decisions (Jarrott, Kwack, & Relf, 2002).

### *c. Emotional Benefits.*

According to the NIMHE (2005) some medical problems like high blood pressure and heart diseases are linked to suppressed emotions. While some people might be able to hide their feelings of sadness or anger, they will eventually feel agitated. In effect, they will be trading one set of negative emotions for another. Haller and Kramer (2006) believe that although such people must let go of negative emotions, it is equally detrimental to do so in heated confrontations or explosive outbursts. Horticultural therapy offers persons in emotional stress a positive option to responsibly release emotions (Buzzell & Chalquist, 2002).

Programs in horticultural therapy help in creating strong senses of self esteem in situations where responsibilities and choices are taken away. The AHTA (2002) points out that horticultural therapists are able to design programs that deliver emotional gains in fields of anger and aggression management. Buzzell and Chalquist (2002) support this view by their contribution that energy consuming activities in horticulture can make use of the energies locked up in aggression or anger by channeling them into reproductive gardening activities. For example, in times of emotional turmoil, if patients put their energy into garden preparation by digging, raking leaves, weeding or washing of pots, they channel their emotions responsibly towards productive engagements Kaplan and Kaplan (1989).

Emotional benefits and better outlook on life are enhanced as the patients are encouraged to observe daily change and growth. According to Meiklejohn (2003) the patients learn to accept and deal with

both success and failure as they observe and monitor the propagation of their plants starting from seeds to the end product, with some flourishing and others dying along the way. Most of the patients in a research conducted by Gerlach-Spriggs, Kaufman and Warner (1998) reported improved relationships with their spouses and better communication.

The most successful were those who took the therapy together. Their focus evolves together with their work beginning with changes and needs of seedlings, transplanting to the gardening and harvesting. It was interesting for the researchers to note that the same patience accorded to the plants was also found to exist in the relationship between the couples over time. Resick, Monson and Chard (2007) also reported a new development in the way the patients dealt with their emotions. They observed that some patients who checked into therapy with deep sadness occasioned by their relationship statuses, most notably women, learned to talk and share their feelings with friends.

The garden setting and atmosphere augment spiritual connection to nature as the patients witness plants' life cycles. Haller and Kramer (2006) opine that such settings rejuvenate the mind freeing people from their emotionally stressing relationships and work environments. The settings promote enthusiasm and interest in the future, especially for emotionally troubled or elderly people who no longer have interest in the future. The anticipation of a germinating seed or a flower budding open has the potential to rekindle interest.

### *d. Social Interactive Benefits.*

As stated by Mind (2007) the fundamental social benefit of horticultural therapy is the naturally occurring socialization that takes place when the exercise brings together different groups of participants in the sessions. The NIMHE (2005) also

agrees that there is evidence of people known to have histories of being reserved or withdrawn starting to open up when they participate in projects. The blooming of plants is reflected in their character as they become more accessible and learn to share and appreciate other people's experiences about common projects they are working on.

In a group setting, people of different backgrounds enjoy the social benefits of conversation and laughter while they make new friends (Mind, 2007). Rothert (1994) observed that a higher degree of socialization takes place when sharing the happenings of the garden during family visits. People are more welcoming, and feel welcome themselves, when discussing activities that they both enjoyed a common participation. This idea is supported by Fieldhouse (2003) when he shares that the simple act of cooperating with team members in gardening projects, or creating a new session, brings people closer. Teaching new skills while learning others from the team enhances the social element. Many patients are motivated to get out of inactive lifestyles and interact with others in projects whose results they can credit to themselves. The physically disabled are a significant beneficial group of the social impacts of horticultural therapy. According to Resick, Monson and Chard (2007), the disabled find gardening to be a leisurely activity that reduces the stigmas associated with their conditions and daily life. Being of a leisurely nature, gardening provides the participants numerous opportunities to integrate into their communities by way of recreational activities. The NIMHE (2005) give examples of such activities. They include interacting with local garden clubs, touring horticultural facilities both in and out of their localities and taking part in community gardens or county fairs.

As per contributions made by Meiklejohn (2003), the participants in horticultural

therapy share a common binding force when they consider themselves as gardeners, rather than a group of unemployed citizens. Among themselves, they form a social entity that promotes their self confidence and, in turn, self esteem. Most of them, after leaving hospital or other rehabilitation facilities, are unable to get into employment immediately, and are easily drawn into shyness and loneliness because they cannot afford most of life's pleasures.

However, with the little allowances they earn from horticultural projects, they find a way of gradually getting back into society as a group (Rothert, 1994)). With continued participation in the gardening activities, the participants gain experiences that provide a platform for further growth as explained by Gerlach-Spriggs, Kaufman and Warner (1998). An added advantage of the socializing aspect is that horticulture may present employment opportunities in the community because the employers in the green industry, such as landscapers and nurseries, require people who have basic skills in horticulture (Gerlach-Spriggs, Kaufman & Warner, 1998). Such skills include planting specifications, watering or maintaining the garden, all learned during the therapy sessions. They, therefore, get to expand their social networks by working with different classes of people. For instance, as contributed by Page (2006), programs targeting people with traumatic brain injuries, developmental disabilities, at-risk youth and incarcerated individuals, offer training on the job while the participants work and interact directly with their clients in a job setting.

#### *e. Intellectual Benefits.*

According to Buzzell and Chalquist (2002) individuals acquire new intellectual abilities and skills in the process of learning methods and techniques in horticulture including flower arrangement, gardening and plant propagation. New terms and

concepts and terms are learned (Resick, Monson & Chard, 2007) as the patients improve their communication skills and vocabulary. In support of this statement, Fieldhouse (2003) says that the fascinating nature of plants arouses a sense of curiosity in the participants of the gardening activities. Many questions are aroused prompting them to experiment and find out why plants grow in the way they do. Their increased observation powers as they watch the interaction between humans, animals and plants develops in them deeper insights and the capacity to evaluate the relationships. Their abilities to plan procedures and make decisions are also developed as their minds sharpen (Johnson, 1999).

In America, the children's gardening movement introduced in some schools is quickly gaining momentum (AHTA, 2002). Students who participate in the activities generally exhibit more composed personalities and are more attentive during academic lessons. Resick, Monson and Chard (2007) observed that such students are also of an inquisitive nature and ask probing questions. In a program under the sponsorship of the National Science Foundation, Page (2006) reported that students who have engaged in horticulture were able to initiate and organize their own projects to be exhibited in a fair with minimal assistance from their teachers.

This is explained by AHTA (2002) that healthy flowers help students to maintain their emotional and intellectual balance. The emphasis lies in the ability of the students to approach life, and thus learning, in a patient, skeptical and observant manner. In that approach, they are able to understand more and at a faster rate (Haller & Kramer, 2006). Horticultural therapy has also been used to rebuild the intellectual capacities of people who have previously suffered traumatic brain injury. According to Resick, Monson and Chard (2007), methods like recognizing fra-

grances can be used to bring back fond memories from past experiences and help one recall or reconstruct events. This method has a wide overlap area with the cognitive benefits as well (Kaplan & Kaplan, 1989).

#### *The Relationship between Horticultural Therapy and Caregiver's Burden*

Pothukuchi and Bickes (2001) define a caregiver as a person who takes care of people with chronic diseases or illnesses. They communicate with nurses and doctors on their patients' behalf and manage medications and take care of other chores including bathing and dressing their patients, preparing meal, shopping and settling bills. In other words, as put by Simson and Straus (2003), caregivers perform all the activities that their patients cannot manage on their own. That means being there to take up on others' activities on their behalf, which is in no way simple task (Jarrott, Kwack & Relf, 2002).

Both horticulture and the caregiver's burden are aimed at taking a patient through the journey of a situation. With their essential purpose being to provide support to other, both the caregiver and horticulture draw benefits from positive responses of their patients. Burls and Caan (2004) provide that by being useful and helpful to other living things, the benefits are also shared by horticulture and the caregivers.

#### Conclusion

In conclusion, horticultural therapy programs enable participants to tend to their crops as well as their own spiritual, physical, mental, intellectual and social well being (Yalom & Leszcz, 2005). Through gardening, the participants' qualities of life are tremendously improved. The activities involved may be as simple as viewing nature, taking a walk through nature, imagining nature, visiting healing

gardens or hospitals, and actual gardening. Through interacting and working with the natural world, individuals with varying ability challenges are able to reintroduce purpose into their lives.

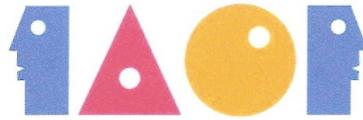
Through horticultural therapy, individuals can maintain or relearn functions they lost because of illnesses or injuries they got in accidents (Jarrott, Kwack, & Relf, 2002). It is perfect way to enhance other forms of physical or occupational therapies already prescribed. The benefits offered by horticultural therapy vary between individual persons. But generally, they all exhibit improved social, mental and physical health. People of different ages facing different challenges can participate in the therapy. The activities are easily accessible to all with some specifically designed to meet the needs of people with, for example, limited mobility as for those in wheelchairs. All these conditions define a group of people who need to be encouraged to remember that they have a place within the human as functioning members (Jarrott, Kwack, & Relf, 2002). They are the ones faced with fear and uncertainty in their life and need assurance.

Although the number of programs in therapeutic horticulture and horticultural therapy has significantly increased in the recent past years, they are presently not required to have registration or affiliation to any professional regulatory body (AHTA, 2002). This has made it a challenge to precisely establish the exact number and type of services offered, but documented evidence has shown that the therapy has actually led many patients to better lives. This can only be given more weight by the growing number of healing gardens. Awareness to the people is promoted by regular features in both national and local publications (AHTA, 2002).

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## BIOGAS POTENTIAL IN TAO-YUAN COUNTY, TAIWAN

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### Abstract

Anaerobic digestion is a well established process for treating many types of organic wastes, both solid and liquid. Biogas is the product of anaerobic digestion of waste, whether occurring spontaneously in landfills or under controlled conditions in digesters. Biogas is viewed as an important energy source in current efforts to reduce the use of fossil fuels and dependency on imported resources. Several studies on the assessment of biogas potential have been made at regional, national, and global scales. However, because it is not economically feasible to transport biogas feedstock over long distances, it is more appropriate to consider local waste sources for their potential to produce biogas. An assessment of the biogas potential in Taoyuan County, based on there view of wastewater treatment plants, solid waste generation and management, and agricultural waste, found that  $28.15 \times 10^6$  of methane( $\text{CH}_4$ ) from biogas might be harvestable, although substantial barriers for complete exploitation exist. This number is equivalent to 0.3 TW-h of electricity, approximately 0.01% of fossil fuel power generation in Taiwan. This study provides a rapidly method to estimate the approximate biogas potentials and give a thought where can develop the renewable energy.

Key Words: Biogas; Renewable Energy; Anaerobic Digestion

## Introduction

Fossil fuels currently provide 86% of the world's energy needs and will continue to do so until suitable replacements are discovered. Burning fossil fuels releases greenhouse gases (GHGs), mostly in the form of carbon dioxide (CO<sub>2</sub>), which results in trapping of heat and thus contributes to global climate change. In the International Energy Outlook 2010 (IEO2010) projections, energy related CO<sub>2</sub> emissions were forecast to grow from 29.71012 kg in 2007 to 42.41012 kg by 2035. In addition, IEO2010 projects that the total world energy consumption will increase by 49% from 2007 to 2035 as fossil fuels reach peak production rates. The price of oil is projected to rise from \$79 per barrel in 2007 to \$133 per barrel in 2035. (Report No. DOE/EIA-0484(2010) and C. Nelder and B. Hicks, Profit From the Peak: The End of Oil and the Greatest Investment Event of the Century, John Wiley & Sons, Inc., Hoboken, NJ, 2008).

Degradation of biomass under anaerobic conditions leads to the formation and release of biogas. Biogas typically contains 50%–70% CH<sub>4</sub>, and 30%–50% CO<sub>2</sub>, with the balance being trace gases. (Source: S. Patel, D. Tonjes, and D. Mahajan, Biogas potential on Long Island, New York: A quantification study, J. Renewable Sustainable Energy 3, 043118, 2011). Anaerobic digestion is a natural phenomenon that can occur in landfills and wetlands. It can also be reproduced in a controlled manner in an anaerobic digester (AD). Anaerobic digestion offers the possibility of using a large variety of waste products, including municipal solid waste (MSW), sewage sludge, manure, food waste, and crop residues to produce biogas. In addition, anaerobic digestion is a well understood technology that can operation large scales. (Source: E. Favre, R. Bounaceur, and D. Roizard, J. Membr. Sci. 328, 11, 2009). This combination of environmental, economical, and political factors has led to

increased interest in alternative and renewable fuels.

This paper identified potential sources of biogas in addition to ones currently being exploited, and quantified the amount that can be produced on Taoyuan County, based on previously published data as well as data provided by local governments and private companies.

The report sums the total biogas generating potential from sources such as wastewater treatment plants (WWTPs), agricultural residues, and yard waste. We believe that this is the first published complete evaluation of the biogas energy potential for primary organic residues to be made on a local scale. This is significant because production of biogas is dependent on locally available biomass sources.

## Background

### *Anaerobic digestion*

In general, biogas generated by a digester contains 60% CH<sub>4</sub> and 40% CO<sub>2</sub>. Anaerobic digestion involves a large number of microorganisms working in synergy, which are often classified into two groups, acid formers and CH<sub>4</sub> formers. The acid formers produce acetic and propionic acids based on a chemical oxygen demand (COD) mass balance, while the CH<sub>4</sub> formers convert the acids and byproducts into CH<sub>4</sub>.

The process of anaerobic digestion occurs in four stages: hydrolysis, acidogenesis, acetogenesis, and methanogenesis. In the initial stage, large proteins, fats, and carbohydrate polymers are broken down through hydrolysis into amino acids, long-chain fatty acids, and sugars. Most of the microorganisms that take part in hydrolysis are strict anaerobes such as Bacterioides, Colstridia, and Bifidobacteria. The initial products are fermented during acidogenesis to form three-, four-, and

five-carbon volatile fatty acids, such as lactic, butyric, propionic, and valeric acids.

The hydrogen (H<sub>2</sub>) producing acetogenic bacteria consume these fatty acids and formacetic acid, CO<sub>2</sub>, and H<sub>2</sub>. Typical homoacetogenic bacteria are *Acetobacterium woodii* and *Clostridium aceticum*. (Source: P. Weiland, *Appl. Microbiol. Biotechnol.* 85, 849 (2010). And W. Gujer and A. J. B. Zehnder, *Water Sci. Technol.* 15, 127, 1983). Finally, methanogenic bacteria consume the acetate, H<sub>2</sub>, and some of the CO<sub>2</sub> to produce CH<sub>4</sub>. The chemical reactions that take place in the final methanogenic stage to produce CH<sub>4</sub> are:

Acetotrophicmethanogenesis :  
 $\text{CH}_3\text{COOH} \rightarrow \text{CO}_2 + \text{CH}_4$  (1)

Hydrogenotrophicmethanogenesis :  
 $\text{CO}_2 + 4\text{H}_2 \rightarrow \text{CH}_4 + 2\text{H}_2\text{O}$  (2)

Methylotrophicmethanogenesis :  
 $\text{CH}_3\text{OH} + \text{H}_2 \rightarrow \text{CH}_4 + \text{H}_2\text{O}$  (3)

Acetotrophicmethanogenesis is the primary pathway used to produce CH<sub>4</sub>. Based on Eq. (1), theoretical biogas yield is 50% CH<sub>4</sub> and 50% CO<sub>2</sub>, but this is not always true. For instance, during the acetogenic stage, a small amount of H<sub>2</sub> is produced, and for every 4 moles of H<sub>2</sub> consumed by hydrogenotrophic methanogens, a mole of CO<sub>2</sub> is converted into CH<sub>4</sub>. Additionally, fats and protein can yield large amounts of H<sub>2</sub> for hydrogenotrophic methanogens to consume. (Source: J. M. Hammer and J. M. J. Hammer, *Waste and Wastewater Technology* (Prentice-Hall, New Jersey, 2001).

Anaerobic digestion is sensitive to toxic compounds and requires a specific range of operating parameters (temperature conditions, pH, and anaerobiosis). For instance, in a two stage AD, in which two digesters operate in series, the rate of degradation in both stages must be equal in

size. If the first degradation stage runs too fast, the acid concentration rises and the pH drops below 7.0, which inhibits the methanogenic bacteria. If the second phase runs too fast, CH<sub>4</sub> production is limited by the first stage. Thus, the rate-limiting step depends on the feedstock that is being digested. (Source: J. Rapport, R. Zhang, B. M. Jenkins, and R. B. Williams, Report No. WMB-2008-011, 2008). Therefore, the process design must be well suited to the feed stock properties to insure optimum biogas production.

### *Biogas production from Anaerobic digestion*

#### *Digestion of MSW in anaerobic digesters.*

In an AD, organic matter in MSW (such as food waste, yard waste, cardboard, and paper) is consumed by the bacteria in absence of oxygen, producing biogas, solid byproducts, and reclaimed water. Treatment of MSW in ADs can be broken into three parts: pre-treatment, digestion of the feedstock, and post-treatment. The need for pre-treatment and post-treatment is determined by the particular digestion technology being used and the overall objective of the user. Pre-treatment requires the separation of organics from other waste and the size reduction of the feedstock, while post-treatment requires the disposal of residuals after digestion. (Source: C. Gallert, A. Henning, and J. Winter, *Water Res.* 37, 1433, 2003).

Use of full scale ADs for MSW management is practiced extensively in Europe. Many reports in literature suggest full scale plants typically achieve biogas yields of 0.10–0.15 m<sup>3</sup>/wetkg of waste on average. However, biogas yield depends greatly on reactor configuration and source of feedstock. For instance, the Valorga plant in Netherlands produces much 0.93 m<sup>3</sup>/wet kg of biogas, while the Dranco plant in Germany only yields 0.147 m<sup>3</sup>/wet kg. (Source: C. Saint-Joly, S. Desbois, and

J. P. Lotti, Water Sci. Technol. 41, 291, 2000).

*Digestion of yard wastes in anaerobic digesters.*

Anaerobic digestion of yard waste reduces waste volumes and produces CH<sub>4</sub> as decomposition gas, and the process by-products can also be used as a soil amendment. Overall, anaerobic digestion is a net energy producer. In addition, anaerobic digestion requires less space than many large-scale composting facilities. Waste decomposition estimates from Table 1. can be used to determine gas generation, assuming brush produces 46.6 ml of CH<sub>4</sub>/g.

*Digestion of sewage sludge in anaerobic digesters.*

Digesting WWTP sludge to generate energy is a common practice throughout the world and produces a biogas that is typically 60% CH<sub>4</sub> and 40% CO<sub>2</sub>. WWTPs that do not utilize ADs have to incinerate or compost sludge, which can add 20% to operational costs. In addition, biogas can be used to generate electricity and then to be used themselves. WWTP power demand of 21 x10<sup>9</sup> kW-h per year, and any excess electricity can be sold for profit. A projection of sludge processing at WWTPs can be made based on the number of people connected to WWTPs.

Given wastewater generation rates of 450 l per person per day and that total solids present in an average sanitary wastewater is 800 mg/l, and assuming 75% of solid in sludge is volatile, 50% reduction in volatile solids after digestion, and 16 m<sup>3</sup> of CH<sub>4</sub> produced per kg of volatile solids destroyed. (Source: J. M. Hammer and J. M. J. Hammer, Waste and Wastewater Technology, Prentice-Hall, New Jersey, 2001). The per capita generation of biogas is 2.16 m<sup>3</sup> of CH<sub>4</sub> per day.

*Digestion of agricultural residues in anaerobic digesters.*

Nationwide, agricultural wastes are increasingly used as feedstocks for ADs, especially for livestock manure management in Taiwan. This has relatively low yield of biogas (cow manure produces 0.025 m<sup>3</sup>/kg and pig manure 0.036 m<sup>3</sup>/kg) because the organic dry matter content is low (2%-10%). Digestion of co-substrates, such as crop residues, can help to increase biogas production. Quantifying biogas potential from diverse agriculture residues is difficult, but one generalized estimate is 0.23 m<sup>3</sup> of CH<sub>4</sub> per m<sup>2</sup> per year. (Source: P. Weiland, Appl. Biochem. Biotechnol. 109, 263, 2003).

Method

The assessment of the energy potential of different organic waste is based on the amount of each that is generated on Taoyuan County. Local and county data were used to calculate MSW generation potentials. Biogas potential from MSW was calculated based on the chemical characteristics of the waste using:

$$B_1 = W_1 \times P_1 \times Y_1 \quad (4)$$

where: B<sub>1</sub> is total CH<sub>4</sub> yield, W<sub>1</sub> is total weight of the waste, P<sub>1</sub> is percentage of degradable waste in question, and Y<sub>1</sub> is CH<sub>4</sub> yield per gram (see Table 1.)

The potential for gas generation from WWTP sludge digestion was calculated based on the percentage of population connected to WWTPs using:

$$B_w = N \times P_w \times Y_w \quad (5)$$

Table 1. Composition data for different items present in the waste stream with corresponding CH<sub>4</sub> yield

Product	Cellulose	Hemicellulose	Lignin	Volatile solids	Yield (ml of CH <sub>4</sub> /dry g)
Grass	26.5	10.2	28.4	85.0	114.4
Leaves	15.3	10.5	43.8	90.2	30.6
Branch	35.4	18.4	32.6	96.6	62.6
Food	55.4	7.4	11.4	93.8	300.7
Coated paper	42.3	9.4	15	74.3	84.4
Old news-print	48.5	9	23.9	98.5	74.33
Old corrugated containers	57.3	9.9	20.8	98.2	152.3
Office paper	87.4	8.4	2.3	98.6	217.3
MSW	28.8	9.0	23.1	75.2	92.0

(Source: W. E. Eleazer, I. Odle, S. William, Y.-S. Wang, and M. A. Barlaz, Environ. Sci. Technol. 31, 911, 1997).

Table 2. The total potential of biogas from major sources in Taoyuan County

Potential source	Currently exploited	Current/potential CH <sub>4</sub> yield ( X10 <sup>6</sup> m <sup>3</sup> )	Optimal use	Technology barriers
Sludge	No	1.74	Pipeline quality gas	ADs are needed.
MSW	No	16.3	Pipeline quality gas	ADs are needed.
Agriculture waste	No	9.445	On-site electricity	ADs are needed.
Yard waste	No	2.41	On-site electricity	ADs are needed.

where: Bw is the total CH<sub>4</sub> yield, N is the population of the area, Pw is the percentage of the population connected to WWTPs, and Yw is CH<sub>4</sub> yield per person.

The potential for gas generation from agricultural residues was calculated based on the area of farmland devoted to crops using:

$$Ba = A \times Pa \times Ya, \quad (6)$$

where: Ba is the total CH<sub>4</sub> yield, A is the total area of agricultural land, Pa is the percentage of farmland devoted to crops, and Ya is the CH<sub>4</sub> yield per meter. Farmland area was derived from local agricultural extension offices.

In some cases, current biogas generation from a particular waste source was used, instead of creating an estimate of potential generation. Otherwise, the background research provided a framework to evaluate the biogas potential of any area. It was relatively straightforward but not particularly easy to collect the necessary information to populate the framework.

## Results

### *MSW*

Taoyuan County has a relatively well developed recycling and yard waste composting infrastructure. Thus, it is estimated that 44% of Taoyuan's MSW is incinerated and 14.45% is recycled. The remaining 0.07% is transported off Taoyuan for land filling. Only the transported portion of the waste has been considered for biogas production. Based on the assumed composition of these materials and Eq. (4), CH<sub>4</sub> potential for MSW if it was managed through anaerobic digestion would be 16.3x10<sup>6</sup>m<sup>3</sup>.

### *Yard Waste*

LI generates approximately 9.616x10<sup>6</sup>

kg of yard waste annually, of which 65% is leaves and 35% is branch. Most yard waste is recycled through composting. Composting is a process where organic matter is digested by aerobic decomposition. It requires energy for equipment and transportation but has no energy output and produces CO<sub>2</sub>. (Source: M. Haight, Water Sci. Technol. 52, 553, 2005). The side-product of composting can be used as a soil amendment. However, if the yard waste were diverted from composting to digestion, based on the assumptions for yard waste degradation and Eq. (4), yard waste could potentially produce 2.41x 10<sup>6</sup>m<sup>3</sup> of CH<sub>4</sub> per year.

### *WWTPs*

According to the annual statistics of sludge, there was approximately 5.11 x 10<sup>6</sup> kg of sludge is generated annually (Eq. (5)). (Source: Department of Budget, Counting and Statistics of Taoyuan County Government, Annual Environmental Protection Statistics, 2011) This is not a conservative estimate, as it includes solids from scavenger waste generated by package treatment plants, septic, and cesspool systems. The CH<sub>4</sub> potential from AD of sludge could be 1.74 x 10<sup>6</sup>m<sup>3</sup> per year.

### *Agricultural Residues*

In 2011, there were 4.0563 X 10<sup>7</sup> m<sup>2</sup> of farmland in Taoyuan County. (Source: Department of Budget, Counting and Statistics of Taoyuan County Government, Annual Land use Statistics, 2011) Nearly 75% is for crops, while the remainder are pastures, woodland, and other usage. Pigs are the most valuable livestock, with 1.7 x 10<sup>5</sup> raised annually. There are relatively small numbers of horses, goats, and dairy cows present.

Using Eq. (6), 6.997x10<sup>6</sup>m<sup>3</sup> of CH<sub>4</sub> might be produced from local crop residues. Local pig waste is currently managed through ADs, but the gas is flared due to

difficulties in maintaining complicated generator equipment.  $2.448 \times 10^6 \text{ m}^3$  of  $\text{CH}_4$  appear to be generated at local pig keeping.

### Discussion

Thus,  $28.15 \times 10^6 \text{ m}^3$  of  $\text{CH}_4$  can be produced annually in Taoyuan County (Table IV). This can potentially generate 0.3 TW-h of power, nearly 0.01% of total electricity consumed in Taoyuan County. In Taiwan, pipeline grade natural gas has a residential value of \$0.70 per  $\text{m}^3$ , which means that biogas potential found here has an estimated value of  $\$19.7 \times 10^6$  annually. Its value as a transportation fuel, especially in terms of replacement value for fossil fuels, is much greater. This implies that significant investment in infrastructure and process improvements can have large returns, which may indicate economic viability. In addition, if landfill each ate re-circulation were adopted at the current landfills, the amount of gas produced could be increased.

### Conclusion

Biogas is generated from organic materials under anaerobic conditions. Feed stocks for biogas generation include cow dung, poultry droppings, pig manure, kitchen waste, grass matter and algae. Countries where agriculture is an important component, must regarded biogas as a useful replacement for using. Given increasing oil prices, high health risk associated with fossil usage and its impact on the environment it is crucial for the government to consider other alternatives which are sustainable and affordable.

Biogas is a renewable source of energy that can satisfy the needs of the local companies, while offsetting the use of non-renewable resources such as natural gas, coal, oil. This also reduces local air pollution generated by conventional fossil fuels. By capturing biogas from landfills, release

of  $\text{CH}_4$  into the atmosphere can be prevented, helping to address climate change concerns since  $\text{CH}_4$  is about 20 times more potent a greenhouse gas than  $\text{CO}_2$ . In addition, utilization of locally available biomass for production of biogas has the potential to reduce waste management costs, reduce waste odors, and create local jobs and revenues, and generate system cost savings, including costs for complying with state and federal waste disposal regulations.

The co-products of the digesters can be used as a compost product. Green credits can be potentially earned if legislation regulating  $\text{CO}_2$  is enacted. Various federal and state financial incentives are available to support biogas as a substitute for natural gas. These incentives include personal, corporate, sales, and property tax credits. A number of rebates, grants, loans, industrial support, and performance based incentives are also available.

Biogas potential and feasibility are usually assessed on national platforms. However, biogas feedstocks are localized and transportation of these feedstocks over long distances usually results in much higher costs, suggesting these resources will need to be exploited locally.

Therefore, it is logical that accurate assessments of biogas potentials need to be constructed for local situations. This study closely examined the potential for one area, Taoyuan County, to produce biogas from a variety of feedstocks from a particular set of generators. There are similar studies conducted elsewhere identifying different amounts of waste products. However, the set of wastes (sewage sludge, yard waste, MSW, and agricultural wastes including livestock manure) are likely to be the same across most of the world, and the procedures and estimation processes used here to quantify biogas potentials are likely to transfer well, giving this study general applicability beyond the specific

results reported here.

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ULTRA-LOW TEMPERATURE TUNA LONGLINERS INDUSTRY  
IN TAIWAN: AN APPLICATION OF SUPPLY  
CHAIN MANAGEMENT

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Abstract

As new competitions have gradually emerged, competing enterprises shall be tested in speed and reliability, and more attentions are paid to the business model that lays emphasis on supply chain management. This research also takes the ultra-low temperature tuna longliner industry as example, and samples 109 companies by means of questionnaire survey, as well as describes the management situation of ultra-low temperature tuna longliners industry in Taiwan by statistic approach for realizing present difficulty. The study establishes a management model to conform industrial development in the future according to the viewpoint of supply management, and hope it could contribute to the practical development of pelagic fishing in Taiwan and the research of supply chain management theory. Taiwan, as a key site of the pelagic ultra-low temperature tuna longliners industry in the world, naturally, the proprietors could not be excluded from this competitive environment.

Keywords: Ultra-low Temperature Tuna Longliners, Business Model, Supply Chain Management.

## Introduction

Since 1980s, under the challenge of total quality management, organizations start to notice collaborative relationships and source control; therefore, the concept of supply management has been addressed to pierce the development from customer to practical supply through the value chain brought up by Porter (1985), and gradually developed to the supply chain management (SCM) (Sahay & Mohan, 2003; Helper & Sako, 2010; Closs et al. 2011) widely emphasized now.

It is well to say pelagic fishing is the most standard traditional industry with most traditional organizational structure, which faces a most complex environment with highly uncertainty and unpredictability. According to Walters' (2004) opinion, in the coming of the epoch of complex industrial management, the Ultra-low Temperature Tuna Longliners Industry in Taiwan also has to develop new business model: (1) Responding market change quickly and flexibly through the management of production and operation process; (2) Developing a unique fishery management partnership with suppliers, customers, employees, shareholders, government and competitors to improve organizational capability.

Therefore, based on the above motivations, this research starts to explore the management framework of supply chain, review the development history of Ultra-low Temperature Tuna Longliners Industry in Taiwan, and hope to bring up a new business model based on SCM through the application of questionnaire survey. It is expected that new business model could assist the continuous development of the companies that are willing to develop Ultra-low Temperature Tuna Longliners Industry in Taiwan for becoming world-class fishery companies.

## Theoretical Background

### *Supply and Management*

Total quality management has become a management example since 1980s, from the investigation of development from customer to practical supply, and through the value chain brought up by Porter (1985) to address the concept of supply chain management, and gradually develop to the SCM that is commonly emphasized now (Sahay & Mohan, 2003; Vanichchinchai & Igel, 2011).

Basically, all supply chains could trace back to mother earth, from the raw material supplied by it to a valued added process, and finally sell to customers; it is a process with respect to the flow, storage, transfer, relevant information and cash management of commodity (Handfield & Nichols, 2001; Randall & Farris II, 2009); and the management covers the procedure of planning, organization, leadership and control. Therefore, the supply chain management is controlled by administrator from the planning of supply chain, establishment of management organization, leading all members to achieve tasks, and ensure "Completion of Task" through control activities of inspection, comparison, maintenance and correction.

Waller (2003) reviewed the business contents of manufacturing industry and considered that supply chain is the movement linkage of the real material or components; the management of supply chain starts from sourcing, negotiating with supplier, maintaining good relationship, introducing raw material or component continuously, manufacturing, and finally sell to customers (Janvier-James, 2012; Steinfield et al., 2011).

Therefore, supply chain is not a group of competitors, although some of them will become major competitors; any company shall cooperate with its suppliers. Also, the

company of the supply chain shall be able to integrate the supply chain completely, including external customers and major suppliers, in terms of management and leadership (Monczka & Morgan, 1997; Kuei et al., 2011; Yin et al., 2011).

#### *Theoretical foundation of supply chain management*

Svensson (2002, 2003) reviewed past definitions and viewpoints with respect to supply chain management and addressed what he called “Theoretical Foundation of Supply Management”, which has considerable potential of theoretical development. To Svensson (2002, 2003), supply chain management is one business philosophy, which considers how to integrate relevant actions, action participants and resources to the marketing channel between supply and consumption, especially to develop the dependence between different companies or inside companies of the marketing channel. According to this definition, the focus of supply chain management is not just on business activities between companies of the marketing channel or supply chain, but have to develop the dependence among various activities (Skipper et al., 2008; Arzu Akyuz & Erman Erkan, 2010; Xu, 2011).

Briefly, according to Svensson (2002, 2003), before applying supply chain management, the Ultra-low Temperature Tuna Longliners Industry in Taiwan has to experience new business philosophy, consider how to integrate relevant resources, actions and action participants, and develop the marketing channel between fish supply market and consumption, especially to consider the dependence between different companies or inside companies of the marketing channel, including time dependence, relational dependence and functional dependence.

#### *Business Model of Supply Chain*

#### *Management Orientation*

Normann (2001) once discussed about “a new strategic logic”. He suggested that managers should be able to mobilize, manage and use resources instead of just acquire and own resources in form. A true manager shall have the capability to use internal and external organizational resources to make effective organization reformation and address new business model under traditional enterprise (Leonidou et al., 2011; Rhodes et al., 2011).

Uncertainty and unpredictability in present business environment is much more serious than past; market globalization, technology prevalence, and the changing relationship among enterprise, supplier, customer and competitor are all factors that result in the emerging of new business model (Walters, 2004; Tseng & Lee, 2010; Yi et al., 2011). Based on Walters’ (2004) opinion, the competition advantages of new business model are originated from quick and flexible responding to market changes, and develop unique partnership of enterprise.

According to the preceding relevant theoretical viewpoints, Walters’ (2004) new business model could further develops to a more integral reference framework: Developing management philosophy: management is not difficult because there is a procedure to follow; the problem is determined by ideal, attitude and consciousness. What is the purpose of enterprise’s existence? Is it the great profits or value of customer? The philosophical concept of supply chain management emphasizes value of customer and obtains long-term and great profits from it; therefore, benefits and value of customer are not conflict with each other (Jayaram et al., 2010; Janvier-James, 2012; Steinfield et al., 2011). Jones and George (2008) believed that all changes result from the

change of manager's attitude; therefore, management philosophy of a company's top management could determine the success or failure of the organization; think about the value of customer, and how to do? And all problems could be solved.

### *Definitions*

**Supply System:** Any supply chain could trace back to stage of raw material provided by mother earth. It is composed of a series of linked suppliers and customers, and every customer is the supplier of low stream's next enterprise, organization or individual, and ended when finished product is sent to customer (Kuei et al., 2011, Yan & Sun, 2011). Enterprises have to accept or reject logistic and information activities with respect to commodities along the road, and define the dependence between enterprises or inside the enterprise, including time dependence, relational dependence and functional dependence (Kristianto et al., 2012).

**Strengthen Flow Management:** Supply chain is nothing more than a set or a series of flow that consists two key factors: object and information. How to accelerate logistic and information flow, keep flexibility, and responding market demands and changes all the time are the principle of flow management (Leng & Zailani, 2012; Amrani et al. 2012; Datta, & Christopher, 2011).

**Developing Partnership:** Develop the relationship with suppliers, customers, employees, shareholders, government and competitors and establish new organizational ability (Cao et al., 2010; Qule et al., 2011; Agus, 2011).

**Applying Marketing Channel:** Integrate relevant resources, actions and action participants, and develop the marketing channel between market supply and consumption, especially to consider the de-

pendence among different companies or inside companies of the marketing channel, including time dependence, relational dependence and functional dependence (Grozniak & Maslaric, 2012; Yan, 2011; Wallace & Choi, 2011; Campo et al., 2010).

### *Analysis of Management Situation*

Relevant management data of ultra-low temperature tuna longliners industry in Taiwan of this research is collected by questionnaire survey. Before questionnaire survey, scholars and experts from the industry are invited to the expert meeting to discuss management model of the industry and also discuss items of the questionnaire to gradually revise problem and order and improve face validity of questionnaire design.

The required samples and data of fishery ecology in Taiwan, especially company's concept, are difficult to collect by random sampling or mail questionnaire. Therefore, this research invites two assistants who are familiar with this industry to visit, explain and send questionnaires personally in order to increase questionnaire return rate.

Totalizing 150 questionnaires are issued, but after urging return for two times and eliminating questionnaire not completely fill up (most key questions are not filled), there are only 109 valid questionnaires. It is discovered from the questionnaire that there are totalizing 276 ultra-low temperature tuna longliners vessels, which is 61% of the total 453 fishery vessels (till 2011), so the data shall be representable. Several findings are listed as follows.

### *Difficulty of ultra-low temperature tuna longliners industry in Taiwan.*

What management difficulties your company has now? Testers answer in se-

quence, and the top three data with highest accumulated frequencies are calculated as below: the difficulties faced by fishery owners in Taiwan in turn are: high seas fish catch quota (93.5%), low consumption in Japan (91.6%), difficulty in finding new fishing ground and reducing resources (51.4%), new competitors (23.7%), fishery cooperative cost is too high (15.9%), serious insufficient supervisors and crew members (12.2%), and difficult to loan (1.9%).

#### *Foreign supervisors and crew members.*

If the government open the policy to employ foreign supervisors and crew members completely, what management worry and problem will your company have? Testers answer in sequence, and the top three data with highest accumulated frequencies are calculated as below: problems originated from the policy to open the employment of foreign crew members in Taiwan fishery in turn are: Influence the heritage of fish catch technology and improvement of fish catch standard (95.4%), increase tuna longliners industry's management risk (88.8%), difficulty in direction due to nationality and language difference (42.0%); however, for the bloodshed usually reported by media is not the major concern, so it has the lowest percentage 7.5%.

#### *Government's fishery development policy.*

What practices do you think government should take to assist the development of tuna longliners industry? Testers answer in sequence, and the top three data with highest accumulated frequencies are calculated as below: Government's tuna longliners industry development policies in turn are: Subsidize the establishment of large refrigerator (85.1%), active assistance on the promotion in domestic market (76.6%), continue to encourage the policy of replacing old fishing vessels (52.3%),

legislate and enforce the reduction of vessels (33.7%), assist to invest jointly at coastal countries (31.8%).

#### *Source of foreign fisherman.*

If the engagement of foreign fisherman is opened, what are the nationalities of the foreign fishermen you prefer for engagement? Testers answer in sequence, and the top three data with highest accumulated frequencies are calculated as below: the preferred nationalities in turn are: China (99.1%), Philippians (92.5%) and Vietnam (85.1%). Reasons for engaging China fisherman are as the foregoing; as for Philippians, because most of the fishermen of inshore small-sized tuna longliners vessels, which cooperated with Pacific Islands, in early period were from Philippians, therefore they have cultivated a group of excellent fishermen, and win public praise, so they are welcomed by high seas tuna longliners industry; finally, Vietnam fisherman substitutes China fisherman in these years due to the prohibition of exporting China fisherman.

#### Conclusion

To conclude, there are two categories discussed as follows.

1. Management status of tuna fishery  
Difficulties faced by fishery in Taiwan in turn are: high seas fish catch quota, low consumption in Japan, difficulty in finding new fishing ground and reducing resources and new competitors.

Problems originated from the policy to open the employment of foreign crew members in Taiwan fishery in turn are: Influence the heritage of fish catch technology and improvement of fish catch standard, increase tuna longliners industry's management risk, difficulty in direction due to nationality and language difference.

Government's fishery development policies in turn are: Subsidize the establishment of large refrigerator, active assistance on the promotion in domestic market, continue to encourage the policy of replacing old fishing vessels, legislate and enforce the reduction of vessels, assist to invest jointly at coastal countries. The preferred nationalities by Taiwan fishery in turn are: China, Philippines and Vietnam.

2. New management model of tuna longliners industry. Fishery resources and relevant industries are well developed from the beginning, and the movement of Capital to Taiwan result in considerable production quota, and with the development of economic, sashimi market in Japan, propagation of Japanese culture, and capital from Taiwan and resources, fishery investors participate the ultra-low temperature tuna longliners industry in Taiwan one after another. The future competition advantages of tuna longliners industry in Taiwan will be determined by the address of a new management model.

Developing management philosophy: What's the purpose of enterprise? Philosophy concept of supply chain management strengthens value of customers; top authorities' management philosophy decides the success or failure, thinking where is the value of customer?

#### *What to do?*

Defining supply system: The supply chain of tuna longliners industry in Taiwan could be traced back to oceans; through fish catching, transportation, storage, processing, flow to lower stream and ended at the delivery of finished product to customer. All enterprises, organizations and individuals in the supply chain are suppliers; enterprises have to accept or reject logistic and information activities with

respect to commodities along the road, and define the dependence between enterprises or inside the enterprise, including time dependence, relational dependence and functional dependence.

Strengthen flow management: Tuna longliners industry in Taiwan is a supply chain system, which consists a set or a series of flow that has two key factors, namely, object and information; how to accelerate logistic and information flow, keep flexibility, and responding requirements and changes from sashimi market all the time.

Developing partnership: All suppliers, from tuna longliners industry to final customers, including vessel owners, refrigerator warehouse, fishery products and marketing channels shall develop the relationship with suppliers, customers, employees, shareholders, government and competitors and establish new organizational ability.

Applying marketing channel: Integrate relevant resources, actions and action participants, and develop the marketing channel between fish supply market and consumption, especially to consider the dependence among different companies or inside companies of the marketing channel, including time dependence, relational dependence and functional dependence.

#### Discussion

The government shall encourage and assist fishery industry to invest jointly with coastal countries.

*Use joint investment to replace payment for catching fish*

According to the development tendency of fish catch quota made by international fishery organization, the quota for major pelagic fishing countries will be

reduced gradually, but quota for developing coastal countries are increasing year by year. In the past, Taiwan tuna longliners industry had to pay for fish catching at the 200 sea miles of exclusive economic zone of other coastal countries, however, as the payment for fish catching is rising and its percentage of total operation cost are increasing, fishery industry shall consider to joint venture with coastal countries to reduce operation cost and localize fishing vessels; therefore, in addition to share fish quota and facilitate fishery development in coastal countries, local fishermen could be employed to make up insufficient fishermen.

*Break up fishery fleets into parts*

Taiwan has the leading position in the production of tuna in the world, regardless of the scale of fleet or fish catch, Taiwan is the No.1 in the world. However, in order to develop fishery resources continuously, it is a tendency to reduce fishing capability; all countries implement the policy to restrict the establishment of vessels or reduce vessels, consequently, some vessel owners turn to fly national flag of other country and become Flag of Convenience (FOC) vessel. However, FOC is criticized by international fishery organization; thus the government shall assist fishery industry to negotiate with those countries in order to solve FOC problem effectively, and localize those vessels to make them really owned by those countries, especially for some of the countries in central Pacific Islands that still maintain diplomatic relations with our country, such as Marshall Islands, Palau, Fiji, Vanuatu and Tonga. Such could reduce the over-sized fishery fleet and conform to international target to eliminate FOC vessels.

In the future, these vessel owners are our countrymen and could influence international fishery organization widely, in particularly, we are the formal members of

Western and Central Pacific Fisheries Convention (WCPFC), and if we connect these Pacific Islands, we will have very significant capability.

*Establish domestic marketing channel for fish catch actively*

Although the amounts of ultra-low tuna caught by Taiwan are very profound (Export quota to Japan is 99000t) each year, consumers are confused, in addition to consuming at restaurants, where could general family buy tuna sashimi? In addition to buying small amounts of sashimi from traditional market, it is very difficult to buy sashimi in Taiwan. The reason is because the domestic marketing channel is not established, including ultra-low temperature refrigerator (fishery industry is asking for government's subsidy), ultra-low temperature transportation fleet, frozen tuna processing facility (slice), low temperature logistic facility in fish market. After all, ultra-low temperature fishing vessels in Taiwan caught so much tuna, but the domestic consumption is low, which might influence fish catch quota in the future.

The establishment of domestic marketing channel from very beginning could refer to the concept of integrated supply chain between producer and consumer in modern countries. Ultra-low temperature in the whole process, from storage to delivery, could ensure consumer's purchasing and eating safety.

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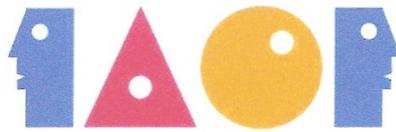
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EFFECTS OF EMOTIONAL LABOR AND JOB SATISFACTION ON  
ORGANIZATIONAL CITIZENSHIP BEHAVIORS: A CASE  
STUDY ON BUSINESS HOTEL CHAINS

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Abstract

Because of the growth of the tourism industry, the hospitality industry is flourishing. Employees in the service industry are increasing every year. However, even with the influx of service personnel, staff turnover rates remain high and unstable, indirectly affecting hotels' service quality. In recent years, the service industry has increasingly emphasized staff service quality for customers. This study investigates the effects of hotel staffs' emotional labor and job satisfaction on organizational citizenship behaviors (OCBs).

This study obtained 150 sets of questionnaires from business hotel chain staff and investigated the emotional labor that business hotel chain service personnel experience at work, job satisfaction, and their relationship to OCBs using reliability and validity analysis, analysis of variance, correlation analysis, and hierarchical regression analysis.

The analyses results revealed that when staff provide intangible services, they display positive emotions, create a positive work environment and atmosphere, their job satisfaction increases, and they have a stronger sense of identity with the hotel. This reduces their willingness to resign and lowers employee turnover. When emotional labor and job satisfaction are high, staff OCBs for the hotel are better.

Keywords: business hotel chains, emotional labor, job satisfaction, organizational citizenship behaviors

## Introduction

Because of the growth of the tourism industry, the hospitality industry is flourishing and the number of employees in the service industry is increasing every year. However, even with the influx of service personnel, the considerable job stress of the hospitality industry causes staff turnover rates to remain high and unstable, indirectly affecting hotel service quality. In recent years, the service industry has increasingly emphasized the staff service quality for customers.

In the service industry, job satisfaction is an indicator of staff attitudes toward their work that directly influences staff service behavior. Job satisfaction shows a significant negative correlation with employee turnover and absenteeism rates, and is closely related to job performance (Cascio, 1991). Job satisfaction is a critical component of organizational behavior research. Graham (1991) recognized that OCBs positively influence organizations' operations and promote team coordination, efficiency, and effectiveness, and cultivate a spirit of mutual support among members of the organization. This enhances the organization's ability to adapt to a rapidly changing environment, facilitate organizational operations, and assist organizations to achieve their goals.

Millions of service-related employees are engaged everyday in occupations requiring differing levels of emotional labor (Glomb *et al.*, 2004). Several emotional labor researches suggested that if a researcher has a specific occupational sample to study, this sample could help guide whether positive or negative emotions should be studied (Blau *et al.*, 2010). Additionally, more recent emotional labor research by Bolton (2001) and Bolton and Boyd (2003) indicated that a service provider, in order to control an interaction with a customer, may be required to express a repertoire of emotions. In a hotel

organization, the behavior of the first line of service personnel represents the service quality of the entire hotel. In the service process, customers develop feelings towards service behavior and form impressions based on these feelings, subsequently determining their willingness to return. Therefore, businesses expect their staff to present excellent behavior in the presence of customers to make favorable emotional impressions for the hotel. Consequently, "emotional performance" is among criteria for businesses when assessing employees' work performances.

This study examines the emotional labor, job satisfaction, and OCBs of hotel employees to elucidate the emotional labor conditions of service personnel and whether employee job satisfaction and OCBs are reduced because of negative emotional labor from the job. Therefore, this study explores means to increase positive cumulative emotions which enhances job satisfaction, and to increase the OCBs of service personnel, enabling hotels and their employees to obtain a mutually beneficial relationship.

### Emotional Labor, Job Satisfaction, and Organization Citizenship Behaviors

Emotional labor refers to the emotional control of workers who are in frequent contact with customers. This control generates facial expressions and body movements. The organization and its salary reward system specify that these workers must control their emotions at work and be able to create a work atmosphere conducive to the organization (Hochschild, 1983). The results of the study on flight attendants and debt collectors discovered that flight attendants must display positive emotions and inhibit negative emotions, whereas debt collectors must display negative emotions and suppress positive emotions (Hochschild, 1983). These polarized results regarding two emotional displays enable a deeper understanding of various

emotional labors required for work. James (1989) indicated that emotional labor is a type of pressure and a critical element of jobs that have high demands for dynamics, perceptions, and reactions. Grandey (2000) expressed that emotional labor is the process of regulating both feelings and expressions for organizational. When first-line service personnel interact with customers, emotional labor is the act of expressing appropriate emotions. Under the organization's demands, workers must control their behavior and display appropriate emotions (Aschforth & Humphrey, 1993). Emotional labor occurs when workers plan, control, and make efforts during social interaction to present emotions according to their organizations' wishes (Morris & Feldman, 1996).

The dimensions of emotional labor include two forms of behavior—surface and deep camouflage (Hochschild, 1983). The former comprises rigorous verbal or non-verbal performances, typically under the demands of an organization, and differ from workers' real feelings. The latter regards an individual's emotional status based on a profound identification or practical experiences, that is, the individual's internal feelings.

Job satisfaction is the general satisfaction level employees harbor for their job. Locke(1976) defined job satisfaction as a positive emotional state derived from organizational members' evaluations of their work or work experiences and the attitudes members possess towards their work, which is a type of emotional response to work. Job satisfaction is the most crucial factor that influences a person's attitude and behavior. It is the subjective perception and interpretation of objective characteristics. These perceptions and interpretations, that is, the emotional response of workers to special dimensions, are affected by personal self-reference frameworks. Therefore, job satisfaction refers to the satisfaction workers

experience psychologically and physiologically towards work and environmental factors, signifying their subjective responses on work situations (Morse, 1953).

In research on emotional labor and job satisfaction (i. e. large banks and teaching hospitals), emotional labor is positively correlated with job satisfaction (Wharton, 1993). The higher the burden of emotional labor, the greater employees' job satisfaction. This may be because the emotional labor requirements and specifications of an organization facilitate employees to handle awkward social situations, thereby raising job satisfaction (Ashforth & Humphrey, 1993). Based on the mentioned research, this study concludes that emotional labor positively affects job satisfaction, and we offer the following hypothesis:

*Hypothesis 1: The higher the emotional labor burdens of service personnel, the greater their job satisfaction.*

OCBs are defined as mutual cooperative behaviors between the organization and the members it depends on (Barnard, 1938). This voluntary, spontaneous, contributory behavior in informal organizations is formed by personal initiative and exceeds the organization's contractual obligations. When employees maintain satisfaction and commitment toward an organization, and subsequently produce OCBs, employees' mutually beneficial behavior arises (Organ, 1988). Thus, OCBs are a social exchange behavior between employees and organizations (Robinson & Morrison, 1995).

When employees control or suppress their emotions to show customers respect and courtesy in a safe and pleasant atmosphere, employees have a superior ability to adjust their thoughts and emotions. When interacting with customers, employees with better emotional labor control can instill higher levels of satisfaction and

leave good impressions of front-line service personnel. If the organization can dictate the emotions of their employees well, OCB performance is enhanced, and employees spontaneously assist colleagues, serve customers, identify with and support the organization's products or services, hope for positive organizational development, and feel pride in their association with the organization. Based on the above inferences, we offer the following hypothesis:

*Hypothesis 2: The higher the emotional labor burdens of service personnel, the better their OCB performance.*

Job satisfaction can stimulate employees' OCBs (Williams & Anderson, 1991). Job satisfaction has been correlated with other work related variables such as higher levels of job performance, organizational commitment and organizational citizenship, innovation, motivation, and stress tolerance (Sledge et al., 2008; Moller and Zoghi, 2008; Tutuncu and Kozak, 2007; Cohrs et al., 2006). Murphy, Athanasou & King (2002) found that job satisfaction has a positive relationship with OCBs. Although the correlation between job satisfaction and precise performance measurement is not strong, a strong correlation does exist between job satisfaction and imprecise OCBs (Weallens, 2003). Satisfied employees are more likely to provide positive reviews of the organization, assist others, and perform beyond the official expectations of their position (Griffiths, 2003). When employees feel job satisfaction, they reciprocate and devote more effort to the organization (Organ, 1990). In addition, Podsakoff, Mackenzie & Bommer (1996) recognizes that the various dimensions of employee job satisfaction and OCBs have significant positive correlations.

*Hypothesis 3: The higher the job satisfaction of service personnel, the higher the level of OCBs they display.*

Batellan & Organ (1983) found that job satisfaction positively affects OCBs. Employees with high job satisfaction behave in the interests of their organization, are willing to accept extra work, and have better work relationships (Organ, 1988). Based on research by social psychologists, when an individual is in a positive emotional state, they demonstrate better job satisfaction, which generates altruistic behavior (Isen & Baron, 1991). This study establishes job satisfaction as an intermediary variable to investigate the relationship between emotional labor and OCBs.

*Hypothesis 4: The emotional labor level of employees influences their OCBs through job satisfaction.*

Figure 1. shows the conceptual framework of this study.

#### Operational Definitions of Research Variables

Hochschild (1938) divided the dimensions of emotional labor into (1) surface emotional control, which signifies low levels and probability to produce emotional tasks that affect workers' inner feelings; and (2) deep emotional camouflage, which represents emotional deregulation and emotional tasks that influence workers' inner feelings.

Job satisfaction refers to both the psychological and physiological feelings of satisfaction towards environmental factors (Hoppock, 1935). This study divides job satisfaction into (1) internal satisfaction, which refers to feelings derived from intimate relationships between satisfaction and the job itself, that is, an individual's level of satisfaction attained from the job; and (2) external satisfaction: there are no

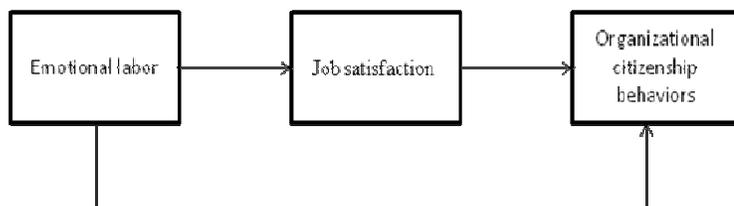


Figure 1. Conceptual framework

direct relationships between the reasons for satisfaction and the job itself.

OCBs occur when employees identify with the organization that employs them, generating employees to produce spontaneous behavior conducive to company performance without being rewarded. This study divides OCBs into five dimensions (Farh, Earley & Lin, 1997; Chu, 2001): (1) conscientiousness: in some job roles, taking the initiative and performing beyond standard organizational demands; (2) assisting colleagues: helping colleagues resolve work problems; (3) protecting corporate resources: avoiding violating company policies or the private use of public resources; (4) identifying with the company: employees praise the organization, defend the organization's reputation, and offer suggestions to improve the company; and (5) interpersonal harmony: avoiding the pursuit of personal power and not interfering in matters that are harmful to the company or colleagues. Methodology

#### *Measurement*

This study collected data using questionnaires, with four major contents such as emotional labor scales, job satisfaction scales, OCB scales, and demographic variables. We adopted Likert five-point scales for all sections except for demographic variables. The emotional labor scale referenced and modified survey content from related studies (Lin, 2001), and contained

six questions. This scale was composed of the dimensions of surface emotional control and deep emotional camouflage. The job satisfaction scale was based on the Minnesota Satisfaction Scale and modified where pertinent, and contained 11 questions, including questions regarding internal and external job satisfaction. The OCB scale referenced and modified survey content from related studies (Farh, Earley & Lin, 1997; Chu, 2001), and comprised eight questions, including the dimensions of conscientiousness, assisting colleagues, protecting corporate resources, identifying with the company, and interpersonal harmony. Finally, to understand the personal attributes of the sample participants, demographic variables were obtained, including gender, age, marital status, education level, economic status, years of service, and department.

#### *Sample*

The participants of this study were service personnel in the system of a Taiwanese business hotel chain. This system operates three business hotel chains whose main customer base is composed of domestic business travelers, employing approximately 400 service personnel. The study used the convenience sampling method to collect anonymous surveys. We distributed 170 sets of questionnaires and successfully retrieved 150 sets.

Table 1. Characteristics of Respondents	
(n=150)	(%)
1. Gender	
Male	37.3
Female	62.7
2. Age	
Under 20	8.70
21-30	49.30
Above 31	42.0
3. Marriage	
Married	32.0
Single	66.7
4. Education	
High school or less	22.7
College	22.0
University degree or above	54
5. Position	
Part-time employee	15.4
Full-time employee	63.8
Management	20.8
6. Tenure	
1 year or less	28.0
1-5years	52.7
5 years or above	15.3
7. Department	
Operation	10.0
Finance	7.3
Customer service	6.0
House keeping	28.7
Restaurant	27.3
Others	6.0

Table 2. Results of Person Correlation

	Mean	Standard deviation	Emotional labor	Job satisfaction
Emotional labor	3.761	0.627		
Job satisfaction	3.656	0.599	0.533**	
OCBs	3.641	0.604	0.560**	0.678**

\*\*p<0.01

## Results

Females made up the majority of the sample (94; 62.7%). The sample was young (74 aged 21-30, 49.3%), with a majority being single (100, 66.7%). The staff was mostly college graduates or above (81, approximately 54%). Entry-level employees comprised 80% of the sample, with only 20% of employees holding management positions. Most employees had worked 1-5 years (79, 52.7%). Table I lists the detailed demographics of the respondents.

Based on a factor analysis and internal consistency analysis, the Cronbach's  $\alpha$  value for the dimensions of this study's scales was greater than 0.7, indicating a high reliability (Hair et al., 1998). In addition, the factor loading magnitude was greater than 0.6 (Bagozzi and Yi, 1988), and the factor loading differences were greater than 0.3, in line with academic standards.

Emotional labor results have shown significant differences because of inconsistent position ( $F=2.665$ ,  $p<0.05$ ) and departments ( $F=2.514$ ,  $p<0.05$ ). The OCB dimensions of marital status ( $t=2.077$ ,  $p<0.05$ ), education level ( $F=2.527$ ,  $p<0.05$ ), position ( $F=4.580$ ,  $p<0.01$ ), and department ( $F=5.331$ ,  $p<0.001$ ) exhibit significant differences. Full-time employees have higher OCBs than do part-time employees. Furthermore, based on a correlation coefficient analysis, there was a significant correlation between each of the dimensions.

### *Hypothesis validation*

This study applied a hierarchical regression analysis to validate Hypotheses 1 to 4. We followed the four steps of hierarchical regression analysis to conduct mediating effect validations (Frazier, Tix & Barron, 2004). Hierarchical regression analysis includes three models. First, the

independent variables must produce an effect on the intervening variables. As shown in Table 2, Model M1 simulates the job satisfaction regression analysis results. The results of adding the independent variable of emotional labor into Model M1 show that the independent variable produced a significant positive effect on the intervening variable of job satisfaction ( $\beta=0.533$ ,  $p<0.001$ ), fulfilling the first condition of the mediating effect analysis step and supporting Hypothesis 1. Second, the independent variables must affect the dependent variables. Model M2 illustrates the OCB regression analysis results. The results of adding the emotional labor independent variable into M2 show that emotional labor has a positive effect ( $\beta=0.506$ ,  $p<0.001$ ) on the dependent variable of OCB, supporting Hypothesis 2. Finally, we added the intervening variable of job satisfaction into M3, where the intervening variable must affect the dependent variable, and the independent variable's effect on the dependent variable decreases. As Model M3 shows, the intervening variable of job satisfaction had a significant positive affect ( $\beta=0.530$ ,  $p<0.001$ ) on the dependent variable of OCB. Therefore, Hypothesis 3 was supported. When validating the mediating effects, emotional labor had a significant positive effect on OCBs, but weakened the effect of the independent variable of emotional labor ( $\beta=0.277$ ,  $p<0.001$ ) after job satisfaction was added as an intervening variable. Consequently, the condition of Step 3 was obtained, partially supporting Hypothesis 4.

### Discussion and Implications

Based on the analysis results above, the individual factors of various respondents differ for emotional labor and OCBs. Concurrently, there was significant correlation and significant effects among the three variables, and Hypotheses 1-3 were completely supported. Regarding the mediating effects, this study found that job satisfaction only has a partial mediating

Table 3. Hierarchical Regression Results

	M1: dependent variable =JS			M2: dependent variable =OCB			M3: dependent variable =OCB		
	B	Standardized $\beta$	T	B	Standardized $\beta$	t	B	Standardized $\beta$	t
constant	1. 733			1. 603			0. 675		
EL	0. 510	0. 533	7. 641***	0. 542	0. 560	8. 192***	0. 268	0. 277	4. 068***
JS							0. 535	0. 530	7. 771***

JS-job satisfaction  
 EL-emotional labor  
 OCB-organizational citizenship behavior

M1: justified  $R^2=0. 279$  ( $F=58. 389$ ,  $p<0. 001$ )  
 M2: justified  $R^2=0. 309$  ( $F=67. 104$ ,  $p<0. 001$ )  
 M3: justified  $R^2=0. 508$  ( $F=60. 385$ ,  $p<0. 001$ )

\*\*\*Significant at  $p<0. 001$

effect on emotional labor and OCBs, and Hypothesis 4 was partially supported.

This study's results show that hotel employees are high emotional labor workers, and 80. 7% of employees have accumulated 5 years of service or less, indicating a high employee turnover rate. Employees believe that, when working, they must hide or control their private emotional state, displaying the emotional behaviors required by the organization. In addition, this study shows that the emotional labors and OCBs of part-time workers are less than those of full-time workers or management positions, possibly because of the impermanent nature of their employment, which results in less loyalty and sense of responsibility compared to those of formally trained employees within the organization. Therefore, hotel management authorities should focus on part-time workers' identification with the organization and strengthen mediating effects for customer service quality. When implementing personnel support services, appropriate job positions can increase job satisfaction, whereas company require-

ments regarding emotional labor can effectively enhance work efficiency and subsequently influence job satisfaction, and produce positive emotional service and spontaneous altruistic behaviors in intangible services.

In addition, this study discovered significant effects among variables, such as emotional labor and job satisfaction, emotional labor and OCBs, and job satisfaction and OCBs. This validates of Ashforth and Humphrey assertion in 1993 that the emotional labor of displaying positive emotions can increase excellent interaction between members and resolve interpersonal problems, resulting in superior organizational performance.

Finally, regarding the theoretical framework, contrary to the results of previous studies, we found that job satisfaction cannot have a complete mediating effect on emotional labor and OCBs. That is, employees' emotional labor can only partially affect OCBs through job satisfaction. These results may have been influenced by other variables.

Regarding emotional labor workers, a higher job satisfaction results in higher OCBs. Thus, employees' job satisfaction can be predicted effectively. Therefore, companies should implement quality human resource management system plans and enhance employees' sense of achievement at work. Providing an excellent work environment allows employees to exert their abilities, and proper feedback creates job satisfaction, thus, employee OCB performances are increased and organizational results are enhanced.

*Limitations and Suggestions For Future Research*

Three regional business hotel chains served as the research subjects of this study. We recommend follow-up studies to investigate various types of hotel chains, such as resorts or international business hotels. In addition, this study examines employees of the hospitality industry. Future studies can include employees of other industries to expand the range of corollaries. In addition to emotional labor and job satisfaction, organizational commitment influences OCBs, along with organizational justice and trust. Studies should consider analyzing additional relevant variables to strengthen the corollary foundation. Finally, this study selected a self-measurement single-source data collection method, which may have been biased because of the expansion effect. Therefore, we suggest using multiple source data collection methods to increase research objectivity.

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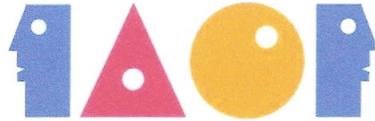
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A STUDY ON THE DESIGN ENTREPRENEURSHIP AND THE  
INTERACTION BETWEEN EMPLOYED BY DESIGN  
AND START-UP BY DESIGN

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Abstract

The purpose of this paper is to suggest that educators in the design field should be aware that it is important for students to develop their multiple capabilities and design career plans early in their school life. This paper is to address how designers can start a business on design through the interaction between employed by design and design start-up during these two different stages. There are seven essential capabilities recommended by several scholars for designers. They are as followed: expertise, business abilities, management abilities, social abilities, mental abilities, personalities, and characters. Thus, we suggest that the educators should help students develop these capabilities earlier in their school life in order to be successful and satisfied in their design careers.

Key words: Design Career, Design Start-Up, Designers, Employed.

## Overview

The economical advancement has transferred from manufacture to service industry gradually over ten years (Ginghină, 2012). Many people are attracted to run a business in the service industry since it is easier to start a business up in this industry (Clow, 1997). Thus the study on how to be successful in this field has become an extremely important issue (Ememe, Ezeh & Ekemezie, 2013; Soleimani, & Shahnazari, 2013).

The designers were often employed in lower positions to do basic technical jobs like product's decoration. Although the employers often assigned such important jobs, like symbol design, to create their enterprise's image to the designers, they never got a promotion. Furthermore, they were also supervised by their managers, who didn't have any background in design field. They couldn't communicate with their bosses about the mission directly. They must compromise the commissions' ideas. Thus, they lost their original design ideas. It seems that the designers were destined to start a business up under this kind of working conditions.

General design firms are always too small to hire many employees or to let senior designers retire from work eventually. This situation forced the designers to make a decision whether to be employed, to transfer to other occupations or to start a design firm up before middle age. In general, most clients of general design firms don't pay too much design fees. It makes it more difficult for general design firms to survive in the industry.

Most designers, who love their jobs and are capable of managing their job well, would start a business up based on their art talents (Rubeling, 1994; Oyedele, 2010). But only a few of them can survive in the competitive market (Rubeling, 1994). Many researchers who studied in

this industry consider that most new firms are going to fail and close their business in between two and five years (Brandstätter, 1997; Duncan & Handler, 1994; Dyer, 1997; Hartenian & Gudmundson, 2000; Heffes, 1999; Ememe et al., 2013). Most talented studio designers who failed in the market lacked knowledge of marketing and management in business. This is the major reason why they failed in the business (Rubeling, 1994; Yusuf, 1995). Also, up to 90% of general firms failed in the market because they either lacked experience or made mistakes on management (Carland & Carland, 1990; Ememe et al., 2013). Therefore, the study of how to start-up a design firm is considered an important reference for those people who work in design related fields.

## Employed by Design

The definition of the "employed by design, EBD" is the designers who are employed by design firms. Most designers get their first job in enterprise or design firms when they enter the design industry. In other words, EBD is the first stage of their design careers.

In fact, every designer gets training opportunities and grows up in a design firm. He carries out his design idea using the firm's resources. The EBD is considered as the first step when a designer starts his design career. The EBD is only the first stage in the process of being a designer in his design career. A designer must realize the reality and challenge in design business. Maybe he will have an opportunity to succeed in his design career. But most of designers earn only a little wage and their names are always concealed behind their bosses' reputation.

Generally speaking, it isn't easy to manage a successful design firm. For example, Monique Brown (2000) advised the black designers that you don't start a business up rashly or you will fail. He

thinks that marketing capability and enough capital are essential for a fashion designer to run his own business. The fashion designer has to be a super salesman or saleswoman to promote his or her products. Otherwise, it is not easy for a fashion designer to survive in the market.

Brown (2000) advises that the black designers have to get a job in a big fashion company which has already established a famous brand in the market. They must stay in the company as long as possible before starting their own business. Brown (2000) also quoted Patrick Kelly at the end of his article. "The more difficulties you face while starting a business up, the more exciting you feel challenging them. There is no formula to access successes." Although it's so difficult to start up by design it's still worth trying.

#### Start-up by Design

The definition of "start-up by design, SUBD" is the starting up of a design business such as design studios, firms or shops by design experts. In fact, it is important for any designers to think about their future plans before they are laid off (Oyedele, 2010). It is difficult for a design firm to keep its employees until they retire. According to Brown's advice, it's too late for you to start thinking about transferring your occupation or starting a business up by design when you are fired because you are not suitable for the job or you are forced to leave because the company closes. The idea of SUBD in this article tries to encourage designers to prepare their knowledge and capabilities of design entrepreneurship in time since there are different approaches between SUBD and EBD.

Generally speaking, every designer has to get through the stage of EBD before he or she starts up a business by design. When you are in the EBD stage you make money for your bosses and get

wages in turn. When you are in SUBD stage you make money for yourself but also take all the business risks. In fact, not every SUBD will survive in the market and earn profitable income. Thus, the knowledge of design entrepreneurship is so important before anyone starts a business up by design (Rubeling, 1994; Oyedele, 2010; Soleimani, & Shahnazari, 2013).

Ibrahim and Goodwin (1986) think the critical success factors of middle-small enterprise are as followed: 1) character; 2) management skills; 3) social and communication skills; and 4) environmental influences. Lussier (1995) also thinks the essential factors of being successful at starting up a business are as follows: 1) capital; 2) financial management; 3) practical experiences; 4) management experience; 5) plan; 6) education; 7) employ; 8) the timing of product / service; and 9) partners. Blancero, Boroski & Dyer (1996) believes that the working competency of an individual can be classified as: (1) managerial; (2) commercial; (3) technical; (4) interpersonal; (5) cognitive / imaginative; (6) influences; (7) organization; and (8) personal.

Ebert and Griffin (2000) also think that the entrepreneur has to develop some capabilities such as: 1) expertise; 2) social and communication skills; 3) analysis ability; 4) decision making ability; 5) time management; and 6) technology application. Oyedele (2010) think the critical factors influencing architects' and design engineers' motivational level in design firms are as followed: 1) favorable project working condition; 2) organizational support; 3) design process efficacy; and 4) effort recognition. interpersonal; (5) cognitive / imaginative; (6) influences; (7) organization; and (8) personal. Chuang (2001) categorized the professional competencies required of an interior designer into: (1) basic designing; (2) interior designing; (3) technical knowl-

edge; (4) communication skills; (5) relevant laws; and (6) operating competencies and professional practices, among others.

The entrepreneurs and bosses are different from general managers. An entrepreneur has to be more motivated and more powerful than a general manager is. He is filled with the aspiration to succeed in life. Besides, he has to be a dreamer who can create an exciting achievement (Dyer, 1997; Kets de Vries, 1997). An entrepreneur also devotes himself to pursue fortune and personal reward (Boyd & Gumpert, 1983). An entrepreneur prefers to have a free and independent life (Kuratko, Hornsby & Naffziger, 1997). An entrepreneur often develops the characters such as a tendency of intra-control, achievement desire, strong will-power, love of adventure (Begley, 1995; Oyedele, 2010). He can always predict the future trends in the market (Brandstätter, 1997). He always can create and discover opportunities that others aren't aware of (Yusuf, 1995). Therefore, Schuler (1986) has stated characteristics of entrepreneurs as cooperation, creative behaviors, risk taking, long-term viewpoint, focusing on results, flexibility against changes, independent behavior, tolerating ambiguity and intention to accept responsibility (Soleimani, & Shah-nazari, 2013).

Ememe et al. (2013) think the entrepreneurial skills and qualities needed to be possessed by these pupil entrepreneurs include: sales and marketing, financial know-how, self-motivation, communication skills, administrative skills, thinking skills, enterprising skills, leadership skills, problem-solving skills, risk-taking skills, time management skills and information skills. William D. Bygrave (1997), the author of 'The portable MBA in entrepreneurship', mentioned Timmons framework regarding to three critical success factors before starting up a business. They are chance, entrepreneur, and re-

sources. He also emphasized the critical success factors of an enterprise are to have a superior entrepreneur, an excellent management teamwork and to enter the market at the right time. Jones, Morris and Rockmore<sup>20</sup> think there are five critical steps in starting up a business. They are: 1) to define chance; 2) to develop commercial concept; 3) to decide essential resources; and 4) to manage and confront adventures.

Rubeling (1994) thinks a successful design firm has a challenge to maintain a balance between design business and commercial principle in terms of executive. McMorro (1997) thinks the clients will consider the designer's design ideas, expertise and performance in the field when they choose a design firm. In other words, most clients would like to work with a successful design firm because they believe they would get the best service quality. Simonetti (1999) also thinks it's very important for a design firm to keep the excellent performance records (Oyedele, 2010). In other words, SUBD has to possess more executive skills and management capabilities. Thus, a designer if he wants to start up successfully, he should spend much more time on learning the knowledge of entrepreneurship.

According to above description, we concluded the designer's capabilities as follows: 1) expertise – know-how, technique and computer application; 2) business abilities – executive abilities, raising capital, trading skills, financial operation and management; 3) management abilities – the knowledge and skills of plan, organization, leadership and control; 4) social abilities – communication, expression and social skills; 5) mental abilities – discovering problems, solving problems, memory / creativity, analysis, anticipating the right timing; 6) personalities – desire achievement, the tendency of intra-control, strong will-power, adventure

lovers, passion, supervising, dreamers, independence, freedom, pursuing profits and personal rewards 7) characters active, initiative, demanding, sound judgment, execution.

#### *The interaction between EBD and SUB*

In brief, designers who want to start a business by design have to learn their bosses' executive skills and business management because the required capabilities of being SUB are so different from the required capabilities of being EDB. Thus, it is necessary to get a job in a large design company with an excellent performance reputation in order to learn more useful executive skills and experience before starting a business by design.

Moreover, the designers have to work hard for their bosses in order to make use of the resources of the company to achieve their design ideas. They have to learn how to share their achievement with others. It's necessary that they share their performance and achievement with their co-workers or their bosses.

Every designer also has the idea of intra-entrepreneurship. He considers the profit of the company as his own responsibility and is willing to devote himself to his job. In fact, an outstanding employee who works hard often gets the chance to be invited to be a partner of the company. This is also the process of how to start up a business in the field.

Based on the rationale above, I found the interaction between EBD and SUBD as followed: 1) EBD is considered a stepping-stone of SUBD – every designer gets his own experience and performance by working in the stage of EBD and also gets his human resource and potential clients during this period. 2) EBD is considered as an opportunity of SUBD – the design entrepreneurship does not mean starting a business from scratch.

He also can start the design entrepreneurship as a partner of his boss. 3) A successful design start-up will depend on working from fundamental tasks – the entrepreneur can understand the details of the tasks and know how to keep excellent employees in the company. 4) The designer should initiate his motivation of design start-up during the stage of EBD – he can learn the management strategies and methods from his bosses and collect required information at the same time. It will facilitate matters if he starts up a business on design.

#### Conclusion

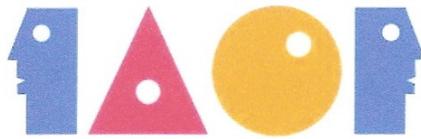
No matter if EBD or SUBD, everyone will face the challenge of transferring his job one or two times in his life. Everyone will face the crisis when he/she is 35 years old. Although the government tries to help people transfer their jobs through offering second expertise training programs, most entrepreneurs still have sort of age discrimination about employment. It doesn't really help those elders who want to find a job. Thus, it might be a better solution to teach them how to start up a business instead of offering the second expertise training program. Designers will also face the crisis sooner or later. Thus, it will be strongly recommended that they study how to start a business on design earlier in their school life in order to be successful and satisfied in their design careers.

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AN EMPLOYEE TRAINING PROGRAM OF HYPERMARKETS IN  
TAIWAN USING QFD BASED FUZZY LINEAR  
PROGRAMMING METHOD

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Abstract

Service quality plays an important competitiveness barometer in service industry. Moreover, a good service quality usually serves to acquire a better customer satisfaction. How the employees identify with the quality knowledge and quality attitude often serves as a key factor. The key factor decides whether or not they can assuredly implement the quality activities of the enterprises as well as an important factor to determine whether or not quality management function effectively influences customers' satisfaction on services or products provided by the enterprises. This study provides a model that associates fuzzy linear programming and quality function deployment method to focus on how the managers of hypermarket organize their own employee training programs to thus fulfill customers' all needs. The case of Hypermarket in Taiwan suggests the method conducted in this study is able to provide a feasible guideline on employee training program, hence could serve as a reference to the human resource department.

Keywords: Service Quality, Employee Training, Quality Function Deployment, Fuzzy Linear Programming, Quality Management

## Introduction

The retailing that greatly affects the public daily life has been popping up all over the country. Among it, the so-called retailing hypermarket, e.g. Carrefour, RT-Mart, Géant, providing benefits such as a wide variety merchandise, one stop shopping, well worth its value, convenient & comfortable shopping surroundings, has become one of the main habitual shopping channels. On the other hand, to achieve a sustainable competitiveness over its rivals in this severe market, each hypermarket must forge their own strategies. Hence, service quality plays an important competitiveness indicator. Moreover, a good service quality usually serves to acquire a better customer satisfaction. A good service quality evaluated by the customers, besides tangibles such as service facilities and physical products, mostly depends on the quality skill carried by the service employees. Furthermore, how the employees identify with the quality knowledge and quality attitude often serves as a key factor decides whether or not they can assuredly implement the quality activities of the enterprises as well as an important factor to determine whether or not quality management function effectively influences customers' satisfaction on services or products provided by the enterprises.

Most research of the recent interest in hypermarkets focus on qualitative attempts or attempts of sorting or clustering via multivariate statistical analysis. Typical examples include the studies conducted by Victor (1996), and Pekka & Aapo (1998). Nevertheless, studies about hypermarket employees' quality management attitude training were not commonly discussed in the previous researches. Hence, the main purpose of this study is to discuss how the managers of hypermarket organize their own employee training programs of all quality management attitude to thus fulfill customers' all needs. However, before discussing the training programs, it is inevitable to analyze and understand voice of customer and the rela-

tive importance of each quality management attitude. Such process will be explored by using Quality Function Deployment (QFD). According to Sullivan (1986) who defined QFD as a comprehensive concept, which transforms customer needs into engineering characteristics at each process of a product development. Herein, service is covered in the domain of product. Govers (1996) also provided an article to introduce QFD. In fact, QFD was originally developed by Akao & Mizuno (1990), and then was widely conducted in the fields like product development, quality management, and customer demand analysis (Chan & Wu, 2002).

Among these service quality application studies, Kim (1997-98) proposed target value of each QFD skill elements by maximum total service satisfaction model with system and budget limitation. C. V. Trappey, A. J. C. Trappey, & Hwang (1996) developed a formal QFD methodology for the retail industry. Andreas, Frank & Christine (2000) extended QFD method to integrate company interior quality improvement and exterior customer demand. Much attention has been recently dedicated to building QFD application systems. For example, Huang & Mak (2002) have built a QFD system which could be used in WWW for upgrading QFD team benefits. Likewise, by conducting visual basic language under Microsoft excel, Myint (2003) has developed an intelligent QFD system that applies for assembling lines such as personal computer assembling lines. Chakraborty & Dey (2007) present a QFD-based methodology to ease out the optimal non-traditional machining process selection procedure. Paryani, Masoudi & Cudney (2010) used QFD as a planning process to link customer requirements and service characteristics in the hospitality industry. Ictenbas & Eryilmaz (2011) used the QFD approach to evaluate different teaching methods in perspective of employers' expectations.

On the other hand, there are a great number of researches on Fuzzy QFD (FQFD) involving fuzzy set and fuzzy theory. Concerning its application, Khoo & Ho (1996) are among the earliest making relationship matrix of QFD conducted by linguistic variable. In 1998, Fung, Popplewell & Xie proposed integrate fuzzy set, QFD, and AHP (analytic hierarchy process) models for providing a method with which the decision makers could analyze characteristics of customer hence project the results into related engineering and product attribute. Among others, Shen, Tan & Xie (2001) as well as Vanegas & Labib (2001), both studies suggested use fuzzy number to represent relationship matrix of customer demand attribute and technical attribute. Kim, Moskowitz, Dhingra & Evans (2000) combined fuzzy multiple criteria decision making techniques with QFD to assist designers select the best engineering characteristic value in different settings. Moreover, Shen et al. (2001) discussed how different fuzzy number and different solution method affects the results. Fung, Tang, Tu & Wang (2002) further focused on resource demand of design activity, hence conducted fuzzy set to acquire relationship between resource demand and design skill attribute; while Yang, Wang, Duhammad & Low (2003) dedicated to develop a FQFD system applied to the construction industry. Sher (2006) used the large scale supermarkets as the observation subjects to investigate the application QFD on supermarket's architecture. Ding (2009) applied FQFD model to identify solutions of service delivery system for port of Kaohsiung from the viewpoints of customers. Recently, Liang, Ding & Wang (2012) applied a FQFD approach to prioritize knowledge management (KM) solutions for an international port in Taiwan.

The issue, programming quality skill training, addressed in this study involves the field of optimizing technical attribute in QFD. In addition to the researches of the above mentioned, Fung et al. (1998), Kim et al. (2000), Vanegas & Labib (2001), and

Fung et al. (2002), Jürgen & Richard (1998) constructed a linear programming model which could approach the maximum total customer satisfaction from the available resources under the cost limitation.

Likewise, Tang et al. (2002) suggested during QFD process, not only total customer satisfaction but also company financial factor such as budgets should be discussed. Moreover, Karsak, Sozer & Alptekin (2002) proposed the optima technical attribute in the product design stage by using a combined analytic network process (ANP) and goal programming approach into QFD.

In managing a hypermarket, whether or not customers' needs are fulfilled is an important factor influencing the store's sustainability. The study discusses to maximize the customers' satisfaction through employee training programming on quality knowledge, believe, and skills. Such process would be achieved by general linear programming; however, most of the request and description of service activities could not be evaluated by exact figures, while it mostly involves linguistic expression. Hence fuzzy set and fuzzy linguistic variable serve to solve this problem. Thus, the skill programming in this study involves fuzzy linear programming (FLP) model. Lai & Hwang (1992) have detailed introduction regarding FLP problem. Relative articles towards this study and recent application researches will be mentioned here. Regarding fuzzy objective and constraints theory, early studies including e.g. Zimmermann (1976), Chanas (1983), Tanaka, Okuda & Asai (1984) and Julien (1994) focused on transferring problems into general LP model, and achieved the optima solution upon the respective problem.

The following researchers have further discussed possible fuzzy degree. Such as Fang, Hu, Wang & Wu (1999) highlighted fuzzy constraint coefficient. Maleki, Tata & Mashinchi (2000) deliberated upon fuzzy variable problem. Likewise, Jamison &

Lodwick (2001) discussed the problem with all the coefficients are fuzzy numbers. Moreover, Buckley & Feuring (2000) forged a FLP upon all of the coefficients and variables are fuzzy numbers. Another prior research tend to modify FLP into the other models. For example, Takashiu (2001) and Zhang, Wu, Remias & Lu (2003) modified FLP model into Multiple Objective Linear Programming (MOLP) model for achieving the best solution. To discuss the best solution of FLP, recent article of Inuiguchi, Ramik, Tanino & Vlach (2003) and its historical article review could offer a detailed introduction. While there are quite a few researches focusing on FLP application: Miller, Leung, Azhar & Sargent (1997) conducted FLP on packing problem of fresh tomato; Shih (1999) proposed a planning for cement transportation between eastern and western Taiwan, by using FLP; in addition, Itoh, Ishii & Nanseki (2003) borrowed FLP to create a crop planning to solve the uncertainty problem.

Wang & Liang (2004) developed a fuzzy multi-objective linear programming (FMOLP) model for solving the multi-product aggregate production planning (APP) decision problem in a fuzzy environment. Wu (2007) provided a framework of fuzzy linear programming model for the function management division dealing with manpower allocation problem within matrix organization. Paksoy & Yapici Pehlivan (2012) applied FLP to optimize the multi-stage supply chain model with triangular and trapezoidal membership functions.

In short, this study takes hypermarkets as example and pinpoints their employee quality skill training. The process of this study, thus, firstly by conducting fuzzy QFD to achieve voice of customer and the relative importance of each quality management attitude, and follow up with FLP to approach the optimum training program underpinning strategic customer satisfaction.

## Methodology

Figure 1. represents the framework of this study. Each detailed methodology is addressed below.

### *House of Quality*

QFD is an overall concept, which is used to transform customer demand into adequate skill demand in each stage of product development process. The use of QFD usually is based on House of quality (HOQ) building. The study's HOQ illustrated as Figure 2.

### *Defuzzification of fuzzy importance of customers' demand*

In discussing the importance of hypermarket customers' demand, since the importance that customer towards measure variables is indeed a fuzzy linguistic variable, triangular fuzzy number thus is conducted here. Figure 3 describes the example of triangular fuzzy number of importance.

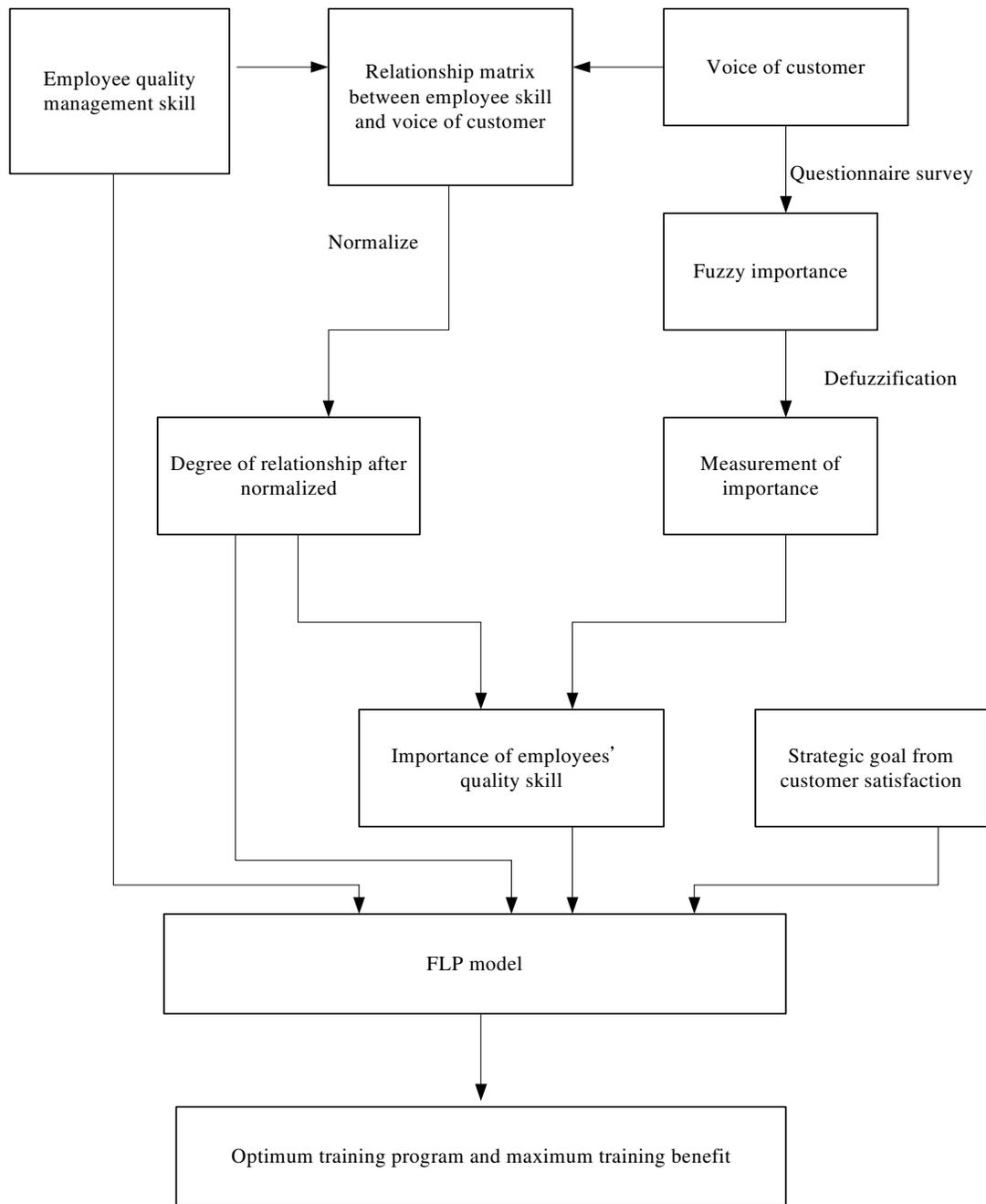


Figure 1. Framework

		Quality management attitude
Voice of customer (Customer demand)	Importance measuring	Relationship matrix
		Quality management attitude importance weight

Figure 2. HOQ of Hypermarket Employee Quality Management Attitude vs. Voice of Customer.

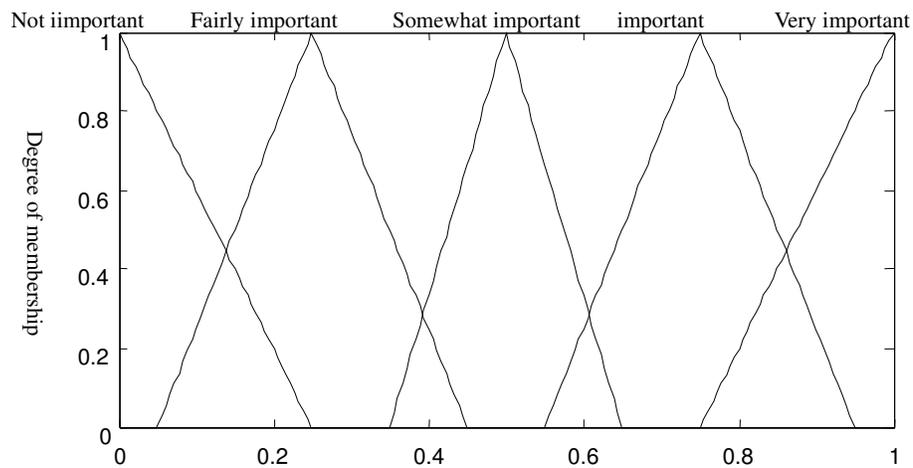


Figure 3. Fuzzy Number of Importance.

Firstly, let the respondent  $k^{\text{th}}$  consumer's importance value towards customer demand item  $i$  to be  $\tilde{A}_{ik}$ , and  $\tilde{A}_i$  denote the overall respondent importance value towards customer demand item  $i$ , the equation (1) can be displayed.

Let fuzzy set  $\tilde{A}$  be a triangular fuzzy number written as  $\tilde{A} = (a_1, a_2, a_3)$ , its grade of membership will be decided by the three parameters,  $a_1, a_2$  and  $a_3$ . Their relationship would be:

$$\tilde{A}_i = \sum_{k=1}^n \tilde{A}_{ik} / n = (\tilde{A}_{i1} \oplus \tilde{A}_{i2} \oplus \dots \oplus \tilde{A}_{in}) / n$$

$$\mu_{\tilde{A}}(x) = \begin{cases} \frac{x-a_1}{a_2-a_1}, & a_1 \leq x \leq a_2 \\ \frac{a_3-x}{a_3-a_2}, & a_2 \leq x \leq a_3 \\ 0, & \text{other} \end{cases} \quad (2)$$

Furthermore, let  $\tilde{B} = (b_1, b_2, b_3)$  be another triangular fuzzy number, hence  $\tilde{A} \oplus \tilde{B}$  will be also a triangular fuzzy number. The computation is displayed as equation (3).

$$\tilde{A} \oplus \tilde{B} = (a_1 + b_1, a_2 + b_2, a_3 + b_3) \quad (3)$$

In addition, let fuzzy set  $\tilde{A}$  be a triangular fuzzy number, thus  $\tilde{A}$  multiplies positive real number  $k$ , the results  $k \otimes \tilde{A}$  is also a triangular fuzzy number which is written as

$$k \otimes \tilde{A} = (ka_1, ka_2, ka_3) \quad (4)$$

By using equation (3) and (4), importance  $\tilde{A}_i$  that overall respondent importance value towards customer demand item  $i$ , could be acquired.

Regarding defuzzification, the study planned to adopt another easier and also useful method, center of area (COA). The COA method initially came from the acquiring center of gravity of the material. In other words, the COA method is to locate the center value of fuzzy set. That center value represents the complete fuzzy set. Example of calculating center of gravity is explained here.

Let  $\tilde{A}$  be a fuzzy set and  $\mu_{\tilde{A}}(x)$  represent membership function of  $\tilde{A}$ , so its center of gravity  $\chi^*$  is

$$x^* = \frac{\int \mu_{\tilde{A}}(x) x dx}{\int \mu_{\tilde{A}}(x) dx} \quad (5)$$

#### Normalization of relationship

Let the goal of the customer satisfaction be requested as an achieved degree, it means a real number that between 0 and 1 is used. Thus, for coordinating with customer satisfaction goal value, to normalize the relationship in the relationship matrix is needed. After acquiring the relationship of each quality management attitude and customers' demand by in-depth interview to some expertise, this study borrows the method conducted in the research of Jürgen and Richard (1998) to normalize the relationship; in other words, the sum of relationship of one same row of the relationship matrix equals one.

#### Fuzzy Linear Programming

There are a great number of researches regarding FLP. Several related historical reviews are addressed in the previous introduction section. Having acquired relational coefficient and the importance of quality management attitude, concerning the model of this study is "maximize the total training effects of each quality management attitude,

and the more the better” with the constrain equation as “at least to satisfy the strategic goal of each customer demand” and the decision variable as “involvement of each quality management attitude in training program”, the FLP model will be applied in this study. In the application researches of Shih (1999), models that conducted in the studies of Zimmermann (1976), Chanas (1983), and Julien (1994) all are with good results were mentioned. Herein general descriptions regarding these three models are introduced. Nevertheless, the primary purpose of this study is to propose a simple but practical method, consequently Zimmermann’s model is adopted in the real case study for acquiring a better percentage composition of the employee training program.

Earliest fuzzy goal and fuzzy constrain model according to Zimmermann is

$$\begin{aligned} \text{Max} \quad & cx \\ \text{s.t.} \quad & a_i x \leq b_i, i = 1, K, m, \\ & x \geq 0 \end{aligned} \quad (6)$$

where  $b_i$  is the available resource. Moreover, let aspiration level of goal function be  $b_0$ , so  $cx \geq b_0$ .

Thus, the equation (6) turns to be

$$\begin{aligned} \begin{bmatrix} -c \\ a_i \end{bmatrix} x \leq \begin{bmatrix} -b_0 \\ b_i \end{bmatrix}, i = 1, K, m, \\ x \geq 0 \end{aligned} \quad (7)$$

When reaches maximum, the correspondent membership equation would be

$$\mu_i(a_i x) = \begin{cases} 1 & a_i x \leq b_i \\ 1 - \frac{a_i x - b_i}{p_i} & b_i \leq a_i x \leq b_i + p_i \\ 0 & b_i + p_i \leq a_i x \end{cases} \quad (8)$$

In equation (8),  $p_i$  represents the tolerance level of requested goal.

Finally, by using “max-min operation”, the original FLP problem could be transferred to the following LP model

$$\begin{aligned} \text{Max} \quad & \lambda \\ \text{s.t.} \quad & \lambda \leq 1 - \frac{a_i x - b_i}{p_i} \\ & \lambda \leq 1 \quad i = 0, 1, \dots, m \\ & x \geq 0 \end{aligned} \quad (9)$$

Hence, by using the general software such as LINDO, the solution could be approached.

#### Application – Training Program For Employees Of A Hypermarket

To obtain the relationship matrix between employee skill and voice of customer, an expert interview was performed. The twenty items of voice of customer and the ten quality skills are shown in table 1 and 2 respectively. Qualitative data was initially obtained to inform and focus the study and in the construction of a questionnaire. The questionnaire is structured with twenty items measuring voice of customer. We have carried out questionnaire surveys in the hypermarkets located in central and southern Taiwan and received 102 responses from consumers in two large-scale hypermarkets. Questionnaire reliability was evaluated by Cronbach's alpha. Results of the test were  $\alpha = 0.922$  for the standardized. As these values are larger than 0.7, consistency of the questionnaire is acceptable. Respective triangular fuzzy function of the importance that customers view the service items is extremely unimportant (0,0,0.25), unimportant (0.05,0.25,0.45), neutral (0.35,0.5,0.65), important (0.55,0.75,0.95), and extremely important (0.75,1.0,1.0). Likewise, customers’ satisfaction and the importance that employees view quality skill use the same five triangular functions. Analyses and results are provided in the following two sections.

### *Data analyses*

The framework of this study shows that by creating FLP model, it is necessary to proceed analyses for acquiring each parameter. Table 1, 2, and 3 provide the results of analyses. By conducting center of gravity method, table 1 displays the defuzzified degree of satisfaction of the 102 customers towards the services provided by the two hypermarkets. That suggests the constraint satisfaction goal ( $s_i$ ) in FLP. In the meantime, let tolerance be 0.1, by employing experts' view and the method of Jürgen and Richard (1998), normalized relationship matrix is acquired as expressed in Table 3 ( $r_{ij}$ ). With regard to defuzzied quality management attitude importance weight ( $w_j$ ), the values are exposed in Table 2.

Table 1. Customers' Satisfaction Goal upon Each Item

Item	Defuzzified satisfaction goal $s_i$
1. Wide variety	0.70915
2. Merchandise quality	0.70752
3. Reasonable pricing	0.68137
4. Quick updating	0.67402
5. After service	0.68056
6. Large assortment brands	0.68546
7. Employees' expertise	0.66095
8. Employees' service attitude	0.67157
9. Checkout speed	0.66422
10. Store reputation	0.69199
11. Store lighting	0.71405
12. Comfortable air conditioning	0.71242
13. Wide and neat aisles	0.71732
14. Convenient pick-up	0.72631
15. Clear signage	0.69118
16. Sufficient parking space	0.70752
17. Transportation convenience	0.70016
18. Information acquisition	0.68301
19. Catalogues design	0.65033
20. Promotion activities	0.60539

Table 2. Quality Management Attitude Importance Weight.

Quality management attitude	A	B	C	D	E	F	G	H	I	J
Importance degree $w_j$	2.106	0.677	0.548	1.380	1.988	0.362	0	1.268	0.194	6.668

Table 3. Normalized Relationship Matrix.

$r_{ij}$	A	B	C	D	E	F	G	H	I	J
1. Wide variety	0.375	0	0.125	0	0	0	0	0.125	0	0.375
2. Merchandise quality	0.2	0.1	0	0	0.3	0	0	0.1	0	0.3
3. Reasonable pricing	0	0	0	0	0	0	0	0	0	1
4. Quick updating	0.429	0	0	0.143	0	0	0	0.143	0	0.285
5. After service	0	0.333	0	0	0.167	0	0	0	0.167	0.333
6. Large assortment brands	1	0	0	0	0	0	0	0	0	0
7. Employees' expertise	0	0.167	0.25	0.25	0	0.167	0	0.083	0.083	0
8. Employees' service attitude	0	0.125	0	0.375	0.125	0	0	0.125	0	0.25
9. Checkout speed	0	0	0	0.25	0	0	0	0.25	0	0.5
10. Hypermarket reputation	0.143	0.143	0	0.143	0.143	0	0	0.143	0	0.285
11. Store lighting	0	0	0	0	0.5	0	0	0	0	0.5
12. Comfortable air conditioning	0	0	0	0	0.5	0	0	0	0	0.5
13. Wide and neat aisles	0	0	0	0	0.5	0	0	0	0	0.5
14. Convenient pick-up	0	0	0.333	0	0.333	0	0	0	0	0.334
15. Clear signage	0	0	0	0	0	0	0	0.667	0	0.333
16. Sufficient parking space	0	0	0	0	0	0	0	0	0	1
17. Transportation convenience	0	0	0	0	0	0	0	0	0	1
18. Merchandise information acquisition	0.333	0	0	0.333	0	0	0	0	0	0.334
19. Catalogues design	0.333	0	0	0.333	0	0.334	0	0	0	0
20. 'Collecting Bonus' promotion activities	0	0	0	0	0	0	0	0	0	1

In Tables 2. and 3., we use the symbols from A to J to represent the ten quality management attitude. The meanings are described as below:

- A: The company can correctly understand the market and provide wide variety merchandise and update the selection accordingly.
- B: There are well-trained employees to explain and treat customers' questions or complaints promptly.
- C: The company owns a complete and professional employee training system to help increase employees' professional knowledge.
- D: The company requests absolute service attitudes and expertise of its employees.
- E: The employees believe that everyone has responsibilities in quality improvement.
- F: The company requests its employees to make decisions based on facts or figures.
- G: Cherish teamwork and pay attention to the communication problem between company and employees as well as between employees.
- H: The company and its employees share the same values 'do it right the first time'.
- I: The company clarifies authority and responsibility associated.
- J: Have customers' satisfaction at heart.

#### Modeling FLP

Input each parameter that is acquired to build the FLP model and let tolerance be 0.1, by employing experts' view. In the meantime, let  $x_j$  denote the weight of the  $j^{th}$  management skill in the training program. The weight for each skill may represent the

percent in all training budget or training time. Thus, the FLP can be constructed as below:

$$Max \sum_{j=1}^{10} w_j x_j \quad (10)$$

$$s.t. \sum_{j=1}^{10} r_{ij} x_j \geq s_i \quad \forall i, i = 1, 2, \dots, 20$$

$$\sum_{j=1}^{10} x_j = 1$$

$$0 \leq x_j \leq 1$$

Subsequently, input the previous acquired importance weight as the coefficient of goal function, normalized coefficient of the relationship matrix and the surveyed customer satisfaction into the model. Because the problem can be transferred to a linear programming problem, the package LINDO is used to obtain the solution. Therefore, the optimum percentage composition of employees' quality management training program that constrained to customer satisfaction and maximizes the effects of quality management attitude could be approached. The optimal solution is listed in Table 4.

The results suggest that 'have customers' satisfaction at heart' serves the most important demand for employee training program. The second important item is 'increase employees' professional knowledge'. Moreover, 'request absolute expertise', 'provide wide variety merchandise', and 'treat customers' problems promptly' also play the important rolls in the training program. The results also provide a feasible guideline on employee training program, hence could serve as a reference to the human resource department.

Table 4. Results of Programming Employee Quality Management Attitude Training.

Item	Percentage (%)
Provide wide variety merchandise	13.3637
Treat customers' problem promptly	3.4228
Increase employees' professional knowledge	25.1285
Request absolute expertise	16.2360
Have responsibilities in quality improvement	0.000000
Make decisions based on facts	0.000000
Cherish team work	0.000000
Do it right the first time	0.000000
Clarify authority and responsibility associated	0.000000
Have customers' satisfaction at heart	41.8490

### Conclusions

This study involves fields of quality management, marketing research, and operations research; in addition, it conducted questionnaire survey to collect customers' demands or voice of customers of the comparatively daily life related hypermarkets. Moreover, the importance of each employee quality management knowledge, belief, and skill is acquired by utilizing a QFD model.

Ensuing, considering the uncertainty and linguistic express in the practical environment, fuzzy set and fuzzy theory are adopted to form a fuzzy linear programming model on employee quality management training.

Seeing this study is a pioneer research and it indeed is very important that how the hypermarkets that suffer from high competition provide satisfying customer services by their well trained employees, hence the methods of this study may serve as a reference model for distribution and the other industries.

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THE EFFECT OF RESOURCE CHARACTERISTICS ON  
ORGANIZATIONAL LEARNING MECHANISMS  
AND ROUTES: EVIDENCE FROM TAIWAN

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Abstract

This article reports the findings from examining the effect of a firm's resource characteristics on organizational learning mechanisms and learning routes. Thus, firms first decide on the sequence of organizational behaviors between technology competence development and market competence development in Taiwanese firms. We used the extended case method and long-term depth interview to compare 2 cases regarding the effect of resource characteristics on learning routes and intra- and inter-organizational learning behaviors. We found that firms possessing improvement resources develop technological competence first and apply them to intra-organizational learning to promote market competence. Conversely, firms that have social resources develop market competence first and incorporate them into inter-organizational learning to promote technology competence.

*Keywords:* technology competence; market competence; resource-based theory; organizational learning theory; small firm

## Introduction

The emerging topic about adding new competencies to a firm's repertoire to maintain prosperity in a dynamic environment has become an essential focus of research (Danneels, 2007; McGrath, 2001; Floyd & Lane, 2000; Helfat, 2000; Cooper & Smith, 1992; Leonard-Barton, 1992; Dierickx & Cool, 1989; Penrose, 1959). It is more challenging for small firms with limited resources and scale (Temponi & Pandya, 1995) to compete with large resource-sufficient firms because small firms are incapable of developing several competencies simultaneously. Therefore, small firms are devoted to prioritizing their development of the most valuable competence, and then combining the first competence to promote new competencies.

Previous research that explored firm competence has mostly emphasized the process of competence development. For example, Wernerfelt (1984) argued that the essential factor affecting firm diversification is the sequence of resource development, rather than the sequence of product development. The sequential development of new resources determines how the next new market emerges (Wernerfelt, 1984). Danneels (2002) argued that firms must develop technological competence first and apply technological competence to new products that address new customers and serve new markets. Danneels opined that technological competence is crucial for supporting the customer competence that ensues. Collis and Montgomery (1997) reported that a firm's development of competence is constrained by its current stock of resources and competencies, as well as by the speed at which it can acquire or accumulate new ones.

These studies have emphasized that firms must develop competence sequentially. However, most research on learning and growth features the experience of large

organizations have not paid adequate attention to small firms with limited resources that do not develop several competencies simultaneously. Firms should develop prioritized competencies before promoting follow-up competencies. Determining the competencies that small firms should prioritize for developing follow-up competencies requires further study.

## Literature Review

The conceptual framework of this study is based on field research and integrating scholarly literature regarding resource-based theory and organizational learning theory.

Resource-based scholars have focused on the dynamic characteristics of competence by questioning how resources and competencies evolve over time (Helfat, 2000). The concept of "dynamic capabilities" (Teece, Pisano, & Shuen, 1997) called attention to the need for renewal of firm competence, particular in changing environments. Eisenhardt and Martin (2000) argued that competence renewal is a dynamic capability of a firm because of its ability to alter resource configurations. In brief, these scholars have noted that competence renewal is crucial to a firm because it is one of the mechanisms by which firms use, leverage, recombine, and reconfigure resources.

Wernerfelt (1984) argued that a firm's resources lead to different immediate insights, in contrast to the traditional product perspective. Furthermore, firms develop resource position barriers as competitive advantages by exploiting existing resources/competencies and exploring new ones within the firm and among firms. Priem and Butler (2001) suggested investigating the accumulation of resources and competencies from the RBV perspective. Danneels (2002) argued for applying technological competence to developing new

products that serve new customers. Danneels (2007) examined how resources/competencies can be used to promote new competencies and showed that the delinking and relinking of resources are crucial activities that can expand the resource base of a firm, thus enabling the development of new competencies.

Applying resource-based theory to investigate the priority of competence development routes, this study distinguished the intra- and inter-organizational learning behaviors between inside-out and outside-in routes, and explored the behaviors between both learning routes from the perspective of dynamic competence.

Based on organizational learning concepts, March (1991) showed how resource characteristics influence a firm's renewal route by applying exploitative and explorative modes of learning. In addition to offering the application of March's distinction to organizational learning, scholars (Kogut & Zander, 1992; Henderson & Cockburn, 1994) also present an additional classification: the concept of basic competence (i.e., a firm's existing repertoire), composite competence (i.e., exploitative learning), and architectural competence (i.e., explorative learning). Composite competence and architectural competence are more important because they are helpful for firms to escape the trap laid by leveraging current competencies.

Therefore, it is important to add new competencies to the firm's repertoire for a firm's continued prosperity in a changing environment (McGrath, 2001). Danneels (2007) further suggested that current competencies may be used as leverage to add new competencies, thus referred to as "resource leveraging," by engaging in inter-functional coordination (Narver & Slater, 1990). Klerk and Havenga (2004) argued that firm growth can be pursued by transferring external resources or extending internal resources. These scholars have

referred to firms incorporating new competencies by using and combining firm resources.

According to Floyd and Lane (2000), "strategic renewal requires both exploiting existing competencies and exploring new ones." A firm's competence development involves expanding resource exploitation and exploration over time (Floyd & Lane, 2000). Kaplinsky and Readman (2001) found that the competence development of small firms relies on the important vehicle of continuous learning. However, their research focuses only on using a firm's existing endogenous resources. They do not develop firm resources by combining exogenous resources. To incorporate intra- and inter-organizational learning is crucial to the development of a firm's resources by combining with endogenous and exogenous resources and competencies.

Sinkula (1994) and Slater and Narver (1995) stated that market-driven organizational learning is a function of a three-step process: information acquisition is the process by which knowledge is obtained; information dissemination is the process by which information from different sources is shared, thereby leading to new information or understanding; information-shared interpretation is the process by which distributed information is explained in the context of more commonly understood concepts.

Danneels (2002) introduced "technological competence" as a type of capability enabling a firm to design and manufacture a physical product with certain features. It is constituted by such technically related resources as design and engineering skill sets, product and process design equipment, manufacturing facilities and skill sets, and procedures for quality control. We adopted the technological competence by Danneels (2002) and extended it to consist of basic, composite, and architectural competencies.

We reviewed market competence literature to extend the Danneels (2002) concept of “customer competence.” According to Danneels (2002), customer competence enables a firm to serve certain customers. It is constituted by such market-related resources as knowledge of customer preferences, distribution and sales access to customers, reputation of the firm reflected in the its brands, and communication channels for exchanging information between the firm and customers during development and commercialization of the product (Danneels, 2002). Moreover, Narver and Slater (1990) proposed the concept of “market orientation” and suggested that market orientation consist of three behavioral components: customer orientation, competitor orientation, and inter-functional coordination. We synthesized the concepts by both Danneels (2002) and Narver and Slater (1990) to develop a new definition of market competence.

### Method

We conducted a field study using in-depth interviews, observations, and documents as data sources from two TFT-LCD equipment providers, which varied in age, size, and the historical progress of resources. The research sites (Table 1) were selected to achieve a dichotic sample that provides many possibilities for comparisons and theory development that is more comprehensive (Glaser & Strauss, 1967; Strauss & Corbin, 1990). We compared firms that were different in their variety of resource characteristics, and that exhibited different behaviors of competence development. Rouse and Daellenbach (1999) called for a rich and detailed investigation of the nature of firm resources through comparative case studies. We used the extended case method (Burawoy, 1991; Danneels, 2002, 2007) as a guide to analyzing and gathering empirical data by conducting case studies to reconceptualize and extend theories. This study contributes

to the integration of concepts and theories by using the extended case method, which integrates and synthesizes existing bodies of work (Burawoy, 1991). We reviewed the literature relevant to research problem areas, and applied the empirical data to fill the gaps of understanding related to research on firm resources.

All interviews were conducted by following a semistructured approach and included some or all of the questions listed in Table 2. The questions were selected to suit the level of the interviewee.

Triangulating various types of data collected through different methods can overcome the limitations of one method by counterbalancing the weaknesses of that method with the strengths of others (Jick, 1979). This study used various types and sources of data to provide a comprehensive and solid foundation for theory development. This study conducted 20 interviews based on the characteristics of resources, organizational behaviors of competence development, and the relationship between the characteristics of resources and the learning routes of competence development. Some of the reports by interviewees were retrospective (Miller, Cardinal, & Glick, 1997), whereas other reports were contemporary with the activities they described. This study conducted an additional 26 interviews based on multiple functional areas (e.g., manufacturing, R&D, marketing, and management) at various organizational levels.

The research sites were Neda and ARET. Neda is a company that offers machine automation and maintenance for integrated circuits (ICs), semiconductors (SCs), flat-panel displays (FPDs), chemicals, parts materials, and solar cell industries. Neda was founded in 1978, and had approximately 577 employees and \$5.4

Table 1. Research Sites

Firm pseudonym	Areas of activity	Age	employees/annual sales in \$ billion NT dollars	Research period
Neda	Robot design, robot application, automation skill, moving system, processing machinery, clean room equipment design, and control system application	Since 1978 32years	577/5.4	3th, Mar, 2006 to 15th, Dec, 2010
ARET	Automation equipment, micro-drill the entire factory equipment, micro-drill, robot design, and pack/unpack system	Since 1982 28years	489/4.25	

Table 2. Questions Posed During Semi-Structured Interviews

Questions
1. When was your firm and industry established and/or restructured?
2. Please summarize the evolutionary history of your industry/ firm resource.
3. Does your company or do firms in your industry partake in any important inter- or intra- firm activities that affect firm's competence development?
4. What are the influencing factors of such inter-firm/ intra- firm interactions? What kind of roles do you think government agencies, research institutions, and private institutions play?
5. Are there any unique inter-firm/ intra-firm learning activities in this industry/ firm?
6. How is the market development within your firm/industry? Does the market competence promote follow-up competence?
7. How does resource characteristic influence the industry/firm competence development?
8. How is the technology development within your firm/industry? Does the technology competence promote follow-up competence?
9. How does resource characteristic influence the industry/firm competence development?

billion in annual sales at the time this study was conducted. Its automation equipment, especially room-cleaning robots and control system applications, have been adopted extensively by leading optoelectronics and SC firms in material moving and manufacturing.

ARET is a company that offers machine automation and maintenance for cathode ray tubes (CRTs), SCs, thin-film transistor liquid crystal displays (TFT-LCDs), and solar cell industries. ARET was founded in 1982, and had approximately 489 employees and \$4.24 billion in annual sales at the time this study was conducted. In many ways, ARET has been a successful company. Its automation equipment, especially micro-drills, the entire factory equipment and pack/unpacking system, have been adopted extensively by leading optoelectronics firms in material moving and manufacturing.

## Results

In accordance with the research purpose, the research results were classified into four parts: (a) the difference between technology competence and market competence, (b) resource characteristics and organizational behaviors of competence development, (c) intra- and inter-organizational learning mechanisms, and (d) resource characteristics and learning routes. Each is discussed below.

### *Technology Competence And Market Competence*

Technology competence is a combination of the resources in a firm's existing repertoire, the resource at exploitative learning, and the resource at explorative learning, help provide tangible and intangible goods and services. Technology competence refers to basic competencies, composite competencies, and architectural competencies (Kogut & Zander, 1992; Henderson & Cockburn, 1994). Based on

the interview results, basic competencies involve using existing endogenous resources and competencies. It includes two types of competence that incrementally improve production processes and manufacturing skill sets. Composite competencies combine existing endogenous resources and competencies with new firm competence. It comprises quality control and research and development (R&D) of existing and new products. Architectural competencies create new domain competence among firms that have obtained exogenous resources and competencies. It is composed of radical material innovation and radical manufacturing innovation.

Market competence can help firms anticipate more accurately the response to actions designed to retain or attract customers, improve channel relationships or thwart competitors, and act on market information in a timely and coherent manner, which has significant implications for the attainment and sustainability of competitive advantage (Möller & Anttila, 1987; Slater & Narver, 1995). According to interview results, market competence is constituted by existing and new market-related resources and assets, such as customer knowledge of needs and preferences, communication and links with internal and external resources, competing cooperative relationship with competitor knowledge, satellite services, long-term post-purchases, and the reputation of the firm and brand. The distinction between technology competence and market competence is listed in Table 3.

### *Resource Characteristics and Competence Development*

This section demonstrates the interplay of resource characteristics and learning mechanisms in competence development, as well as the historical progress of the critical resource development of firms.

Table 3. Technology Competence And Market Competence

patterns	Technology competence	Market competence
Architectural competence (exploration resource)	T <sub>6</sub> : Manufacturing radical innovation T <sub>5</sub> : Material radical innovation	M <sub>6</sub> : Reputation of the firm and brand M <sub>5</sub> : Long-term post-purchase
Composite competence (exploitation resource)	T <sub>4</sub> : Quality control T <sub>3</sub> : Research and Design	M <sub>4</sub> : Satellite system M <sub>3</sub> : Competing cooperative relationship with competitor knowledge
Basic competence (existing resource)	T <sub>2</sub> : Incremental improvement in production process T <sub>1</sub> : Manufacturing know-how	M <sub>2</sub> : Communication with employees and customers M <sub>1</sub> : Customer knowledge of needs and preference

Based on the historical progress of Neda’s existing resource development, we found that Neda has the resource characteristics of continuing improvement and exploitation (March, 1991). They obtain advanced knowledge from intra-firm interaction by continuing to improve their existing resources (Ittner & Larcker, 1997; Serel, Dada, & Moskowitz, 2001). In other words, small Taiwanese firms have historically progressed by developing, improving, and exploiting resources, and tend to prioritize developing technology competence.

Conversely, based on the historical progress of ARET in resource development, we found that ARET has the resource characteristics of social linkage and exploration (March, 1991). They obtain enhanced experience from external-firm connections by continuing to link their existing resources with social resources. In other words, small Taiwanese firms have historically progressed by exploring social resources, and tend to prioritize developing market competence.

*Intra- And Inter- Organizational Learning Mechanisms*

Based on the historical progress of Neda’s existing resource development, we found that Neda has the resource characteristics of continuing improvement and

exploitation (March, 1991). They tend to prioritize developing technology competence. The various departments, supervisors, and members are fully informed and participate in the company’s intra-organizational learning to promote technology-oriented resources to upgrade the three stages of “information acquisition→ information dissemination→ shared interpretation” (Sinkula, 1994; Slater & Narver, 1995). More important, this mechanism of the firm’s intra-organizational learning requires being built within a corporate institution (Lee & Saxenian, 2007).

Based on the historical progress of ARET’s existing resource development, we found that ARET has the resource characteristics of social linkage and exploration (March, 1991). They tend to prioritize developing market competence. The various departments, supervisors, and members are fully informed and participate in the company’s inter-organizational learning to promote market-oriented resources to upgrade the three stages of “information acquisition→ information dissemination→ shared interpretation” (Sinkula, 1994; Slater & Narver, 1995). More important, these mechanisms of the firm’s inter-organizational learning require collaborative coordination (Lee & Saxenian, 2007).

### *The Resource Characteristics and Learning Routes*

Applying intra-organizational learning interactions (Harvey, Palmer, & Speier, 1998) in intra- and inter- departments has upgraded Neda's technical knowledge. The firm has shaped technological barriers (Hsu & Chiang, 2001) by developing more advanced equipment and exploring the external consumer market. Using the inside-out learning route (outward learning), firms prioritize developing technological competence, and further promote market competence by intra-organizational learning to upgrade their technical knowledge and experience (Harvey, Palmer, & Speier, 1998).

Using inter-organizational learning interconnections with external contractors and the embedded network (Hobday, 1995) has upgraded ARET's marketable knowledge. The firm has shaped marketability synergies and agglomerations (Grabher, 1993; Yeung, 1994; Amin & Cohendet, 1999) by improving the competitiveness of the company's product market and transferring external technology and knowledge (Mathews, 2002). By combining the outside-in learning route (inward learning), firms prioritize developing market competence and further promote technology competence by inter-organizational learning to upgrade their marketable knowledge and experience.

#### *Academic Application*

The findings of this study are consistent with the views of scholars (Wernerfelt, 1984; Danneels, 2002, 2007) who have stated that a firm's development is necessary for considering sequential resource development. Furthermore, we emphasize that the crucial choice for small firms in the development process is the continual exploitation of existing resources, thus saving the firm financial

costs and time. This view is consistent with that by March (1991).

We applied resource-based theory to explore organizational behaviors. Several contributions are described as follows.

First, this study identified resource characteristics that are necessary for a firm's competence development, particularly regarding organizational behaviors. We found that firms possessing improvement resources develop technology competence first and apply them to intra-organizational learning to promote market competence. Conversely, firms that have social resources develop market competence first and incorporate them into inter-organizational learning to promote technology competence.

Second, this article shows that a firm must exploit existing resources and explore new ones (Floyd & Lane, 2000) to facilitate the renewal of small firm competencies. Furthermore, the processes of exploiting and exploring must occur simultaneously and are equally important. The findings of this study show that exploiting and exploring both existing and new resources are activities that can expand the resource base of a firm, thus enabling the development of new competencies.

Third, a small firm requires not only specific resources but also the mechanisms of intra- and inter-organizational learning with three stages of "information acquisition→ information dissemination→ shared interpretation" (Sinkula, 1994; Slater & Narver, 1995), which actuate and complete a firm's competence development.

Fourth, this study articulates the dynamic and reciprocal relationship of inside-out and outside-in organizational learning routes based on the support of firm specific resources, leading to firm competence renewal. The insight into the reciprocity of the resource characteristics

and organizational behaviors of competence renewal relationships extends resource theory by examining not only how resources are used in competence renewal but how they are built intra-firm or inter-firm as well, and by examining how resources/competencies can be used to promote new competencies. The findings contrast those of Danneels (2002) in that a firm should always apply the technology to new products that addresses new customers.

Finally, we found that small firms are devoted to prioritizing the development of the most valuable competence, and then use/combine the first competence to drive/promote follow-up competence. Neda should first develop technology competence and further use the technology competence through intra-organizational learning to drive market competence. Conversely, ARET should first develop market competence, and then combine the market competence through inter-organizational learning to promote technology competence.

#### *Practical Application*

This study applied resource-based theory and organizational learning theory to explore the organizational behaviors of competence development. Several contributions to the efforts of industrial companies are described as follows.

First, the findings of this study can help small firms understand their resource characteristics and further formulate the direction of their competence development.

Second, small firms with limited resources and scales develop TFT-LCD industry require high costs and technologies. The findings of study can help small firms develop more urgently required competencies, and further use previous competencies to promote new competencies.

Third, small firms choose inside-out and outside-in learning routes by using the mechanisms of intra- and inter-organizational learning with three stages of “information acquisition→ information dissemination→ shared interpretation” (Sinkula, 1994; Slater & Narver, 1995) to promote and complete new competence development.

Finally, for small firms, exploiting internal resources and exploring external resources are equally important and should be accomplished simultaneously. More important, as long as such resources are beneficial to a firm’s future direction, expand the resource base of the firm, which enables firms further new competencies, why should care about inward- or outward-learning routes.

#### *Limitations and Future Research*

The findings of this study are based on an in-depth study of two firms. We could not establish whether the findings are generalizable to firms that are not high-tech or are in newly industrialized economies, or whether the findings are generalizable to firms possessing abundant resources. Therefore, the findings of this study are limited.

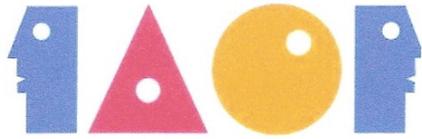
The researched firms could have idiosyncrasies that may have influenced their competence development behaviors or renewal efforts. However, the findings of this study have an intuitive and conceptual appeal, and are amenable to quantitative verification. Future research may be directed toward quantitative approaches or extended to the alliance partners (Lane and Lubatkin, 1998) and mergers and acquisitions (Eisenhardt and Martin, 2000; Karim and Mitchell, 2000).

Based on Priem and Butler (2001), we suggest that a great research opportunity exists for investigating the process of accumulating resources and competencies.

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RESEARCH ON ATHLETE ENDORSEMENT, CONSUMER  
INVOLVEMENT AND ADVERTISING EFFECTS

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Abstract

Advertising spokespersons can increase product reputation and further enhance brand image, so that advertisers' brand names and products can quickly become a part of consumers' memories, thus fulfilling the purpose of advertising. This research aims to probe into the relationships among athlete endorsement, consumer involvement and advertising effect, and treats Hong-Chih Kuo, the spokesperson of SUBWAY, as the subject. A total of 400 questionnaires were distributed and 347 valid samples were retrieved for a return rate of 86.75%. The results indicate that athlete endorsement significantly and positively influences consumers' attitude toward advertising, products and purchase intention, in advertising effect. When consumer involvement is a mediating variable, however, athlete endorsement does not significantly influence advertising effect.

Keywords: Athlete endorsement, Advertising Spokesperson; Advertising Effect; Consumer Involvement

## Introduction

### *Research Background and Motives*

According to Forbes, golf player Tiger Woods's annual global income for 2008 was 150 million USD, making him the highest paid athlete in the world. As the spokesperson of Nike Golf Kit, Woods can bring Nike a profit of 600 million USD every year. British football star David Beckham is the spokesperson of Adidas, Motorola and Pepsi Cola, and his annual income last year was 33 million USD. Brazilian football star Ronaldo's annual income last year, due to his increasing endorsement incomes, was 31 million USD. In the US, where sports and business are closely associated, NBA players' annual incomes are impressive. Well-known NBA players Kobe Bryant, Shaquille O'Neal and Michael Jordan have annual endorsement incomes of over 30 million USD. Bryant is the spokesperson of Adidas in Germany, and Jordan's name even became one of the trademarks of Nike.

In Taiwan, as domestic players have shown outstanding performances in foreign teams or international competitions, advertisers have begun to endorse them. For instance, Wang Chien-ming, the Taiwanese baseball pitcher in the US, is the spokesperson of Acer, Ford, McDonald's, E. Sun Bank and Kuang Chuan Milk. Chu Mu-yen, the Taekwondo gold medalist of the Olympic Games, is the spokesperson of Adidas in Taiwan. Tennis player Lu Yen-Hsun officially endorses Taiwan Beer. In such advertising, there is athlete endorsement in order to more effectively control the advertising effect. There is an urgent need to study how athlete endorsement achieves the effect desired by firms through advertising (Chien, 2006).

Advertising spokespersons enhance product reputation and brand image. Thus, advertisers' brand names and products can

quickly become part of consumers' memories, thus fulfilling the purpose of advertising. This is called "recommendation advertising". A spokesperson's identification with products in advertising constructs or reconstructs consumers' attitude toward advertising (Mowen and Brown, 1980). McCracken (1989) suggested that spokespersons directly reflect their personal traits on brands. Fence (1991) indicated that consumers tend to be impressed by advertising with celebrities' recommendations which leads to trust in, and familiarity with, products or firms. Therefore, well-known advertising spokespersons can significantly enhance the promotion of products.

According to the report of Advertising Magazine in 2000, about 10% of annual TV commercial expenditure in the US is paid to celebrities, such as well-known athletes, movie stars, and singers (Chou et al., 2008). In addition, Stafford, Stafford and Day (2002) suggested that celebrities are suitable for serving as advertising spokespersons when products are introduced in the market; since consumers have the idea that celebrities represent brands, they connect celebrities with these brands, leading to the desired advertising effect. In addition, celebrity endorsements allow consumers to have more brand and advertising memories (Harmon and Coney, 1982; Grewal et al., 1994). Based on the above, the relationship between celebrity endorsement and advertising effect is supported.

Most of the past research on the relationship between advertising spokespersons and advertising effect demonstrates the abovementioned correlation (Freiden, 1984; Tripp et al., 1994; Till, 1998; Bower and Landreth, 2001; Stafford et al., 2002; Lin and Tseng, 2008). However, these studies neglect the role of consumers which falls between advertising spokespersons and the advertising effect. With

consumer involvement, will celebrity endorsement, attitude toward advertising, attitude toward products and purchase intention influence the relationship between advertising spokesperson and advertising effect? Answering this question underlines the main motive of this study.

### Research Purposes

Based on the research background and the above stated motive, this study treated consumers who had tasted or heard of SUBWAY sandwiches in Taiwan as the subjects to probe into the influence of the endorsement of Hong-Chih Kuo, the Taiwan baseball player for the LA Dodgers, on consumer involvement and advertising effect. The main research purposes are shown below:

1. Probe into the influence of athlete endorsement on the advertising effect, and
2. Probe into the relationship between athlete endorsement and the advertising effect when consumer involvement is a mediating variable

### Literature Review and Hypothesis Testing

#### *Literature Review*

##### *Athlete Endorsement.*

McCracken (1989) suggested that advertising spokespersons demonstrate consumers' use benefit by their reputation in advertising. When consumers receive information from advertising, they determine the product image according to the image of the advertising spokespersons. Such shifting of spokesperson image is one of the focuses of advertisers. O'Gainn, Allen and Semenik (2000) and Wang, Hsieh and Chen (2002) suggested that celebrities, experts and consumers are the most common advertising spokespersons. Schiffman and Kanuk (2004) divided

spokespersons into celebrities, experts, ordinary people, high-rank managers, and mottoes. Celebrities include social celebrities, movie stars, TV celebrities, popular artists and sports idols. As for dimensions of advertising spokespersons, Ohanim (1991) and Chanthika (2003) indicated attraction, reliability and professionalism Shane (2005) suggested reliability, professionalism and preference; Lei and Sung (2009) divided dimensions of spokesperson into professionalism, reputation, attraction, reliability and exposure.

According to Ho and Lee (2010), the measurement could be based on attraction, reliability and professionalism. Based on the above, this study suggests that athlete endorsement is based on athletes' reputation, reliability and attraction, as demonstrated by advertising. When consumers receive information from advertising, they determine product image based on the advertising spokesperson's image.

##### *Advertising Effect.*

Lavudge and Steiner (1961) attributed the advertising effect to both the communication effect and sales effect, and probed into the potential influence of advertising information on consumers' cognition, preference and purchase intention (actual sales). Ducoffe (1996) defined the advertising effect as potential communication between advertisers and consumers regarding advertising information. Based on studies of Lutz (1985), Gardner (1985), MacKenzie, Lutz and Belch (1986), Lafferty and Ronald (1999), and Wang, Hsieh and Chen (2002), measures of advertising effect include attitude toward advertising, attitude toward brands and purchase intention. Attitude toward advertising refers to consumer preference in regard to advertising and trust in information, which would draw attention to advertising. Attitude toward brands is the consumers' preference for products of certain

brands. Purchase intention is the possibility of consumer purchase of products. Based on the above, this study suggests that advertising effect can create, communicate with and deliver value to consumers to result in consumers' favoring products, thereby increasing the possibility of product purchase.

#### *Consumer Involvement.*

Purchase involvement refers to consumers' concern about certain purchases (Engel et al., 1982). When the correlation between purchasing intent and consumers is high, consumers will spend more time on consideration and information collection order to make more reasonable decisions; this Tmodel is called high involvement purchase decision making. The opposite situation is called low-involvement purchase decision making. Petty and John (1984) suggested that consumers with different involvement would deal with information differently. According to Zaichkowsky (1985), consumer involvement is a person's concern about specific things because of basic needs and interests. MacKenzie and Lutz (1989) suggested that consumer involvement is the critical factor in attitude and behavior. Researches of Moorman and Jaworski (1991), Janssens and De Pelsmacer (2005) and Tung (2008) demonstrate that consumers with high involvement reveal better quality and quantity of perception. Based on the above, this study suggests that consumer involvement is the model in which consumers are willing to spend more time considering and collecting information related to products that they are interested in.

#### Hypothesis Testing

##### *Studies on the relationship between athlete endorsement and advertising effect*

Kamins (1990) suggested that when spokespersons fit the products, the en-

dorsement effect would be the best. Solomon, Ashmore and Longo (1992) and Lynch and Schuler (1994) indicated the importance of fit between spokesperson and products by condition of "match-up hypothesis". Past research demonstrates that the advertising effect is influenced by advertising spokespersons (Till, 1998; Bower and Landreth, 2001). Stafford et al. (2002) suggested that attraction and attitude toward advertising significantly influence the advertising effect of celebrity endorsement. Brian, Sarah and Randi (2006) indicated that fit between spokespersons and types of products is important for consumers' positive attitudes. Lei et al. (2009) suggested that firms draw consumers' attention by a star player's reputation, charm and advertising endorsement. In other words, athlete endorsement could enhance consumers' purchase intention. Based on literature and the analysis above, the following hypothesis is proposed:

*H1: Athlete endorsement positively influences the advertising effect.*

Probing into the influence of athlete endorsement on advertising effect by treating consumer involvement as a mediating variable

Greewald and Leavitt (1984) suggested that when consumers have high involvement with advertising, there is a high correlation between advertising information and consumer rated importance of the above information. Mittal (1989) indicated that involvement is consumers' interest in and concern about purchase decision making. According to Schiffman and Kanul (1991), involvement is consumers' concern about specific purchase decision making and perceived importance. Janssens et al. (2005) demonstrated that higher consumer involvement leads to higher product perception. Chien, Hsiao,

Chiu and Lu (2007) suggested that for high-involvement consumers, when there is a high correlation between information source and types of products, attitudes toward products are influenced by information reliability. However, when there is a low correlation between information source and types of products, they would not be influenced by reliability of information source. Chen (2008) suggested that consumers' purchase involvement significantly influences information search. Based on literature and the analysis above, the following hypothesis is proposed:

*H2: Through consumer involvement, athlete endorsement positively influences the advertising effect.*

### Research Method

According to research motives, purposes and literature review, this study constructed the research framework and collected data by questionnaire to validate the hypotheses. Measurement of research framework, hypotheses, research subjects and variables is shown below.

### Research Framework

This study treated consumers who had tasted or heard of SUBWAY sandwiches

as the subjects, and probed into the correlation between athlete endorsement, consumer involvement and advertising effect. The conceptual framework is shown in Figure 1. Advertising effect is influenced by athlete endorsement. By treating consumer involvement as a mediating variable, this study explored the correlations among athlete endorsement, consumer involvement and advertising effect (“->” refers to the direction of effect.)

### Assessment of Research Variables

According to the literature review, variables were defined and operated to meet the purposes of this study, and wording acceptable to the subjects was developed. Two marketing teachers discussed and modified the content of the questionnaire items, and completed the final draft. A total of 30 pretest questionnaires were distributed to confirm the feasibility of the questionnaire. Cronbach's  $\alpha$  of athlete endorsement is 0.877, Cronbach's  $\alpha$  of consumer involvement is 0.926, Cronbach's  $\alpha$  of advertising effect is 0.856. Cronbach's  $\alpha$  of reliability analysis of dimensions are above 0.8. These scores demonstrate good reliability of the pretest questionnaire.

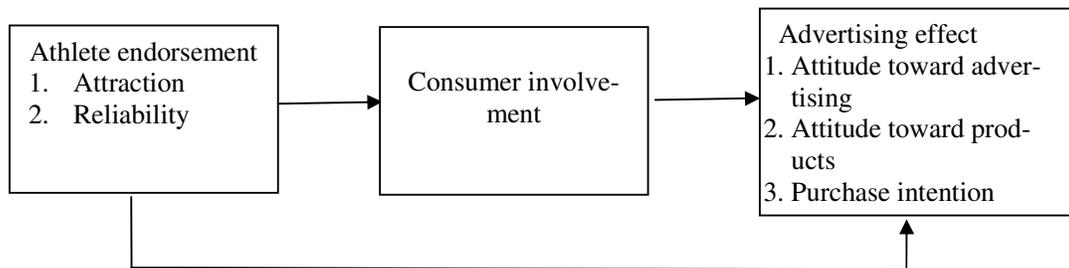


Figure 1. Research Framework

Except for the personal basic information, the rest of the questionnaire was based on a Likert 5-point scale, from “strongly disagree” (1 point) to “strongly agree” (5 points). The content is as follows: (1) athlete endorsement: according to reliability sources of advertising spokespersons indicated by Ohanian (1991), this study measured consumers’ identification with athlete endorsement; there are nine items; (2) consumer involvement: this is based on the definition of Zaichkowsky (1985) on involvement with advertising, and it includes advertising information attention and advertising content memory; there are six items to probe into consumers’ involvement with product content information; (3) advertising effect: this is to measure consumers’ attitude toward and perception of SUBWAY sandwiches; there are 21 items, including: attitude toward advertising, attitude toward products and purchase intention. Data Analysis and Research Results

#### *Basic Characteristics of Samples*

This study formally distributed 400 questionnaires to customers who had tasted or heard of SUBWAY sandwiches. A total of 347 valid samples were retrieved, and the return rate was 86.75%. The respondents include 157 males (45.2%) and 190 females (54.8%); 167 participants are 21-30 years old (48.13%); most of them have university or college education (262 people, 75.5%); most of them are military personnel, public servants and teachers (180 people, 51.9%); most of them have a monthly income of \$20,000~30,000 NTD (122 people, 35.2%), followed by below \$10,000 NTD (77 people, 22.2%).

#### *Reliability and Validity Analysis*

By the largest variation axis method of factor analysis, factors with eigenvalue

above 1 are extracted from different scales, and items with lower factor loading are eliminated. The internal consistency of items is measured by Cronbach’s  $\alpha$ . Cronbach’s  $\alpha$  of all dimensions is above 0.7. According to Nunnally (1978), Cronbach’s  $\alpha$  above 0.7 is acceptable criterion; therefore, the reliability of this questionnaire is acceptable.

In the scale of athlete endorsement, two factors are extracted and the accumulated explained variance is 82.66%. Factor 1 is related to athletes’ image and attraction and is called “athlete endorsement attraction”; factor 2 is related to trust, image and importance of athlete endorsement, and is called “athlete endorsement reliability”. Cronbach’s  $\alpha$  of these two factors is 0.87 and 0.96, respectively. In the scale of consumption involvement, one factor is extracted: accumulated explained variance is 62.82%. This factor, called “consumer involvement”, is related to recognition of product information. Cronbach’s  $\alpha$  of consumer involvement is 0.85.

In the scale of advertising effect, three factors are extracted and the accumulated explained variance is 80.16%. Factor 1 is related to consumers’ impressions and perceptions of advertising and is called “attitude toward advertising”; Factor 2 is related to consumers’ trust and value of products in advertising and is called “attitude toward products”; and Factor 3 is related to consumers’ product purchase desire after reading advertising and is called “purchase intention”. Cronbach’s  $\alpha$  of three factors is 0.95, 0.92 and 0.82, respectively.

Cronbach’s  $\alpha$  of dimensions is above 0.80. It indicates the degree of reliability of the scale. Items extracted in factor analysis meet the original design of this study. This demonstrates proper construct validity of this scale.

### *Correlations among Research Variables*

According to the correlation analysis in Table 1, “athlete endorsement attraction” and “athlete endorsement reliability” reveal positive correlations with “attitude toward advertising”, “attitude toward products” and “purchase intention”. In other words, when “attraction” and “reliability” of products endorsed by athletes are higher, consumers’ “attitude toward advertising”, “attitude toward products” and “purchase intention” are stronger. “Attitude toward advertising”, “attitude toward products” and “purchase intention” reveal positive correlations with “consumer involvement”. In other words, when consumers’ attitude toward advertising, attitude toward products and purchase intention are higher, their involvement will be higher.

### *Regression Analysis*

In order to probe into the relationship between athlete endorsement (attraction and reliability) and advertising effect (attitude toward advertising, attitude toward products and purchase intention), regression analysis was performed. When criterion variables are attitude toward advertising, attitude toward products and purchase intention predictors are athlete endorsement attraction and reliability. The results indicate that athlete endorsement attraction and reliability significantly influence attitude toward advertising, attitude toward products and purchase intention in advertising effect ( $\beta$  are 0.71, 0.17, 0.30, 0.63, 0.29 and 0.20). This means that there is a linear correlation, as shown in models 1, 2, 3, 4, 5 and 6.

### *Path Analysis*

With regard to the relationship between athlete endorsement (attraction and reliability) and advertising effect (attitude toward advertising, attitude toward prod-

ucts and purchase intention, consumer involvement is a mediating variable.

According to validation conditions indicated by Baron and Kenny (1986) on mediating effect, predictors significantly influence a mediating variable; a mediating variable significantly influences a criterion variable; and with a mediating variable, correlation between predictors and a criterion variable should be less significant than the situation without a mediating variable. According to the correlation analysis in Table 2, the correlations among athlete endorsement attraction, reliability and consumer involvement do not exist. However, consumer involvement reveals a significant and positive correlation with attitude toward advertising, attitude toward products and purchase intention in advertising effect.

The first two conditions suggested by Baron and Kenny (1986) are not consistent with H1 of this study. Therefore, in the correlations among athlete endorsement attraction, reliability and attitude toward advertising, attitude toward products and purchase intention of advertising effect, consumer involvement do not reveal a mediating effect.

## Conclusions and Suggestions

### *Conclusions*

Based on the data analysis and above discussion, the conclusions are as follows.

*Athlete endorsement and advertising effect.*

The findings of this study suggest that athlete endorsement attraction significantly and positively influences consumers’ attitude toward advertising, attitude toward products and purchase intention resulting from the advertising effect. Wanting more significant advertising effect, companies’

searches for the right spokespersons to draw consumers' attention and fulfill maximum advertising effect become critical in product marketing. As suggested by Brian et al. (2006), the fit between spokespersons and types of products is important for consumers' positive attitudes. Hsu and McDonald (2002) indicated that celebrity recommendation refers to a shift in consumers' attitudes and feelings toward brands through celebrities' attraction. In other words, in current sports marketing, attraction of athlete endorsement positively enhances consumers' attitude toward advertising, attitude toward products and purchase intention. Therefore, when searching for advertising spokespersons, determining how to draw the consumers' attention and shift the product characteristics to spokespersons, and further increase

advertising effect, becomes an important issue for firms. Reliability of athlete endorsement significantly and positively influences consumers' attitude toward advertising, attitude toward products and purchase intention in advertising effect. In other words, reliability of athlete endorsement will enhance consumers' attitude toward advertising, attitude toward products and purchase intention. This result matches the view of Shane (2005) and Chou et al. (2008) that experts' and celebrities' persuasion is based on their reliability and professionalism. Thus, consumers believe that they are being recommended the products sincerely with a reliable professional judgment. Consumers thus identify with the products. The findings of this study show that the reliability of

Table 1. Pearson Correlation Analysis

Research variables	1	2	3	4	5	6
1. Athlete endorsement attraction	1.00					
2. Athlete endorsement reliability	.48**	1.00				
3. Attitude toward advertising	.71**	.17**	1.00			
4. Attitude toward products	.30**	.63**	.27**	1.00		
5. Purchase intention	.29**	.20	.37**	.13*	1.00	
6. Consumer involvement	-.01	.09	.09 <sup>+</sup>	.17**	.29**	1.00

Note: <sup>+</sup> denotes p<0.1; \* denotes p<0.05; \*\* denotes p<0.01

Table 2. Regression analysis on Athlete Endorsement and Advertising Effect

Criterion variables	Attitude toward advertising		Attitude toward products		Purchase intention	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Predictor variables						
Athlete endorsement attraction	0.71**		0.30**		0.29**	
Athlete endorsement reliability		0.17*		0.63**		0.20**
F value	357.59**	9.92*	34.93**	222.58**	30.60**	14.86**
R <sup>2</sup>	0.509	0.028	0.092	0.392	0.081	0.041

Note: <sup>+</sup> denotes p<0.1; \* denotes p<0.05; \*\* denotes p<0.01

SUBWAY products endorsed by baseball player Hong-Chih Kuo can enhance consumers' attitude toward advertising, attitude toward products and purchase intention of advertising effect.

*Consumer involvement is a mediating variable: influence of athlete endorsement on advertising effect.*

According to the analytical result, the influence of athlete endorsement and consumer involvement on advertising effect does not exist. When consumer involvement is a mediating variable, the influence of athlete endorsement on advertising effect is insignificant. In general, after consumers are involved with products, athlete endorsement attraction or reliability cannot enhance attitude toward advertising, attitude toward products and purchase intention of advertising effect. This study demonstrates that consumers' product involvement will not influence advertising effect of SUBWAY products endorsed by baseball player Hong-Chih Kuo.

#### *Suggestions*

Based on the above, suggestions are provided as follows.

Attraction and reliability of endorsement of Hong-Chih Kuo significantly influences advertising effect. This means that when consumers receive advertising information, they value a spokesperson's reputation and personal attraction. They trust a spokesperson's professionalism in the field, and believe that they can provide reliable product information for consumers. It is suggested that when looking for spokespersons of products, companies should consider a spokesperson's attraction, reliability and fit with products in order to enhance advertising effect, business image and benefit.

*Careful selection of the right spokespersons.*

Selection of the right spokesperson is of critical importance, since spokespersons directly represent brands. This study finds that upon consumer involvement, spokespersons' influence on advertising effect is insignificant. Thus, when selecting spokespersons, companies should consider advertising policy and purposes since different spokespersons will have different effects in different markets and on different products.

#### *Limitations*

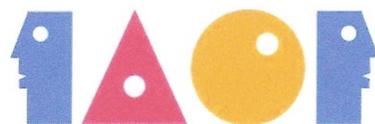
Regarding the subjects of the questionnaire survey, this study adopted convenience sampling, thus demographic variables did not have average distribution. Future studies can adopt stratified sampling or sampling according to different nationalities. Moreover, consumers who had tasted or heard of SUBWAY sandwiches were invited to fill in the questionnaire; they might be influenced by subjective or external factors such as environment, emotions, attitude and perception. Future studies can conduct item studies on consumers' purchase behaviors or service quality in order to probe into the correlation between consumers' purchase behaviors and service quality, in order to enhance the operational management and advertising effect of SUBWAY.

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INTEGRATED ENVIRONMENTAL INDICATORS IN DEVELOPING  
WATERSHED RURAL COMMUNITIES

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Abstract

Rural village watersheds own a greater proportion of land and agricultural resources than do general communities. However, they have been restricted by policies of watershed protection and hillside control, which result in partial urbanization and limited socioeconomic benefits. This study established an evaluation index to rate the sustainability of major watersheds in Taichung County, Taiwan. We used Delphi technology and the AHP, and invited 23 experts to participate. Our results showed that the experts generally considered sustainable development a crucial factor for rural village communities. Our study also identified suitable strategies for achieving local sustainability. The village obtaining the lowest ranking on the actual evaluation was Fusing village. We concluded with a case study in which the proposed model was applied to Fusing to develop suggestions for practical policies that might improve the village's sustainability.

Keywords: Watershed Management; Watershed Community; AHP, Expert Questionnaire

Introduction

Sustainable development was defined in the report "Our Common Future" (WCED) as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (1987). Similarly, Hurni (2000) defined sustainable land management as a system of technology and/or planning that integrates Ecological

principles with socioeconomic and political principles to manage land effectively. Such management may be focused on agricultural or other purposes and should achieve intra- and inter-generational equity (2000).

The sustainable use of a watershed requires that issues of sustainability be simultaneously addressed for land, agriculture, and forests. Subha et al. (2008) defined sustainable watershed management as the management of a

watershed system using sustainable technological options to ensure the conservation of land, agriculture, and forestry. Sustainable management should conserve the natural resources and provide adequate institutional and economic options.

We sought to identify suitable indicators to evaluate the sustainability of watershed rural communities, using the framework of sustainable watershed management. This paper presents our analytical framework for examining the differences between watershed communities. Each element was assessed for its effect on sustainability and in relation to the other identified elements. We applied the framework to three case studies in Taiwan.

## The Study Area

The Baiamo subwatershed of the Shirh-Gang Dam catchment basin constituted our main research area, which deposited with the administrative regions with GIS tool. (See Figure 1.) This subwatershed contains three villages: Nanshih Village, Tianlun Village of Heping Township, and Fusing Village of SinSer Township in Taichung County. Nanshih Village is the most densely populated village of the three, with a population of 2204 and an area of 20.84 km<sup>2</sup>. The whole village belongs to the Tachia upstream watershed. The area of Tianlun Village is 56.35 km<sup>2</sup>, and the total population was 609 at the end of 2007.



Figure 1. The subwatershed of Shirh-Gang Dam catchment basin.

Fusing Village is located in the eastern-most mountains of Sinser township, taichung county. The village's total area is 21.58 km<sup>2</sup> and fusing is the largest village of sinser township, with a population of 1583 at the end of 2007.

## Methodology

### *Establishment Of An Evaluation Index For Watershed Rural Communities*

The sustainability index system for watershed rural communities is a complex system with multiple subjects and levels. It encompasses the ecological, water quality and quantity, and landscape environments. Our analysis showed that the evaluation index system for watershed rural

communities included four subsystems: ecological (B1), water quality and quantity (B2), landscape (B3), and the socio-economic and cultural subsystem (B4). To validate the index system for rating the sustainability of watershed rural communities, identification of the key assessment factors is crucial. These factors should accurately represent the main features of a sustainable community.

We established four subsystems and 24 indicators to provide an integrated analysis. The indicators were as follows: proportion of protected area, proportion of natural river length, green coverage rate, proportion of leisure space, proportion of existing forest area, proportion of agricultural land, RPI value, agricultural water use, livelihood water, water quantity, terrain landscape, geological landscape, vegetation landscape, animal landscape, water landscape, cultural landscape, educational attainment, average household income, local agricultural production, local cultural resources, number of development projects, degree of alliance with strategic tourism, convenience of transportation, and number of community organizations. These indicators are discussed in the following paragraphs.

#### *Ecological subsystem (B1).*

For the ecological subsystem, the following factors were selected: proportion of protected area (D1), proportion of natural river length (D2), green coverage rate (D3), proportion of leisure space (D4), proportion of existing forest area (D5), and proportion of agricultural land (D6).

#### *Water quality and quantity subsystem (B2).*

For the water quality and quantity subsystem, the following factors were selected: RPI value (D7), agricultural water use (D8), livelihood water (D9), and water quantity (D10).

#### *Landscape subsystem (B3).*

For the landscape subsystem, the following factors were selected: terrain landscape (D11), geological landscape (D12), vegetation landscape (D13), animal attractions landscape (D14), water landscape (D15), and cultural landscape (D16).

#### *Socioeconomic and cultural subsystem (B4).*

For the socioeconomic and cultural subsystem, the following factors were selected: educational attainment (D17), average household income (D18), local agricultural production (D19), local cultural resources (D20), number of development projects (D21), degree of alliance with strategic tourism (D22), convenience of transportation (D23), and number of community organizations (D24).

#### *Weighting of Assessment Factors*

The analytic hierarchy process (AHP) method was used to determine the weight of each factor. The AHP is a simple systematic engineering technique for the quantitative analysis of non-quantitative objects. The AHP considers the researcher's subjective judgment during quantitative and/or qualitative analysis, and also illustrates complex systems in a hierarchic structure. The relationships between the internal and external components of the system are described and analyzed stepwise, thus providing a systemic, numerical, and modeling system for decision-making. Because of its ability to assign accurate weights to factors within complex systems, the AHP has been described as an analytic multilevel value process (1999).

In this study, the AHP was used to determine the weight of each factor according to expert opinions. The AHP

provides a systematic analysis for the qualitative evaluation of a complex multiple-component index system. A complex problem can be decomposed into layers and factors, which can then be compared and assigned individual weights (2002). Our data were obtained using the Delphi expert advice system, followed by the application of the AHP to determine the weight of each factor (2000).

The AHP calculation method was developed by Saaty (1980) and is recognized as a useful approach to multiple-criteria decision-making problems. The AHP assists with solving complex problems by clarifying underlying priorities (2011). The method has been successfully used in policy selection (2010). The AHP enhances the identification of cause-and-effect relationships involving goals, factors, subfactors, and alternatives, by breaking down the structure of the problem (2003).

However, in the real world, obtaining precise data on measurement factors is challenging because all human preferences are prone to a degree of uncertainty. Decision-makers are inclined to favor natural language expressions over exact numbers when assessing criteria and alternatives. For this reason, “fuzzy” AHP methods have been extensively studied because of their ability to emulate human thought and perception. Several fuzzy AHP methods have been proposed, based on the concepts of fuzzy set theory and hierarchical structure analysis.

The study of an eco-environment requires methodology that is able to assess a complex system including multiple subjects and levels. Our choice of methodology was thus the AHP. The detailed analytic process is described in the following section.

#### Data Collection

A synthetic evaluation of the quality of an eco-environment requires the collection of numerous types of data and figures from natural, economic, and social sources. The interrelationships among population (social ties), resources, ecology, and economic development must be considered. Thus, data collection becomes crucial to the successful assessment of conceptual models.

We used two types of data to evaluate the eco-environment. The first was environmental characteristics, including the natural environment, social economy, environmental pollution, and disaster index. The other type of data qualified the extent of these characteristics. The measures of extent included remote sensing figures and thematic maps, such as forest floor maps or distribution maps of waterlogged and dry areas, and runoff depth maps.

The data for land use were derived from digital maps of land resources and present land use, at a scale of 1:250 000, provided by the Soil and Water Conservation Bureau (SWCB). Because various maps employed different scales, we scanned them and digitized the data on a computer. We used ArcGIS8.1 to project all maps into a standard projection system.

#### Dimensionless Evaluation Factors

Each evaluation factor addressed a specific characteristic or extent, and the data set for each factor had its own dimensions and distribution. This diversity prevented us from making direct comparisons. Consequently, the original data of evaluation factors should be dimensionless by range transformation. Furthermore, the evaluation factors showed either negative or positive interrelations. Positive interrelations between certain factors indicated an advantageous eco-environmental quality. Higher evaluation values for those factors signified better eco-

environmental quality. Negative interrelations indicated a disadvantageous quality of the eco-environment. Higher evaluation values for these factors indicated worse eco-environmental quality. Thus, negative and positive interrelations were rendered dimensionless, with Formula 1 representing positive factors, and Formula 2 representing negative interrelation factors. This dimensionless unit rendered all factors comparable, so that we could identify factors with higher values. A higher factor value signified greater importance of the factor's contribution to eco-environmental quality.

Our analysis showed that the positive factors were D1, D2, D3, D4, D5, D6, D8, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, and D24. The negative factors were D7 and D9. All the factors were analyzed using the following method (2003):

$$x_i = \frac{x_i - x_{i \min}}{x_{i \max} - x_{i \min}} \times 100 \quad (1)$$

$$x_i = \left(1 - \frac{x_i - x_{i \min}}{x_{i \max} - x_{i \min}}\right) \times 100 \quad (2)$$

Where:  $x_i$  is the evaluation unit;  $X_i$  is the original value of  $I$ ;  $X_{i \max}$  and  $X_{i \min}$  are the maximum and minimum values, respectively, of  $i$ . For convenient processing, all transformed data were magnified 100 times.

#### Weight of Evaluation Factors

The weight of each factor was determined using the AHP, based on expert opinions obtained using the Delphi method. As discussed, the AHP is a systematic method for analyzing complex problems quantitatively. The AHP identifies layers and factors, for which accurate weights can then be calculated (2002). This ability to calculate weights for the various factors of complex systems

led us to select the AHP for our study of eco-environmental systems. The basic analytic process involved four steps:

- (1) Establishment of the hierarchic structure
- (2) Establishment of a comparison matrix
- (3) Single ranking
- (4) Total ranking

Because of the pairwise comparison, the matrices of Layers B and C, C and D were with the same method as that of Layers A and B. Based on the results of a series of simple rankings, the weights of all elements at a specific level of the hierarchy can be obtained, relative to the entire level directly above. We calculated a comparison matrix showing the corresponding pairwise comparisons of Levels A and B. This matrix enabled us to compare the elements at a specific level of the hierarchy, and relate these elements to a single element at the level directly above; each element was ranked by eigenvectors for the matrix (2003).

We invited 23 experts to participate in two stages of the Delphi expert advice system. These included six government officials from the SWCB and the Water Resources Agency, and 18 professors specializing in the fields of landscape, agriculture, ecology, environmental engineering, and management.

Calculate the eigenvalue of the max as totally ranked, and was carried from the upper layer to the lower layer. After this analysis, we determined the weight of each evaluation factor contributing to the overall index value. The index measured the sustainability of watershed rural communities (Table 1.)

Calculation of Synthetic Index and Subindex Scores.

As a complex system with multi-subject and multilevel sustainability

evaluation systems for the watershed rural community, the synthetic evaluation index of environmental quality was adopted to enhance the accuracy and confidence of the levels [5,7,13], which means that the values of all the indices were overlaid in each evaluation unit and the synthetic value was used to determine environmental sustainability. We used the ArcGIS software to analyze data obtained from the regional information system database. The software enabled us to calculate a graded index for the synthetic evaluation of eco-environmental quality. The process of calculation was as follows.

First, a characteristic database of each evaluation unit was established. Second, a synthetic index of the eco-environmental quality for each evaluation unit was automatically calculated using ArcGIS. The weights of each factor were used in this calculation.

The requisite spatial data were then selected from the eco-environment thematic database. A series of data processing was conducted by overlaying spatial data and characteristic data. The vector was grated to assess the model being evaluated. Finally, the quality of regional eco-environments was quantified using the method of multilevel weighted sums, after standardization and quantization of the thematic data. The output represented the synthetic index of environment evaluation. The evaluation value for each unit represented the sum of the corresponding weight values for all related factors. The following equation was used:

$$EEQ = \sum_{i=1}^n u_i w_i \quad (3)$$

Where: EEQ is the synthetic index of eco-environment quality; u is the value of each index; w is the weight of each index; and n is the total number of indices (i=1, 2, 3, . . ., n).

## Results And Analysis

Figure 2. shows the environmental assessment values for the three village communities in the Bai-Mao watershed area. The values represent the qualitative assessment for Heping Township, using indicators such as ecological status, water quality and quantity, landscape, and community cultural characteristics. The calculated values totaled 48.38 for NanShi Village, 45.84 for TianLun Village, and 45.17 for Fuxing Village in Sinshe Township.

The project assessment model showed that Fusing Village obtained the lowest score. Thus, this village was selected as the site most in need of immediate improvement.

The indicators of sustainability across all sectors related to this study require further elaboration. Table 1 shows the numerical rankings of the sustainable development indicators. The village assessment level (first level) and the criterion level (second class level) are shown in the bar graph in Figure 2. A greater indicator value signifies a larger area in the bar graph, and a greater area represents a higher level of local sustainability. As shown in Figure 2., NanShi Village attained the highest level of sustainability, TianLun Village the second highest, and FuXing Village the least. If local government wished to spend less while still enhancing these villages, our recommendation would be to focus on FuXing Village. Furthermore, the model identified specific items requiring attention. The subindex of sustainability values and the third subindex of sustainability values for watershed rural communities were relevant here.

### *Analysis of Subindex of Sustainability Values.*

At the subindex level, overall environmental conservation was adequate,

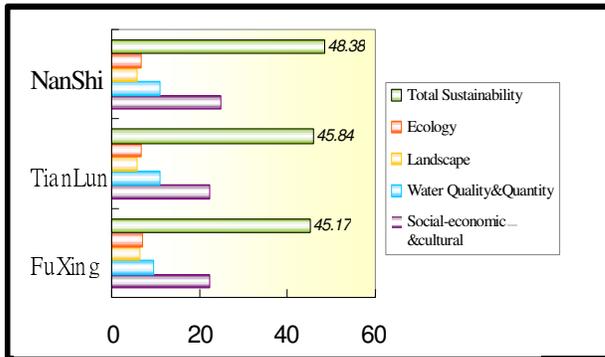


Figure 2. Total sustainability of the villages

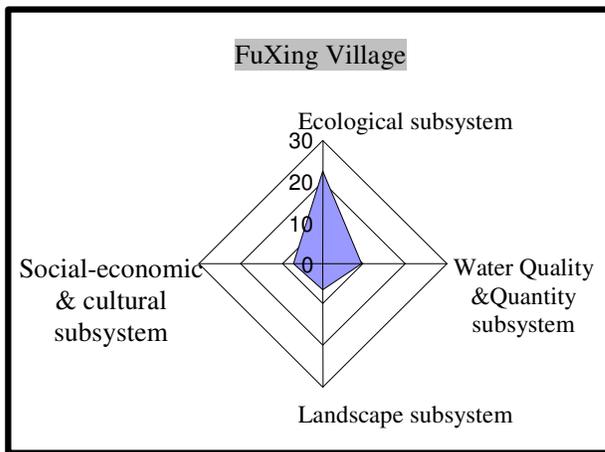


Figure 3. Second grade radar of the Fuxing village

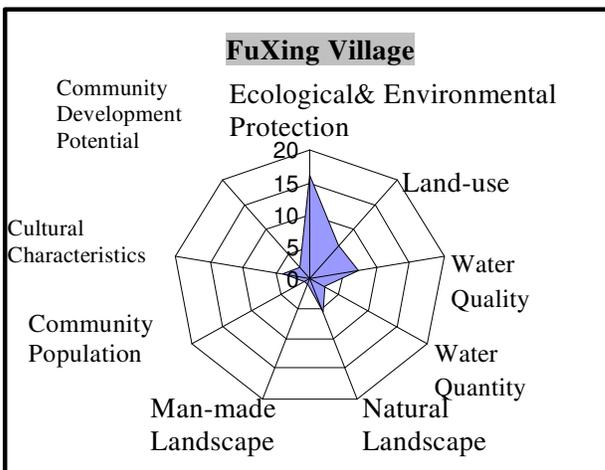


Figure 4. Third grade radar of the Fuxing village

Table 1. Weight of each evaluation index of eco-environment.

First grade	Second grade no.	Weight	Third grade no.	Weight	Fourth grade no.	Weight
Ecology (B1)	0.522	Ecological and Environmental Protection (C1)	0.3727	The proportion of protected areas(D1)	0.1901	
				The proportion of natural river length(D2)	0.101	
				Green covers rate(D3)	0.0816	
				The proportion of leisure space(D4)	0.0266	
				Land use (C2)	0.1493	
Water Quality and Quantity (B2)	0.196	Water Quality (C3)	0.1439	The proportion of the existing forest area(D5)	0.0855	
				The proportion of agricultural land(D6)	0.0373	
				RPI value(D7)	0.1439	
				Agricultural water use(D8)	0.013	
				Water Quantity (C4)	0.0521	
Landscape (B3)	0.135	Natural landscape (C5)	0.1125	Livelihood water use(D9)	0.0138	
				Field measurement of water (D10)	0.0253	
				Terrain Landscape(D11)	0.031	
				Geological landscape(D12)	0.0157	
				Vegetation landscape(D13)	0.0355	
Socio-economic and Culture (B4)	0.148	Man-made landscape (C6)	0.0225	Animal attractions landscape (D14)	0.0126	
				Water Landscape(D15)	0.0177	
				Cultural Landscape(D16)	0.0225	
				Education(D17)	0.0082	
				Community population (C7)	0.0179	
				The average household income (D18)	0.0097	
				Cultural characteristics (C8)	0.0836	
				Local agricultural production (D19)	0.0247	
				Local cultural resources (D20)	0.059	
Community Development Potential (C9)	0.0465			The total number of development projects(D21)	0.0099	
				The total number of Tourism Strategic Alliance(D22)	0.0065	
				Convenience of transportation(D23)	0.0172	
				The total number of people involved in community organizations(D24)	0.0129	

whereas the socioeconomic and cultural level was relatively low (Figure 3.) In FuXing Village, we recommend that local government focus more on socioeconomic and cultural and landscape items.

#### *Analysis of the Third Subindex of Sustainability Values.*

At this level, ecological and environmental protection attained the highest value. Relatively low values were obtained for indicators of community development potential, water quality, manmade landscape, and community population (Figure 4). Our results showed that human activities played a crucial role in the overall sustainability of watershed rural communities.

#### Conclusion

This study integrated expert opinions, local public opinion, and advice from the SWCB to achieve optimum balance among academia, industry, and policy planning. Our data collection and analysis focused on the dimensions of landscape, ecology, quality and quantity, and socioeconomic and cultural subsystems. We sought feasible solutions to the problems faced by rural communities in improving the environment. Such an improvement should involve the social, environmental, economic, and institutional sectors, and must ultimately facilitate the integration of policy initiatives and local development planning with the implementation of specific measures. The draft plan of our improvement assessment model prioritized the analysis of water quality in the studied watershed areas. Thereafter, water quality was sampled in the subwatershed and downstream water areas, and the most heavily polluted areas were identified. The characteristics of the area were described to the experts and then to the AHP questionnaire survey of experts to enhance its objectivity and representation.

Our model proposed using different types of reservoirs in watershed planning for rural communities, as the main focus. The communities should then submit their environmentally feasible solutions for future water catchment to improve the environment assessment, remediation planning, and implementation. Taiwan includes lakes, rivers, and reservoirs, and other major water catchment areas. Discussions with Water Conservation Bureau experts identified a comprehensive response to the question of how villages can adequately cover basins in Taiwan's catchment areas. Our recommendations consider the limitations of pollution, purification, and funding, as well as actual environmental conditions at the proposed sites of implementation. Projects should be selected for planning and conducting environmental improvement ecological communities for planning and design, make development of strategies possible to benefit rural communities and to improve the environment and future development. Our results showed that FuXing Village in Sinsar Township possesses several advantages. These include its natural landscape and abundant tourism resources, agricultural products year round, and the vast development potential of the rural ecological community. However, the community is located on a hillside and water source protection area. Heavy rain leaves areas close to mountains or valleys vulnerable to natural collapse. Thus, community planning should consider the availability of land resources and aim to protect the natural environment. Repressed industrial development will be the price of occurring natural disasters, and traditional industries will inevitably see a decline in production. Therefore, a community resettlement plan is necessary to ensure the continued development of sustainable industry.

In this study, the physical planning in rural areas targeted rural sites based on the findings. After the selection of development sites, sustainable development

indicators were used to measure the index of rural sustainability. Sites that achieved lower overall indicator values should be prioritized for project planning and implementation. The main principle is based on technology-oriented planning with the principles of land use zoning, with the full set of systems and indicators of sustainable objectives and strategies,

and developing the most appropriate planning strategy and plan for energy use by including environmental, ecological and cultural goals plan to cover the point, line, surface preparation of various scales of planning. The ultimate aim is to enhance rural sustainability.

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