



# THE INTERNATIONAL JOURNAL OF ORGANIZATIONAL INNOVATION

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INFORMATION REGARDING  
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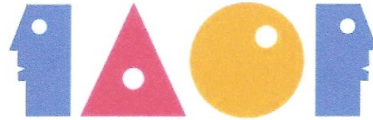
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## THE ROLES OF BENCHMARKING, BEST PRACTICES & INNOVATION IN ORGANIZATIONAL EFFECTIVENESS

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### Abstract

The purpose of this paper is to delineate the practices of benchmarking, “best practice” and innovation, and to show the relationships between them. The paper describes the basic processes in each of these practices and makes recommendations on how to incorporate them into an organization’s operations. Simplified, benchmarking is the process of an organization finding examples of superior performance in their area of interest, then examining all these examples of superior performance. They then compile a comprehensive list of all aspects of these factors that contribute to success, and endeavor to understand the purposes and relationships of all of these factors. They then gain an understanding of the processes or “Best Practices” that are driving that superior performance. The organization improves its own performance by tailoring and incorporating these best practices into their operations. Innovation is necessary when the organization is operating at a high level of performance but is still not meeting their client’s needs.

Keywords: Benchmarking, Best Practice, Innovation, Organizational Effectiveness

### Introduction

All organizations have a central purpose: to meet the needs & wants of their clients/customers. (Deming, 1990, Gitlow, 1987). Organizations must continue doing this in order to survive and continue to provide their goods and services (products). Once the products and services are determined, they then manage their operations to achieve the production and delivery of their products. This is the basic process of total quality management (TQM).

In the production and delivery processes of their product, they strive to become efficient and effective. Simplified, effectiveness is “doing the right thing”. Organizations must determine the appropriate product or service that their consumer wants. This becomes their goal. They then manage their operations to achieve the accomplishment of this goal. If they achieve this goal, they are “effective”. However, there are many different ways to accomplish their goal. In order to be effective, they must not only determine the correct mix of products, they must determine the best method of production. While there are many methods of production, they

must strive to determine the most efficient method of production while ensuring effectiveness. Efficiency is producing at the lowest cost, where cost is defined as the sum of the factors of cost, including money, time, physical resources (machines, buildings, etc.), and human capital, both the quantity of labor and the quality or skill set, of that labor. If they optimize the use of all of these resources in their production processes, they are “efficient”. However, they usually do not become effective and efficient at the beginning of their organization. This takes time to accomplish.

In their seminal work on organizational effectiveness, Cameron & Whetton (1983) proposed a comprehensive model of organizational effectiveness. The model has many components (see Figure 1.) It is not the purpose of this paper to describe all of the components in this complex model. However, one facet of the model relevant to this paper is that all organizations have a “life cycle” with three phases: *Maintenance*, *Improvement*, and *Development*. They briefly described these processes that organizations have to implement and conduct in their life cycle.

Dembowski and Eckstrom (1999) elaborated on this work and stated that each of these phases of the organization’s life cycle has its’ own unique set of management processes that need to be conducted (See Figure 2.) Once an organization is established, hopefully based on *benchmarks*, the first life cycle phase is *maintenance*. Maintenance is concerned with the short term (i.e. annually). Once operations are proceeding in a satisfactory manner, the organization begins the next phase of their life cycle, the *improvement* phase. This phase may start when the organization is established, but usually begins once products and services are produced and delivered in the longer term. This improvement process often includes the search for a “*best practice*”. Finally,

the organization enters its’ *development* phase. This phase is where *innovation* usually occurs, although some organizations are established because they have an innovative product. A more comprehensive discussion of the life cycle phases, once it has been established, follows.

### *Maintenance*

The functions involved in the maintenance of an organization are usually performed in the short term or annually. Among many others, these maintenance functions include:

- a. Budgeting
- b. Review of policies, rules & regulations
- c. Conduct of operations, and
- d. Program review
- e. Planning & ***Benchmarking***

### *Improvement*

The improvement phase begins once an organization is producing its products. This involves an analysis of the operations of the organization, and is usually a continual process. This evaluation process usually includes:

- a. Problem solving & systems analysis
- b. Deming’s Continuous Improvement (TQM) and
- c. ***Best Practices***

### *Development*

The development phase in the life cycle of an organization includes a re-examination of the purpose of the organization’s processes & products, usually in the longer term. The development phase includes processes such as:

- a. Strategic planning
- b. Restructuring & re-engineering
- c. ***Innovation***



## A Framework for Managerial Performance

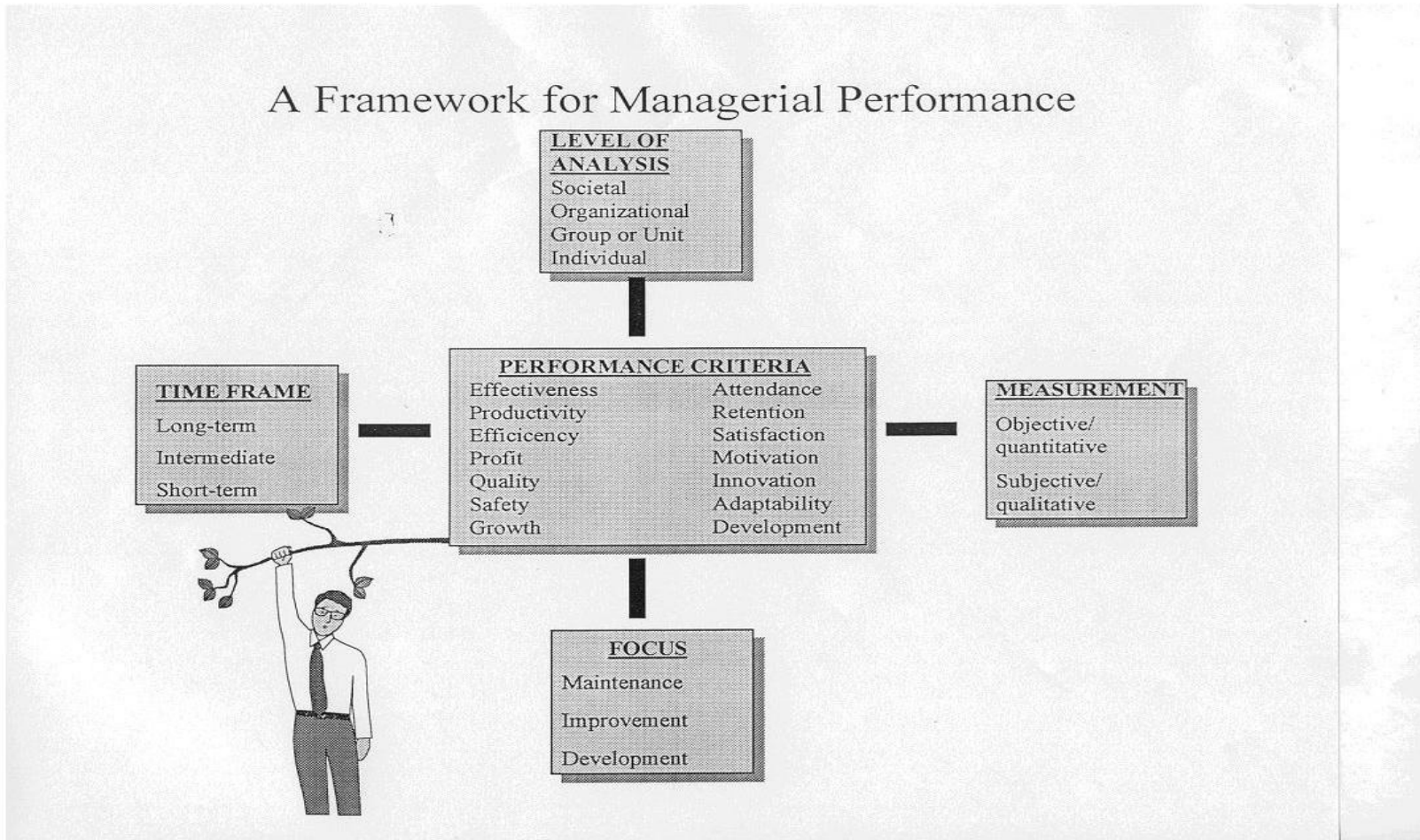


Figure 1. Cameron & Whetton's Model of Organizational Effectiveness (Cameron & Whetton, 1983)





Figure 2. The Management Functions in the Life Cycle of an Organization (Dembowski & Eckstrom, 1999)

## Benchmarking

### *Benchmarking and Best Practice*

What is benchmarking? Benchmarking is the process of identifying "*best practice*" in relation to both products and the processes by which those products are created and delivered. (Riley, 2012). The search for "best practice" can take place both inside a particular industry and also in other industries. Benchmarking provides necessary insights to help understand how an organization compares with similar organizations, even if they are in a different business or have a different group of customers. The objective of benchmarking is to understand and evaluate the current position of a business or organization in relation to "best practice" and to identify areas and means of performance improvement. They do this not by imitating, but by innovating, adapting the best practice to meet their own needs. (Bain, 2011) Simply stated: Benchmarking is the process of determining who is the very best, who sets the standard, and what that standard is.

Benchmarking includes measuring products, services, and processes against those of organizations known to be leaders in one or more aspects of their operations. Additionally, benchmarking can help you identify areas, systems, or processes for improvements, either incremental (continuous) improvements or dramatic (business process reengineering or innovation) improvements. (Revelle, 2004)

### *Why Is Benchmarking Necessary?*

If you don't know what the standard is you cannot compare yourself against it. If a customer asks "what is the mean time before failure (MTBF) on your widget?", it is not enough to know that your mean time between failures is 120 hours on your standard widget and 150 for your deluxe widget. You also have to know where your competitors stand. If the companies against whom you are competing for this

order has a MTBF of 100 hours you are probably okay. However, if their MTBF is 10,000 hours, who do you think will get the order? (Revelle, 2004)

### *What Can Be Benchmarked?*

Most of the early work in the area of benchmarking was done in manufacturing. Now benchmarking is a management tool that is being applied in all types of organizations. Once it is decided what to benchmark, and how to measure it, the object is to figure out how the "best" got to be the best and determine what has to get done to get there. Benchmarking is usually part of a larger effort, usually a process re-engineering or quality improvement initiative. (Reh, 2012)

### *The Benchmarking Process*

Benchmarking involves looking outward (outside a particular business, organization, industry, region or country) to examine how others achieve their performance levels and to understand the processes they use. In this way benchmarking helps explain the processes behind excellent performance. When the lessons learnt from a benchmarking exercise are applied appropriately, they facilitate improved performance in critical functions within an organization or in key areas of the business environment.

Application of benchmarking involves four key steps:

- (1) understand in detail existing business processes
- (2) analyze the business processes of others
- (3) compare own business performance with that of others analyzed
- (4) implement the steps necessary to close the performance gap

Benchmarking should not be considered a one-time exercise. To be effective, it must become an ongoing,

integral part of an ongoing improvement process with the goal of keeping abreast of ever-improving best practice. Some excellent resources on the benchmarking processes are denoted by \*\* in the references.

### *Types of Benchmarking*

There are a number of different types of benchmarking, as summarized in Table 1.

Table 1. Types of Benchmarking

Type	Description	Most appropriate for the following purposes
<i>Strategic benchmarking</i>	<p>Where organizations need to improve overall performance by examining the long-term strategies and general approaches that have enabled high-performers to succeed. It involves considering high level aspects such as core competencies, developing new products and services and improving capabilities for dealing with changes in the external environment.</p> <p>Changes resulting from this type of benchmarking may be difficult to implement and take a long time to materialize</p>	Re-aligning business strategies that have become inappropriate
<i>Performance or competitive benchmarking</i>	<p>Organizations consider their position in relation to performance characteristics of key products and services.</p> <p>Benchmarking partners are drawn from the same sector. This type of analysis is often undertaken through trade associations or third parties to protect confidentiality.</p>	Assessing relative level of performance in key areas or activities in comparison with others in the same sector and finding ways of closing gaps in performance
<i>Process benchmarking</i>	<p>Focuses on improving specific critical processes and operations. Benchmarking partners are sought from best practice organizations that perform similar work or deliver similar services.</p> <p>Process benchmarking invariably involves producing process maps to facilitate comparison and analysis. This type of benchmarking often results in short term benefits.</p>	Achieving improvements in key processes to obtain quick benefits
<i>Functional benchmarking</i>	<p>Organizations look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes. This sort of benchmarking can lead to innovation and dramatic improvements.</p>	Improving activities or services for which counterparts do not exist.

<i>Internal benchmarking</i>	<p>Involves benchmarking organizations or operations from within the same organization (e.g. business units in different countries). The main advantages of internal benchmarking are that access to sensitive data and information is easier; standardized data is often readily available; and, usually less time and resources are needed.</p> <p>There may be fewer barriers to implementation as practices may be relatively easy to transfer across the same organization. However, real innovation may be lacking and best in class performance is more likely to be found through external benchmarking.</p>	<p>Several business units within the same organization exemplify good practice and management want to spread this expertise quickly, throughout the organization</p>
<i>External benchmarking</i>	<p>Involves analyzing outside organizations that are known to be best in class. External benchmarking provides opportunities of learning from those who are at the "leading edge".</p> <p>This type of benchmarking can take up significant time and resource to ensure the comparability of data and information, the credibility of the findings and the development of sound recommendations.</p>	<p>Where examples of good practices can be found in other organizations and there is a lack of good practices within internal business units</p>
<i>International benchmarking</i>	<p>Best practitioners are identified and analyzed elsewhere in the world, perhaps because there are too few benchmarking partners within the same country to produce valid results.</p> <p>Globalization and advances in information technology are increasing opportunities for international projects. However, these can take more time and resources to set up and implement and the results may need careful analysis due to national differences</p>	<p>Where the aim is to achieve world class status or simply because there are insufficient "national" organizations against which to benchmark.</p>

Source: <http://tutor2u.net/business/strategy/benchmarking.htm>

### Best Practice

According to Wikipedia (2012), a *best practice* is a method or technique that has consistently shown results superior to

those achieved with other means, and that is used as a *benchmark*. A "best" practice can evolve to become better as improvements are discovered. Best practice describes the process of developing and following a standard way of doing things that multiple organizations can use. Best

practices are used to maintain quality as an alternative to mandatory legislated standards and can be based on self-assessment or benchmarking. Best practice is a feature of accredited management standards such as [ISO 9000](#) and [ISO 14001](#) (Bogan & English, 1994).

There are many pre-made templates to standardize business processes or best practices. Wikipedia (2012) provides access to some of these templates. Some excellent resources on the best practices is denoted by \*\* in the references.

Sometimes a "best practice" is not applicable or is inappropriate for a particular organization's needs. A key strategic talent required when applying best practice to organizations is the ability to balance the unique qualities of an organization with the practices that it has in common with others.

There are some criticisms with the term "best practice". Bardach (2011) claims the work necessary to determine and practice the best is rarely done, and most of the time you will find "good" practices or "smart" practices that offer insight into solutions that may or may not work for your situation. Scott Ambler (2011) challenges the assumptions that there can be a recommended practice that is best in all cases. Instead, he offers an alternative view, "contextual practice," in which the notion of what is "best" will vary with the context. Kaner and Bach (2011) provide two scenarios to illustrate the contextual nature of "best practice"

This article will describe one method of best practice that was used by ANZAC (1999). A "best practice" is the optimiza-

tion of the effectiveness of an organization. It is a process that is comprised of five key stages: (See Figure 3.)

1. Define
2. Develop
3. Deliver
4. Evaluate
5. Support

#### *Best Practices Stage 1 - Define*

In the define stage, the organization needs to consider what it hopes for at the end of the best practice process. The define stage considers issues such as:

- What is the rationale for change?
- What are the desired benefits and outcomes?
- What are the desired goals and functions?
- What is the relationship to other organization functions?

#### *Best Practices Stage 2: Develop*

In the development stage of the best practice process, the organization begins to map all of the components in the production process and end result. The develop stage includes:

- What are the operational objectives? Who are our customers and what are their wants and desires? This includes mapping and analyzing *customer needs*.
- What do we want our customers to know? This involves formulating and refining messages.
- How good do we want to get? This involves setting performance standards (*benchmarks*).
- How do we know how well we are doing? Setting key *performance indicators*



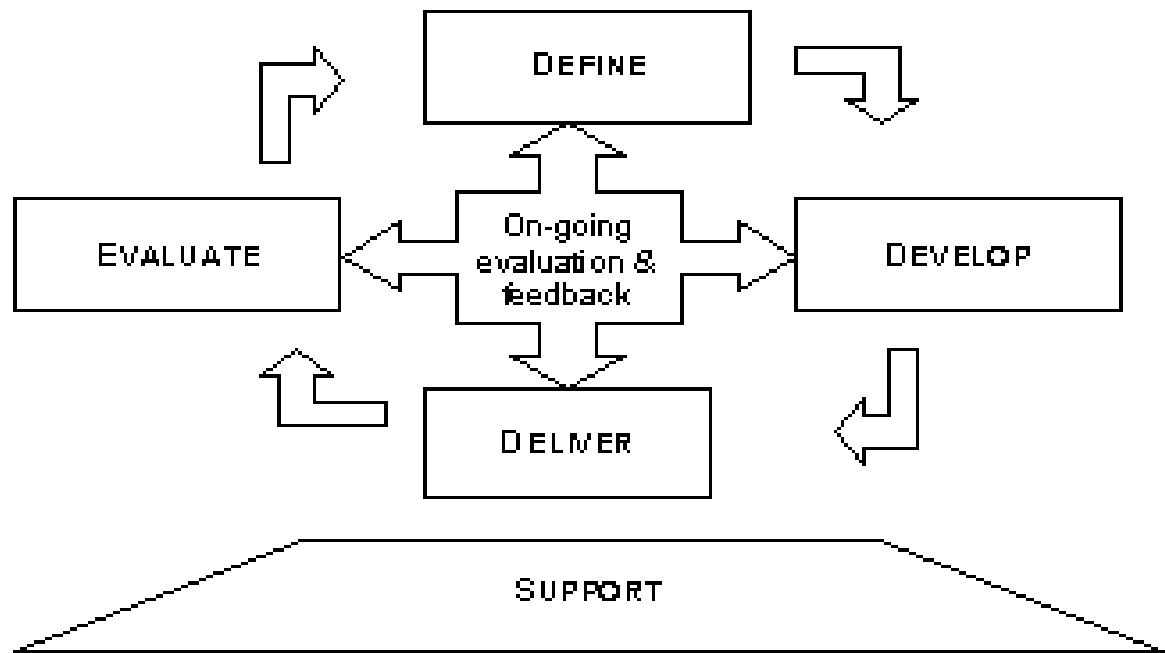


Figure 3. A Model of “Best Practice” (Anzac, 1999)

Who are our targets? This involves identifying key secondary customers, both internal and external to the organization.

Is it worth it? Weighing costs against benefits

Planning & designing appropriate methods and options for product/service delivery

What are our current and hoped for relationships with our customers?

*Best Practices Stage 3: Delivery*

The delivery stage includes the following processes:

1. *Controlling* delivery to ensure services are in accordance with target objectives, timeliness, budget and standards
2. Seeking *feedback* to monitor the effectiveness of products/services and improve day-to-day performance
3. *Communicating* internally across organization's operating units and externally with the organization's cus-

tomers base to support effective delivery, and

4. Designing work routines and job responsibilities for *effective delivery* of products/services

*Best Practices Stage 4: Evaluation*

The *evaluate* stage checks that the products/services the organization delivers are regularly and systematically assessed for:

1. Effectiveness in achieving stated *outcomes*
2. The level to which *performance standards* have been met
3. Degree to which *performance indicators* have been achieved
4. Continuing relevance of *objectives* and *design features*
5. Wider anticipated or unanticipated *impacts*

*Best Practices Stage 5: Support*

The *Support* stages mainly address responsibilities such as:



- \* human resources, skills and deployment
- \* financial systems, and
- \* technology, equipment, and supply of materials.

### Development

What happens if the organization has gone through the improvement processes and is still not producing their products in an optimal manner (best practice)? Or, the organization's customers are still not satisfied? That is the point when there is the need to explore the *development* stage of your organization. The *development* stage consists of processes such as:

- a. Strategic planning
- b. Restructuring & re-engineering
- c. *Innovation*

The remainder of this paper will focus on the process of *innovation*.

### Innovation

*Innovation* is the development of new customer value through solutions that meet new needs, unarticulated needs, or old customer and market needs in new ways. This is accomplished through different or more effective [products](#), [processes](#), [services](#), [technologies](#), or [ideas](#) that are readily available to [markets](#), [governments](#), and [society](#). Innovation differs from [invention](#) in that innovation refers to the use of a better and, as a result, novel idea or method, whereas invention refers more directly to the creation of the idea or method itself. Innovation differs from [improvement](#) in that innovation refers to the notion of doing something different (Wikipedia, 2012). In the organizational context, innovation may be linked to positive changes in [efficiency](#), [productivity](#), [quality](#), [competitiveness](#), [market share](#), and others. All organizations can innovate.

Innovation is achieved in many ways. One common way is through formal research & development (R&D) for "breakthrough innovations." Another is that innovations evolve by less formal on-the-job modifications of practice, through exchange and combination of professional experience. The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice, but there are many exceptions to each of these trends. A great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities. Often, user innovators have personal motivators, sometimes becoming entrepreneurs. (Siltala, 2010).

There are many models of innovation proposed by a wide variety of sources such as consulting firms, professional associations, etc. Most of the models of innovation have similar components and processes. Some excellent resources on Innovation are denoted by \*\* in the references. For simplification purposes, this article will focus on one model of innovation, called "InnovationDNA™", developed by the Innovation Network (2010).

#### *The InnovationDNA™ Model Framework of Principles*

The Innovation DNA™ model presents the broad scope of what it takes to create an innovated organization. The DNA concept came from the work of the Founding Fellowship class of Innovation University (IU) in 2002, and has been continuously field tested and revised. (Innovation Network 2010). The InnovationDNA™ Model consists of a number of components organized into a "Framework of Principles" graphically displayed in Figure 4. Some of these principles are as follow.

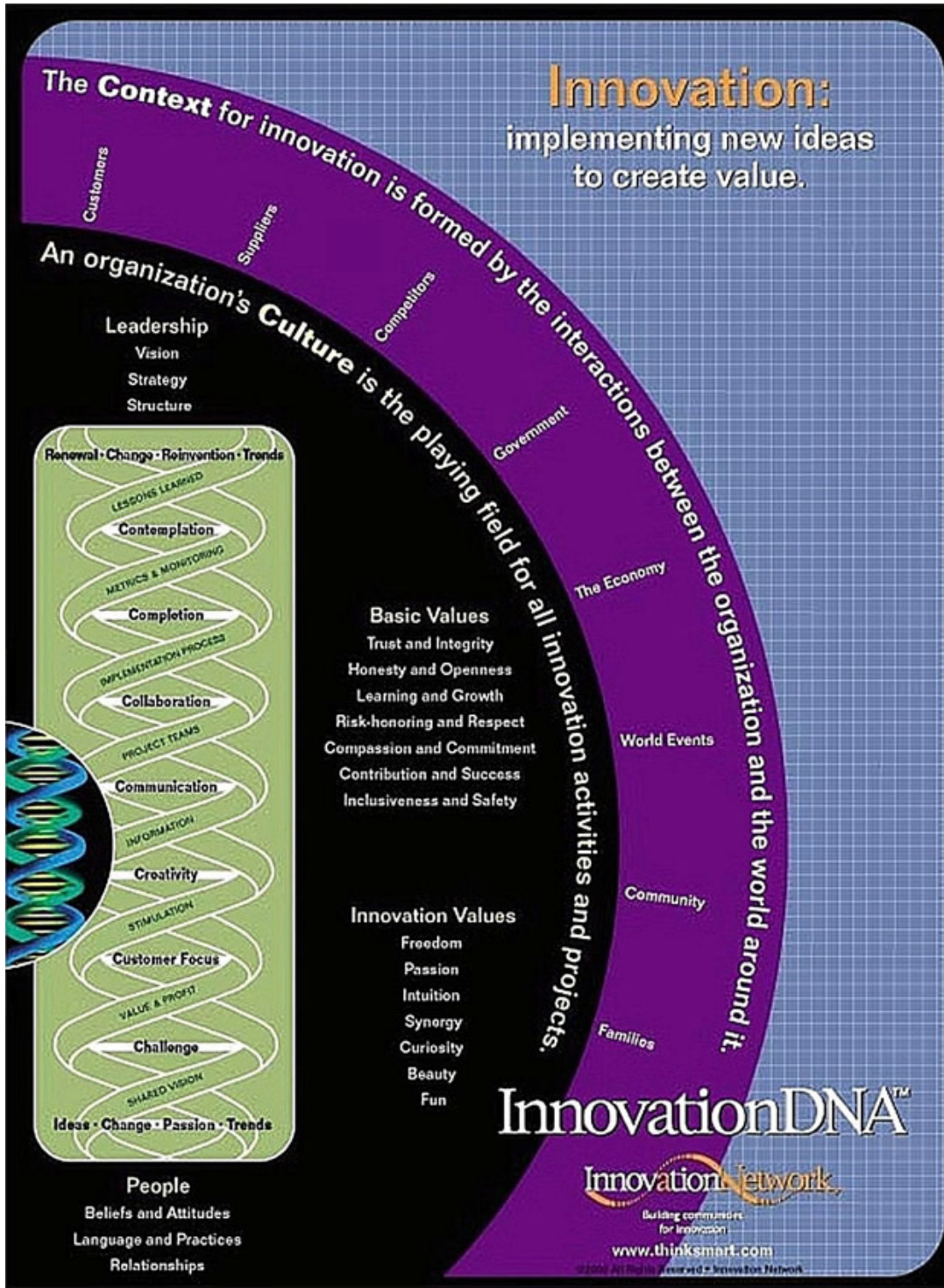


Figure 4. The InnovationDNA™ Model  
(source: <http://www.innovationnetwork.biz/mission/dna/index.html>)

### *Environmental Context*

Organizational innovation does not occur in a vacuum. While it is obvious that Customers, Suppliers, Competitors and The Economy affect organizations daily, there are also periodic interactions with Government, World Events, Communities and Families. All of these interactions form the context for all business activities, including innovation.

### *Organizational Culture*

While innovation is "for the sake of" creating value for customers or a lofty vision, the organization must be fertile for the seeds of ideas and solutions to grow. An environment that is empowering, flexible, welcomes ideas, tolerates risk, celebrates success, fosters synergy and encourages fun is crucial. Creating such a climate may also be the biggest challenge facing all organizations wanting to be more innovative. There are four main components that lie in an organization's culture that provide the climate for innovation to occur: Leadership, People, Basic Values and Innovation Values.

#### *1. Leadership*

Innovation does not occur in an organization unless there is strong leadership. The leaders must be role models who see the possibilities for the future. These leaders must provide an environment with the values, strategies and structures that fosters innovation.

#### *2. People*

The source of innovation is the people of the organization. The people must possess certain characteristics that foster innovation. These include their beliefs and attitudes towards innovation. They must have the appropriate skill set and "speak the language". They must be open to and proactive towards innovation. They must be team players and foster relationships with like minded colleagues.

#### *3. Basic Organizational Values*

The organization must have a strong set of beliefs which forms their "backbone" and defines an organization. These values include: trust and integrity, honesty and openness, learning and growth, risk-honoring and respect, compassion and commitment, contribution and success, inclusiveness and safety.

#### *4. Innovation Values*

The people in the organization must have an environment that fosters innovation. Some of the characteristics of this organizational environment include the following. They must possess the mindset that they can make the impossible possible. They must have the freedom to explore ideas. They must be passionate about innovation. They must have a strong sense of curiosity and the courage and freedom to follow their intuition. They must create a synergy of innovation. They must see the "beauty" of innovation and have fun pursuing innovation.

### *The Operational Dimensions of Innovation*

The InnovationDNA™ Model has seven operational dimensions necessary to ensure success.

*Challenge - the Pull:* Innovation, by definition, means doing things differently, exploring new territory, taking risks. There has to be a reason for "rocking the boat", and that's the vision of what would be the challenge. The bigger the challenge and the commitment to it, the more energy the innovation efforts will have. Sometimes challenge is as much about how to do business as it is about what business to do.

*Customer Focus - the Push:* All innovation should be focused on creating value for the customer, whether that customer is internal or external to the organization. Interaction with customers, gaining understanding of their needs, is one of the best stimulators

of new possibilities and provides the motivation for implementing them. When the customer has a real presence to people, they get excited about finding new ways to add value.

*Creativity - the Brain:* Everything starts from an idea and the best way to get a great idea is to generate a lot of possibilities. While creativity is a natural ability of every person, the skill of developing a lot of ideas and connecting diverse concepts can be enhanced through training and exercise. It is up to the leadership to provide the direction and stimuli to spur creativity. For example, one way that creativity happens is when someone makes a connection between two things that were never connected before.

*Communication - the Lifeblood:* Open communication of information, ideas and feelings is the lifeblood of innovation. Both infrastructure and advocacy must exist in an organizational system to promote the free flow of information. Organizations that restrict this information flow risk atrophy which ultimately may affect their survival. The communication must foster a positive and open culture. When leaders regularly and genuinely recognize people, they model behavior that is an underpinning for culture of achievement and success.

*Collaboration - the Heart:* Innovation is group process. It feeds on interaction, information and the power of teams. It is stifled by restrictive structures and policies as well as incentive systems that reward only individual efforts or that punish failure. Innovation is a team sport. While one person might come up with a blockbuster idea, in today's organizations it takes the collaboration of lots of people (synergy) to successfully implement the idea.

*Completion - the Muscle:* New innovations are projects that are successfully realized through superior, defined processes and

strong implementation skills such as: decision making, delegating, scheduling, monitoring, and feedback. When projects are completed, they should be celebrated. Innovation is all about implementation.

*Contemplation - the Ladder:* Making objective assessments of the outcomes, benefits and costs of new projects is essential. Gleaning the lessons learned from both fruitful and failed projects builds a wisdom base that creates an upward cycle of success. Documenting and evaluating projects is a critical step that helps perpetuate innovation. The world is moving too rapidly to continue to learn the same lessons over and over. Innovative organizations develop ways to collect and share the lessons that come with each project and activity in order to create wisdom systems.

## Summary

All organizations have a purpose: to meet the needs of their customers. They must provide appropriate products and do so in an efficient and effective manner. All organizations have a life cycle with different phases. In each phase, certain management operations occur that influence their efficiency and effectiveness. Three of these operations are *benchmarking*, instituting *best practices* and being *innovative*. Highly successful organizations realize the importance of all three of these and take purposeful steps in undertaking them. The organizations must have a skill-set and mind-set that fosters creativity and innovation. It is the responsibility of the leadership of the organization to ensure that the appropriate culture and environment for innovation is present, and that the organization has all of the resources needed to accomplish the goals of being efficient, effective and innovative.

## References



- Anzac Working Group, "Best practice in park interpretation and education: a report to the Anzac working group on national park and protected area management", *Department Of Natural Resources And Environment, Victoria New Zealand, April 1999*
- Ambler, Scott. "[Questioning "Best Practices" for Software Development](http://www.ambysoft.com/essays/bestPractices.html)". <http://www.ambysoft.com/essays/bestPractices.html>. Retrieved 17 November 2011.
- Bardach, Eugene. "[Faculty page](http://gsppi.berkeley.edu/faculty/ebardach/)". <http://gsppi.berkeley.edu/faculty/ebardach/>. Retrieved 22 September 2011.
- Bogan, C.E. and English, M.J., *Benchmarking For Best Practices: Winning Through Innovative Adaptation*. McGraw-Hill, New York, 1994.
- Cameron, Kim s., and Whetton, David A. *Organizational Effectiveness: A Comparison Of Multiple Models*, Academic Press, 1983.
- Dembowski, F., "The Roles Of Leadership And Management In School District Administration", *The AASA Professor*, vol. 20, no. 2 Fall, 1997.
- Dembowski, F. and Ecktsrom, C., *Effective School District Management*, American Association Of School Administrators, Arlington, Virginia 1999.
- Deming, W. Edwards *The New Economics for Industry, Government, Education* (2nd ed.). MIT Press, 2000.
- Gitlow, Howard S., Shelly J. Gitlow, "The Deming Guide to Quality and Competitive Position" Prentice Hall Trade, 1987.
- Kaner, C. "[The Seven Basic Principles of the Context-Driven School](http://www.context-driven-testing.com/)". <http://www.context-driven-testing.com/>. Retrieved 17 November 2011.
- Riley, J., *Tutor2U*, retrieved September, 2012  
<http://www.tutor2u.net/blog/index.php/site/author/11/>
- <http://www.bain.com/publications/articles/management-tools-2011-benchmarking.aspx>
- Reh, F. J. , "How to Use Benchmarking in Business", About.com Guide, 2012  
<http://management.about.com/cs/benchmarking/a/benchmarking.htm>
- Revelle, J. B., *Quality Essentials: A Reference Guide from A to Z* , ASQ Quality Press, 2004,
- Siltala, R. *Innovativity and cooperative learning in business life and teaching*. University of Turku, 2010.
- The Innovation Network, 2010.  
[www.innovationnetwork.biz](http://www.innovationnetwork.biz)
- Wikipedia, 2012  
[http://en.wikipedia.org/wiki/Best\\_practice](http://en.wikipedia.org/wiki/Best_practice)
- \*\* Excellent Resources for *Benchmarking*:  
[http://www.google.com/search?q=benchmarking&hl=en&prmd=imvnsb&tbm=isch&tbo=u&source=univ&sa=x&ei=l49lunzbhok-9gts\\_4hyda&sqi=2&ved=0cfeqsaq&biw=1594&bih=689](http://www.google.com/search?q=benchmarking&hl=en&prmd=imvnsb&tbm=isch&tbo=u&source=univ&sa=x&ei=l49lunzbhok-9gts_4hyda&sqi=2&ved=0cfeqsaq&biw=1594&bih=689)
- <http://totalqualitymanagement.wordpress.com/2008/09/12/benchmarking/>
- \*\* Excellent resources for *Best Practices*:

<http://www.workforce.com/section/best-practices>

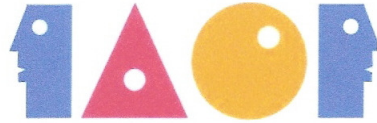
<http://www.ideafit.com/fitness-articles/health-clubsfitness-facilities/best-practices>

\*\* Excellent resources for *Innovation*:

<http://www.innovationtools.com/links2/su-bcat.asp?CatID=26>

<http://www.skyrme.com/resource/mgmtres.htm>





## INNOVATION AND THE PERCEPTION OF RISK IN THE PUBLIC SECTOR

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### Abstract

This article examines the impact that the perception of risk has upon innovation recognition and development in the public sector. The article suggests a critical impediment to increasing innovation in public sector organizations is aversion to risk by both individual actors and by public organizational culture. Potential solutions to this impediment lie in the modification of the calculus of risk through cultural modifications and alignments.

Keywords: Innovation, public sector

### Introduction

As budgetary pressures and performance expectations of the public sector increase, public managers look for new ways to achieve public goals in a dynamic environment. Increasingly that search for new solutions has led to the study of how innovation comes to the public sector.

The traditional view of public sector service organizations characterized them as lacking in innovation discovery and slow to adopt and diffuse innovations from other service sectors. Several studies have found that to not be true. A Canadian study found that between 1998 and 2000 more public entities produced organizational and techno-

logical innovations than the private sector corporations (Earl, 2002). Empirical studies are revealing that the public sector is fertile ground for innovation. In a study published in 2011 by Bugge, Mortensen and Bloch measuring innovation in public institutions in Nordic countries found results as high as 91.5 of public entities reporting innovations (2011: p.54). Miles (2008) cites similar results from Canadian studies that found the levels of 'significantly improved organizational structures' and 'significantly improved technologies' almost twice a high in the public sector as the private sector (2008: p. 126). Miles (2008) attributes these differences to factors such as the relatively higher proportion of professional staff and better

connections to university systems in the public sector than in the private sector.

While the public sector may have the capacity for innovation, the hunger for greater use and exploitation of innovation still exists. This article will examine the impediments to innovation in the public sector and offer possible strategies for overcoming them.

### Defining Innovation In The Public Sector

It is emblematic of the state of the art in innovation research that almost every paper on innovation must address a discussion of the definition of innovation. There is a substantial area of innovation study solely dedicated to reviewing the literature on the definition of innovation (Perry, 2010; Crosson & Apaydin, 2010; Eveleens, 2010; Tzeng, 2009). This is not the result of confusion but rather reflects the drive for precision in a concept that by its nature is context dependent.

Since Shumpeter's (1934) primarily new product oriented concept of innovation, the definition of innovation has evolved to include service concepts and extended to the public sector. Some innovation activities are themselves innovative; others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation (OECD, 2005). In the OSLO Manual (2005) the Organization for Economic Co-operation and Development (OECD) defines innovation as "*the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations*" (2005:46).

The definition of innovation is changed, somewhat, when it is applied to the context of services and then more specifically, services in the public sector. The literature contains several applications of more common definitions of innovation to the public sector. These ideas expand the definition of innovation to include new modalities of delivering existing services. Windrum (2008) discusses the concept of service delivery innovation. This idea refers to new or changed service delivery or modes of interacting with 'service users' within the context of the service delivery (2008:08). Hartley (2005) supports this feature of service innovation and defines it as: "*new ways in which services are provided to users (for example on-line tax forms)*" (2005:28). Walker (2008) asserts that public service innovations are focused upon the delivery of the service and are best understood by the relationship of the public organization to users of the service (2008:593). Bason (2011) defined public sector innovation as, "New ideas that are implemented and create value for society" (Bason, 2011: p. 4). Perry (2010) provides a survey of the evolution of the innovation definition and taxonomy and how these have extended to the public sector. He concludes that, "*There is no widely accepted or common definition of what counts as an innovation*" (Perry, 2010: p.16).

Many times it seems that quibbling on the specifics of an innovation definition is more closely related to the ability of the researcher to quantify its measure rather than an understanding of an important organizational process. However, as we apply our definitions to various organizational types and environmental contexts, there are substantial differences that this understanding produces. Alas, as always, the devil is in the details.

The definition of innovation can have a substantial impact upon the data collected and lead the researcher to incorrect conclusions. The definition of innovation as distinct from other types of “change” is particularly important in the public sector. One example of this is in a 2006 study public of innovation conducted for the U.K. National Audit Office by Dunleavy, et. al. (2006). The researchers conducted a survey of U.K. central government organizations in an attempt to identify and characterize the type and nature of innovations occurring. Based upon their survey, they found; “The innovation process in central government is top-down and dominated by senior management. Contributions from lower level staff are not so important” (Dunleavy, et. al. 2006: p. 5).

Despite this finding, the authors noted and recommended; “Current innovations processes in central government organizations are overly ‘top-down’ and dominated by senior managers. Yet there is a wealth of research to show that innovation does not flourish easily within strongly hierarchical or siloed structures” (Dunleavy, et. al. 2006: p. 33). They go on to recommend that innovation processes be open to input from front line employees and customers.

This contradiction between the finding and recommendation can be traced to the specifics of the definition of innovation used by Dunleavy, et. al. (2006). In order to assist respondent in understanding the information requested, the survey instrument provided 4 characterizations of innovation, including; “Innovation is doing new things” and “Anything new that works” (Dunleavy, et. al. 2006: p. 8). While the intent is to provide the widest possible definition of innovation and prevent self-selection, there is no distinction between these operational definitions and any other type of change. The concept of novelty so important to understand-

ing innovation becomes understood as “anything different”. As stated by Sorensen & Torfing (2010), “As *innovation* is rapidly becoming a new buzzword in the public sector, there is a risk that the concept of innovation loses its edge and becomes synonymous with all kinds of change or transformation” (2010: p.6).

If we broaden the definition of innovation to involve all change, we would expect it to be overwhelmingly a top-down process in a hierarchical public sector organization. One would expect most, if not all change in the public sector to be a top-down process, as the result of implementing policy change, orders, regulations or laws. But what does this tell us about innovation? We are not sure where the idea was generated nor if it was tried before it became policy. Innovation *implementation* in the public sector is top down. If we only look at the implementation of change, we will understand little about the process of innovation generation, evaluation and diffusion. Weaknesses in understanding of the innovation survey results can be mapped back to weaknesses in the innovation definition. We must carefully consider how our definition of innovation frames the context of what is being measured.

## Innovation and The Perception Of Risk

Central to understanding an innovation process is the understanding of how actors and organizations perceive risk. This perception of risk varies from between organizations, cultures, industries markets and actors.

### Risk Aversion

The response to risk is quite different in the public and private sectors. The inception of the corporation in western culture originated as a response to risk. European corpo-

rations that engaged in the commercial exploration of the Americas, Africa and Asia were developed as a mechanism to syndicate and diffuse the risk associated with innovative activities. Modern corporations syndicate large bank loans or publicly trade their equity as a way to disperse risk.

While no two individuals share an identical perception of risk, specific contexts and organizational cultures produce similar expectations and behavioral norms. There is an often observed and documented bias in the perception of the risks and rewards associated with an uncertain proposition known as “loss aversion”. It leads decision makers to value statistically identical losses more highly than identical gains. This bias is evidenced when the payouts are known and to a greater extent when they are unknown. This phenomenon is more acutely observed in the public sector where the personal costs of being associated with failure (marginalized, passed-over) are more severe and certain than the potential benefits of association with a success (small bonus or award). Indeed, this results in an increased support of the status quo as the most reliable method of avoiding downside potential.

There are legitimate reasons for the risk aversion bias, particularly in smaller firms. While the expected value of a proposition may suggest taking a particular risk, the downside cost of failure may be unsustainable and terminal. Increased uncertainty in the private sector leads to risk avoidance. In the public sector increasing uncertainty becomes paralytic. Klein, et. al. (2010) cite that public managers have the additional difficulty in the evaluation of risk because due to the non-market nature of the services that they provide, accurate quantitative metrics are not available. They are faced with mainly subjective and qualitative assessments to evaluate choices (2010: p. 25).

The fear of risk-taking has negative impacts on the quality of public policy as well; “When fear of failure replaces a capacity to experiment and create trial and error learning, the result is *unlikely* to be an artifact that actually works. I would suggest it is also unlikely to produce a policy that ‘works’” (Parsons, 2006: p. 6). Through the avoidance of risk and resistance to change, public organizations become increasingly unresponsive to their environments (Potts, 2009). This results in an organization that is resistant to any change, whether from policy or innovation. The ossification of the organization makes the public organization increasingly fragile (Parsons, 2006).

#### The New Public Management And Innovation

The New Public Management (NPM) evolved as a theory of public administration during the 1980s and 1990s (Osborne & Gaebler, 1993; Hood, 1995; Lynn, 1998; Christensen and Lægread, 1999; Groot and Budding, 2008). The NPM is characterized by efficiency, accountability, performance measurement and rational planning. The NPM attempts to reduce complexity by mapping clear goals and responsibilities. NPM drives to increase focus on customer satisfaction, enhancing productivity and cost efficiency in the accomplishment of measured objectives and greater discipline in resource use.

While the NPM may see increased efficiency in the use of public resources as the standard of good public management, this may be in conflict with the impetus to innovate. Potts (2009) brings the issues of the inconsistency of public management methods with innovation processes into clear relief; “public sector management of assets and provision of services is properly evaluated as *effective* when it is judged to be *effi-*

*cient*” (Potts, 2009; p. 35). Potts (2009) argues that the main metric of efficiency in the public sector is economy in the performance of a specific service. This metric assumes a specific delivery modality, resource requirements and methods. Budgets are tailored to those boundaries. This approach precludes resource availability to experiment with innovative alternatives without specific approval of additional resources for an experiment or trial. In addition, all levels of public employees would suffer penalties and be viewed as ‘wasting resources’ if the experiment failed (Parsons, 2006). “The goal of efficiency is inconsistent with the goal of innovation” (Potts, 2009; p. 35). In light of these conflicting forces, innovation comes in a poor second. “The goal of efficiency crowds out the goal of innovation” (Potts, 2009; p. 36). This leads Potts to argue in favor of a reduction in efficiency in order to allow the flexibility to experiment and perhaps fail in pursuit of innovation (2009: p. 35).

The need for innovation in the public sector is driven by changes in the environment and in the expectations for delivery of services by the public organization. If there is no change in expectation from the public service provider or changes in its context, then increasing efficiency in providing those existing services is all that is required for increasing performance. This is consistent with the NPM objectives. However, in a constantly changing environment, maintaining the same static approach to delivering public services makes the organization increasingly dysfunctional and unresponsive to its environment. Potts (2009) characterizes this process; “It [the public organization] will be adapted to an economic world that, by increment, no longer exists” (p. 37). This focus on policy implementation efficiency becomes increasingly ineffective; “The upshot is that in an evolving economy,

the strident pursuit of policy efficiency may actually result in *less* effective or well-adapted policy” (Potts, 2009; p. 37).

This drive for simplicity and efficiency in public administration has significant side effects for innovative processes. As NPM has become more of an accepted standard in the public sector, it has led to an increased uniformity and standardization of approach that has stifled alternatives or initiatives localized to a specific context. These initiatives fail to neither surface nor be adapted. Efforts at experimentation are discouraged as wasted resource usage or are discarded because they cannot be evaluated because performance metrics are aligned with existing techniques (Christensen and Lægneid, 1999, Stacey and Griffin, 2006). Another area where the NPM approach in the public sector excels in the documentation of results. In Eveleens (2010) review of the literature on innovation process models, they found relatively little attention given to post-launch learning activities. While an important part of most prescriptive models, they found it rarely implemented in practice (Eveleens, 2010, p.8).

#### Risk Aversion Leads to Over Reliance on Systemic Solutions

As public systems become less adaptive to their environments, there is an impact on the decision making of the public actors. Rolfstam et. al. (2011) confirm that public institutions evolve slowly and reactively. Indeed, the institution acts as a barrier to the diffusion of innovation. Rolfstam, et. al. (2011) cites a comparative example of innovation diffusion in the medical supply industry between the primarily private U.S. system and public U.K. system.

About 40% of all hospital acquired infections are urinary tract infections. Of those



infections, 80% are linked to indwelling urinary catheters. The problem lay in the bacterial colonization of the surfaces of the catheter. A U.S. company, Bardex, introduced a silver alloy coated hydrogel catheter in U.S. and soon thereafter in the U.K. market in 2002. Evaluations of the product in both markets showed that it substantially reduced the number of infections. However, due to the cumbersome process of obtaining products that were not part of the National Health System (NHS) supply chain, few U.K. hospitals procured it. In 2004, the U.K. Health Protection Agency set up the Rapid Review Panel to evaluate new products and innovation for inclusion in the supply chain in an expedited fashion. Its first review was the Bardex catheter. Despite a strong recommendation and 'fast-tracking' the product, by the end of 2006, the market share of this product in U.K. hospitals was a mere 2-3%, as opposed to its 40% share in the U.S. market (Rolfstam, et. al. 2011: p.9).

This example demonstrates the corrosive effect that risk avoidance can have on public decision-making. Even when public actors know of better solutions, most times they select the solution 'approved' and 'accepted' by the public system. This behavior is usually characterized as 'not making waves' or 'not bucking the system'. While they may try to persuade a different systemic choice, ultimately they will not do the work or take the risk to pursue the better alternative. The ultimate effect is a public organization that is ponderously slow to respond to its environment and the degrading of the quality of service.

#### Changing The Perception Of Innovation Risk In The Public Sector

If the perception of risk leads to impediments to innovative behavior, how can the public organization be changed to en-

courage it? What factors must be modified to change risk perception in favor of innovative outcomes?

There have been many attempts to explain public sector motivations for innovation. These include a combination of political, legal, scientific and economic rationalities (Gregersen, 1992); or a search for increased 'social welfare' (Windrum, 2008). Hartley and Downe (2007) examine the effectiveness of peer acknowledgement as a driver of innovative behavior in the public sector. Specifically, they examine the effectiveness of a national award program on the behavior of local public agency actors. Some authors argue that in order to increase the realization of innovation in the public sector, the NPM model must be balanced with other public governance models (Aagaard, 2010).

Focusing on innovation as a goal in itself rarely generates and implements effective changes. Focusing on clear desired outcomes and being flexible and open to changes in how those outcomes are delivered enables innovation. Performance metrics of themselves are not impediments to innovation. Outcome focused performance measurement do not deter incremental innovative behavior. However, in the public sector, it is often difficult to quantify the desired outcomes in ways that can be tied directly and unambiguously to the activities and decisions of the public actor. We tend to measure the public activity itself and assume that the outputs produced generate public value. When those performance metrics are less oriented around outcomes and concentrate on the process of delivery they do form barriers to changes in organization, product and process.

The public sector is less interested in innovation for the capture of economic



value, but in fulfilling the public interest (Bernier & Hafsi, 2007.). Klein, et. al. (2010) identify another significant differentiator between private and public pursuits of innovation. Both public and private entrepreneurship involve decision-making and investment under uncertainty. Success or failure of this decision-making in the private sector is defined in primarily financial terms. In the public sector, while success may generate returns to the public interest, failure generates damage to the actor's reputation, a private interest (p.4). Klein, et.al, (2010) states, "More importantly, political entrepreneurs are only likely to undertake actions that foster economic value if the personally benefit from these actions in ways other than the mere private appropriation of value created" (2010: p.5).

Innovation is not necessarily driven by a desire for potential gain, whether public or private. A driver of innovation is sometimes a response to the threat of loss. Innovation can be generated as a result of an impending failure of the system to deliver an acceptable product or service. This driver of disruptive innovation may be the result of a substantial change in the environment, market or existing production methods. In the private sector, these may be the result of a market failure, technological change or other environmental cause that would result in organization failure if dramatic changes are not implemented. While market failures are rarely drivers of disruptive innovation in the public sector, they are subject to environmental and technological changes that have the same level of impact.

All systems resist change. Many systems will resist change to the point of collapse and failure. In the private sector, systems can only resist changes in their environment for so long. Adaptation in the public sector, and the innovation that creates it, is em-

blematic of an organization's ability to survive. This is not the case of systems in the public sector. Public systems have the added armor of governmental fiat and monopolistic or near-monopolistic power. They can and do use this power to impose their interpretation of the features of the product or service that will be delivered despite the desire of their customers for alternative choices. The power of the government monopoly on delivering the product or service can allow it to resist not only disruptive change but incremental change, as well. Despite increasing pressure to change, a governmental system has the power to ignore it. What then produces the triggering event that informs the governmental system that failure is imminent? What cues must occur for the governmental system to perceive its own collapse?

While the public sector entity usually does not face the ultimate downside risk that a private organization risks, they are not immune to catastrophic consequences as a result of their decisions. Some authors reflect that public organizations do not run the risk of going out of business as the result of failed choices. However, public organizations do go out of business where there are pareto optimal solutions that the organization does not respond to. This threat is institutionalized in the federal A-76 study, which compares the cost of providing a service in the public sector with comparable service delivery in the private sector. The drive to "contract out" services in pursuit of economy finds support with the NPM concepts of performance management, economy and accountability. Indeed, this trend has gained ground even in areas that were previously viewed as exclusively the domain of public employees. This can be seen in the growth of private military company like Blackwater and MPRI (Klein, et. al. 2010; Baum and McGahan, 2009). These firms grow because they are seen and evaluated as providing a

public service at a lower cost than their public organization counterpart. In fact, there are few major industrial firms in the U.S. that do not perform public functions under contract with the government. The threat of privatization and loss of position and status offer a clear downside risk to the public decision-maker.

Changes in the evaluative calculus of risk can also be a response to court decisions, legislative or political changes that modify the decision landscape. Klein, et.al, (2009) cite an example of an external cue that changes the public organization's landscape. He discusses a case where a judge issues a threat of an imposed solution to a public problem that disadvantages the organization (Klein, et.al, 2009: p.5). This represents the case where an external entity intercedes to realign the incentives and costs associated with the public organizational desire to change.

### *Culture of Empowerment*

Allowing individuals to explore and try new ideas is the cornerstone of an innovative organization. Sorensen & Torfing (2010) note the increasing importance of actor-centered innovation strategies (2010: p.3). Encouraging a culture of openness and empowerment is important for the development of innovation in the public sector (Borins, 2001). Saying this is one thing, but institutionalizing it into the organization's culture is another.

Baxter, et. al. (2010) discuss the need to decentralize decision-making empowering public actors and thereby "freeing up the frontline to innovate and collaborate" (Baxter, et. al. 2010: p. 11). This is particularly true in the case of budgetary decision-making allowing for the flexibility for resource reallocations for experimentation and

trials of innovative concepts. This requires a substantial cultural change from the norms of the NPM where accountability for public managers can only be achieved through cost control and demonstration of results against quantifiable metrics (Hood, 1995). While the NPM develops the concepts of efficiency, measurement and accountability as part of the public organization's culture, these same attributes are the antithesis of the space, resources and experimentation that promotes effective innovation. Private firms like Google and 3M allow their employees to spend substantial amounts of their work-day developing their own innovative ideas (Eggers and Singh, 2009).

The role of public actors who champion innovation despite resistant systems should not be underestimated. Damanpour and Schneider (2009) identify that despite institutional barriers to innovation in the public sector, that it is the characteristics of individual public managers that determines innovation adoptions. Characteristics like the age, education and tenure of the individual are correlated to innovative performance (Damanpour & Schneider, 2009). The role of the individual public actor in innovation activities cannot be overlooked. Bartlett and Dibben (2002) discuss how innovative solutions emerge in the public sector. In their examination of case local government studies they confirm that innovation is less process driven and more actor driven. They see the personal roles of 'champion' and 'sponsor' as the primary drivers in the interpretation of risk (Bartlett & Dibben, 2002). Borins (2000) work identified innovative public managers as 'loose cannons and rule breakers', reflecting their need to buck the institutional barriers to achieve innovation.

One attribute of the NPM is the competition that it breeds between public managers. This competition is primarily for resources

and based upon objective performance metrics, however, it also naturally extends to issues of status and recognition within the public organization and profession. While the rewards of competitive gain in the public sector are not as personally lucrative as they can be in the private sector, they are a substantial driver of achievement and the desire to excel. Absent large financial incentives, personal and professional recognition amongst peers are strong motivators of behavior in the public sector (Mulgan and Albury, 2003). This can be harnessed as a driver of innovation. Being a part of a successful innovation effort can be seen a significant professional discriminator, adding status and recognition to the employee.

Other perspectives would promote a culture with less competition between public actors and more collaboration to encourage innovation. The culture of the NPM promotes competition between public managers, for status, resources and promotion. Sorensen & Torfing (2010) stress the importance of collaborative activities between public sector actors in order to promote innovation; “Public managers and employees are well educated people who are driven by values and ambitions that prompt them to improve their performance. The new innovation agenda provides a golden opportunity for the professionals to mobilize their knowledge and competencies that recently have been suppressed by the New Public Management reforms aiming to enforce rigid performance standards” (Sorensen & Torfing, 2010: p. 6). Eggers and Singh (2009) provide a framework of five different collaborative strategies:

**Cultivation** – The provision of the space and time to allow public employees to interact, develop and test innovative ideas.

**Replication** – The use of knowledge bases or experiential learning from other public organizations to duplicate and adapt innovation into best practices.

**Partnership** – The use of private partners in the innovation process who bring different resources, experiences and rule sets to the collaboration.

**Network** - Construction of a community of innovation between the actors and interested parties driven by their mutual interest and interdependence.

**Open Source** – Creating of global innovation contribution communities through the use of the Internet and enrolling unknown contributors in the process.

The selection or combination of these collaboration strategy types is dependent upon the specific context in which they are applied.

### Innovation Narratives

One aspect of innovation research that has a particular application in the public sector is the role of innovation narratives as a cultural tool and contextual communicator. Bason (2011) uses narratives developed from cases to change perceptions of public managers. Bason indicates that these narratives are important for cultural understanding and ‘sense making’ of changing contexts and applications. Bartel & Garud (2009) found that “narratives are powerful mechanisms for translating ideas across the organization so that they are comprehensible and appear legitimate to others” (p. 107). They also found that narratives assist in real time

problem solving by making sense of emerging situation as well as serving as a store of organizational knowledge and memory. Narratives allow “ideas to be translated across space and time” (Bartel & Garud, 2009: p. 108).

The cultural cues provided by narratives not only provide useful knowledge about past relevant experiences, but also offer important cues to the organization about the perception of values, norms and allowable behaviors within the group. Narratives communicate in both a literal and an allegorical sense how a particular event or activity was processed and recast symbolically to demonstrate what the organization values and penalizes.

The use of these narratives is effective to understand existing organizational culture as well as crafting new cultural values. Tom Peters has used these narratives to great effect in communicating the organizational attributes that promote organizational excellence. Many times these narratives change over time, depending less on actual facts and events, but evolving into cultural myths. From Joseph Campbell to George Lucas, we have seen the power of these stories to communicate important values and visions to the culture.

Narratives about successful innovative risk taking can have a similar positive impact upon an organization. By providing widespread publicity, acknowledgement and retelling of innovation risk taking examples, the organization can begin to move toward a more positive perception of these events.

### *Public Entrepreneurship*

The concepts of decision empowerment and accountability lend themselves well to

models of entrepreneurship applied to the public sector. Potts (2006) advocates a concept of evolutionary policy that reflects the development of policy based upon experimentation. This experimentation provides for innovation and allows policy to be adaptive in response to results of various experimental efforts. Potts holds that these experiments must be “subject to strict methodological protocols” (Potts, 2006: p. 41). The purpose of the experiment is learning that can be applied.

The difficulty with this approach is in overcoming the public organization’s perception that experimentation is waste. This concept has led many authors to advocate a philosophy of public entrepreneurship. Theories of public entrepreneurship offer possible perspectives for dealing with the risk adverse posture of the public sector (Klein, et. al. 2010; Maguire, Hardy & Lawrence, 2004; Henisz and Zelner, 2005). Extending theories of entrepreneurship from the private sector to the public sector is a difficult task. Principally, these difficulties rest on the lack of autonomy of public actors and the difference between maximization of profit and maximizing public benefit as the primary drivers. Costs and benefits that can be measure in clearly monetary terms in the private sector, are less quantifiable in the public sector.

Incremental innovation has a greater resonance with public managers. It is more closely aligned with the NPM philosophy of providing good stewardship of public resources in achieving results as economically as possible. Holcombe (2002) refers to this efficiency perspective, “if political goals are not being implemented in the least cost way, then there is a profit opportunity from restructuring the nature of the government activity so that the goals are achieved at least cost. The cost savings are a political

profit which the entrepreneur can then apply toward the satisfaction of other goals” (p.147) . The approach suggests that incremental innovation in the public sector is a simple drive toward Pareto optimality and the gains that can be derived from it.

### Conclusions

The key element in encouraging innovative behavior in the public sector lies in changing the calculus of the public servant’s perception of risk. With an increasingly performance driven culture based upon metrics that measure existing processes and services, alternatives are perceived as waste with negative personal consequences. Many times even incremental innovation associated with the delivery of the current portfolio of services, are precluded due to a highly centralized, lengthy and discouraging decision process for authorization.

To encourage experimentation, the recognition or even the adoption of innovation, a public manager must see it as both beneficial personally and to the public good. This requires a reward structure that is aligned with the potential benefits of the innovation results and not just an acknowledgement of the cost.

In order to maximize innovation possibilities, there must be a change to public organization culture that is empowering and tolerant of failure, when failure occurs in the public interest. This would be a culture that would not penalized reasoned risk taking behavior and experimentation. It would empower a broader set of decision makers in the organization to allow them to act upon the choices that they make. One important way of encouraging this behavior in public organizations is through the use of cultural narratives that celebrate innovators and ac-

knowledge that the organization sincerely values the contribution of new ideas.

To maximize the benefits of innovation, align the decision making process for innovation evaluation and implementation with the reward structure and organizational elements that have the greatest chance of realizing the benefits. Public sector innovation experiments are likely to be successfully conducted at the point of service delivery rather than in a controlled setting (Tidd & Bessant, 2009, p.60). This approach of empowering middle managers as innovation decision makers has the greatest chance of empowerment of the innovation champions within the organization and encouraging reasoned risk-taking behavior.

### References

- Aagaard, P. 2010. *New ways in public innovation?* Working Paper 2/2010, Studies in Collaborative Innovation, CLIPS Project, Department of Society and Globalization, Roskilde University, Denmark.
- Bartel, C. & Garud, R. 2009. The role of narratives in sustaining organizational innovation. *Organization Science*, 20(1): 107-117.
- Bartlett, D. & Dibben, P. 2002. Public sector innovation and entrepreneurship: Case studies from local government. *Local Government Studies*, 28(4): 107–121.
- Baum, J. & McGahan, A. 2009. *Outsourcing war: The transaction cost dynamics of private military companies after the cold war*. Summer Conference 2009,



- Copenhagen Business School,  
Frederiksberg, DK, June 17 - 19, 2009.
- Bason, C. 2011. *Public design: How do public managers use design thinking?* Work in Progress (WIP) Seminar, Copenhagen Business School, DK.  
[http://www.mindlab.dk/assets/525/Public\\_Design\\_Bason\\_WIP\\_Paper.pdf](http://www.mindlab.dk/assets/525/Public_Design_Bason_WIP_Paper.pdf) Accessed 4/1/2011.
- Baxter, D., Schoeman, M., Goffin, K. & Micheli, P. 2010. *Public sector innovation: The role of commercial partnerships*, Cranfield University School of Management, U.K.  
[https://dspace.lib.cranfield.ac.uk/bitstream/1826/4621/1/Public\\_sector\\_innovation\\_the\\_role\\_of\\_commercial\\_partnerships.pdf](https://dspace.lib.cranfield.ac.uk/bitstream/1826/4621/1/Public_sector_innovation_the_role_of_commercial_partnerships.pdf) Accessed 4/1/2010.
- Bernier, L. & Hafsi, T. 2007. The changing nature of public entrepreneurship. *Public Administration Review*, 67: 408-533.
- Borins, S. 2000. Loose cannons and rule breakers, or enterprising leaders? Some evidence about innovative public managers. *Public Administration Review*, 60(6): 498-507.
- Borins, S. 2001. Public service awards programs: an exploratory analysis. *Canadian Public Administration*, 43(3): 321-342.
- Bugge, M., Mortensen, P. & Block, C. 2011. *Measuring public innovation in Nordic countries*,  
[http://mepin.eu/documents/public/News/MEPIN\\_%20Nordic\\_pilot\\_study.pdf](http://mepin.eu/documents/public/News/MEPIN_%20Nordic_pilot_study.pdf). Accessed 4/1/2011.
- Christensen, T. & Lægreid, P. 1999. New Public Management: Design, resistance, or transformation? A study of how modern reforms are received in a civil service system. *Public Productivity & Management Review*, 23(2): 169-193.
- Crosson, M. & Apaydin, M. 2010. A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47(6): 1154-1191.
- Damanpour, F. & Schneider, M. 2009. Characteristics of innovation and innovation adoptions in public organizations: Assessing the role of managers. *Journal of Public Administration Research and Theory*, 19 (3): 495-522.
- Dunleavy, P., Margetts, H., Bastow, S., Tinkler, J., Pearce, O., & Bartholomeou, P. 2006. *Achieving innovation in central government organisations*. HC 1447-1. London, UK: The Stationery Office.
- Earl, L. 2002. *Innovation and change in the public sector: A seeming oxymoron survey of electronic commerce and technology*. Ottawa: Statistics Canada.
- Eggers, B. & Singh, S. 2009. *The Public Innovators Playbook*, Washington, DC: Harvard Kennedy School of Government.
- Eveleens, C. 2010. *Innovation management: A literature review of innovation process models and their implications*. Downloaded from  
<http://www.lectoraatinnovatie.nl/wp-content/uploads/2011/01/Innovation-management-literature-review-.pdf>. Accessed 4/1/2011.



- Gregersen, B. 1992. The public sector as a pacer in national systems of innovation. In
- B. Lundvall (Ed.), *National systems of innovation: Towards a theory of innovation and interactive learning*: 129-145. London: Pinter Publishers.
- Groot, T. & Budding, T. 2008. New Public Management's current issues and future prospects. *Financial Accountability & Management*, 24(1): 1-13.
- Hartley, J. 2005. Innovation in governance and public services: past and present. *Public Money & Management*, 25(1): 27-34.
- Hartley, J. & Downe, J. 2007. The shining lights? Public service awards as an approach to service improvement. *Public Administration*, 85(2): 329-353.
- Henisz, W. & Zelner, B. 2005 . Legitimacy, interest group pressures and change in emergent institutions: The case of foreign investors and host country governments. *Academy of Management Review*, 30: 361–382.
- Holcombe, R. 2002. Political entrepreneurship and the democratic allocation of economic resources. *Review of Austrian Economics*, 15: 143–159.
- Hood, C. 1995. The "New Public Management" in the 1980s: Variations on a theme. *Accounting, Organizations and Society*, 20(2/3): 93-109.
- Klein, P., Mahoney, J., McGahan, A. & Pitelis, C. 2010. Toward a theory of public entrepreneurship. *European Management Review*, 7: 1–15.
- Lander, B. 2010. *Who innovates within innovation systems*. <http://www.sfu.ca/cprost/docs/lander2010.pdf>. Accessed 4/1/2011.
- Lynn, L. 1998. The New Public Management: How to Transform a Theme into a Legacy. *Public Administration Review*, 58(3): 231-237.
- Maguire, S., Hardy, C. & Lawrence, T. 2004. Institutional entrepreneurship in emerging fields. *Academy of Management Journal*, 47: 657-679.
- Mulgan, G. & Albury, D. 2003. *Innovation in the public sector*. London, UK: Prime Minister's Strategy Unit.
- OECD. 2005. *The measurement of scientific and technological activities: Guidelines for collecting and interpreting innovation data: Oslo manual, Third edition*, prepared by the Working Party of National Experts on Scientific and Technology Indicators, Paris: OECD.
- Osborne, D. & Gaebler, T. 1993. *Reinventing government: How the entrepreneurial spirit is transforming the public sector*, Reading, Mass.: Addison-Wesley.
- Parsons, W. 2006. Innovation in the public sector: Spare tyres and fourth plinths, *The Innovation Journal: The Public Sector Innovation Journal*, 11(2), Article 1.
- Perry, K. 2010. *Innovation in the public sector*. ICE Project, Working paper 2010:01, Aalborg University, DK.
- Potts, J. 2009. The innovation deficit in public services: The curious problem of

- too much efficiency and not enough waste and failure. *Innovation: Management, Policy & Practice*, 11(1): 34-43.
- Rolfstam, M., Phillips, W. & Bakker, E. 2011. Public procurement and the diffusion of innovations: Exploring the role of institutions and institutional coordination. *International Journal of Public Sector Management*. In press. [http://eprints.uwe.ac.uk/12658/3/rolfstam\\_et\\_al\\_ijpsm.pdf](http://eprints.uwe.ac.uk/12658/3/rolfstam_et_al_ijpsm.pdf). accessed 4/3/2011.
- Schumpeter, J. 1934. *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge, MA: Harvard University Press.
- Schumpeter, J. 1950. The process of creative destruction. In J. Schumpeter (Ed.), *Capitalism, socialism and democracy*. London: Allen and Unwin.
- Sorensen, E. & Torfing, J. 2010. *Collaborative innovation in the public sector: An analytical framework*. Working Paper 1/2010, Studies in Collaborative Innovation, CLIPS Project, Department of Society and Globalization, Roskilde University, Denmark.
- Stacey, R. & Griffin, D. 2006. *Complexity and the experience of managing in public sector organizations*, Routledge: Oxon.
- Tidd, J. & Bessant, J. 2009. *Managing innovation* (4<sup>th</sup> ed.), Chichester, England: John Wiley & Sons, Ltd.
- Tzeng, C. 2009. A review of contemporary innovation literature: A Schumpeterian perspective. *Innovation: Management, Policy & Practice*, 113(3): 373-394.
- U.K. National Audit Office. 2006. *Achieving innovation in central government organisations: Report by the Comptroller and Auditor General*. London, England: Stationary Office.
- Walker, RM. 2008. An empirical evaluation of innovation types and organizational and environmental characteristics: Towards a configuration framework. *Journal of Public Administration Research and Theory*, 18(4): 591 – 615.
- Windrum, P. 2008. Innovation and entrepreneurship in public services. In P. Windrum, & P. Koch (Eds.), *Innovation in public sector services: Entrepreneurship, creativity and management*: 3-20. Cornwall, UK: Edward Elgar.

THE MODERATING EFFECTS OF SWITCHING COSTS ON  
SATISFACTION - COMMITMENT RELATIONSHIP:  
AN AGRITOURISM APPROACH IN TAIWAN

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Abstract

With the active growth of agritourism in Taiwan, the total amount of leisure farms is keeping growing. However, it is now facing some marketing difficulties. For instance, the higher churn rate of the tourists or low revisiting rate despite of high revisit intention. Evaluating the reasons they switch destination and understanding how to achieve tourists' commitment is needed for the development of Taiwanese agritourism. The current study develops and tests a model of tourists' commitment that incorporates such contingencies between satisfaction and switching costs. A core proposition is that the effect of satisfaction on commitment depends on the magnitude of switching costs in the agritourism context. Data was collected by questionnaire survey from tourists in leisure farms. The findings show that affective commitment is a mediator between satisfaction and continuance commitment; switching costs is a moderator on satisfaction-affective commitment relationship. Finally some more managerial implications are drawn.

Keywords: agritourism, leisure farms, switching costs, commitment

## Introduction

Within the agritourism industry in Taiwan, three types of experience service are offered by leisure farms i.e. agricultural experience activities, food and beverage service, and accommodation service. Each of the farms can adapt one or more service as its business model. Those adopt three types of experience service are full-service farms and others are limited-service farms. There are clearly defined business segments, which vary in their level of service and amenities, and attract different customer types with different needs. However, with the active growth of agritourism, the total amount of leisure farms has been more than 1,244 in 2007, recording a total revenue of an estimated 4.5 billion NT dollars in 2004 and the gross output value of agritourism was estimated to be 21.7 billion NT dollars (Tuan, 2011; Chen, Tuan, Lin and Xie, 2007). Taiwanese agritourism is now facing some marketing difficulties. For instance, the higher churn rate of the tourists or low revisiting rate despite of high revisit intention (Cheng, 2003; Lin, Chen and Wang, 2007).

Reflecting upon these problems identified above, researchers have found that the total cost of bringing a new customer to a comparable level of profitability to that of the lost customer is approximately sixteen times greater (Lindgreen et al., 2000), and customer switching has deleterious effects on organizations' market

share, profitability, viability, and future revenue stream in today's competitive marketplace (Ganesh et al., 2000; Keaveney, 1995; Rust et al., 1995). Evaluating the reasons they switch destination and understanding how to achieve visitors' commitment is needed for the development of Taiwanese agritourism.

Moreover, there have been studies indicating that providing good service behavior and professional interpretation may help leisure farms improve relationship quality (RQ) and revisit intention (Wei, 2008); good service quality presents positive impacts on customer loyalty (Lee, Chou and Lin, 2006). Furthermore, studies out of agritourism have explored how to obtain the customers' satisfaction with higher service quality (Kim and Lee, 2011; Park, Robertson, and Wu, 2004) and with higher perceived value (Santiago, Ramon, Javier, and Luís, 2012; Chen and Chen, 2010; Reisinger and Turner, 2003). One has demonstrated the higher satisfaction visitors' perceived could lead to higher affective commitment (Yen, 2009) and revisit intention (Han, Back, and Barrett, 2009). Some of them have understood their behavioral intentions (Santiago et al., 2012; Chen and Chen, 2010), and achieved their loyalty (Santiago et al., 2012) when visitors perceived the higher satisfaction.

There is very little scholarly research evaluating the role of switching cost. Switching costs refer to visitors' perceptions of the time, money, and effort associ-

ated with changing service providers (Jones, Mothersbaugh and Beatty, 2000). It is one of switching barriers and can positively enhance continuance commitment and decline switching intention to leave of customers (Bansal et al., 2004; Yen, 2009). Another study states that it is positively related to affective commitment and can moderate the relation between satisfaction and affective commitment (Yen et al., 2010). It is important because it may generally foster greater retention and help companies weather short-term fluctuations in service quality that might otherwise result in defection. However, managers and scholars are confused because it acts a contingency role on satisfaction and commitment relations. Clarifying its role on the relations of those variables will have higher probabilities to benefit decision making of managers and to fill up the theoretical gaps.

Therefore, the current study develops and tests a model of visitors' commitment that incorporates such contingencies between customer satisfaction and switching costs. A contingency approach has been called for by a number of researchers (e.g., Anderson and Fornell, 1994), but has generally not been adopted in studies of commitment for agritourism. A core proposition is that the effect of satisfaction on commitment depends on the magnitude of switching costs in the agritourism context. Satisfaction should play a lesser role when exit costs are high and a greater role when exit costs are low. This proposition, if sup-

ported, would (1) augment existing visitor-commitment models which focus mostly on satisfaction, (2) help to explain variability in the satisfaction-commitment relationship evidenced in prior research, and (3) provide guidance to leisure farms in developing visitor-commitment programs.

## Literature Review

### *Satisfaction*

Satisfaction, according to Oliver (1980) and Tse and Wilton (1988), is an evaluation made by a person between previously created expectations and the result obtained from the consumption of a product or service; i.e. the final psychological state resulting when the feeling around the disconformity of expectations meets the previous sentiments about the consumption experience (Oliver, 1981). In tourism context, satisfaction is primarily referred to as a function of pre-travel expectations and post-travel experiences. When experiences compared to expectations result in feelings of gratification, the tourist is satisfied. However, when they result in feelings of displeasure, the tourist is dissatisfied (Reisinger and Turner, 2003).

Furthermore, satisfaction itself has occasionally conceptualized as emotional responses to product/service experiences (Han and Back, 2007). This emotional response is a critical determinant of commitment (Kyle, Theodorakis, Karageorgiou, and Lafazani, 2010) and can enhance



affective commitment of a tourist (Liu, Yen and Huan, 2010).

### *Commitment*

Commitment has been defined as a force that binds an individual to a course of action of relevance to one or more targets and is distinguishable from exchange based forms of motivation and from target-relevant attitudes and can influence behavior even in the absence of intrinsic motivation or positive attitudes. (Meyer and Herscovitch, 2001; Bansal et al., 2004). The role of commitment in loyalty has been well documented. Affective commitment, also referred to as emotional or relationship commitment, can be described as an emotional attachment that creates a sense of belonging and personal identification and a desire to maintain a long term relationship with the provider (Allen and Meyer, 1990; Baloglu, 2002; Benapudi and Berry, 1997; Bowen and Shoemaker, 2003; Fullerton, 2003, 2005; Mattila, 2001, 2006; Sui and Baloglu, 2003; Liu et al., 2010; Tanford, Raab, and Kim, 2012). Affective commitment is considered key to building relationships within the hotel industry (Bowen and Shoemaker, 2003; Shoemaker and Lewis, 1999).

A second type of commitment has been termed calculative commitment (Mattila, 2006), value commitment (Tanford et al., 2010), or Continuance commitment (Bansal et al., 2004). Value commitment is less enduring and associated

with greater price sensitivity and willingness to switch hotels than affective commitment (Tanford et al., 2010). Continuance/calculative commitment refers to a cost-based attachment where an employee feels he or she has to stay with the organization (i.e., employees remain with the organization because they need to) (Bansal et al., 2004). Continuance commitment represents a constraint-based force binding the consumer to the service provider out of need. It reflects the fact that consumers stay with a service provider because they feel they have to; it reflects a sense of being “locked in” to the service provider (Meyer and Herscovitch, 2001).

Numerous studies have identified the important roles of satisfaction in building commitment (Back, 2005; Han and Back, 2008; Kim and Han, 2008; Yuksel et al., 2010; Kyle, Theodorakis, Karageorgiou, and Lafazani, 2010; Liu et al., 2010). Satisfaction is a critical determinant of commitment (Kyle et al., 2010), when a destination predicts tourist behavioral loyalty. Kim and Han (2008) found that satisfaction enhances customers’ favorable intentions toward a restaurant firm. In the hotel industry, Kim et al. (2001) demonstrated that satisfaction, as a central part of relationship quality, was an important predictor of commitment and behavioral intentions. In agritourism, Liu et al. (2010) and Yen (2009) have evidenced that satisfaction can enhance affective commitment. Hence, the following hypothesis is developed:

*H1: the higher satisfaction a tourist perceived could lead to the higher affective commitment.*

Moreover, commitment can be related to purchase decision factors (Tanford et al., 2012). Hospitality research has documented the role of affective commitment and relationship quality in loyalty to hotels (Mattila, 2006; Tanford et al., 2010), casinos (Baloglu, 2002; Sui and Baloglu, 2003), and restaurants (Hyun, 2010; Mattila, 2001). Affective commitment is positively associated with continuance commitment in agritourism (Wu, Yen, Tsai, 2009; Yen, 2009). In those studies, affective commitment has been shown to be a stronger determinant of loyalty than other forms of commitment. Hence, the following hypothesis is developed:

*H2: the higher affective commitment a tourist perceived could lead to the higher continuance commitment.*

### *Switching Costs*

Perceived switching costs are consumer perceptions of the time, money, and effort associated with changing service providers (Jones et al., 2000). One state that switching costs are the costs/sacrifices that may be incurred when changing providers, including monetary and non-monetary costs/sacrifices (i.e., time, psychological costs) (Dick and Basu, 1994; Han et al., 2009). Monetary costs are sunk cost and non-monetary costs refer to a

perceived risk. Such costs may entail search costs resulting from the geographic dispersion of service alternatives, as well as learning costs resulting from the customized nature of many service encounters (Guiltinan, 1989). As the perceived costs of an activity increase, the likelihood of consumers engaging in such behavior should diminish (Yen et al., 2009). Switching service providers is likely to involve various behavioral and psychological costs, and such costs should act to diminish switching tendencies (Jones et al., 2000).

Economic models of buyer behavior generally posit that consumers weigh both the costs and benefits of a particular decision (Hauser and Wernerfelt, 1990). One implication is that as perceived switching costs increase, the perceived costs of switching should eventually outweigh the perceived switching benefits arising from dissatisfaction with the core service. When perceived switching costs are low, dissatisfied consumers should be more likely to defect than are satisfied customers. Alternatively, when perceived switching costs are high, customers may remain despite their dissatisfaction due to perceptions that switching costs outweigh switching benefits (Jones et al., 2000). Hospitality research has been offered the evidence that dissatisfied guest will not switch the service firm because the switching costs are high (Han et al., 2009). The probability for developing SAT-AC relation might be

moderated by switching costs. Therefore, this study hypothesizes that:

*H3: As perceived switching costs increase, the relationship between satisfaction and affective commitment will diminish (i.e., switching costs × satisfaction interaction).*

### Methodology

Having considered the data collection requirements of this study such as a need of large sample of customers and quantities of Taiwanese agritourism, it would be appropriate to employ the field survey with a self-administered questionnaire as the primary data collection technique for this study. The field study method was chosen in order to gain information directly from individuals at the leisure farm settings. As such, their feelings and perceptions about the setting with respect to relational satisfaction, affective commitment, continuance commitment and switching cost are likely to be clearly in mind (Danaher and Mattsson, 1994).

To ensure the content validity of the scales, the items selected constructs are mainly adopted from prior studies. The study uses existing scales for measuring satisfaction, affective commitment, continuance commitment and switching cost. Three items for SAT were drawn based on the studies of De Wulf et al. (2001) and Yen and Liu (2009). Three items for SWC were drawn based on the studies of Han et al., (2009) and Jones *et al.* (2000). Three

items for CC were drawn based on the studies of Bansal *et al.* (2004) and Jones *et al.* (2000). Three items for AC were drawn based on the studies of Tanford, Raab, and Kim, (2012) and Yen and Liu (2009). The initial items were confirmed and corrected by the managers of leisure farms and pre-tested was done by EMBA (Executive Master of Business Administration) students in NPUST (National Pingtung University of Science and Technology), Taiwan. For items, responses were ratings from 1 to 7. The anchors are “strongly disagree” (1) and “strongly agree” (7) for measuring SWC (switching cost), CC (continuance commitment), and AC (affective commitment). The anchors for SAT (satisfaction) are “strongly displeased” (1) and “strongly pleased” (7), “strongly disgusted” (1) and “strongly gusted” (7) and “strongly dissatisfied” (1) and “strongly satisfied” (7).

It was decided that the model would be tested by collecting data from leisure farms in Taiwan. The criteria for farms’ selection were based on their service quality of experience, food and beverages, and accommodation certified by Taiwan Leisure Farms Development Association (TLFDA). Finally, a total of 23 farms were drawn and could be categorized into full-service farms and limited-service farms. They were selected expecting adequate diversity of quality and loyalty to allow a model to be estimated. A questionnaire was prepared for collecting rating and other information. Items measuring the

various constructs were distributed about in the questionnaire to reduce halo effects.

Because the goal was to develop a model, random sampling was not seen as necessary. Surveyors were collecting data from visitors they did not know. Quota sampling was adapted to ensure that respondents were distributed across age and sex groups. Having enough respondents in certain categories was seen as important for data to be appropriate for estimating the model of concern. Data was collected by personal contact with respondents at rest area of the farm. In collecting data, respondents were asked to complete a printed questionnaire. The data collectors, as necessary, clarified the meaning of questions and answers. In other words they dealt with any problems encountered while answering questions. Data were collected during the April to May in 2012. A total of 351 valid questionnaires were received. Of 351 questionnaires (166 respondents were drawn from limited-service farms and 185 respondents were drawn from full-service farms) obtained about 50% were from female respondents (50.4%). At about 16.8% of respondents were below 20 years of age and 13.6% of respondents were higher than 40 years of age. The majority of respondents were between 20-40 years of age (69.8%). Approximately 7.1% of respondents were graduated from junior high school and 26.5% of respondents were graduated from junior high school. At about 65.4% respondents were graduated from college or above. With regard to the

frequency visited, 55.6% of respondents were first time to the destination and 44.4% were revisit.

## Results

A confirmatory factor analysis (CFA) using AMOS 17.0 and SPSS 17.0 were conducted to test the measurement model and hypothesis. Before testing the model, the data were examined. For making maximum likelihood (ML) estimates for path models (Kline, 1998), there are problems if certain conditions arise. There are likely to be outliers if the absolute value of skewness is greater than 3. Also, there is a distribution problem if the absolute value of kurtosis is larger than 10. One wants data that is approximately normally distributed for making ML estimates. For this research the skewness of variables ranges between -0.605 and 0.311 (Table 1) so the  $< 3$  criterion is met. The kurtosis values are between -0.842 and 0.650 so the  $< 10$  criterion is met. Therefore, this enables authors to proceed in evaluating the measurement models.

The chi-square (115.06) is significant ( $p < 0.05$ ; Bollen, 1989), a finding is not unusual with large sample sizes (Doney and Cannon, 1997). The ratios of chi-square to degrees of freedom ( $df = 48$ ) are 2.39 for measurement model within the acceptable range of 2 to 5 (Marsh and Hovecar, 1985). The values for GFI (0.948), AGFI (0.915), CFI (0.966), and RMSEA (0.063) are acceptably close to

the standards suggested by Hu and Bentler (1999) 0.9 for GFI, 0.9 for AGFI, 0.95 for CFI and 0.08 for RMSEA. Given that these batteries of overall goodness-of-fit (GFI) indices were accurate and that the model was developed on theoretical bases, and given the high level of consistency samples, no respecifications of the model were made. This enables authors to proceed in evaluating the reliability and validity.

This study assesses the quality of measurement efforts by investigating uni-dimensionality, convergent validity, reliability, discriminate validity. Evidence for the uni-dimensionality of each construct included appropriate items that loaded at least 0.573 on their respective hypothesized component and loaded no

Table 1. Reliability and convergent validity

Concept	Items	Mean	SD	Skewness	Kurtosis	Loading	SMC	CR	AVE
SAT	sat1	4.60	1.47	-.605	.397	.720	.519	.89	.72
	sat2	4.85	1.36	-.220	-.438	.779	.607		
	sat3	4.95	1.32	-.442	.067	.815	.664		
AC	ac1	3.97	1.60	-.101	-.683	.834	.696	.92	.80
	ac2	3.92	1.59	-.057	-.592	.835	.697		
	ac3	4.16	1.73	-.081	-.842	.831	.691		
CC	cc1	3.29	1.60	.311	-.410	.816	.666	.87	.70
	cc2	3.46	1.70	.248	-.688	.818	.670		
	cc3	4.13	1.55	-.190	.350	.622	.386		
SWC	swc1	4.29	1.25	-.068	.406	.573	.329	.87	.69
	swc2	4.08	1.22	-.222	.650	.875	.766		
	swc3	4.11	1.29	.011	-.346	.797	.635		

Note:  $\chi^2=115.06(p=.000)$ ;  $df=48$ ;  $GFI=.948$ ;  $AGFI=.915$ ;  $CFI=.966$ ;  $RMSEA=.063$   
 SMC: Squared Multiple Correlation; CR: Composite Reliability; AVE: Average Variance Extracted

larger than 0.30 on other components in a factor analysis (see Table 1). In addition, the overall goodness of fit supports uni-dimensionality (Steenkamp and van Trijp, 1991). Convergent validity was supported by all loadings being significant ( $p < 0.01$ ) and nearly all SMC (square of multiple correlation) exceeding 0.30 (Hildebrandt, 1987). This study assesses reliability

jointly for all items of a construct by computing the composite reliability (C.R.) and average variance extracted (AVE) (Baumgartner and Homburg, 1996; Steenkamp and van Trijp, 1991). For a construct to assess good reliability; composite reliability should be higher than 0.70, and the average variance extracted should at least be 0.60



(Bagozzi and Yi, 1988). All scales demonstrate good reliabilities.

To examine discriminant validity, this study first checks the coefficients of correlations between factors whether they are significantly lower than 1 and then compared the correlations between factors with their AVE (Gaski and Nevin, 1985). The results show that all of coefficients of correla-

tions between factors are significantly lower than 1 and the correlations between factors are lower than their AVE, thus confirming discriminant validity (see Table 2). In summery, the measurement model demonstrates adequate uni- dimensionality, convergent validity, reliability, and discriminant validity. This enables authors to proceed in evaluating hypotheses testing.

Table 2. Discriminate validity

Concept	Mean	SD	SAT	AC	CC	SWC
SAT	14.40	3.55	.72			
AC	12.04	4.39	.64**	.80		
CC	10.88	4.07	.47**	.72**	.70	
SWC	12.47	3.16	.39**	.40**	.42**	.69

\*\* Correlation is significant at the 0.01 level (2-tailed).

Diagonal elements are AVE. Off-diagonal elements are correlations between factors.

Before testing the hypotheses, the role of SAT, CC, and AC should be clarified to make sure their relations. Three steps were adapted to examine the mediated effects of AC. The results (see Table 3) showed that the effects of SAT on CC ( $t= 6.85$ ;  $\beta=.46$ ) and on AC ( $t= 6.85$ ;  $\beta=.46$ ) were significant when the only independent variable SAT was considered in the model; the effects of AC on CC ( $t= 8.74$ ;  $\beta=.72$ ) was significant but SAT on CC ( $t=.117$ ;  $\beta=.01$ ) was not when the inde-

pendent variable SAT and AC were considered in the model. This indicated that AC acts a mediated role among SAT and CC. This enables authors to proceed in evaluating hypotheses testing. The results of structural model showed that the model fit were adequate ( $\chi^2=66$ ;  $df= 25$ ;  $p= .000$ ;  $GFI=.959$ ;

Table 3. Results of mediated effects

Path	Model 1		Model 2		Model 3	
	t	$\beta$	t	$\beta$	t	$\beta$
SAT-CC	6.85	4.6**			.11	.01
SAT-AC			9.49	.64**		
AC-CC					8.75	.72**

NOTE: \*\*p<.01

AGFI = .927; CFI= .973; RMSEA = .068). SAT can positively influence AC (t= 9.57;  $\beta$ =.64) and AC can positively influence CC (t= 11.68;  $\beta$ =.72). H<sub>1</sub> and H<sub>2</sub> were evidenced. Moreover, in order to confirm the moderated effects of SWC on both SAT-AC and AC-CC relations, two tests were carried out. The results (see Table 4) re-

vealed that SAT-AC relation could be significantly moderated by SWC (t= 3.09;  $\beta$ =.17). The higher SWC visitors perceived might enhance the SAT-AC relation. Therefore, H<sub>3</sub> was evidenced. However, the moderated effect of SWC (t= 1.08;  $\beta$ =.05) on AC-CC relation was not significant. H<sub>4</sub> was rejected.

Table 4. Results of hypotheses testing

Path	Model 1		Model 2		Model 3	
	t	$\beta$	t	$\beta$	t	$\beta$
H <sub>1</sub> :SAT-AC	9.57	.64**	9.69	.68**	9.58	.65**
H <sub>2</sub> : AC-CC	11.68;	.72**	11.68	.72**	11.64	.72**
H <sub>3</sub> :INTA			3.09	.17**		
H <sub>4</sub> :INTB					1.08	.05
R <sup>2</sup> AC	.41		.46		.42	
CC	.52		.52		.52	
Model fit	$\chi^2$ =66; df= 25; p= .000; GFI=.959; AGFI= .927; CFI= .973; RMSEA= .068					
	$\chi^2$ =540; df= 121; p= .000; GFI=.857; AGFI= .80; CFI= .90; RMSEA= .10					
	$\chi^2$ =488; df=120; p= .000; GFI=.874; AGFI= .821; CFI= .926; RMSEA= .094					

NOTE: INTA: SWC\*SAT; INTB: SWC\*AC; \*\*p<.01

## Discussion and Conclusion

Results of the current study highlight the role of switching costs in the visitors' commitment proneness in Taiwanese agritourism. Consistent with prior research, satisfaction was a critical determinant of commitment (Kyle et al., 2010). Current study finds that switching costs in form of affective commitment was also found to be important. That is, the effect of satisfaction on affective commitment was enhanced when visitors perceived high switching costs. This is very important for Taiwanese agritourism when affective attachments were emphasized and the goal of leisure farms was to achieve visitors' affective commitment and continuance commitment.

In terms of theory, results highlight the need to incorporate factors beyond satisfaction in models of visitors' affective commitment and suggest the need to extend existing theories of commitment to incorporate contingency relationships. In considering such contingencies, results may partially explain, for example, why visitors may commit with service providers despite lower levels of satisfaction and why the satisfaction-affective commitment relationship has evidenced variability in prior research (e.g., Yen et al., 2009; Anderson and Sullivan, 1993; Cronin and Taylor, 1992). Achieving a high level of satisfaction is the ultimate goal of marketing strategies, despite behavioral intentions are considered as a better predictor of performance (Chi & Qu, 2008). Before understanding visitors' behavioral intentions, their emotional attachment to a service provider should be confirmed. This affective force binds the visitor to the service provider out of desire. It reflects an individual's "psychological bond" (Gruen et al., 2000) with a service provider and is similar to "loyalty commitment" described by Gilliland and Bello (2002). On the other hand, the better satisfaction a visitor perceived to a service provider has higher

probabilities to reveal psychological bond to them. This psychological bond may be an important factor of positive behavioral intentions for those service providers.

Furthermore, the second finding of this study is affective commitment is a mediator between satisfaction and continuance commitment. This implies that satisfied visitors will have higher probabilities to present positive emotion and affective force binds them to the service provider; and then cost-based attachment, a sense of being "locked in" to the service provider, can be considered. Comparing to previous researches (Abdul-Muhmin, 2005; Halinen, 1997; Tellefsen, 2002; Vasudevan et al., 2006), they observed the positive influence of satisfaction on commitment. For services, this means that the more satisfied visitors are with the service experience the more likely they are to commit to a relationship with a service provider. And the affective state of visitors should be concerned before cost-based attachment in an agritourism context. Our findings extend the theory existed.

Specifically, the relationship between satisfaction and affective commitment appears to vary somewhat as a function of the magnitude of switching costs present in a given agritourism context. As perceived switching costs increase, the perceived costs of switching should eventually outweigh the perceived switching benefits arising from dissatisfaction with the core service. This implies that service provider should provide more emotional attachment whether tourist have been satisfied or not. However, when perceived switching costs are low, dissatisfied visitors should be more likely to defect than are satisfied ones. This means dissatisfied tourists would have the lower probabilities to be bound by the service provider and they might have the lower probabilities to perceive a sense of being "locked in" to the service provider.

In terms of practice, results support the importance of satisfaction in the retention process. Consistent with prior research, tourist satisfaction should remain a primary strategic focus of service providers due to its strong impact on affective commitment and continuance commitment. The practical implications of switching costs may, however, not be so straightforward. One possible conclusion is that leisure farms should build up various switching costs so as to retain existing visitors despite their lack of satisfaction with the core service offering. Such a recommendation seems most fitting for full-service farms who generally satisfy their visitors but want some sort of “insurance” against defection when their visitors experience the occasional but probably unavoidable service failure (Tax, Brown, and Chandrashekar, 1998). However, creating switching costs in lieu of satisfaction seems destined to failure in the long run particularly when (1) dissatisfaction is ongoing rather than temporary, and (2) the nature of the switching costs are such that visitors feel entrapped (Jones et al., 2000). When tourist dissatisfaction is an ongoing phenomenon, tourists may remain due to high switching costs, but engage in company-focused sabotage such as negative word of mouth. Hence, another possible conclusion is that leisure farms should build up their own core competitive service that can satisfy the target tourists. Such as agricultural experience activities, rural food and beverage, and rural accommodation can be adapted and concerned as core competitive service.

#### References

Abdul-Muhmin, A. G. (2005). Instrumental and interpersonal determinants of

relationship satisfaction and commitment in industrial markets. *Journal of Business Research*, 58(5), 619-628.

Anderson, E. W. & Fornell, C. (1994). A customer satisfaction research prospectus, in *service quality: New directions in theory and practice*, Roland T. Rust and Richard L. Oliver, eds. Thousand Oaks, CA: Sage Publications, 1994, pp.241-268

Allen, N. & Meyer, J. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Occupational Psychology* 63 (1), 1-18.

Anderson, E. W. & Sullivan, M. W. (1993). The antecedents and consequence; of customer satisfaction for firms," *Marketing Science*, 12 (2), 125-143.

Back, K. (2005). The effects of image congruence on customers' brand loyalty in the upper middle-class hotel industry. *Journal of Hospitality and Tourism Research* 29 (4), 448-467.

Bagozzi, R. P. & Yi, Y. J. (1988). On the evaluation of structure equation models. *Journal of the Academy of Marketing Science*, 16(1), 74-94.

Baloglu, S. (2002). Dimensions of customer loyalty: separating friends from well wishers. *Cornell Hotel and Restaurant Administration Quarterly* 43 (1), 47-59.

Bansal, H. S., Irving, P. G., & Taylor, S. F. (2004). A three-component model of customer commitment to service providers. *Journal of the Academy of Marketing Science*, 32(3), 234-250.

- Baumgartner, H. & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing*, 13, 139-161.
- Benapudi, N. & Berry, L. L. (1997). Customers' motivations for maintaining relationships with service providers. *Journal of Retailing* 73 (1), 15-37.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York: John Wiley & Sons.
- Bowen, J.T. & Shoemaker, S. (2003). Loyalty: a strategic commitment. *Cornell Hotel and Restaurant Administration Quarterly* 44 (5/6), 31-46.
- Chen, Z. L, Tuan, C. L., Lin, F. J. & Xie, J. J. (2007). Evaluate the out put value in 2006 for domestic leisure agricultural area by assessing managers. *Agriculture Extension*, 52, 199-221.
- Chen, C. F. & Chen, F. S. (2010). Experience quality, perceived value, satisfaction and behavioral intentions for heritage tourists, *Tourism Management* 31, 29-35.
- Cheng, C. H. (2003). A study on competitiveness of service quality in Taiwanese leisure farms. 2003 Technological Research Report of Council of Agriculture, Executive Yuan, R.O.C.
- Chi, C. G. Q., & Qu, H. (2008). Examining the structural relationships of destination image, tourist satisfaction and destination loyalty: An integrated approach. *Tourism Management*, 29, 624-636.
- Cronin, J.J. & Taylor, S.A. (1992). Measuring service quality: A reexamination and extension, *Journal of Marketing*, 56(3), 55-68.
- Danaher, P. J. & Mattsson, J. (1994). Cumulative encounter satisfaction in the hotel conference process, *International Journal of Service Industry Management*, Vol. 5 No. 4, pp. 69-80.
- De Wulf, K., G. Odekerken-Schröder & Iacobucci, D. (2001). Investments in consumer relationships: A cross-country and cross-industry exploration. *Journal of Marketing*, 65(4), 33-50.
- Dick, A.S. & Basu, K. (1994). Customer loyalty: toward an integrated conceptual framework. *Journal of the Academy of Marketing Science* 22, 99-113.
- Doney, P. M. & Cannon, J. P. (1997). An examination of the nature of trust in buyer-seller relationships. *Journal of Marketing*, 61(2), 35-51.
- Fullerton, G. (2003). When does commitment lead to loyalty? *Journal of Service Research* 5 (4), 333-344.
- Fullerton, G. (2005). How commitment both enables and undermines marketing relationships. *European Journal of Marketing* 39 (11/12), 1372-1388.
- Ganesh, J., Arnold, M. J., & Reynolds, K. E. (2000). Understanding the customer base of service providers: an examination of the differences between switchers and stayers. *Journal of Marketing* 64, 65-87.
- Gaski, J. F. & Nevin, J. R. (1985). The differential effects of exercised and unexercised power sources in a marketing channel. *Journal of Marketing Research*, 22, 130-142.
- Gilliland, D. I. & Bello, D. C. (2002). Two sides to attitudinal commitment: the effect of calculative and loyalty commitment on enforcement mechanisms in distribution channels. *Journal of the Academy of Marketing Science*, 30 (1), 24-43.



- Gruen, T. W., Summers, J. O., & Acito, F. (2000). Relationship marketing activities, commitment, and membership behaviors in professional associations. *Journal of Marketing*, 64 (July), 34-49.
- Gultinan, J. P. (1989). A classification of switching costs with implications for relationship marketing, pp. 216-220 in 1989 AMA Winter Educators' Conference: Marketing Theory and Practice, T. L. Childers, R. P. Bagozzi, J. P. Peter (Eds.), Chicago, IL: American Marketing Association.
- Halinen, A. (1997). Relationship marketing in professional services: A study of agency-client dynamics in the advertising sector. London: Routledge.
- Han, H. & Back, K. (2007). Assessing guest emotional experiences influencing customer satisfaction in the lodging industry. *Journal of Travel and Tourism Marketing* 23(1), 43-56.
- Han, H. & Back, K. (2008). Relationships among image congruence, consumption emotions, and customer loyalty in the lodging industry. *Journal of Hospitality and Tourism Research* 32 (4), 467-490.
- Han, H., Back, K. J., & Barrett, B. (2009). Influencing factors on restaurant customers' revisit intention: The roles of emotions and switching barriers, *International Journal of Hospitality Management* 28, 563-572.
- Han, H., Kim, W., & Hyun, S. S. (2011). Switching intention model development: Role of service performances, customer satisfaction, and switching barriers in the hotel industry, *International Journal of Hospitality Management* 30, 619-629.
- Hauser, J. R. & Wernerfelt, B. (1990). An evaluation cost model of evoked sets, *Journal of Consumer Research*, 16 (4), 393-408.
- Hildebrandt, L. (1987). Consumer retail satisfaction in rural areas: a reanalysis of survey data. *Journal of Economic Psychology*, 8(1), 19-42.
- Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.
- Hyun, S.S. & Perdue, R. (2010). Previous trip satisfaction, destination images, and probability of future visitation. *Tourism Analysis*, 15(6), 725-728.
- Jones, M. A., Mothersbaugh, D. L. & Beatty, S. E. (2000). Switching barrier and repurchase intention in service, *Journal of Retailing*, 76(2), 259-274.
- Keaveney, S. M. (1995). Customer switching behavior in service industries: an exploratory study. *Journal of Marketing* 59, 71-82.
- Kim, W. & Han, H. (2008). Determinants of restaurant customers' loyalty intentions: a mediating effect of relationship quality. *Journal of Quality Assurance in Hospitality and Tourism* 9 (3), 218-238.
- Kim, Y. K. & Lee, H. R. (2011), Customer satisfaction using low cost carriers, *Tourism Management* 32 (2011) 235-243.
- Kim, W. G., Han, J. S., & Lee, E. (2001). Effects of relationship marketing on repeat purchase and word of mouth. *Journal of Hospitality & Tourism Research* 25 (3), 272-288.
- Kline, R. B. (1998). Principles and practice of structural equation modeling. New York, NY: The Guilford Press.
- Kyle, G. T., Theodorakis, N. D., Karageorgiou, A. & Lafazani, M. (2010). The effect of service quality on customer loyalty within the context of ski resorts,

- Journal of Park and Recreation Administration, 28(1), 1-15.
- Lee, M. S., Chou, J. N. & Lin, Y. J. (2006). The research of the relationship among service quality, relationship quality, and customer loyalty in leisure farms. *Journal of Agricultural Economics*, 80, 125-168.
- Lin, H. P., Chen, C. C. & Wang, J. S. (2007). Study in the development and developing strategy of Taiwan leisure farm. *Journal of Taipei Physical Education College*, 15, 152-163.
- Lindgreen, A., Davis, R., Brodie, R. J., & Buchanan-Oliver, M. (2000). Pluralism in contemporary marketing practices. *International Journal of Bank Marketing* 18 (6), 294-308.
- Liu, H. H. J., Yen, T. F. & Huan, T. C. (2010). Effects of switching barriers of visitors on satisfaction-commitment relationship, *International Journal of Agricultural Travel and Tourism*, 1(1), 28-40.
- Marsh, H. W. & Hovecar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: first and higher order factor models and their invariance across groups. *Psychological Bulletin*, 97(3), 562-582.
- Mattila, A.S. (2001). Emotional bonding and restaurant loyalty. *Cornell Hotel and Restaurant Administration Quarterly* 42 (6), 73-79.
- Mattila, A.S. (2006). How affective commitment boosts guest loyalty (and promotes frequent guest programs). *Cornell Hotel and Restaurant Administration Quarterly* 47 (2), 174-181.
- Meyer, J. P., & Herscovitch, L. (2001). Commitment in the workplace: Toward a general model. *Human Resource Management Review*, 11, 299-326.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460-469.
- Oliver, R. L. (1981). Measurement and evaluation of satisfaction processes in retail settings. *Journal of Retailing*, 57(3), 25-48.
- Park, J.-W., Robertson, R., & Wu, C. L. (2004). The effects of airline service quality on passenger's behavioral intentions: a Korean case study. *Journal of Air Transport Management*, 10, 435-439.
- Rust, R. T., Zahorik, A. J., & Keiningham, T. L. (1995). Return on quality (ROQ): making service quality financially accountable. *Journal of Marketing* 59, 58-70.
- Reisinger, Y., & Turner, L. W. (2003). *Cross-cultural behaviour in tourism: Concepts and analysis*. Oxford: Butterworth-Heinemann
- Forgas-Coll, S., Palau-Saumell, R., r. Sánchez-García, R. J., & Callarisa-Fiol, L. J. (2012). Urban destination loyalty drivers and cross-national moderator effects: The case of Barcelona, *Tourism Management* xxx (2012) 1-12.
- Shoemaker, S. & Lewis, R.C. (1999). Customer loyalty: the future of hospitality marketing. *International Journal of Hospitality Management* 18 (4), 345-370.
- Sui, J. J. & Baloglu, S. (2003). The role of emotional commitment in relationship marketing: an empirical investigation of a loyalty model for casinos. *Journal of Hospitality & Tourism Research* 27 (4), 470-489.
- Steenkamp, E. M. & van Trijp, H. (1991). The use of LISREL in validating marketing constructs. *International Journal*

- of Research in Marketing, 8 (4), 283-99.
- Tanford, S., Raab, C., & Kim, Y. S. (2012). Determinants of customer loyalty and purchasing behavior for full-service and limited-service hotels, *International Journal of Hospitality Management* 31, 319-328.
- Tax, S. S., Brown, S. W. & Chandrashekar, M. (1998). Customer evaluations of service complaint experiences: Implications for relationship marketing. *Journal of Marketing*, 62(2), 60-76.
- Tellefsen, T. (2002). Commitment in business-to-business relationships: The role of organizational and personal needs. *Industrial Marketing Management*, 31(8), 645-652.
- Tse, D., & Wilton, P., (1988). Models of consumer satisfaction formation: an extension. *Journal of Marketing Research*, 25(3), 204-212.
- Tuan, C. L. (2011). *Leisure agriculture: an experience perspective*. Wey Far Books Co., Ltd. Taipei.
- Wei, L. (2008). The effect of leisure farm interpretation program on behavior Intention: the mediate mechanism of relationship quality. *Bio and Leisure Industry Research*, 6(1), 1-17.
- Wu, C. C., Yen, T. F., & Tsai, S. C. (2009). The impacts of visitors' satisfaction on commitment of leisure farm: Switching costs and alternative attractiveness as moderators, *Humanities and Social Sciences Research*, 3(3), 158-174.
- Yen, T. F. (2009). Factors affecting visitors' switch intentions in urban leisure farms. *Journal of Sport, Leisure and Hospitality Research*. 4(3), 1-14.
- Yen, T. F. & Liu, H. S. (2009). Tourist perceived the relation between relationship investment and relationship quality in leisure farm. *Journal of Sport, Leisure and Hospitality Research*, 4(1), 96-109.
- Yen, T. F., Wu, C. Y. & Wu, C. C. (2010). Effects of justice on relationship quality: Empirical study of cross strait resorts, *International Journal of Asian Tourism Management*, 1(1), 90-97.
- Vasudevan, H., Gaur, S. S., & Shinde, R. K. (2006). Relational switching costs, satisfaction and commitment: A study in the Indian manufacturing context. *Asia Pacific Journal of Marketing and Logistics*, 18(4), 342-353.
- Yuksel, A., Yuksel, F., & Bilim, Y. (2010). Destination attachment: effects on customer satisfaction and cognitive, affective and conative loyalty. *Tourism Management* 31, 274-284.

EFFECTS OF CONSUMER PARTICIPATION MOTIVATION AND  
PARTICIPATION INTENTION TOWARDS FESTIVALS ON  
EXPERIENTIAL SATISFACTION – A CASE STUDY OF  
THE RAINBOW BAY FESTIVAL KAOHSIUNG CITY

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Abstract

From the perspective of leisure education, leisure is the process of human resource development in which individual creativity, thinking, and interpersonal relationship could be promoted through leisure activities and social interaction. Technology in Taiwan is progressing, knowledge is emerging, and the society is approaching soundness that the public acquire more free time after the promotion of labor acts and the implementation of two-day weekend. With the increasing leisure time, participating in leisure activities has become one of the important activities in living. Aiming at the relations among Participation Intention, Consumer Participation Motivation, and Experiential Satisfaction, this study concludes the following findings. 1. Participation Intention shows significantly positive effects on Experiential Satisfaction. 2. Consumer Participation Motivation appears partially positive effects on Participation Intention. 3. Consumer Participation Motivation reveals partially positive effects on Experiential Satisfaction. 4. Consumer Participation Motivation presents notable moderating effects on the relations between Participation Intention and Experiential Satisfaction. At the end, this study expects to provide suggests for comprehensively improving and promoting the quality of leisure activities.

Key words: Participation Intention, Consumer Participation Motivation, Experiential Satisfaction

## Introduction

With globally economic development and the enhancement of living quality, the increase of national income, the implementation of two-day weekend, and the decrease of basic working hours, the concept of leisure activities has become popular for the public, the population for outdoor leisure activities is increasing, and modern people pursue high-quality leisure life, particularly in daily leisure activities, for better health. Leisure activities therefore have become the major participation of the public; occasional leisure behaviors have turned to routine behaviors; and, the demands for leisure space have been increased. With stable job, sufficient income, more time, or settled family, people are likely to look for leisure activities to have the living be more meaningful and the mental perception more valuable. Especially, they would be more energetic and active at work, after returning to the work, and contribute more to the nation.

For this reason, the government has largely invested in the promotion of culture, the practice of contents in cultural organizations, and the maintenance of cultural assets so as to enhance the standard of art appreciation and creation, such as Wei Wu Ying Center for the Arts, New Cinema of Great Taipei, Pop Music Center, Southern Branch of National Palace Museum, Taichung Metropolitan Opera house, and Development of Southern Art Performance. In comparison with Taipei

and Tainan, Kaohsiung City, with less historical relics, appears less cultural space and cultural art activities. To get rid of such a name of culture desert, Kaohsiung City Government has actively held “international” art activities, inviting artists from various countries to join in, such as Kaohsiung International Container Arts Festival, Kaohsiung International Steel & Iron Sculpture Festival, and Kaohsiung International Beer Festival. Moreover, Bureau of Cultural Affairs Kaohsiung City Government has positively promoted art activities, expanding indoor art performance outdoors, including A Cappella on Grass Music Concert and Rainbow Bay Festival. Accordingly, this study tends to discuss the Participation Motivation, Experiential Satisfaction, and Participation Intention of visitors towards Rainbow Bay Festival when participating in art leisure activities.

## Literature Review

### *Consumer Participation Motivation*

The Leisure Participation Motivation Scale, developed by Beard and Ragheb in 1983, has been the reference for a lot of research on sports or leisure, covering the dimensions of 1. Intellectual Need, 2. Social Need, 3. Competence-Mastery, and 4. Stimulus Avoidance. 1. Intellectual Need in leisure motivation aims to evaluate individual motivation for leisure activities, including mental activities of learning, exploration, discovery, crating, or imagination. 2. Competence-Mastery refers to



individual need for achievement, mastery, challenge, and competition that such activities are instinctive. 3. Social Need relates to individual social need of friendship and interpersonal relationship and respect from others. 4. Stimulus Avoidance considers an individual avoiding pressure, as people tend to escape and get away from abundant stimuli in the environment, keep away from social contact, and pursue being alone and quiet for rest and relax. Aiming at the members of health & fitness clubs, Chen (2009) divided Participation Motivation into 1. Intellectual Pursuit, 2. Health and Fitness, 3. Social Need, 4. Achievement Need, and 5. Stimulus Avoidance. Fan (2010) classified Participation Motivation into 1. Intellectual Pursuit, 2. Social Need, 3. Achievement Need, and 4. Health Need. According to the importance, Huang (2010) divided Participation Motivation into 1. Health Need, 2. Achievement Need, 3. Social Need, and 4. Intellectual Pursuit.

#### *Participation Intention*

Huang (2011) regarded Participation Intention as the possibility and the intention of individual participating in leisure activities. Liao (2008) measured the intention of leisure farm long-stay with the dimensions of considering leisure farm long-stay, intending to long-stay in leisure farms, and intention of recommending friends and relates. Cheng (2010) measured tourists' revisit intention with the dimensions of intending to revisit and the

intention of recommending others. Hsu (2009) studied the willingness to revisit of the Shin-Shen area with the dimensions of intending to revisit, intending to recommend friends and relatives, and the spot being the prior consideration. Lee (2011) measured tourists' revisit intention of high mountain recreational areas with the dimensions of Revisit Intention and Recommendation Intention. The former referred to the intention of revisiting the recreational area or visiting other areas; and, the latter considered the intention of recommending friends for the place. In conclusion, recommendation, intention of visit, and preference for visit are the commonness for measuring Participation Intention. Word-of-Mouth Recommendation, Follow-up Participation, and Preference therefore are regarded as the research dimensions in this study.

#### *Experiential Satisfaction*

Pine & Gilmore (2003) regarded experiences as the favorable feeling when a person achieving a standard emotionally, physically, intellectually, and even spiritually; different people could not receive identical experiences as they were the interactive results between a person's mind and the event. Lin (2009) pointed out an experience as physiological and psychological reactions in emotional and perceived processes after an individual being stimulated externally; it could be divided into internal and external. Experiences are not simply the rational or perceptual ap-

peal, but an overall perception, with which consumers could accurately receive the message delivered from the products, even if they have not contacted with such a product. Schmitt (1999) defined experiences as individual reaction to certain stimuli. Holbrook (2000) classified consumer experiences into fantasies, feeling, and fun, being the sources of consumer experiences. Abbott (1995) considered products as the service performance in consuming experiences that people did not actually desire the product, but a satisfactory experience. During festivals, festival experiences were regarded as individual psychological experiences when the perceived natural and humanistic environments being interpreted through perception transform and recombination; i.e., having tourists be satisfied to some extent (Lin, 2011). Besides, individual perception, sensation, mind, and behaviors would continuously interact with the environments for various perception and experiences (Kao, 2010).

#### *Research on Participation Motivation, Satisfaction and Participation Intention*

Chen (2009) studied the learners' parents in swimming training classes and found significantly positive effects of Participation Motivation on Experiential Satisfaction and Continuing Willingness. Lu (2009) discovered the remarkably positive correlations among Participation Motivation, Experiential Satisfaction, and Participation Intention among tourists in Jiji ar-

eas. Chen (2010) mentioned the positive correlations between Participation Motivation and Satisfaction, Participation Intention among the members in a health and fitness club. Lu (2007) also discovered the positive effects of Participation Motivation and Revisit Intention on Experiential Satisfaction among Taiwanese tourists in a Swiss package tour.

Accordingly, the following hypotheses are proposed in this study.

*H1: Participation Intention presents notably positive effects on Experiential Satisfaction.*

*H2: Participation Intention shows significantly positive effects on Consumer Participation Motivation*

*H3: Consumer Participation Motivation reveals remarkably positive effects on Experiential Satisfaction.*

*H4: Consumer Participation Motivation appears moderation effects on Participation Intention and Experiential Satisfaction.*

#### Research Method

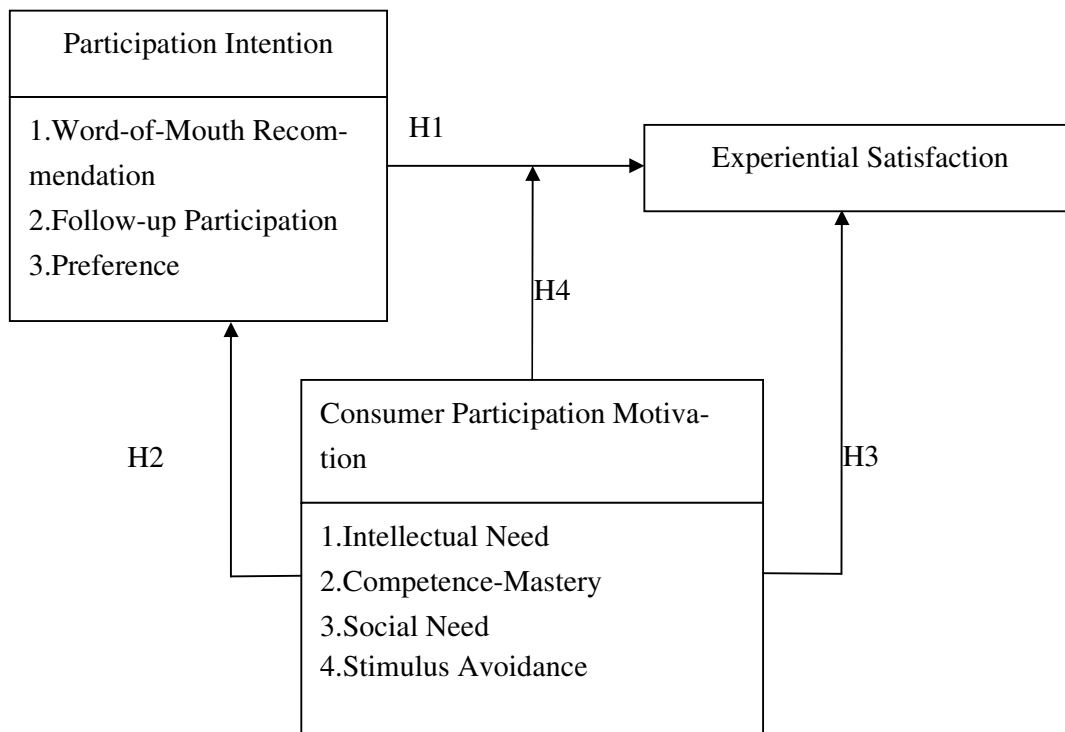
##### *Research Framework*

With literature review, Consumer Participation Motivation, Experiential Satisfaction, and Participation Intention are considered correlated, as shown in the research framework.

##### *Sampling and Sample Analyses*

Questionnaires were distributed and collected with random sampling. For the first time, Bureau of Cultural Affairs Kaohsiung City Government held Rainbow Bay Festival in 2011, attracting more than 37 thousand people and successfully receiving good word-of-mouth, that it has become one of the representative music festivals in Asia. Based on the seven colors of a rainbow, Rainbow Bay Festival was held simultaneously in seven areas, containing rock singers and bands, creative arts, lectures of music industry, and so forth. A participant could visit any one of

the areas with one ticket. The areas covered about three Taipei Arenas for all activities that it became the first international festival combining with pop music, local specialties, and new fashion culture in Taiwan. Kaohsiung City Rainbow Bay Festival therefore was selected as the research subject, and 500 visitors were distributed questionnaires. Having deducted invalid or incomplete copies, 372 valid copies were retrieved, with the retrieval rate 74%. Each valid copy was considered as a valid sample.



## Research Outcomes and Analyses

### *Reliability and Validity Analysis Consumer Participation Motivation Scale*

The questions for Consumer Participation Motivation were based on Beard and Ragheb's (1983) definition and dimensions. With Factor Analysis, four factors, namely Intellectual Need (eigenvalue=2.799,

$\alpha=0.80$ ), Competence-Mastery (eigenvalue=2.162,  $\alpha=0.83$ ), Social Need (eigenvalue=1.433,  $\alpha=0.86$ ), and Stimulus Avoidance (eigenvalue=1.127,  $\alpha=0.90$ ), were extracted; and, the cumulative variance explained reached 81.572%.

#### 1. Experiential Satisfaction Scale

The design of Experiential Satisfaction was referred to Pine & Gilmore's (2003) single dimension.

#### 2. Participation Intention Scale

The questionnaire for Participation Intention was revised from different research. With Factor Analysis, three factors, including Word-of-Mouth Recommendation (eigenvalue=2.736,  $\alpha=0.84$ ), Follow-up Participation (eigenvalue=2.138,  $\alpha=0.81$ ), and Preference (eigenvalue=1.922,  $\alpha=0.82$ ), were extracted; and, the cumulative variance achieved 82.053%.

*Regression Relations Among Variables*

1. Multiple Regression Analysis of Participation Intention and Experiential Satisfaction  
In regard to Multiple Regression Analysis of Participation Intention and Experiential Satisfaction, Word-of-Mouth Recommendation, Follow-up Participation, and Preference in Participation Intention were regarded as independent variables, while Experiential Satisfaction was the dependent variable, Table 3.

Table 3: Multiple Regression Analysis of Participation Intention and Experiential Satisfaction

Independent variable	Experiential Satisfaction (Dependent variable)
Participation Intention	
Word-of-Mouth Recommendation	0.223**
Follow-up Participation	0.167*
Preference	0.174*
F	16.284
Significance	<b>0.000***</b>
R <sup>2</sup>	0.266
Adjusted R <sup>2</sup>	0.242
*p < 0.05 **p < 0.01 ***p < 0.001	

Data source: Self-sorted in this study

The regression equation achieved the significance (F=16.284,  $p < 0.001$ ), presenting the significantly positive effects of Participation Intention on Experiential Satisfaction, where Word-of-Mouth Recommendation, Follow-up Participation, and Preference showed notably positive effects on Experiential Satisfaction ( $\beta = 0.223$ ,  $p < 0.01$ ;  $\beta = 0.167$ ,  $p < 0.05$ ;  $\beta = 0.174$ ,  $p < 0.05$ ). H1 therefore was agreed.

3. Multiple Regression Analysis of Consumer Participation Motivation and Participation Intention

Regarding Multiple Regression Analysis of Participation Intention and Consumer Participation Motivation, Intellectual Need, Competence-Mastery, Social Need, and Stimulus Avoidance in Consumer Participation Motivation were regarded as independent variables, while Word-of-Mouth Recommen-

dation, Follow-up Participation, and Preference in Participation Intention were the dependent variables, Table 2.

The regression equation reached the significance ( $F=7.512$ ,  $p < 0.001$ ), showing the remarkably positive effects of Consumer Participation Motivation on Word-of-Mouth Recommendation and of Intellectual Need, Competence-Mastery, Social Need, and Stimulus Avoidance on Word-of-Mouth Recommendation ( $\beta=0.188$ ,  $p < 0.05$ ;  $\beta=0.173$ ,

$p < 0.05$ ;  $\beta=0.165$ ,  $p < 0.05$ ;  $\beta=0.197$ ,  $p < 0.05$ ).

The regression equation achieved the significance ( $F=13.466$ ,  $p < 0.001$ ), revealing the significantly positive effects of Consumer Participation Motivation on Follow-up Participation Follow-up Participation and of Intellectual Need and Stimulus Avoidance on Follow-up Participation ( $\beta=0.159$ ,  $p < 0.05$ ;  $\beta=0.169$ ,  $p < 0.05$ ).

Table 2: Multiple Regression Analysis of Consumer Participation Motivation and Participation Intention

Independent variable	Participation Intention (Dependent variable)		
	Word-of-Mouth Recommendation	Follow-up Participation	Preference
Consumer Participation Motivation			
Intellectual Need	0.188*	0.159*	0.177*
Competence-Mastery	0.173*	0.137	0.192*
Social Need	0.165*	0.141	0.182*
Stimulus Avoidance	0.197*	0.169*	0.122
F	7.512	13.466	22.347
Significance	0.000***	0.000***	0.001***
R <sup>2</sup>	0.205	0.238	0.317
Adjusted R <sup>2</sup>	0.184	0.215	0.292
*p < 0.05 **p < 0.01 ***p < 0.001			

Data source: Self-sorted in this study

The regression equation reached the significance ( $F=22.347$ ,  $p < 0.001$ ), presenting the notably positive effects of Consumer Participation Motivation on Preference and of Intellectual Need, Competence-Mastery, and Social Need on Preference ( $\beta=0.177$ ,  $p < 0.05$ ;  $\beta=0.192$ ,  $p < 0.05$ ;  $\beta=0.182$ ,  $p < 0.05$ ).

H2 therefore was partially agreed.

#### 4. Multiple Regression Analysis of Consumer Participation Motivation and Experiential Satisfaction

In regard to Multiple Regression Analysis of Consumer Participation Motivation and Experiential Satisfaction, Intellectual Need, Competence-Mastery, Social Need, and Stimulus Avoidance in Consumer

Participation Motivation were considered as independent variables, while Experiential Satisfaction was the dependent variable, Table 1.

The regression equation achieved the significance ( $F=12.036$ ,  $p < 0.001$ ), showing the remarkable correlations between Consumer Participation Motivation and Experiential

Satisfaction, where Intellectual Need, Social Need, and Stimulus Avoidance appeared significantly positive effects on Experiential Satisfaction, reaching the significance ( $\beta = 0.213$ ,  $p < 0.01$ ;  $\beta = 0.164$ ,  $p < 0.05$ ;  $\beta = 0.207$ ,  $p < 0.01$ ).

H3 therefore was partially agreed.

Table 1: Multiple Regression Analysis of Consumer Participation Motivation and Experiential Satisfaction

Independent variable	Experiential Satisfaction (Dependent variable)
Consumer Participation Motivation	
Intellectual Need	0.213**
Competence-Mastery	0.106
Social Need	0.164*
Stimulus Avoidance	0.207**
F	12.036
Significance	<b>0.000***</b>
R <sup>2</sup>	0.176
Adjusted R <sup>2</sup>	0.151
*p < 0.05 **p < 0.01 ***p < 0.001	

Data source: Self-sorted in this study

*Effects of the interactions between Participation Intention and Consumer Participation Motivation on*

*Experiential Satisfaction Moderating effects of Consumer Participation Motivation and Participation Intention on Experiential Satisfaction.*

With the interaction between Intellectual Need, Competence-Mastery, Social Need, Stimulus Avoidance in Consumer Participation Motivation and Word-of-Mouth Recommendation, Follow-up Participation, Preference in Participation Intention, the effects on

Experiential Satisfaction are shown in Table 4.

According to the above Regression Analysis of interaction, the dimensions in Participation Intention could explain 26.6%



Table 4: Hierarchical Regression Analysis of Consumer Participation Motivation and Participation Intention towards Experiential Satisfaction

Hierarchical variable	Experiential Satisfaction (Dependent variable)		
	Hierarchy I	Hierarchy II	Hierarchy III
Participation Intention			
Word-of-Mouth Recommendation	0.223**	0.202**	0.231**
Follow-up Participation	0.167*	0.184*	0.192*
Preference	0.174*	0.196*	0.213**
Consumer Participation Motivation			
Intellectual Need		0.124	0.155*
Competence-Mastery		0.157*	0.178*
Social Need		0.162*	0.181*
Stimulus Avoidance			
Interaction			
Intellectual Need×Word-of-Mouth Recommendation			0.073
Competence-Mastery×Word-of-Mouth Recommendation			0.094
Social Need×Word-of-Mouth Recommendation			0.088
Stimulus Avoidance×Word-of-Mouth Recommendation			0.181*
Intellectual Need×Follow-up Participation			0.066
Competence-Mastery×Follow-up Participation			-0.075
Social Need×Follow-up Participation			0.043
Stimulus Avoidance×Follow-up Participation			0.048
Intellectual Need×Preference			0.169*
Competence-Mastery×Preference			0.050
Social Need×Preference			0.170*
Stimulus Avoidance×Preference			-0.042
F	16.284	22.618	28.442
Significance	0.000***	<b>0.000***</b>	<b>0.000***</b>
R <sup>2</sup>	0.266	0.303	0.332
△R <sup>2</sup>	0.266	0.037	0.029

Data source: Self-sorted in this study

of the variance of Experiential Satisfaction, before inputting the independent variables of Consumer Participation Motivation. The overall test of Multiple Linear Regression F appeared 16.284 ( $p < 0.001$ ), achieving the significance, that Participation Intention showed remarkably positive effects on Experiential Satisfaction. The standardized regression coefficient  $\beta$  of Word-of-Mouth Recommendation, Follow-up Participation, and Preference presented 0.223 ( $p < 0.01$ ), 0.167 ( $p < 0.05$ ), and 0.174 ( $p < 0.05$ ), reaching the significance and being positive, that the independent variables revealed notably positive effects on Experiential Satisfaction. After inputting the independent variables of Consumer Participation Motivation to the regression model, the overall variance explained increased 3.7%,  $F=22.618$  ( $p < 0.001$ ), achieving the significance. Overall speaking, both Participation Intention and Consumer Participation Motivation presented remarkably positive effects on Experiential Satisfaction, with the increasing variance explained 30.3%. It was worth noting that Word-of-Mouth Recommendation, Follow-up Participation, and Preference revealed significantly positive effects on Experiential Satisfaction before inputting Consumer Participation Motivation, but the significance increased after the input. In this case, the effects of Participation Intention on Experiential Satisfaction would increase with the moderating effects of Consumer Participation Motivation. After inputting the interaction between Participation Intention and Consumer Participation Motivation, the overall variance explained was enhanced, and  $F=28.442$  ( $p < 0.001$ ) reached the significance, presenting the remarkably positive effects on Experiential Satisfaction. The interaction between Stimulus Avoidance and Word-of-Mouth Recommendation, between Intellectual Need and Preference, and between Social Need and Preference appeared notably positive effects on

Experiential Satisfaction ( $\beta=0.181$ ,  $p < 0.05$ ;  $\beta=0.169$ ,  $p < 0.05$ ;  $\beta=0.170$ ,  $p < 0.05$ ).

H4 was agreed.

## Conclusion

The research findings show the remarkably positive effects of Participation Intention on Experiential Satisfaction that the following practical suggestions are proposed.

1. Improve the environment for enhancing the identity of visitors. The research outcomes present the significant effects of Participation Intention on Experiential Satisfaction that garbage cans are suggested to place around the areas of Kaohsiung City Rainbow Bay Festival, as they are convenient for visitors and could maintain the clean environment, reducing garbage on the ground to promote the identity towards Rainbow Bay Festival. Furthermore, mobile toilets could be offered for Rainbow Bay Festival, as visitors would stay in musical festivals for a period of time. The establishment of toilets would provide visitors with physiological need and prolong the stay in the musical festival. As a result, Experiential Satisfaction with the musical festival is promoted and Word-of-Mouth Recommendation is enhanced.

2. Improve the attitude of the service personnel in the musical festival. People are likely to appear bad attitude because of the crowd and time. Visitors generally attend such musical festivals with relaxing attitude and request for good service quality. In this case, the attitude of service personnel would affect the mood of visitors, the evaluation of the musical festival, and even the intention of Follow-up Participation. Consequently, it is suggested that service personnel should always remain friendly and pleasant attitude towards each visitor, even when they are busy, to pre-

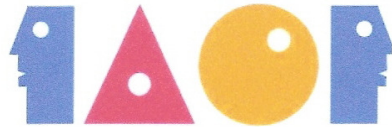
vent visitors from being unpleasant and reducing the revisit intention.

3. Promote new products. Although a lot of visitors intend to kill time in musical festivals, they would not be attracted with unchanged musical festivals. It is therefore suggested to change the performance with special or interesting programs, or to provide music performance different from the past styles so that visitors could experience exotic music. Having musical festivals to expand the leisure activities in daily life and enhance the knowledge, visitors would consider Kaohsiung City Rainbow Bay Festival as the preference for daily leisure activities.

#### Reference

- Abbott, L. (1995). *Quality and competition*, New York: Columbia University Press.
- Beard, J. G., & Ragheb, M. G. (1983). Measuring leisure motivation. *Journal of Leisure Research*, 15 (3), 219-228.
- Chen, Chi-lun (2010). The study of Members' Participating Motivation, Customer Satisfaction and Repurchase Intention about Health and Fitness Club—A case study of GYMLUX FITNESS CLUB. *Pei Ti Hsueh Pao*, 14, 146-156.
- Chen, Ming-kun (2009). The Study of Participant's Parents' Satisfaction and Continuing Willingness under the Influences of Participating Motive in a Swimming Training Class. *Zhong Hua Ti Yu*, 8, 117-132.
- Chen, Show-hwa (2009). The Study of the Consumer Behavior of the Health & Fitness Club Members. *Journal of Taiwan Society for sport Management* '2' 74-92.
- Cheng, Chien-hsiung (2010). Relationship among Attractions, Images and Revisiting Willingness for Heritage Destination. *Journal of Tourism and Travel Research*, 3(4), 103-124.
- Fan, Chih-ming (2010). A Study of Consumer Behavior of the Sport and Health Club Members in Taipei Metropolis. *Zhong Hua Ti Yu*, 13, 45-50.
- Holbrook, M. B., (2000). The Millennial Consumer in the Texts of Our Times: Experience and Entertainment. *Journal of Macro marketing*, 20(2), 178-192.
- Hsu, Kuo-chuan (2009). The Study of Agricultural-Tourism Visitor's Motivation, Benefits of Leisure and Willingness to Revisit of The Shin-Shen Area. *Journal of Tourism and Travel Research*, 1(3), 42-60.
- Huang, Chi-ming (2011). A study on High-concerned high school students' participant intention of leisure activities and the factors—Application and verification of theory of planned behavior. *Journal of Sport, Leisure and Hospitality Research*, 1(4), 24-42.
- Huang, Hung-bin (2010). The Correlation Study on Members' Participating Motivation, Customer Satisfaction and Loyalty about Health & Fitness Club—A Case Study Of Gold's Gym Health & Fitness Club. *Journal of Taiwan Society for sport Management*, 4, 113-129.
- Kao, Chin-hsung (2010). The Analysis of Experience in Leisure Pursuits. *Journal of Outdoor Recreation Study*, 6(4):1-12.
- Lee, Chih-neng (2011). A Study of Recreation Service Quality and Revisit Intention on the Mountain Tour Area in Taiwan. *Journal of Outdoor Recreation Study*, 7(3)25-38.

- Liao, Wan-ju (2008). A Study on the Relationship among Retirees' Leisure Farm Cognition, Social Support and Participation of the Long Stay in the Leisure Farm. *Journal of Sport, Leisure and Hospitality Research*, 3 (2), 68-85.
- Lin, Chao-chin (2011). Verification of multi-phase recreational experience. *Journal of Outdoor Recreation Study*, 14(1):1-10.
- Lin, Yo-te (2009). A study on topophilia. *Journal of National Taiwan College of Arts*, 71, 17-32.
- Lu, Hsiao-yun (2007). A Study of the Relationships among Travel Motivation, Satisfaction and Revisit Intention—Group Package Tours to Switzerland as a Case. *Zhong Hua Ti Yu*, 12(2), 47-52.
- Pine B.J. & Gilmore J.H. (2003). Welcome to the experience economy.
- Schmitt, B. H. (1999). Experiential Marketing. *Journal of Marketing Management*, 15(1), 53-67.



ENHANCEMENT OF QUALITY FUNCTION DEPLOYMENT BASED ON  
CHINKLESS-TEACHING CONCEPT DESIGN COURSES

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Abstract

This study proposes the “Chinkless-Teaching Concept (CTC)” based on “quality function development (QFD)” for increasing the skills and employment prospects of vocational students. The framework contributes to the following: 1) understanding baking entrepreneur demands regarding the characteristics of new hires; 2) planning practical baking curriculums; 3) duplicating this empirical study for different departments in a technical and vocational university.

Keywords: Chinkless -Teaching Concept, Quality Function Development, Technical and Vocational University

## Introduction

The teaching materials used in general universities primarily focus on theory, whereas those in vocational and technological universities emphasize practical skills. Most vocational and technological universities train students in cooperation with enterprises.

The sandwich and topping teaching methods are well established. The former allows students more creativity in working on their theses, projects and future studies, enabling them to perform better than students without practical training (Blair and Millea, 2004). Meanwhile, the latter can narrow the gap between academia and industry, and focuses on the ultimate goal of ensuring students obtain employment after graduation (Chen, 1991). However, both methods suffer numerous inadequacies, particularly in that the teaching methods do not increase the possibility of students finding employment. Even when the sandwich-teaching method and topping-teaching method are applied, gaps persist between academic knowledge and practical required skills. On the other hand, gaps may exist between the knowledge students acquire and the needs of enterprises. Moreover, classroom learning is often difficult for students to apply in the workplace. Bao et al. (2012) developed the Chinkless-Teaching Concept (CTC) model by using the Value Chain concept to solve this dilemma by optimizing textbook design and teaching methods.

This study further presents an empirical study that uses quality function development (QFD) to verify the CTC model.

## Literature Review

### *Review of Sandwich and Topping Teaching Methods*

The sandwich-teaching and topping-teaching methods are the industry-academia collaboration models. The models are designed so that students can apply classroom learning to their work situation to achieve on-the-job training.

Students in sandwich-teaching internships may be assigned to companies where they are not interesting in working, and equally the host company may be uninterested in the interns (Chen et al, 2010). Students who undertake practical training thus are often treated as a source of cheap labor (Chen et al, 2006).

Additionally, the topping-teaching method is applied when students are in their final years/semester of study, at which time they tend to be more mature and serious about career training (Chen et al, 2006).

Most importantly, students who exhibit outstanding performance in a topping-teaching program are often hired immediately after graduation, which helps improve the image of technical and vocational graduates and eliminate the stigma of low university performance rankings.



However, in-class activities and real operations still differ for students participating in internships before graduation. Otherwise, the gap between learning and practice narrows but still persists (Woodcock and Chen, 2000).

Although the topping teaching method has reduced the disadvantages of the Sandwich teaching method, the gap in the practical capabilities of graduating students must still be bridged before they start their careers. A clear drawback of the sandwich teaching method is that some enterprises may exploit students as cheap labor (Chen et al., 2006). The drawback of the topping teaching method is that students' knowledge obtained in school is difficult to apply in the workplace (Bao et al., 2012). Although practical training has substantially improved, the following section demonstrates that major improvements are still needed.

#### *Chinkless-Teaching Method*

To enable students to reduce OR To help students reduce the gap between their capacities and industry requirements, the Chinkless-Teaching Method (CTC) model attempts to supply communication media that teachers, students and employers can use to reform technological and vocational education (Bao et al., 2012). The course designs included the concept of the industrial value chain. The links in the value chain were the subjects of the courses, while the chapters and the various course

chapters discussed the processing value chains. Technological and vocational teachers apply value chain concepts by rewriting textbook chapters to make them effective for reading, learning and practice.

#### *Quality Function Deployment*

QFD is a customer-oriented approach to product innovation. QFD guides product managers and design teams through the conceptualization, creation and realization of new products into summarizes the appropriate technical requirements for each stage of product development and production (that is, marketing strategies, planning, product design and engineering, prototype evaluation, production process development, production, and sales) (Sullivan, 1986).

One of the earliest applications of quality function deployment (QFD) to education was by Ermer (1995). Motwani et al. (1996), Lam and Zhao (1998), Hwang and Teo (2001), and Bier and Cornesky (2001) implemented QFD approach in education. Gonzalez et al. (2003) further strengthened the use of QFD in designing OR to design the supply chain management academic curriculum. In short, the successful application of QFD by these researchers enhanced the implementation of this tool, enabling them to meet student needs], and current university education standards. These applications all confirm the potential of QFD to facilitate effective communication, timely informa-

tion transformation, and efficient resource utilization. The following section presents a case study where QFD provides a framework for incorporating the needs of business entrepreneurs to develop a strategy for launching a campus-wide entrepreneurship initiative.

### Methodology

This study proposes a conceptual framework “Chinkless-Teaching Concept (CTC)” based on the “quality function development (QFD)” for increasing the

skills and employment prospects of vocational students.

This study aims to identify the capabilities entrepreneurs’ desire in new hires. Their responses were then grouped using QFD, which helps structure the necessary requirements from the customer perspective. See Fig. 1. To illustrate the QFD process, this study presents a simple example of how its use to design a baking program for a vocational and technical university.

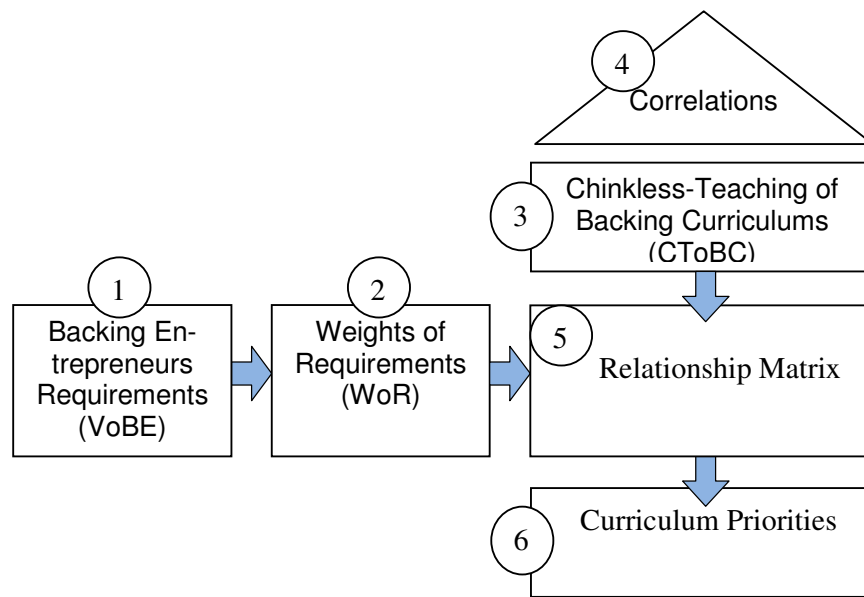


Figure 1. A House of QFD for the backing curriculums to entrepreneurs

Step 1: Identify the requirements of baking entrepreneurs (VoBE)

The first step is to begin the QFD process to identify the needs and expectations of baking entrepreneurs hiring new

employees. To fully identify the requirements of all baking entrepreneurs, this study interviews seven baking business managers all of whom are school customers. The KJ Method is then used to group

and categorize their requirements. This part is shown at the left of Fig. 1.

Step 2: Score the Weights of Requirements (WoR). Each requirement is scored using a scale that typically ranges from 1 to 9. The weights of four experts are then scored using the geo-matrix mean.

Step 3: Create a baking curriculum using the Chinkless-Teaching Method (CToBC). Using the Chinkless-Teaching Method, curriculum creation was performed through seamless integration between teachers' vocational and technological university and baking business managers.

Step 4: Identify the correlations. The correlations are the relationships between baking curriculum requirements in the roof of QFD. The correlations range from 0 to 9. The symbols in the roof of the house represent the relationships among the different curriculum design elements. The inter-correlations among the academic requirements use the following symbols to indicate the strength of association:

- ∈ [7,9] (Strong association)
- ⊙ ∈ [4,6] (Moderate association)
- ∈ [1,3] (Weak association)
- × = 0 (None)

Step 5: Identify the relationship matrix. The matrix shows the relationship between the requirements of baking entrepreneurs and baking curriculum requirements. The relation matrix ranges from 0 to 9, with a value close to 9 indicating a stronger association. Meanwhile, a value near 0 indicates a weaker association.

Step 6: Calculating the curriculum priorities. The primary outcome of the house of QFD is stored at the bottom of the matrix (⊙ in Fig.1). Let  $\delta_j$  ( $j = 1, \dots, n$ , where the number of CToBC is  $n$ ) in row ⊙ denote the importance of the  $j$ th CToBC to reflect the priorities of entrepreneurs in relation to curriculum design. Equation 1 shows how to calculate  $\delta_j$  assuming  $m$  WoRs and  $n$  CToBCs.

$$\delta_j = \sum_{i=1}^m \omega_i r_{ij}, \forall j = 1, \dots, n$$

Where  $\omega_i$  and  $r_{ij}$  represent the important of the  $i^{\text{th}}$  WoR (⊙) and the correlation between the  $i^{\text{th}}$  WoR and  $j^{\text{th}}$  CToBC (⊙),

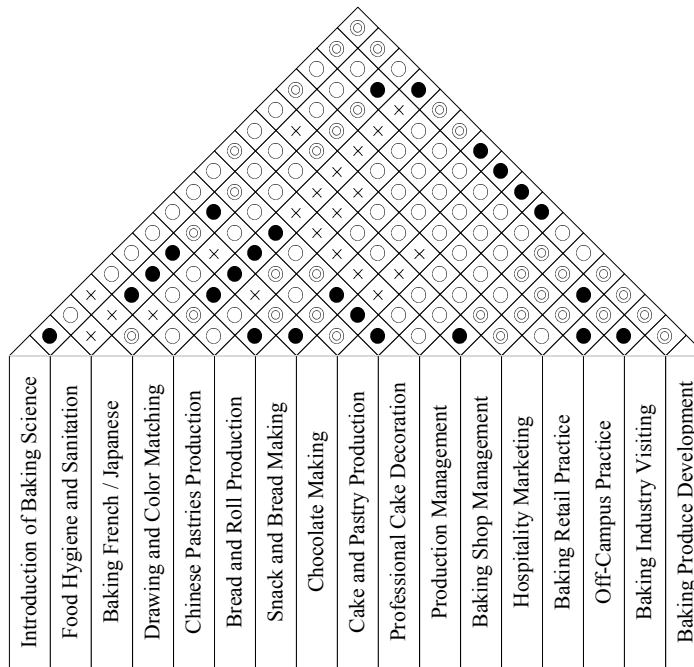
respectively. That is  $\delta_j$  is the average weight of cell values in the  $j^{\text{th}}$  column (⊙) with the WoR importance (⊙) representing their corresponding weights.

Computing  $\delta_j$  reveals which curriculum requirements (CToBC) are important and thus enables effort to be focused on improving baking curriculum.

Table 1 The Empirical Data --A House of QFD without the roof

Entrepreneurs' Re-quirements (VoBE)		WoRs	CToBC																
			Introduction of Baking Science	Food Hygiene and Sanitation	Baking French / Japanese	Drawing and Color Matching	Chinese Pastries Production	Bread and Roll Production	Snack and Bread Making	Chocolate Making	Cake and Pastry Production	Professional Cake Decoration	Production Management	Baking Shop Management	Hospitality Marketing	Baking Retail Practice	Off-Campus Practical	Backing Industry Visiting	Baking Product Development
Baking Knowledge	Knife work	4.93	3.00	0.00	0.00	0.00	6.00	6.33	3.67	3.67	6.33	7.33	0.00	0.00	0.00	0.00	5.33	0.00	2.67
	Cake Decorating	8.32	2.67	0.00	2.67	2.67	0.00	2.00	4.00	3.67	7.33	7.00	0.00	3.00	0.00	0.00	5.67	0.00	3.67
	Basic weighing	8.28	5.00	0.00	0.00	0.00	7.67	8.00	9.00	9.00	9.00	6.00	0.00	3.00	0.00	0.00	6.00	0.00	4.00
	Professionalism	9.00	9.00	7.67	6.00	6.00	7.00	7.00	8.33	8.33	8.33	8.33	9.00	8.33	8.33	8.33	6.00	6.00	8.33
	Product Knowledge	8.65	6.00	5.00	2.67	4.67	4.67	5.33	6.00	6.00	6.00	6.00	5.33	6.00	5.33	4.67	6.00	4.67	6.00
	Proficiency	9.00	5.00	3.67	2.00	5.67	9.00	8.33	6.00	9.00	9.00	9.00	2.67	4.67	3.33	3.67	9.00	3.00	6.00
	Independent operation	8.28	5.33	1.67	2.00	3.00	8.67	8.67	8.67	8.67	8.67	8.67	3.00	6.00	0.67	3.00	5.67	2.00	8.67
	Nutrition Analysis	5.65	8.33	2.33	0.00	0.00	3.33	4.67	3.33	3.33	3.33	3.33	2.00	4.00	2.00	2.00	3.50	1.00	3.33
License acquisition	6.26	5.00	4.33	0.00	1.00	8.67	8.67	5.00	4.33	8.00	4.33	1.00	2.33	1.67	1.67	5.00	0.00	4.33	
Personal Quality	Assiduousness	8.65	3.00	1.00	1.67	0.00	8.33	9.00	9.00	9.00	9.00	9.00	2.33	3.00	1.00	1.00	3.00	0.67	9.00
	Anti-Stress	8.65	3.00	1.00	1.67	0.00	7.67	7.67	7.67	7.67	7.67	7.67	2.67	9.00	3.67	1.00	6.67	0.67	8.67
	Physical strength	8.65	3.00	0.33	1.00	0.00	8.67	9.00	9.00	7.67	9.00	9.00	1.00	6.00	1.67	1.00	0.67	1.00	9.00
	Professional ethics	9.00	3.00	3.00	0.00	0.00	8.67	9.00	9.00	9.00	9.00	9.00	1.00	6.00	1.67	1.00	3.00	1.00	9.00
	Work Attitude	9.00	3.00	3.00	0.00	3.00	8.67	9.00	9.00	9.00	9.00	9.00	4.00	6.00	1.67	1.00	6.00	1.67	9.00
	Communication	8.65	6.00	6.00	2.67	1.00	8.67	8.67	8.67	8.67	8.67	8.67	4.00	9.00	4.67	6.00	6.67	1.00	8.67
	Alertness	7.65	2.33	8.67	0.00	1.00	6.00	6.00	5.33	5.33	5.33	5.33	2.33	3.00	2.33	1.00	3.67	1.00	5.33
	Logical	8.00	7.67	6.00	2.67	3.67	8.67	8.33	7.33	7.33	7.33	7.33	6.67	9.00	6.67	6.00	6.67	1.00	7.33
Others	Enthusiasm	8.65	3.00	0.67	5.33	6.00	7.00	9.00	7.00	7.00	7.00	7.00	3.00	6.00	3.00	3.00	8.33	3.00	7.00
	Self - request	8.65	6.00	3.67	7.00	9.00	7.00	7.67	7.67	7.67	7.00	7.67	7.00	8.33	7.00	4.67	7.67	4.00	7.67
	Interesting	8.28	3.00	0.33	6.00	6.00	7.67	9.00	9.00	9.00	9.00	9.00	5.33	6.00	5.33	3.00	6.00	3.00	9.00
	Division of work	7.65	2.33	0.33	4.00	3.00	8.33	8.33	8.33	8.33	8.33	8.33	4.67	6.00	4.67	3.00	7.00	1.00	8.33
	Good contacts	6.95	1.67	0.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	9.00	3.00	0.00	3.00	0.00	6.00
	Master professional	8.65	5.33	6.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.00	7.67	6.00	3.00	6.00	3.00	7.00
	Work environment	7.96	2.00	2.67	3.67	6.00	7.00	7.00	7.67	9.00	7.00	9.00	4.00	6.00	4.00	0.00	6.00	3.00	7.00
	Destiny	7.27	2.00	0.00	3.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	5.33	4.00	0.00	3.00	0.00	3.00
Weighted Average			851	556	542	632	1389	1464	1417	1436	1492	1468	689	1177	675	487	1101	355	1388
Curriculum Priority			10	14	15	13	6	3	5	4	1	2	11	8	12	16	9	17	7

Table 2. The Empirical Data -- the Roof of QFD



### Data Analysis

Regarding the House of QFD for developing baking curriculum for entrepreneurs, Table 1 lists the values for steps 1, 2, 3, 5, and 6. Table 2 lists the result of steps 3 and 4.

Table 1 reveals that entrepreneur requirements include 25 items that new hires should be asked. These items deal with areas that include baking knowledge, personal qualities, and so on.

Requirements were weighted using scores calculated by the geo-matrix mean of seven experts. The scores ranged from 4.93 to 9, and values closer to 9 indicated that higher importance was assigned to entrepreneur requirements.

Professionalism, professional ethics and work attitude are the main requirements. A score approaching 4.93 signifies that knife work is less important in entrepreneurs' requirements. Using the Chinkless-Teaching Method, 17 curriculums

were created by three baking teachers in vocational and technological university and seven baking business managers. The four courses differ categorically from current implement baking curriculums, and are called Baking

*French/ Japanese, Baking Industry Visits, Baking Product Development, and Snack and Bread Making.*

In the relationship matrix, the scores are calculated using arithmetic mean based on the scores assigned by seven experts. Arithmetic mean is adopted because it can include 0.

$\bar{S}_i$  is defined in Step 6 above. The formula is used to obtain the weighted average. The highest score is 1492, while the lowest is 355. The weighted average is used to determine the curriculum priority. The correlations listed in Table 2 show the process of establishing a relationship between two or more curriculums. For ex-

ample, the [ Drawing and Color Matching] course has five strong associations with other baking practice courses, and is unrelated to six baking management courses.

### Conclusions

Based on the above, the following can be concluded: (1) In-depth understanding of baking entrepreneurs' demands regarding desirable characteristics in new hires, (2) Obtaining baking curriculums that are suitable for use in industry, (3) Identifying the relationship among courses, (4) Exploring the importance of each course from baking teachers in vocational and technological universities and baking business managers.

This study can have extremely valuable feedback effects on technical and vocational university education, and the framework of the research thesis can be duplicated; moreover, different departments can also apply the Chinkless-Teaching Concept of high-quality curriculum design.

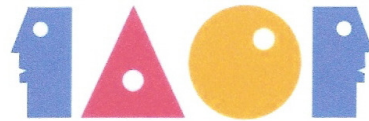
### References

- Bao, C.P., Lee, Y.P., & Chen, C.Y. (2012). The recreation of the chinkless-teaching concept by using value chain analysis to bridge the theory and practice. *International Journal of Organizational Innovation*, 5(1), 268-280.
- Bier, I.D., & Cornesky, R. (2001). Using QFD to construct a higher education curriculum. *Quality Progress*, 34 (4), 64-68.
- Blair, B.F., & Millea, M.M. (2004). Quantifying the benefits of cooperative education. *J. Coop. Edu.*, 38(1), 67-72.
- Chen, C.Y., Lee, Y.J., & Kao, K.S. (2006). The specific practice of the Last Mile Transactions on Engineering and Technology Education, 5(3), 401-407.
- Chen, C.Y., Lee, Y.J., Kao, K.S., & Ho, Y.T. (2010). A study on the topping and sandwich teaching method efficacy towards the last mile application from the perspective of vocational and technical college graduates. *World Transactions on Engineering and Technology Education*, 7 (2), 176-185.
- Chen, X.G., (1991). A discussion of educational institutions' cooperation between academia and industry. *Technological and Vocational Educ. Double Monthly*, 4, 22-27.

project at Taiwanese universities of science and technology: a discussion of the different effects between topping and sandwich teaching methods from the perspective of industry.



- Ermer, D.S. (1995). Using QFD Becomes an Educational Experience for Students and Faculty. *Quality Progress*, 28(5), 131-136.
- Gonzalez, M., Quesada, G., & Bahill, T. (2003). Improving product design using quality function deployment : the school furniture case in developing countries. *Quality Engineering Journal*. 16(1), 47-58.
- Hwarng, H.B., & Teo, C. (2001). Translating customers' voices into operations requirements – A QFD application in higher education. *International Journal of Quality and Reliability Management*, 18(2), 195–226.
- Lam, K., & Zhao, X.(1998). An application of quality function deployment to improve the quality of teaching. *International Journal of Quality and Reliability Management*, 15(4), 389–413.
- Motwani, J., Kumar, A., & Mohamed, Z. (1996). Implementing QFD for improving quality in education: An example. *Journal of Professional Services Marketing*, 14 (2), 149–159.
- Murgatroyd, S. (1993). The house of quality: Using QFD for instructional design in distance education. *The American Journal of Distance Education*, 7, 34-48.
- Sullivan, L. P. (1986). Quality Function Deployment. *Quality Progress*, 19(6), 39-50.
- Woodcock, D.J., & Chen, C.Y. (2000). Taiwanese universities and educating of future manufacturing managers. *Journal of Management development*, 19(20), 853-869.



## KEY SUCCESS FACTORS IN CATERING FRANCHISES

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### Abstract

Based on Key Success Factors in catering franchises, this study tends to discuss the hierarchical levels of Key Success Factors and the relative importance with Analytic Hierarchy Process. After integrating the opinions in the questionnaire survey, Service Quality of Franchise presents the most importance among Key Success Factors in catering franchises, followed by Location of Franchise and Characteristics of Product and Service. Among the factors in Service Quality of Franchise, Meeting Customer Requirements is regarded the most critical, followed by Service Standard. In regards to Location of Franchise, Tide of People at the Store shows the most importance, followed by Local Consuming Capacity. Regarding Characteristics of Product and Service, Product Characteristics is considered as the key, followed by Product Diversity. The proposed hierarchical levels could provide domestic catering franchises with Key Success Factors analyses as well as the benchmarking among catering businesses. According to such hierarchical levels, domestic franchising businesses could have the major manufacturers with better performance be the benchmarking subjects. Moreover, the hierarchical levels could be the references of yearly self-evaluation. It is suggested that franchising businesses could utilize such a structure for self-evaluation, establishing the objective with more specific improvement strategies.

Key words: Franchises, Key Success Factors, Catering Industry

### Introduction

The recent economic depression has resulted in high unemployment that a lot of unemployed people or the ones worrying about permanent unemployment have invested in catering franchises, as franchises present lower investment capitals and restrictions, owners appear higher autonomy and are not required of high educational background, and trainings in establishing one's own business are provided for the ones without any experiences. Franchising

is considered as the most successful route to own a business in Europe, the USA, and Japan, as it is a duplication of successful business model. Statistics show the success rate of franchising up to 90%. A lot of people therefore would like to have their own businesses that franchising has boomed. Catering franchises in Taiwan are rapidly expanded the brands by both the franchisors and franchisees to create benefits for both parties. Franchisors rapidly expand the chain stores by franchising to achieve the success in a short period of

time. Franchisees, on the other hand, select a good franchising business for the dream of owning a successful business. In this case, the key factors in selecting franchisors and the relative importance become primary and valuable.

## Literature Review

### *Franchising Management*

Franchising management is commonly utilized for expanding businesses. Theoretical and practical definitions and classification of franchises are slightly different domestically and internationally. In order to understand the essence and the major management model of franchising, exploring the definition is the priority. The relationship between franchisor and franchisee is a contract, not employment, with which both parties precede specific commercial behaviors. Franchising therefore is regarded as a contracted business management system.

Wang (2009) argued that franchises were not cooperatively operated by franchisors and the chain stores, but a collaborative business. After all, franchisors and the chain stores were independent businesses, which shared the roles and functions to enlarge the network and expand the economic scale. Association of Chain and Franchise Promotion, Taiwan (2009) pointed out the contract between a franchisor and the franchisees (or an authorizee who is an independent legal person, a store, or an individual) that the franchisor authorized the franchisees of the trademark, products, and management model (management technique), and the franchisees paid the franchisor for the above rights and received instructional trainings and professional job assignment from the franchisor. Li (2010) considered a real franchising as the standardization and consistency of management concept, CIS, product service, and management system.

The following management systems should be taken into account for catering franchises (Su, 2011).

1. Establishment of Operation and Management Center. It aims to establish a set of franchising operation system and plan the responsibilities of each department so as to smoothly precede the business.
2. Establishment of CIS (Corporate Identity System). Corporate Identity System is the key in present chain stores. The primary contents of CIS cover to have consumers generate new image and perception and to combine CIS and the management concept of chain stores in order to attract consumers and franchisees.
3. Selection of Store Location. The selection of locations is regarded as the key success factor in franchising that the evaluation of trade area and location environment is the prior considerations in the decision-making process.
4. Product Management. The major profits of chain stores are the products that an accurate and effective product strategy and management for product orientation and structure, pricing, promotion, and distribution should be established.
5. Personnel Management. It aims at the problems of human resource, recruitment, trainings, and employee retention.
6. Financial Management. Cash income appears in convenience stores everyday that bad management or reinvestment is likely to cause management risks. Retail industry, on the other hand, is a "location industry" that the capitals are normally sufficient, unless management difficulties resulted from bad locations. Aiming at cash management, a management system should be established. (1) The enterprise capital should not be privately embezzled. (2) Data and report management should be well applied. (3) Investment strategies should be evaluated in ad-

- vance. (4) Cash management in chain stores should be controlled.
7. Store automation. Based on a standardized, systematic, and highly structural commercial environment, the tools of (1) Value Added Network (VAN), (2) Electronic Ordering System (EOS), (3) Point of Sale (POS), and (4) Electronic Data Interchange (EDI) are necessary.
  8. Consultation of instructors. A successful franchising system aims to transform the power of franchisors into the chain stores as the executive and pleasure motivation, which relies on a favorable medium supervisor. A supervisor mainly (1) assists the chain stores in promoting businesses and coping with competitors, (2) improves and reinforces the product structure, (3) inspects and improves the store management, (4) promotes the policies of the franchisor, and (5) builds up the relationship with the franchisees.
  9. Contract planning. The contract planning in developing chain stores closely relates to the relationship between the franchisor and the chain stores. For this reason, the contract should be (1) clear and easy to understand, (2) deliberate and definite, (3) suitable for a long period of time, (4) fair and legal, and (5) appropriately restricted, but not over-restricting the operation activities of the chain stores or violating Fair Trade Act.
  10. Joining conditions. The selection items contain (1) understanding personal background of the franchisee, (2) the setting of capital, self-fund, franchising fee, and real estate, and (3) the store, ownership, area, trade area condition, and number of competitors

Summing up the above management keys, the best benefit is created by mastering the standardization and systemization and maintaining the good cooperation with the franchisees.

#### *Key Success Factors*

Lin (2010) indicated that an enterprise could master the factors in industrial fluctuations with Industry Analysis and develop the limit resources into uniquely competitive advantages for acquiring effective competitive advantages in the industry. Chin (2009) proposed that competitive technologies or assets were the key in successful competition in specific industry. Chen (2011) regarded Key Success Factors as a primary tool in management, an essence of competitiveness, and an important consideration in planning and decision-making. Huang (2009) argued that a manufacturer should master the Key Success Factors, the most important competitiveness or assets, in the industry so as to establish sustainably competitive advantages. Yang (2010) considered Key Success Factors as the major elements in Industry Analysis and the references of internal resource allocation and technology integration in an enterprise so that the enterprise could acquire the strength for success by mastering such key factors. Chen (2009) indicated that a manufacturer could present more successful management than the competitors by completing certain critical tasks in different phases.

Chin (2009) pointed out the sources of competitive advantages for catering franchising industry as (1) low cost, (2) unique production line, (3) scale economy created by a larger scale franchising system, (4) complete personnel system and rich human resource, (5) complete logistic system, (6) high popularity and favorable image, (7) highly standardized products, (8) advantages created by highly vertical integration, including cost reduction, stable material supply, and economic operation, (9) highly differential management, such as all-year-round and 24 hour-day, (10) high-quality service, (11) complete management techniques, (12) high customer satisfaction, (13) advantages of focusing on specific market, (14) advantages from computerization, and (15) warm atmosphere for dining.

Yang (2010) mentioned the following conditions to develop the management for catering franchises. (1) A complete and powerful franchisor with good personnel trainings to control the quality of employees. (2) Sensitive business information system for rapidly delivering consumer responses to the product service in chain stores to the franchisor in order to adjust product strategies and modify business management system according to the consumer and market demands. (3) Good financial system with deliberate financial planning, accounting system, and auditing system for smooth management. With complete operation policies, a franchisor could effectively control the operation of each chain store. Yen (2010) concluded the premises and conditions for a successful franchising system. (1) Correct understanding. The introduction of a franchising system was a management concept, rather than a tool for illegally collecting wealth. (2) Presenting specific quality and responsibility to actively operate with strong belief. (3) Forming enterprise culture and styles, rather than the expression of individualism. (4) Presenting unique characteristics on the product development and services. (5) Being able to develop unique sales. (6) An enterprise with certain awareness and favorable image. (7) Showing enormous capitals and financing ability. (8) With perfect organization and suitable talents for promoting the franchises. In regard to the industrial characteristics, Lo (2012) pointed out the importance of the above problems for catering industry. A sustainable franchising system should reinforce and update the written-rule and standardization of know-how with written documents or files and well manage the knowledge.

Yang (2010) summarized seven Key Success Factors in operating a coffee shop, as Service Quality, Product Quality and Characteristics, Marketing, Store Style and Characteristics, Customer Relationship and Personal Capability of Shop Manager,

Selection of Trade Area and Location, and Fitness of Business Meetings, in which Customer Relationship and Personal Capability of Shop Manager, Service Quality, and Product Quality and Characteristics were ranked the top three in the perception and mastering, presenting that coffee shops not only emphasized such factors, but also devoted to the implementation. Chin (2009) proposed the KSFs for coffee chain stores as (1) selection of location and trade area, (2) complete educational training system, (3) ability to research and develop new products, (4) advertisement and promotion, and (5) profitability of products.

## Research Method

### *Research Framework*

Based on the literature review, variables with high significance were organized for the Analytic Hierarchy Process framework to discuss the Key Success Factors in catering franchises.

### *Distribution and Retrieval of Questionnaire*

Total 300 questionnaires were distributed to 10 chain stores of My Home Steak in Tainan and Kaohsiung. With the owner's insistence on offering the customers with the best steak, My Home Steak has led the trend. The clean and hygienic kitchens are commonly praised. In 1990, it enhanced the economic steak with high-quality services. Following the economic growth, customers expect to have multiple choices. My Home Steak is aware of offering warmer and more comfortable experiences for the public. Nevertheless, the insistence on healthy flavor with the best ingredients has never been changed. Dining in My Home Steak, people enjoy the visual space with special steak, coffee, refreshment, and salad as well as the services. Having organized the collected questionnaires, 18 invalid ones were

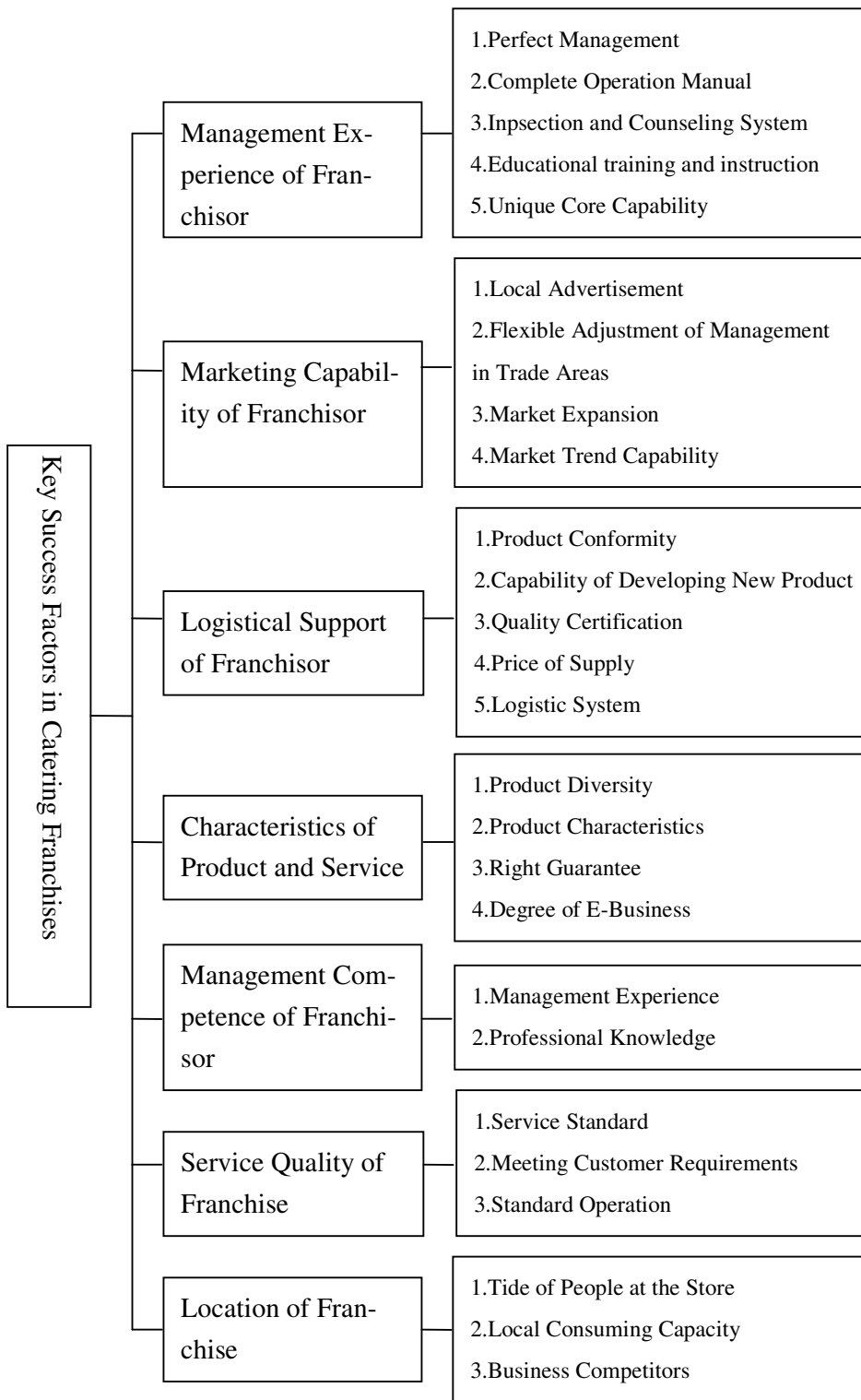


Figure 1. Research Framework



deducted for total 214 valid copies, with the retrieval rate 71%.

### *Empirical Analysis*

Since AHP (Analytic Hierarchy Process) is applied to discussing the Key Success Factors in catering franchises, the establishment of hierarchy and the relative weights are described in this chapter.

With Excel to calculate the weight of each measurement index for analyses, the second level of measurement index was first analyzed to understand the sequence of Key Success Factors. The consistency ratio of the second level  $C.R.H. = 0.028 < 0.1$  showed the consistency among the research subjects. The third level was further proceeded Content Analysis to measure the weight of the factors being  $C.R.H. = 0.016 < 0.1$ , presenting the acceptable consistency of the level. The priorities of the indices in each level were further sequenced, Fig. 2.

Fig. 2 shows the integrated opinions from the questionnaire survey.

1. Within the Key Success Factors in Catering Franchises, Service Quality of Franchise appeared the highest importance (0.22), followed by Location of Franchise (0.19), Marketing Capability of Franchisor (0.17), Characteristics of Product and Service (0.15), Management Competence of Franchisor (0.12), Logistical Support of Franchisor (0.10), and Management Experience of Franchisor (0.05). Key Success Factors in franchises presented  $0.22$  (Service Quality of Franchise) +  $0.19$  (Location of Franchise) +  $0.17$  (Characteristics of Product and Service) +  $0.15$  (Marketing Capability of Franchisor) +  $0.12$  (Characteristics of Product and Service) +  $0.10$  (Logistical Support of Franchisor) +  $0.05$  (Management Experience of Franchisor).
2. Among the factors in Service Quality of

Franchise, Meeting Customer Requirements (0.082) showed the highest importance, followed by Service Standard (0.048), and Standard Operation (0.022) the least.

3. Among the factors in Location of Franchise, Tide of People at the Store (0.068) revealed the highest importance, followed by Local Consuming Capacity (0.046), and Business Competitors (0.017) the least.
4. Among the factors in Characteristics of Product and Service, Product Characteristics (0.067) appeared the highest importance, followed by Product Diversity (0.047) and Right Guarantee (0.021), and Degree of E-business (0.018) the least.
5. Among the factors in Marketing Capability of Franchisor, Molding Brand Image (0.061) presented the highest importance, followed by Flexible Adjustment of Management in Trade Areas (0.038), Market Trend Capability (0.037), Market Expansion (0.025), and Local Advertisement (0.021) the least.
6. Among the factors in Management Competence of Franchisor, Management Experience (0.050) appeared the highest importance and Professional Knowledge (0.022) the least.
7. Among the factors in Logistical Support of Franchisor, Product Conformity (0.045) showed the highest importance, followed by Capability of Developing New Product (0.042), Price of Supply (0.039), Logistic System (0.023), and Quality Certification (0.019) the least.
8. Among the factors in Management Experience of Franchisor, Unique Core Capability (0.043) revealed the highest importance, followed by Inspection and Counseling System (0.036), Educational training and instruction (0.024), Complete

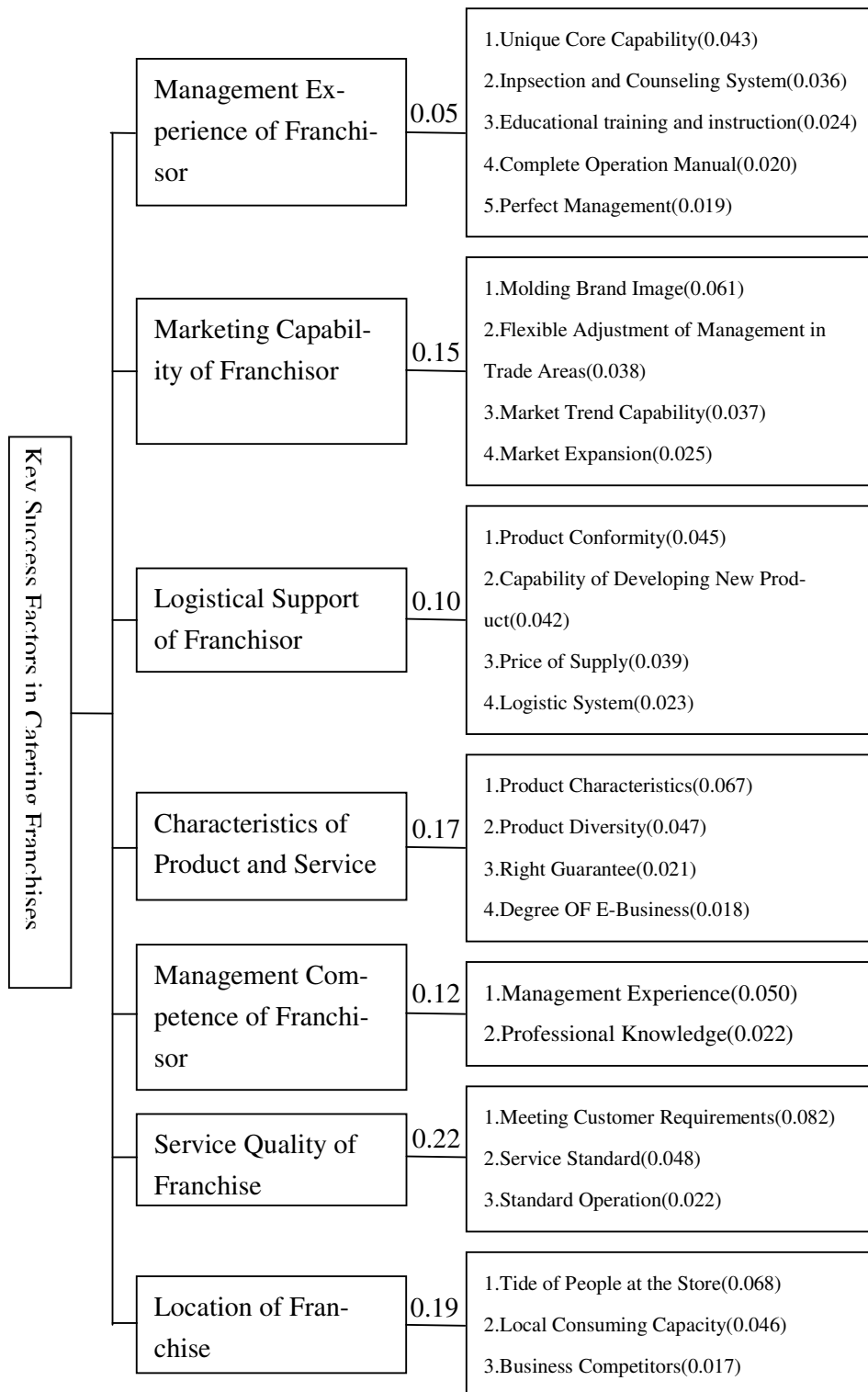


Fig. 2: Weights of Key Success Factors in Catering Franchises

Operation Manual (0.020), and Perfect Management (0.019) the least.

### Conclusion and Suggestions

According to the data analyses and research conclusions, suggestions for practical applications with Key Success Factors in catering franchises are proposed. The research outcomes show the top three factors of Service Quality of Franchise, Location of Franchise, and Characteristics of Product and Service with the following suggestions.

1. Among the Key Success Factors in catering franchises, Service Quality of Franchise is regarded as the priority. Apparently, consumers present higher flavor and demands on products and services from franchises, which therefore continuous innovate to enhance Capability of Developing New Product and promote the quality so as to meet the increasing demands of consumers.

2. Location of Franchise is ranked the second of Key Success Factors in catering franchises that sufficient target customers in the area should be taken into account. Most catering franchises are located in noisy areas with a large tide of people. However, such people are mobile, not for specific purposes, in the areas that they tend to select stores with famous brand, as they perceive better security. Catering businesses therefore should devote to Molding Brand Image and provide favorable logistic support to enhance consumers' confidence, increase the success of chain stores, and attract the investment of franchisees.

3. Characteristics of Product and Service is the third factor. As the restrictions for catering industry is relatively low, differential products or services should be offered for discriminating the market to attract consumers and enhance the purchase intention.

### References

Association of Chain and Franchise Promotion, Taiwan (2009.02.08)  
[www.franchise.org.tw](http://www.franchise.org.tw)

Chen, Ching-te (2011). An empirical research of the Key Success Factors for chain administration— English Supplement School Industry as An Example. *TamKang Management Research*, 4(4), 86-107.

Chen, Wen-kai (2009). The Influence of Success Factors on Taiwan Franchise System—An Empirical Study of Franchisee's Perception. *Journal of Management*, 4(4), 77-96.

Chin, Chien-wen (2009). Key Success Factors of Coffee Chain Stores. *TamKang Management Research*, 1(4), 49-63.

Huang, Wei-ru (2009). The Relationship of Relationship Bonding, Trust and Commitment- Moderating Effect of Relationship Phases . *Asia Pacific Management Review*, 4(2), 127-141.

Li, Hsin-mo (2010). *Franchises Q & A. Version II*. Taipei: Business Weekly Publications.

Lin, Yu-cheng (2010). Investigation and Analysis of Key Success Factors for Franchise Chain Stores: An Example of Chain Bookstore. *Sun Yat-Sen Management Review*, 3(1), 102-119.

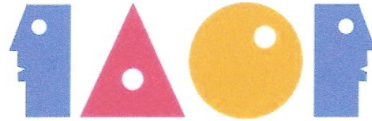
Lo, Li-ren (2012). A study on market discrimination and trade area evaluation for selecting the location of franchises. *Journal of Commercial Modernization*, 36, 78-106.

Su, Shu-hua (2011). Analytical Study of Development of Franchise Business in the Republic of China. *Journal of Management*, 2(3), 33-57.

Wang, Shiu-ying (2009). A Study of Market Segmentation and Consumer Behavior in Coffee Chain Shops. *Journal of Commercial Modernization*, 29, 34-36.

Yang, Jih-jung (2010). A Study of Key Success Factors of Coffee Stores. *Sun Yat-Sen Management Review*, 3(3), 34-51.

Yen, Sheng-hao (2010). A study on Franchising Management Control—System Analysis Method. *Journal of NCCU*, 2(1), 66-82.



A STUDY OF THE REDESIGN AND PRODUCTION OF THE TRADITIONAL  
TAIWANESE PEACOCK CHAIRS

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Abstract

In this study, the collected data were employed to examine and analyze the disadvantages of traditional peacock chairs, and according to ergonomics, the dimensions were amended to design a more ergonomic peacock chair. In addition to the dimension amendment, new elements were added to integrate tradition and the contemporary age in order to redesign a new-style peacock chair.

To shorten the production process and due to the lack of professional technicians, Computer Numerically Control (CNC) was employed instead of traditional handiwork to analyze the manufacturing technology and procedures. Furthermore, various parts of a peacock chair were compared to explore the possibility of the mass production of traditional furniture. The redesign and production process of a peacock chair includes precise mold making, computer-aided design and graphics, processing commands input, CNC router processing, and detailed modification.

According to this study, applying a CNC router to the production of a peacock chair not only is feasible but also does not need skillful traditional carpentry. That is, the processing time, the dependence on traditional techniques, and the material waste reduce, and, meanwhile, the new manufacturing method increases changes and challenges comparing with traditional processing methods. In the new design, the seat of a peacock chair was reduced to 425 mm, the tilt of the backrest was changed to 102°, and each stretcher was lowered to 127 mm above the ground. Therefore, the appearance of the peacock chair was beautified, and the comfort is increased, but it is still a peacock chair. These modifications can be based in the future to develop more diversified peacock chairs in order to enhance capacity of corporation innovation.

Keywords: traditional furniture; peacock chair; Computer Numerically Control (CNC); ergonomics; design

### Introduction

Traditional furniture was very important for ancient Taiwanese. The furniture accompanied ancient Taiwanese to witness the cultural changing process of Taiwan. However, most of families use western-style furniture nowadays, and the traditional Taiwanese furniture with special historic importance has gradually declined among general families. However, New Orientalism prevailing in European and American furniture makes people gradually value traditional Taiwanese cul-

ture in recent years, and the beauty of traditional Taiwanese furniture thus attracts a great deal of attention.

“Traditional Taiwanese furniture” indicates the household utensils, tables, chairs, cabinets, cupboards, racks, etc., which are of a classic Chinese style and used generally in folk houses in Taiwan before 1960 (Jian, 2000). Among them, board benches and peacock chairs were the most common in the agricultural society



since they could be used as not only dining chairs but also single chairs in various places (Su et al., 2007).

Peacock chair is also called Fuzhou chair, which was first produced in Fuzhou. After the Japanese colonization, western-style chairs were popular in Taiwan. Mortise and tenon joints were employed to integrate Chinese-style backrest chairs with western curvy style, round seats, and turnings. The backrest arc of a peacock chair conforms to ergonomics, and the slightly outward chair legs stabilize the weight. There are simple openwork carving patterns on some seats to allow ventilation. The design is simple, poised, and functional (Jian, 2000).

In traditional Taiwanese furniture, there is not any metal in a peacock chair, and the chair is simple, of graceful lines, and ergonomic, which are unique in traditional furniture. Nevertheless, a chair was mainly made by the ideas and craftsmanship of experienced professionals as well as carpentry tools in the past. Efficiency will be a problem if one would like to manufacture 1000 chairs. Although modern machinery for carpentry is very developed in Taiwan, it is indeed difficult to become familiar with a great number of tools (Hong, 2006).

More people pay attention to the beauty of peacock chairs, but most of the peacock chairs made in recent years are simply reproductions of ancient peacock

chairs. In addition, some problems related to structure and comfort exist among traditional peacock chairs. Therefore, this study was aimed to discover a modern method to speedily produce ergonomic, structurally enhanced, and stylish peacock chairs.

As time changes, the production technology of furniture progresses with each passing day. However, the pursuit of modern processing and machine mass production makes the craftsmanship of traditional Taiwanese furniture gradually decline and become lost. At present, it is indeed an important issue to continue the characteristics of traditional Taiwanese furniture as well as keep up the pace of the times in order to preserve cultural and historic relics and enhance capacity of corporation innovation.

CNC is a basis for an industry to become automatized, and CNC routers are indeed helpful for automatic production or mass production, which not only saves labor but also increases precision.

### Design Methods

In this study, a CNC system was employed to examine the possibility of producing traditional Taiwanese peacock chairs in order to conform to the need of modernization, automation, and mass production, increase production efficiency, and redesign a new, trendy model according to the forms of traditional peacock

chairs so as to create new styles of peacock chairs.

To continue and circulate peacock chairs, the research purposes include: Using a CNC router to accelerate the production process and increasing processing precision in order to reduce labor consumption and shorten production time. Enhancing ergonomic features. Designing a new-style peacock chair and producing it by a CNC router. The redesign procedures are illustrated in Figure 1. (All Figures and Tables are at the end of this article.)

## Result and Discussion

### *Design Analysis*

#### *Traditional Peacock Chair Reproduction.*

There are usually two turnings in the backrest of a traditional peacock chair, which was an important style of the Japanese colonization (Chen, 1996; 2006). The structure of a traditional peacock chair tended to be complete.

Mortise and tenon joints and lap joints were applied to a traditional peacock chair, and the lap joint between the back legs and the seat was weaker. Therefore, ergonomics was applied to the improvement while the original structure of a traditional peacock chair was maintained in this study.

In ergonomics, the dimensions and angles of one object vary according the occasions of use. Generally, traditional peacock chairs were used as dining chairs, so they were regarded as working chairs in this study.

The seat of a common traditional peacock chair is about 440~490mm high, which is obviously too high and does not conform to the builds of Taiwanese. Hence, the seat of a peacock chair was lowered to 425mm in this study, so when a person sits on it, the waist will be less stressed, and the feet can be placed on the ground easily (Li, 1980; Su, 2010). Since the seat was lowered, the legs tilted slightly inward for the overall beauty and harmony and avoiding the look of light top and heavy bottom. Similarly, based on the golden proportion, namely 1:1.618, the stretchers were also lowered down to 127mm. However, the backrest is already ergonomic, similar to traditional peacock chairs, so the tilt angle was set as 102°, as shown in Figure 2.

Furthermore, for characteristic “turning” backrest ribs, the design proportion of Su et al. (2007) was applied to the backrest stretchers of this product, as shown in Figure 3.

### *New Peacock Chair Design*

Based on traditional peacock chairs, two new peacock chairs, which are different from traditional peacock chairs and

bring people new feelings, were established in this study. The basic dimensions are identical to the dimensions of the traditional peacock chair modified in this study. Graceful curves are a feature of traditional peacock chairs, so more lines were added in this study.

There was not critical change in traditional backrest shapes. The original design in this study was to allow light objects, such as kettles and scarves, to be firmly hung on the backrest of a chair. Finally, a shape similar to the roof of a temple was modified and applied to the top splat, which thus looks not only traditional but also stylish. A traditional backrest usually consists of 2 or three turnings, or it is usually a board backrest similar to the Queen Anny style in England in 17<sup>th</sup> century (Vandal, 1990). To harmonize with the top splat, the backrest designed in this study was of two curved boards, which is very different from traditional design.

Simple lap joints are usually employed in traditional stretchers. However, to match the curved shape of the backrest, the stretchers in this study were also designed to be curved in order to make the entire look more like a whole.

Generally, the legs of peacock chairs are curvy, but they look drab. Thus, an angle was added to each leg to make it look neater and pithier (Figure 4). After the aforementioned design graph was accomplished, a 1 : 5 precision model was estab-

lished to confirm the connection of the parts and the over appearance after assembly.

### *Processing Engineering Analysis*

In this study, a CNC router was used to produce peacock chairs. First, AlphaCAM was employed to draw, edit the processing paths, and simulate actual cutting (Su, 2010). The materials were prepared, the parts were milled, and then, the parts were assembled to confirm the precision after the confirmation was made.

### *Material preparation*

#### 1. Material preparation

*Pinus Radiate* D.Don (or New Zealand Radiata Pine) was used to produce the peacock chair. In the preparation, 4 “2100mm × 150mm × 50mm” planks of New Zealand Radiata Pine were prepared, and each of them was then cut into three equal parts. In total, there were 12 “700mm × 150mm × 50mm” planks. A hand plane was used to plane the surface of the planks and modify the angles. Then, planks with similar veins and colors were collaged.

#### 2. Plank collage

According to the material dimensions in the AlphaCAM file, the “700mm × 150mm × 50mm” planks of New Zealand Radiata Pine were collaged. The dimen-

sions of the collaged planks are summarized as follows:

Seat: One 700mm × 450mm × 50mm plank (2 seats)

Leg: One 700mm × 450mm × 50mm plank (8 legs)

Top Splat: One 700mm × 450mm × 50mm plank (2 top splats)

Stretcher: One 700mm × 450mm × 50mm plank (8 stretchers)

The collaged planks were stacked up properly with rods between them to avoid warp.

### 3. Plank surface modification and calibration.

Since the smoothness of the planks were highly required, a hand plane was first used to plane the surfaces of the planks, and a single-sided automatic plane was then employed to calibrate the surfaces, so when a CNC router was applied to processing, the materials could be fixed on the processing platform.

## Production

### 1. Making top splats

- (1) The collaged plank was planed to the thickness of 28mm.
- (2) According to the design, the width of each top splat was originally 56mm. However, the thickness of New Zealand Radiata Pine is only 50mm, and 56mm is too thick for the CNC router. Thus, each top splat was divided into two parts, 28mm each, for

processing.

- (3) The top splats were glued and assembled, and a clamping apparatus was used to fasten the two parts of each top splat until they were dry.
- (4) The rough surfaces were initially sanded by a vertical belt sander to make them smoother. Moreover, the upper part of each top splat was chamfered to increase the comfort brought by the backrest. Since this study was for product development instead of mass production, a vertical belt sander was applied to the process. For mass production, it will be faster to process the upper part of each top splat by molds and shapers.

When a CNC router is employed to mill a mortise, the corners of the mortise hole will be arched, so it will not be able to exactly fit the tenon of each back chair leg. Therefore, it is necessary to use an angle chisel machine to chisel the corners into right-angle corners. For mass production, an oval tenoner can be used to produce oval tenons.

- (5) The processing procedures are illustrated in Figure 5.

### 2. Making seats

- (1) The collaged plank was planed to the thickness of 34mm. The both sides of a seat can be processed through a CNC router. To avoid that the plank can not be held on the platform when the second side is processed, it is necessary to process the bottom of the seat

first, namely making the mortise hole of the front legs and proceeding the 3D surface. A hand router was used to chamfer the seat in order to increase the comfort when a user sits on it. The procedures are illustrated in Figure 6.

### 3. Making chair legs

The collaged plank was planed to the thickness of 37mm.

There was not any special processing method when the legs were milled.

A desktop bandsaw machine was employed to transform the arched corners, which could not be processed by a CNC router, into right-angle corners in order to better match the seats. According to the design, an angle chisel machine was used to create mortises. Since the legs were curvy, and each leg and each stretcher were not jointed in a 90° angle, each leg was chocked higher to form a 90° angle with the platform of the angle chisel machine for tightly jointing the stretchers and legs.

A hand router was used to process the chamfers, and the radius was 6mm.

The processing procedures are illustrated in Figure 7.

### 4. Making stretchers

The collaged plank was planed to the thickness of 25mm.

Each stretcher and each leg were jointed through a mortise and tenon joint. To completely joint them, the mortise and tenon should fit each other. When a CNC router is applied to the process, if vertical processing is carried out directly, the quan-

tity of milling would be excessive, which will not only speed up the wear of the knife but also influence the fixation of the materials. Therefore, when the CNC router was used to process the stretchers, a trench larger than each stretcher was milled to reduce the milling quantity of the second process. A desktop circular sawing machine was used, and a suitable guide plate was prepared to turn each arched tennon into a right-angle tenon for the convenience of joint.

A circular sawing machine installed with a grooving knife was used to create transverse grooves for lap joints.

(1) The stretchers of the new peacock chairs are thin in the middle and thick in both ends. In this study, a vertical belt sander was used to sand the predetermined shape. For mass production, a shaper should be employed, and molds should be made. The processing procedures are illustrated in Figure 8.

### 5. Making backrest ribs

(1) A 1:1 graph was printed, cut, and pasted on the 12mm plank. A desktop bandsaw machine was used to saw the plank along the lines. For mass production, a shaper should be combined with molds in the shape cutting process.

(2) Each backrest rib has a tilt to the top splat, so a desktop bandsaw machine was used to saw the slope of the tenon.

(3) A vertical belt sander was used to carefully sand each rib for making it smooth.

(4) A hand router was used to chamfer

each rib.

(5) The processing procedures are summarized in Figure 9.

#### 6. Gluing and assembling

(1) First, the front and back legs and stretchers were assembled, glued, and fastened until the glue was dry. The seat was then installed but not glued, yet.

(2) The seat was glued and fastened; the backrest was installed and slightly fixed.

(3) The backrest ribs and top splat were jointed and glued. The processing procedures are shown in Figure 10.

### *Ergonomic Analysis*

#### 1. Height of seat

According to ergonomics, each seat was lowered to 425mm, which is within the range of “chi (or literally, lucky)” on the Lu Ban Ruler, a traditional Chinese measurement tool for Feng Shui. Each stretcher was also lowered to 127 mm due to the height of each chair. The distance between the stretchers and the seat of each chair is approximately 230 mm, which forms the gold proportion of 1:1.618. The height of the backrest of each chair is 260mm, which makes each chair not only ergonomic but also visually beautiful and comfortable.

#### 2. Tilt of a backrest

The tilt of the backrest of a traditional peacock chair is mostly  $100^\circ$  or generally between  $97^\circ$  and  $101^\circ$  (Su et al., 2007). The tilt of the back legs originally designed

in this study was  $102^\circ$ . However, after the legs and the top splat of a chair were assembled, the backrest ribs slightly tilted forward, which caused a  $90^\circ$  angle between the seat and the backrest, which further resulted in discomfort of sitting. Therefore, the tilt was adjusted to  $110^\circ$ , and the thickness of each backrest was increased. The tilt between the seat and the backrest thus became  $102^\circ$ , which increased comfort and beauty.

According to ergonomics, the dimensions of each peacock chair were redesigned to make each chair more user-friendly. The redesigned peacock chairs and traditional peacock chairs are compared in Table 1.

### *Conclusions*

In this study, two peacock chairs were redesigned and produced semi-automatically through a CNC router instead of the handiwork of professionals for improving production efficiency. If the production of traditional furniture can be automatized or mass-produced, historic traditional furniture will be preserved forever among ever-changing technologies.

When a CNC router is used to produce the parts of a chair, it is still necessary to modify the joints of some parts by hand to make up for the disadvantages caused by the production of a CNC router. For example, it is necessary to use a band-



saw machine or an angle chisel machine to transform the arched corners milled by a CNC router into right-angle corners, so that the parts will be better jointed when they are assembled. To solve this problem, oval mortise and tenon joints can be employed to conform to the processing feature of a CNC router.

The most critical problem of the design of traditional peacock chairs lies in that the seat of each chair is usually too high, so if one sits on it for too long, it is easy to have waist or spinal fatigue. To solve this problem, the height of the two chairs in this study was adjusted according to the overall harmony as well as the golden proportion. Moreover, the chair leg angle and the height of the stretchers were also adjusted accordingly. The actual comparison with traditional peacock chairs showed that the redesigned peacock chairs are more ergonomic.

The leg tilt of the redesigned peacock chairs was originally  $102^\circ$ , but due to the arc of the top splat of each chair, the backrest slightly tilted forward, which caused a  $90^\circ$  angle between the seat and the backrest. Therefore, the tilt was then adjusted to  $110^\circ$ , so the tilt between the seat and the backrest became  $102^\circ$ . The actual final products are thus much more comfortable and beautiful.

In summary, this method was used to redesign traditional Taiwanese furniture in this study. It was found that if new tech-

nologies are well used to improve the production, people without great skill in traditional woodworking can also produce meaningful historic relics. The study also could provide the styles of the innovational peacock chairs for references of furniture designers when creating new furniture.

## References

- Li, J. H. (1980). *The Ergonomics and Design of Chairs*. Taipei: Liuho.
- Hong, Y. C. (2006). *The Integration of Nature and Handiwork- New Taiwanese Wood Furniture*. Taipei: Jimu.
- Chen, Q. X. (1996). *The Investigation and Promotion of Traditional Agricultural Furniture in Taiwan (II)*. Douliou: Yutech Books.
- Chen, Q. X. (2006). Reflection on the Modern Design of Traditional Taiwanese Furniture. *Beauty of Furniture – Seminar of Traditional Taiwanese Furniture*, 64-81.
- Jian, R. C. (2000). *Traditional Taiwanese Furniture*. Taoyuan: Taoyuan County Heritage Association.

Su, W. Q. (2010). Ergonomics. Department of Forest Products Science and Furniture Engineering, Chiayi.

Su, W. Q. (2010). Computer-aided Design and Manufacturing. Department of Forest Products Science and Furniture Engineering, Chiayi.

Su, W. Q. & Sun, Q. H. (2007). An Investigation on the Design and Structural Damage of Traditional Taiwanese Peacock Chairs. *Forest Products Industries*, 26(4): 267-276.

Vandal, N. 1990. Seating furniture in 'Queen Anne Furniture'. The Taunton Press. USA. P.35-52.

Figure 1. Redesign schema of peacock chair

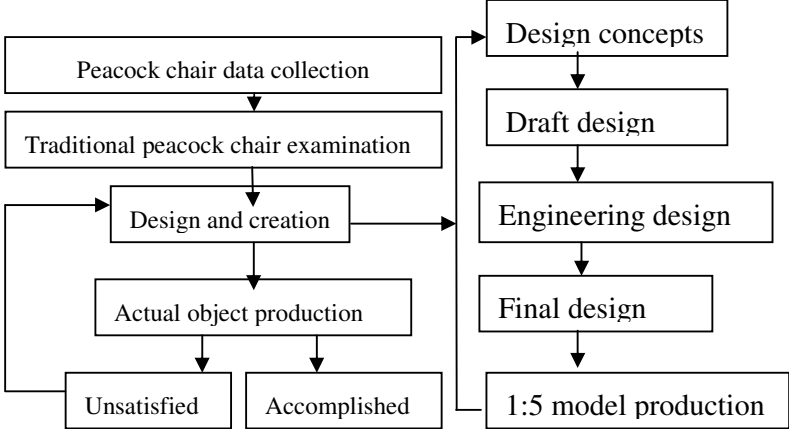


Figure 2. The three-view graph of peacock chair.

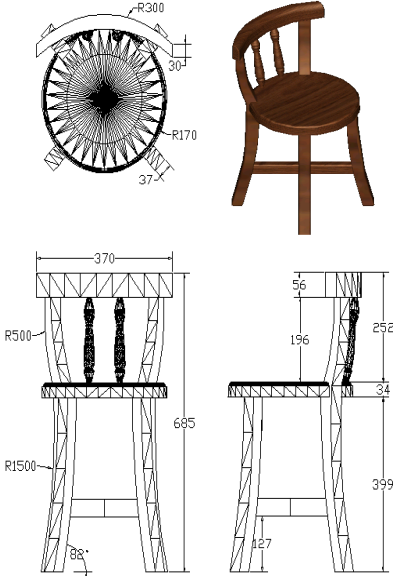


Figure 3. The proportion of turning.

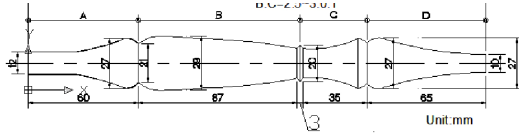


Figure 4. The three-view graph of the re-designed peacock chair.

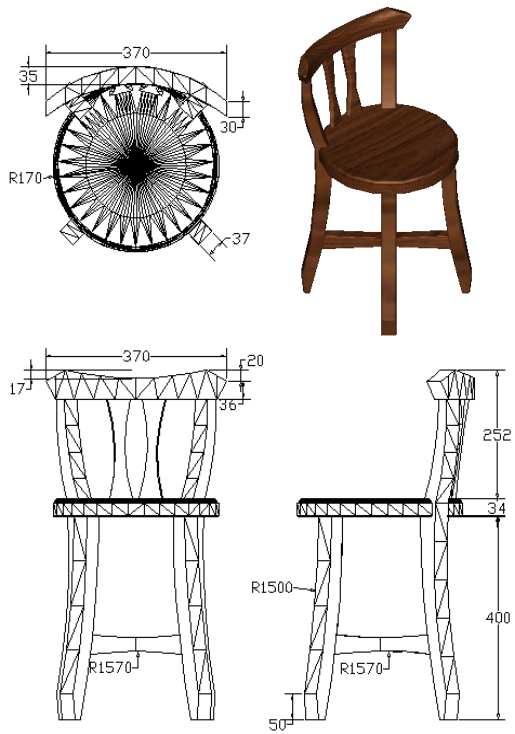
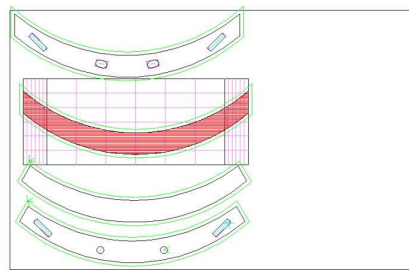
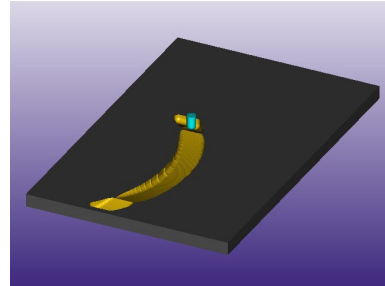


Figure 5. Making processes of top splat.



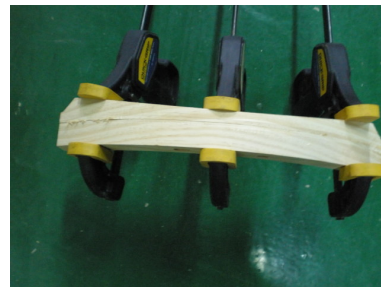
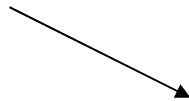
The AlphaCAM graph of top splat



Processing the top splat of a new peacock chair



An unassembled top splat



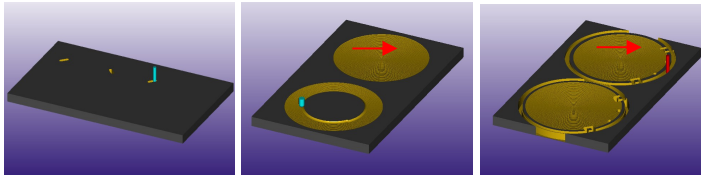
Gluing and assembling a top splat



An accomplished top splat



Figure 6. Making processes of seat.



Applying a CNC router to the 3D surface processing of the seat

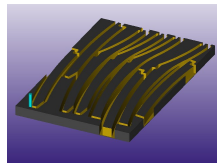


Transforming the arched corners of a mortise hole into right-angle corners

Transforming the arched corners of a mortise hole into right-angle corners



Figure 7. Making processes of leg.



Using a CNC router to mill the legs



A CNC router can not process right angle corners.



Using an angle chisel machine to create the mortise holes



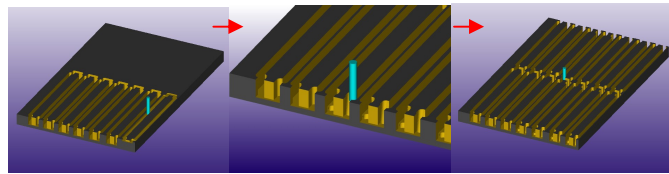
Chamfering a leg



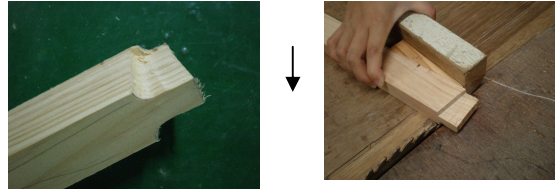
A completed leg



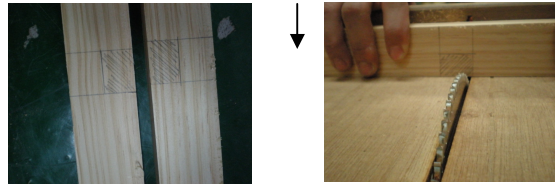
Figure 8. Making stretchers for redesigned peacock chairs.



Milling the stretchers by a CNC router



Sawing a right-angle tenon



Making a lap joint



Making the stretchers of a redesigned peacock chair



An accomplished transverse groove for a lap joint

Figure 9. Making processes of rib.

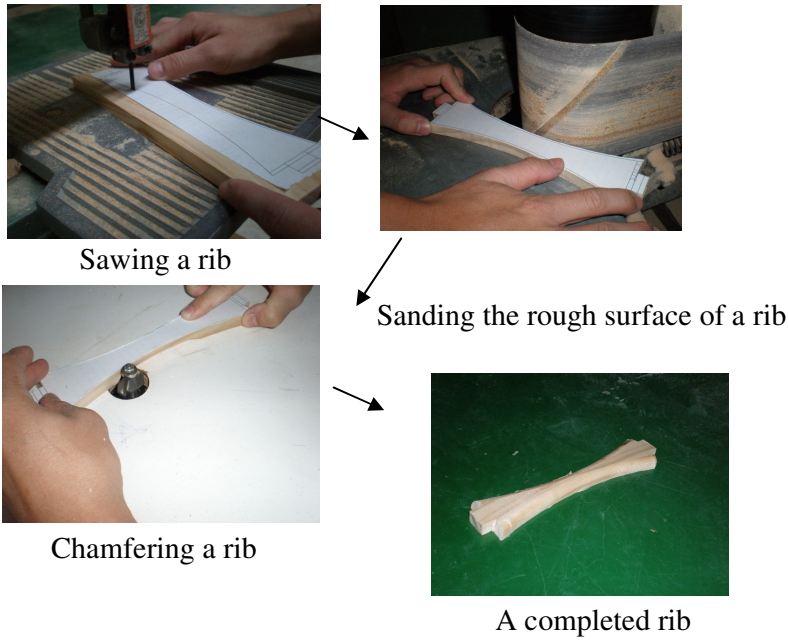


Figure 10. Assembly of the chair parts.

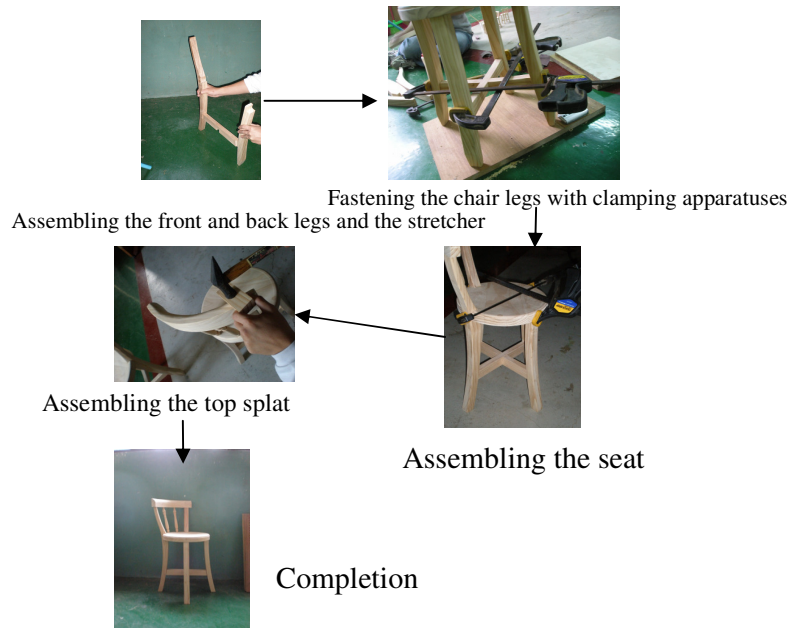




Table 1. The Comparison between Traditional Peacock Chairs and Newly Designed Peacock Chairs.

Item	Traditional Peacock Chair	Newly Designed Peacock Chairs (2 Patterns)
Occasion of Use	Dinning Chair	Working Chair or Dinning Chair
Height of Seat	The height of the chairs is between 440 and 490mm, but the chairs are usually higher, which is less suitable for Taiwanese.	The height of the chairs was reduced to 425mm, so they are ergonomic and reduce the burden of one's waist.
Chair Leg Angle	The chair legs tilt slightly outward, approximately 15°.	Since the height of each seat was reduced, the tilt of each leg was changed to 8° in order to increase the over harmony.
Height of Stretcher (Above the Ground)	The height is between 190mm and 235mm.	Based on the golden proportion of 1:1.618, the height was changed to 127mm.
Overall Design	The appearance is graceful, and the design is simple.	Based on traditional peacock chairs, the details of the two chairs were improved, so they look not only traditional but also modern.
Structure	The joints are usually mortise and tenon joints and lap joints. The structure of each chair is strong except the joints between the seat and back legs. The chairs were hand-made.	The overall structure is similar. The traditional jointing method is kept, and the amendment is based on ergonomics.
Technology	Only skillful professionals can produce them in small quantity.	The two chairs were semi-automatically produced through a CNC router. One only needs to have basic skills.

Table 1 (continued)

Item	Traditional Peacock Chair	Newly Designed Peacock Chairs (2 Patterns)
Occasion of Use	Dinning Chair	Working Chair or Dinning Chair
Ergonomics	The seat of each chair is usually too high, but the tilt of each backrest is ergonomic.	The dimensions were redesigned, so each chair is ergonomic.
Appearance		

## AN EXPLORATORY ANALYSIS IN THE CONSTRUCTION OF COLLEGE PERFORMANCE INDICES

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### Abstract

Education of high-caliber talent knows no boundary. To enhance the national compositeness, it is essential to break the mould of traditions and create innovations and creativity in the era of knowledge economy. Universities have grown far more complex in recent years in order to face increasing competition. However, there is a lack of objective and authoritative performance indices available for colleges and universities. Hence, the redesigning and improvement of conventional performance management and control systems of colleges are a critical issue.

The main purpose of this research is to construct a set of performance indices for colleges. First, we aim at functional and achievements target of the college performance evaluation system based on the theories and implementation references in knowledge management and performance evaluation. An explorative analysis was conducted to design a performance indices questionnaire for the evaluation of colleges, and re-examine the connotation of the questionnaire structure by referring to inputs from scholars. Finally, a questionnaire survey with in-depth interviews was conducted with five scholars who had been involved in planning and evaluating the performance evaluation system of colleges. The structure of evaluation and indices of performance were revised accordingly. The suggested performance indices of a college are divided into four dimensions: the benefit orientation of internal work, the service improvement orientation in teaching and curriculum, the benefit orientation of students and the market, the orientation of innovation and research, these four dimensions consist of 23 sub-dimensions and 85 items. We hope this coherent approach can serve as a reference to future research.

Keywords: Knowledge Management, Performance Appraisal

## Introduction

Globalization, competition and the calls for reforms impose many daunting challenges for higher-education institutes in terms of budgetary sources and allocations, teaching quality and operational management. It is a critical issue to effectively evaluate performances so as to facilitate the maximization of operational and managerial benefits. Tasked to educate talents, schools are on the forefront of the development of intellectual capital. Generally speaking, schools are domesticated organizations, relatively stable and conservative, weak in adapting to environmental changes. Meanwhile, schools are also knowledge organizations, emphasizing the expertise and autonomy of educating professionals. This loosely coupled structure also undermines overall competitiveness (Chang, 2002). Therefore, the directions and strategies of educational reforms should be anchored on the characteristics of school education and the modern management know-how, in order to enhance quality and functionality of university education (We, 2000). Stufflebeam (2000) suggested that assessment is a systematic review of the value/strength of any given project, plan, service or other subject matter (translated by Huang Shu-dong, 2005: 334). The purpose is to determine the strength, value or importance of the reviewed subject (Scriven, 1991). This can have significant influence over university education, learning subjects, and product quality. To effectively implement a pleth-

ora of policies and actively respond to external changes and meet with the needs of students and parents, it is important to redesign and improve the traditional performance management system and formulate a new set of performance indices to facilitate the performance management of universities.

The 21<sup>st</sup> century is the era of knowledge economy. Intellectual capital has replaced labor and capital as the most important assets of companies. Conventional wisdom in management and strategies cannot cope with rapid changes and intense competition nowadays. Sustainable operations are only possible after effective transformations (Chang, 2002). These new managerial concepts mean schools, like companies, are increasingly becoming performance-driven. Whether performance management is achieved as expected depends on whether performances are evaluated properly. Hence, scholars are concerned with whether performance management tools and construction methodologies ensure professional standards in task performances. Most of the studies in Taiwan on reorganization are from the academics focused on corporate management. Only a small number of papers come from educational institutions. The majority of the studies on school reorganization in Taiwan are concerned with how educators and scholars perceive structural adjustments (Huang, 2002). These papers address issues such as school re-engineering (Lin, 2001; Wu, Lin, 2002) and the rela-

tionship between school re-engineering and knowledge management (Huang, 2003; Chen 2003; Chuang, Tseng, Chiu, 2005) and the construction of school indicators (Chuang, 1999; You, 2000; Chang, 2004; Chung, 2004; Yeh, 2004; Tsai, 2005). However, there is a scarcity of papers examining the construction of school performance indices. Therefore, it is important to build a timely and appropriate set of university performance indices able to reflect the effectiveness of strategies and targets. It is a trend in the era of innovative management, as well as a key driver of school competitiveness. It is one of the most critical issues in the educational reform of Taiwan.

The innovation in the management of universities is more than just a concept, but also about actions and implementations (Wu, 2004). Peter F. Drucker says, "Innovate or Die". In other words, developments are only possible with innovations. Competitiveness is only achieved via innovations. Universities have been at the focal point of educational reforms over the past decade and under the influence of management concepts in the new century. Universities have to constantly change and innovate to cope with challenges one after another (Tai & Pu, 2006). Also, the public has high expectations for educational reforms in universities. There is an increasing emphasis on the option of education. Universities are no longer "domesticated". Rather, they are exposed to market competition. Therefore, universities have to util-

ize knowledge to create and innovate, in order to achieve competitive advantage and sustainable developments. In sum, this study aims to construct a performance evaluation system that translates the strategic goals of universities into tangible action plans. The purpose is to provide a complete picture of college management and construct a methodology for comprehensive performance indices. This will serve as a performance management tool for colleges and facilitate the achievement of strategic goals. This study performs an exploratory data analysis, with an initial focus on Taiwan. The construction of performance indices is based on literature reviews and such a framework will serve as a reference to theoretic foundations and implementation procedures for the study. The next step is to submit the draft questionnaire to the interviewees for a review, to ensure the hierarchical structure and contents are appropriate. Finally, this study gathers the feedback from the schools with the experience or know-how in college planning via in-depth interviews in order to construct or modify the list of college performance indices. The goal is to develop a set of performance review indices suitable to colleges and universities.

The educational environment has been increasingly complex due to the changing times. This means a different set of performance review indices is required. Are the indices developed by the education authorities suitable for universities? Which are the appropriate indices? Which are the



outdated ones? In fact, there is no standardized set of performance indices formulated by the education authorities. This makes it impossible to stay abreast of and respond to the rapidly changing environment. In the knowledge economy, traditional management concepts cannot adapt to the rapidly changing and highly competitive environment. In fact, the performance evaluation mechanism for colleges and universities should aim to assist the creation of school value and maximization of operating performances. The planning of the performance evaluation is the starting point of the proper evaluation of performances. This can help to apply performance metrics into the management of colleges and universities and articulate the visions and goals of higher education institutions. It will also help in the identification of potential obstacles in the implementation process and assist in the elimination or determination of such obstacles. This will guide the applications of the performance metrics and accumulation of planning experience to facilitate the establishment of college performance indices by managers. It will benefit the growth of schools and satisfy the needs of parents and students. As a result, the details of the performance indices are better aligned with the goals and performance management in colleges and universities. In fact, performance indices can make up where the assessment mechanism set by the education authorities falls short of. In sum, the construction of performance indices is critical for the improvement of manage-

ment mechanism for colleges and universities.

Therefore, this study aims to explore the philosophies and methodologies in the construction of performance indices for colleges and universities in order to make up the inefficiency of conventional performance reviews. It attempts to identify the strategic goals pertinent to schools on the basis of the management concepts in the knowledge economy. It will help to cope with the uncertainties and challenges of the business environment and assist educators to effectively monitor the performance reviews. Given a lack of the empirical studies concerning the construction of college performance indices, this study performs an exploratory data analysis to ensure the results meet the requirement of parents, students and education evaluation authorities. The first step is to review the literature in Taiwan and overseas concerning the concept of knowledge management evaluations and the construction of performance indices. This will serve as a reference and benchmark to the theoretic and practical procedures of the overall research framework. Next, this study designs a questionnaire and conducts in-depth interviews to ensure the list of college performance indices are relevant, measurable and appropriate. This will assist in the improvement of management in colleges and universities and set the tone for follow-up studies.

## Literature Review

The traditional definition of performances can no longer interpret the modern implications of performances. Also, the convention management techniques can no longer encompass modern management. Benjamin Franklin says that knowledge is the investment with the highest return. Management guru Peter Drucker positions knowledge as the new cornerstone for competition in the post-capitalism society (1993). This production factor is the most important resource in the globalized economy. To gain a deep understanding of the effects of performance assessment and knowledge management on the integrated system, this study reviews the definitions, purposes, importance, integration and trends of performance assessment and knowledge management.

### *Performance Assessments*

In the book “The Effective Executive”, Peter Drucker explains that performances are the direct outcome. Scholars in Taiwan and overseas have come up with their interpretations of performance appraisals. Performance appraisals are usually a formal and structured system to evaluate, review and affect employees’ work-related characteristics, behavior and results. It is a way of discovery work effectiveness and understanding whether better performances are achievable. The purpose is to benefit both employees and

organizations (Schuler, 1995). Evans et al. (1996) suggested that performance appraisals are an element of management and control. Performance appraisals and performance management help companies to effectively manage, measure and control resources. In fact, performance evaluation is a measurement system that is combined with bonuses and compensations. In the short term, measurement serves to control daily operations and modify targets. In the long term, it is a tool for strategic management, planning and achievement (Chu, 2005). Drucker also indicated that one of the basic tasks for managers is to evaluate and assess. Managers should establish measurement standards. Few other factors are as important as this one as far as performances of organizational members are concerned (Lin, 2002). Performance reviews and performance management usually consist of four steps: the determination of assessed contents, the selection of appropriate assessment methods, the feedback of the assessment results and the review of the assessment system (Schuler and Jackson 1996). Niven (2005) pointed out the issues concerning performance appraisals: (1) the restrictions of financial performance metrics; (2) the increase of intangible assets, often the factor that contributes to the success of an organization. A new performance evaluation system is required to track the value of intangible assets so that it is possible to predict and drive future success; (3) challenges in strategic implementations. To success, it is necessary to translate strategies into ac-

tions and detail the necessary tasks on a daily basis to all the members of an organization. As a rule of thumb, 35% of the progress in the quality of strategic implementations is relevant to 30% of the shareholders' value. However, many organizations are overly and almost exclusively focused on financial goals and as a result, they become disconnected with the implementations of the performance evaluation system and ignorant of the drivers of implementation strategies. In fact, it is necessary to start with visions and strategies by translating them into track-able performance assessments. Hence, the measurement of intangible assets should be incorporated because it is able to reflect the value-creation mechanism and resolve the issues associated with performance appraisals.

### *Knowledge Management*

There are many definitions and classifications of knowledge but all scholars agree to the following: knowledge has replaced land, capital and labor and become the most important economic resource in the information society (Drucker, 1989). In the 1990s, knowledge management started to attract attention. Knowledge management is a set of methods with which organizations utilize information technology. It is a process of gathering, organizing, storing, transforming, sharing and using knowledge in the context of organizational cultures and structures. This process ensures constant innovations and

regeneration of an organization. The purpose is to enhance productivity, increase assets and improve the capability of coping with external change and constantly re-engineering (Wu, 2001). Therefore, organizations should consider knowledge a most important asset and properly manage it (Senge, 1990; Drucker; Davenport et al., 1998). According to Wang et al. (2001), knowledge is an abstract term with many different meanings. Hence, there are many interpretations of knowledge management. For example, there are perspectives based on strategies and leadership (with a focus on goals and procedures), knowledge contents and practical aspects (with a focus on knowledge and actions), technological aspects (with a focus on systems and techniques), change management (with a focus on integration and management) and organizational reengineering (with a focus on transformations and reengineering). Wang Cheng-Yen and Li & Chen (2001) consolidated the definitions by different companies, organizations, scholars and experts on knowledge management, and classified knowledge management into knowledge contents & practical aspects, technological aspects, strategy & leadership, change management and organizational reengineering.

Broadly speaking, the measurement for knowledge management within an organization is the process of investing in knowledge management, achieving targets and return on investment. It is an assessment on outcomes in order to under-

stand the effectiveness and efficiency in strategic goal achievements". The purpose is to set a benchmark for follow-up actions and improvements (Lin, 2008). Knowledge management pays particular emphasis on human capital, i.e. the development of personnel expertise, in order to enhance productivity and innovation capability (Wang, 2000). Meanwhile, globalization and the competition to meet customers' needs also force companies to treat employees in the context of knowledge organization by focusing on their career development and professional expertise. Of course, knowledge management requires consolidation, transfer and integration of the knowledge owned by different employees in order to build up the intellectual capital of an organization. This is why companies are setting up the position of CKOs (Chief Knowledge Officers) who are responsible for knowledge management. Over the recent years, knowledge management has also been attracting attention in educational institutions. This is particularly important for the heritage of administrative experience because of the higher turnover of administrators. If the administrative work contents and procedures can be stored in computers, it can mitigate the problems caused by staff turnovers and maintain normal operations of schools. Some schools have set up knowledge management function and this is a good practice for other schools to follow (Chang, 2002).

#### Importance of Performance

#### *Assessments and Knowledge Management*

Companies and universities both pursue performances and growth. In essence, performance assessments are the control function of management. It has passive and active implications. The former refers to the understanding of the status and progress of planning. In case of deviation to a certain degree, it is necessary to take corrective measures. The latter is the influence of guidance from managers in decision-making and behavior via the establishment of a performance appraisal system ex-ante or in progress. The purpose is to align personal goals and organizational targets. According to a recent study by Arian Ward on Hughes Aerospace, 15~20% of the management's team is spent on searching for knowledge and responding to requests associated with knowledge. In terms of management and practices, knowledge is critical. Most importantly, it is necessary to leverage performance management and knowledge to create competitive advantages and values of colleges and universities. It is the key to success in the knowledge economy. The studies in Taiwan relevant to knowledge management and the construction of performance indices are as follows: Chen and Chen (2003), Su (2003), Yang (2004), Chang (2004), Tu (2005), Shih (2005), Lai (2005), Lin (2006), Wu (2006), Chen and Yang (2006), Hsu (2006), Peng (2006), Tsai (2007), Evaluation of Universities by the Ministry of Education (2007), Liao (2008).

The performance evaluation in the corporate world must be combined with the key success factors that guide through the achievement of strategic goals and visions. It is the same with the performance evaluation of colleges and universities. The assessment in knowledge-related factors is essential to the maintenance of the competitiveness of intangible assets such as diversified knowledge. In the knowledge-based competition, it is critical to ensure the capability in the development and utilization of intangible assets because such capability multiplies the effects of knowledge for both companies and universities. However, unlike companies, universities are non-profit organizations. Knowledge is an intangible asset of schools. Also, performances are the most prioritized consideration because conventional financial metrics cannot fully reflect the value activities of the organizations. Hence, the performances of colleges and universities are not solely based on financial metrics. It is necessary to establish a comprehensive set of measurement tools to evaluate the achievement of missions and visions of schools. Therefore, to ensure sustainable growth and development of colleges and universities in the new century, it is necessary to devise a set of appropriate performance metrics and indices in order to drive the pursuit of educational goals.

*Integration of Performance Assessments  
and Knowledge Management*

A good assessment system must start with organizational visions and strategies and convert such visions and strategies into actionable, track-able, measurable performance indices. What are the key considerations for effective measurement of university performances? Firstly, the knowledge transferred by colleges and universities are an intangible assets. They are the key factor to the success and value creation of schools. Colleges and universities need a new performance appraisal system that focusing on the value of intangible assets and able to predict and drive future success. To gain a deep understanding of the educational characteristics in schools, it is necessary to master the knowledge in modern management. In fact, the purpose of knowledge management is to ensure the creation, accumulation and application of knowledge (Chao, 1998), and hence the new lease of life and value of such knowledge. To enhance the educational quality in colleges and universities and fulfill the educational function of universities, it is necessary to formulate a set of feasible management strategies. There are four basic steps in the construction of performance indices for colleges and universities and they are as follows: (1) the definition of the key factors driving the ultimate satisfaction of the needs of students and parents, and such factors including time, cost, quality and product functions; (2) the mapping of the multiple functions for the whole value creation process; (3) the identification of

the key tasks and prerequisite capabilities for the successful completion of the whole process; (4) the design and tracking of the indices for such tasks and capabilities. The most effective performance indices are often expressed in appropriate numbers. For example, an index measured with a new or unique indicator provides more value than an indicator expressed with an absolute number (Chiu, 2004). However, it is worth noting that the managers of colleges and universities should instruct on the strategic goals so that all the teams understand how to align work and strategies. It is also necessary to provide training and learning so that each group can establish their own metrics. To ensure all the teams can perform and are responsible for their own performances, managers must track and assist in the achievement of such performances. In sum, the construction of performance indices for colleges and universities is an across-the-board approach. It can assist managers to transform visions and strategies via PDCA process into a set of coherent performance indices.

To ensure the efficiency of performance assessments, knowledge management and innovation, it is important that strategies of an organization dictate its structure. Each strategic focus also intends to align schools with the specific market needs they address (Hong, 2000). Organizations have to constantly improve the accuracy of predictions and decisions in the process of knowledge management to

enhance its knowledge. This ensures the accuracy, appropriateness and timeliness of knowledge owned by an organization. The purpose of the strategic management of knowledge is to support an organization to become a learning organization or a competent one. An organization must be able to create, obtain and transform knowledge, as well as modify its performance assessment model accordingly to reflect new knowledge and visions (Kotnour, 1997). Schools have different emphases on the measurement of the effectiveness of knowledge management. As a result, there are many different methods and tools for the measurement. Will (1999) examined the relationship between knowledge management and financial performances of companies and suggests that investments in knowledge management are often about improvements of fundamental bases. The effects on financial performances are via the following three intermediate factors: (1) the effectiveness of internal-operations orientation; (2) the improvement of products and services orientation; (3) the effectiveness of external customers and markets orientation. The more direct the effects of any assessment on causal relationships, the shorter the causal relationship path and the easier the assessment on effectiveness. This study modifies the relationship proposed by Will (1999) between knowledge management and school effectiveness (Figure 1). Arthur Andersen Consulting (1999) defined knowledge management as the process of systematically obtaining, creating, owning,



co-owning, learning and using information. Knowledge management is the engine to transform ideas into corporate value. The process of understanding, applying and experiencing knowledge can enhance performances. In sum, the modifications of fundamental bases of knowledge management in schools exercise their effects on school performances via the following three intermediate factors: (1) the effectiveness of internal operations orientation; (2) the improvement of teaching and curricula orientation; (3) the effectiveness of external students and markets orientation. Hammer and Champy (1994) indicated that organization re-engineering requires a rethinking of fundamentals and a complete redesign of operational flows to achieve performances in cost, quality, service and speed. Shih (1996) suggested that workflow re-engineering is integral to organizational transformations. The design of workflow should not only address the requirements for internal management, but also the needs of external customers. This is more than just a conceptual change. It is also a path to reconstruct competitive advantages. Similarly, workflow re-engineering is an important element of college and university re-engineering. It cannot only enhance the performances of schools, but also enhance the conditions required for educational service quality and school organizational re-vitalization.

In sum, the effects of knowledge management go beyond the financial met-

rics in the accounting system. Many effects influence the ultimate benefits via indirect and non-financial metrics not associated with accounting information. In other words, knowledge is created, obtained, shared and enhanced value in the introduction of knowledge management. In this feedback system, it is necessary to formulate strategies, create a learning culture, provide assistance via IT technology, ensure effective leadership and appropriate performance appraisals to ensure the effectiveness of knowledge management. Therefore, the construction of the performance assessment indices for colleges and universities will benefit the operational planning and management capability of the management. Knowledge innovation and organizational learning can transform team efforts into operational effectiveness. The establishment of performance indices can help school managers to understand the interactions within internal units, with external organizations and between employees. This brings managers beyond the boundaries of different functions and ultimately empowers them to the improvement of policies and solutions to problems (Lin, 2008). The new focus, integration and learning mechanism in the context of performance appraisals can dramatically enhance the performance of colleges and universities. The overall value created is greater than the sum of parts.

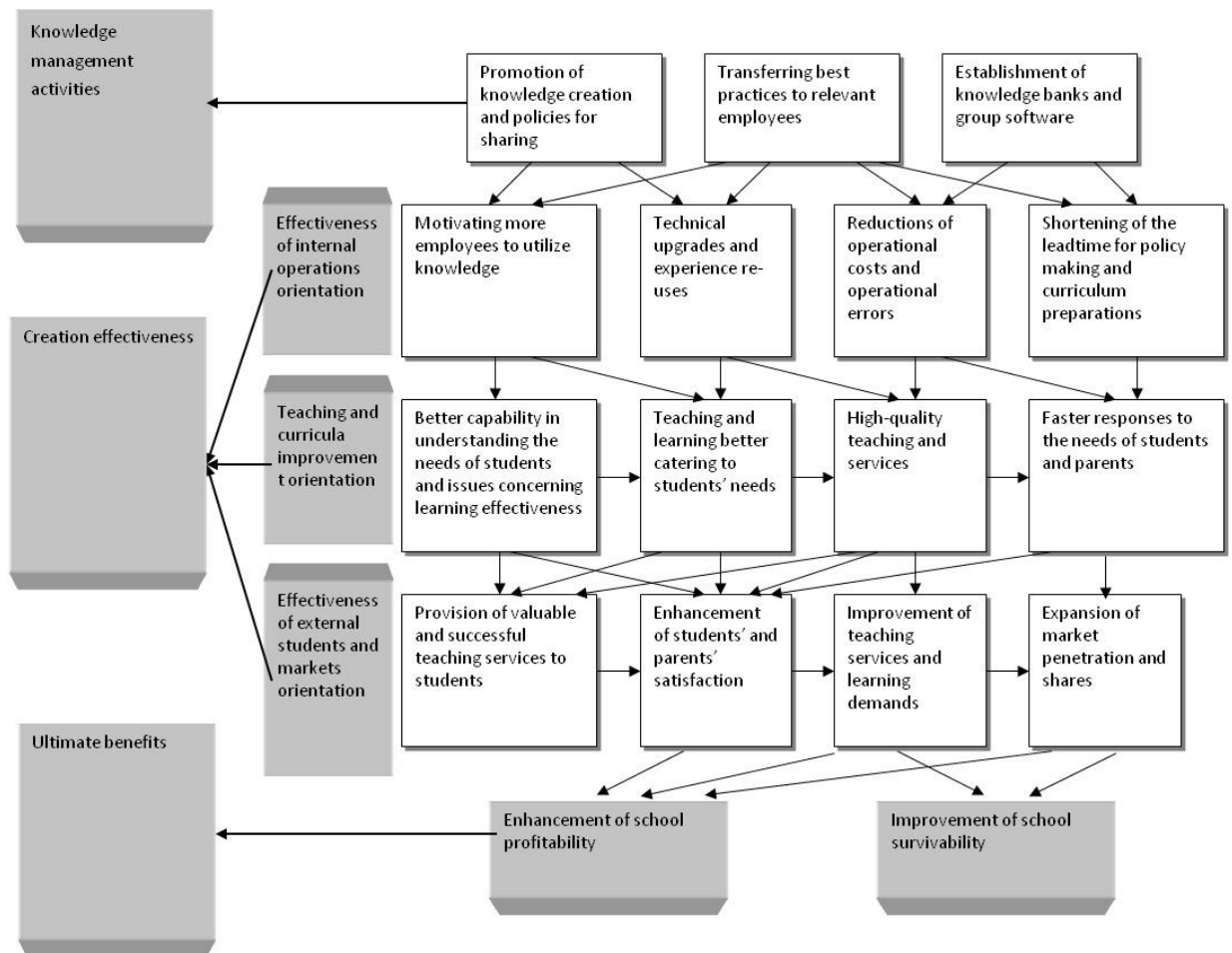


Figure 1. Knowledge Management and School Performance Benefits  
 Source: Willg,1999, Willg (1999) modified

### *Trends for Universities*

Technological developments are also highly relevant to social developments. Technologies are changing our world in a speed beyond imagination. Knowledge and management skills are the most two valuable resources of schools. Knowledge management is more than just management techniques. It encompasses the fundamental changes of organizational

operations. Galbreath (2000) mentioned in his book “Knowledge Management Technology in Education that knowledge management is an education technology. The architecture of knowledge management creation must include the knowledge links between individuals, departments, social groups, institutions and companies. Hargreaves (2000) proposed the concept of knowledge-creating schools, i.e. schools and teachers can constantly create profes-

sional knowledge in administration, management and effective teaching and promote such knowledge among different schools. One of the attributes of the knowledge economy is the rapid development of IT and communication technologies. Now schools are connected via IT and communication technologies and they can all be involved in the creation, application and communication of professional knowledge (Centre for Educational Research and Innovation, 2000). Investments are advised in hardware and software in IT and communication technologies in education, such as the development of technology platforms flexible, open and cost effective. Experts in the academic fields and IT technologies should also take part in the construction of new learning methods. This can enhance the education and applications of IT and communication technologies and narrow Digital Divide and the learning gaps in academic achievements across regions and between schools. Also, the elimination of space and time barriers is also beneficial to the promotion of adult and continuing education (Kelley-Salinas, 2000). The educational applications of IT and communication technologies can effectively expand the opportunity in education and lifelong learning, as well as improve teaching techniques and effectiveness.

Schools are confronted with the need for transformation in the 21<sup>st</sup> century, the era of the knowledge economy. The educational authorities all over the world

also drive such transformations in the role of schools. The conventional rigid approach can no longer satisfy the changes brought about by rapid flows of knowledge. Therefore, it is essential for experts and scholars to come up with consensus concerning a balance between the preservation of the principles of knowledge education and the need to learn about the marketplace. The educational model in a knowledge economy combines technologies, innovations, the Internet, globalization and new economy orientations. All these emerging forces mean universities have to keep up-to-date and stay flexible. They cannot afford to be passive. Rather, they have to change, reform, re-engineer, and innovate to adapt to the new environment. Flexibility allows for the adaptation to the changing environment at any time and the march toward the desired directions. Hence, it is critical for colleges and universities to establish a performance measurement mechanism as part of the formulation of reforms, strategies and action plans.

#### Research Design and Implementation

This section explains the research design and implementations of this study by covering research architecture design, research methods and procedures, initial results of data analyses, compilation of the questionnaire, data gathering via case studies and interviews and analysis processes.

### *Research Method and Implementation Procedures*

The features of case studies hinge on the research design, rather than mere data gatherings (Yin, 2000). This study summarizes the initial findings after the approval from the interviewees, and lists the broad-based and deep-end issues based on observations, literature review, and in-depth interviews. The results are constantly refined and modified to come up with the list of new issues so as to establish the complete picture of the pertinent concerns. Below is an explanation of the research procedures, data collections and records in the case studies.

#### *Selection of Research Participants*

The research participants are scholars in the education field, with experience in planning and implementations in the assessment of university departments and school affairs in Taiwan. Well-versed in the theoretic backgrounds in the relevant domains and equipped with the practical experiences, they are willing to assist help and provide suggestions to the research methods, results analysis and report writing of this study.

#### *Literature Review and Observations*

This study performs five visits to interview delegates of different schools concerning the actual operations and the assessments by the Ministry of Education,

in order to gain an understanding of the situations in different departments. After the review of files and the resources of individual schools, this study observes how policies affect different aspects. An analysis is performed on the basis of the classification of school characteristics. The modified results are the foundation of performance indices. This approach aims to enhance the legitimacy of the analysis. As none of any single data source can represent the whole truth or phenomenon, Yin suggested the adoption of multiple evidence sources to ensure the accuracy and convincingness of research conclusions.

#### *Interview Records*

This study started the formal writing process in March 2007, post the initial planning. During the initial stage, the researcher first collected literature and reviewed all the documents and files associated with individual schools. The next step was to draft the list of performance indices. This list was modified (including deletions and additions of items) based on the feedback from the interviewees. The brainstorming with the interviewees helped the researcher to gain an in-depth understanding of the relevant issues and get closer to the reality. The interviewees were willing to provide assistance and suggestions in the record writing, in order to make up the insufficiency of data, statistics and documents. Meanwhile, the interviews with the administrators helped to establish an understanding of the culture

and system of the school in question. As a result, this study was more able to select appropriate indices. The in-depth interviews were open-ended and on the basis of the questionnaire and semi-structured questions. The whole process is described below:

1. Before the interview: The invitation and the question list were emailed to the interviewees so that they learned about the background, motivations and purposes of this study. The interview time and venue were confirmed. The definitions of key terms and the contents of the questionnaire were also available.
2. During the interview: The in-depth interviews were recorded. Notes were also taken. Each interview lasted one to two hours.
3. After the interview: All the recordings were transcribed into texts and the texts were sent back to the interviewees for confirmation. The confirmed written texts were the basis of the data analysis. Any new questions arising during the data analysis were discussed face-to-face, over the phone or emails.

#### *Document Analysis*

A document analysis is an analysis on the documents associated with school planning. Such documents include the detailed explanations on budgets, budgets over the past year, minutes for annual meetings, mid-term and long-term plans, the assessment by the Ministry of Education, school affairs evaluations and internal

and administrative data. A study and collation of such data helps to sketch an initial understanding of the relevant issues. Meanwhile, the results are constantly being modified into the list of key issues. This approach aims to derive a complete description of the whole picture. It facilitates the follow-up studies and shortens the subsequent interviews times so that the interviews are more efficient and there is less of a burden on the interviewees.

#### *Initial Research Findings*

This section summarizes the initial findings based on data gathering, reviews and analyses. The list of relevant issues are generalized, consolidated and clarified on the basis of the literature review. The list of the performance indices for colleges and universities is as follows.

#### *Literature Review*

There are few empirical studies on the construction of performance indices for schools in Taiwan. In fact, there is a lack of relevant studies concerning school organizations. The relevant studies in Taiwan and overseas concerning the performance indicators for profit-seeking and non-profit organizations are as follows: Chang, Liu and Chou (1997), Li et al.(1999), Chou, Tu and Yen (2000), Yeh (2003), Su (2003), Chang (2004), Huang (2004), Liao (2004a), Corrigan (1996), Norton and Kaplan (1996), Wise (1997), Arverson et al. (1998), Jackson (1999), Amaratunga

(2000), Karathanos (2005), Papenhausen (2006), Chen Shun-Hsing (2006), Umashankar (2007) and Nayeri (2008). In sum, there is a scarcity of papers addressing the performance management of colleges and universities.

### *Research Procedures*

The first step is to summarize the missions, tasks, goals and targets of different schools, in order to ensure the implementation and achievement of these goals and strategies as scheduled. Generally speaking, the organizations in the case studies divide the stages of different projects in a chronically order. This study then constructs workflows via the know-how in knowledge management and applies these workflows to other colleges and universities for performance assessments. The visions, missions and strategies are slightly different from university to university. Hence, the performance assessment system constructed by each college and university is also slightly different. Schools should modify their own system accordingly in order to drive the achieving of visions and strategies by aligning the performance assessments with strategies.

Figure 2 shows the procedures for the performance measurement model constructed by this study for colleges and universities. These procedures are as follows:

1. Literature reviews and collations: All the relevant literature addressing issues in knowledge management and perform-

ance indices, particularly for non-profit organizations, is summarized. An analysis is performed on the basis of relevant theoretic foundations, problem-solving skills and practical applications. A generalization and comparison is made so as to clarify key concepts and select the appropriate methods for the indices selected by this study.

2. Definition of performance appraisal dimensions: The definitions are based on the literature review. Other than the three dimensions mentioned above, i.e. (1) internal operations orientation; (2) improvement of teaching and curricula orientation; (3) external students and markets dimension, this study suggests that different dimensions can be constructed in accordance with industry characteristics and actual requirements. This study refers to the three major dimensions, i.e. internal operations, teaching and learning improvement, students and markets orientation, as these dimensions aim to respond to rapid environmental changes. The interview questions are also drafted accordingly, to cater to the management requirements of colleges and universities so that these questions can grasp the pulse of the trends in higher education and the Excellence Programs in Universities promoted by the Ministry of Education.

3. Applications of interviews and case studies as research methods: To understand the feedback from the interviewed scholars and experts, this study gathers literature and selects a list of appropriate performance indices for the initial per-



formance assessment of organizations concerned, before the in-depth interviews and case studies. This study also refers to

the feedback from relevant scholars and experts in

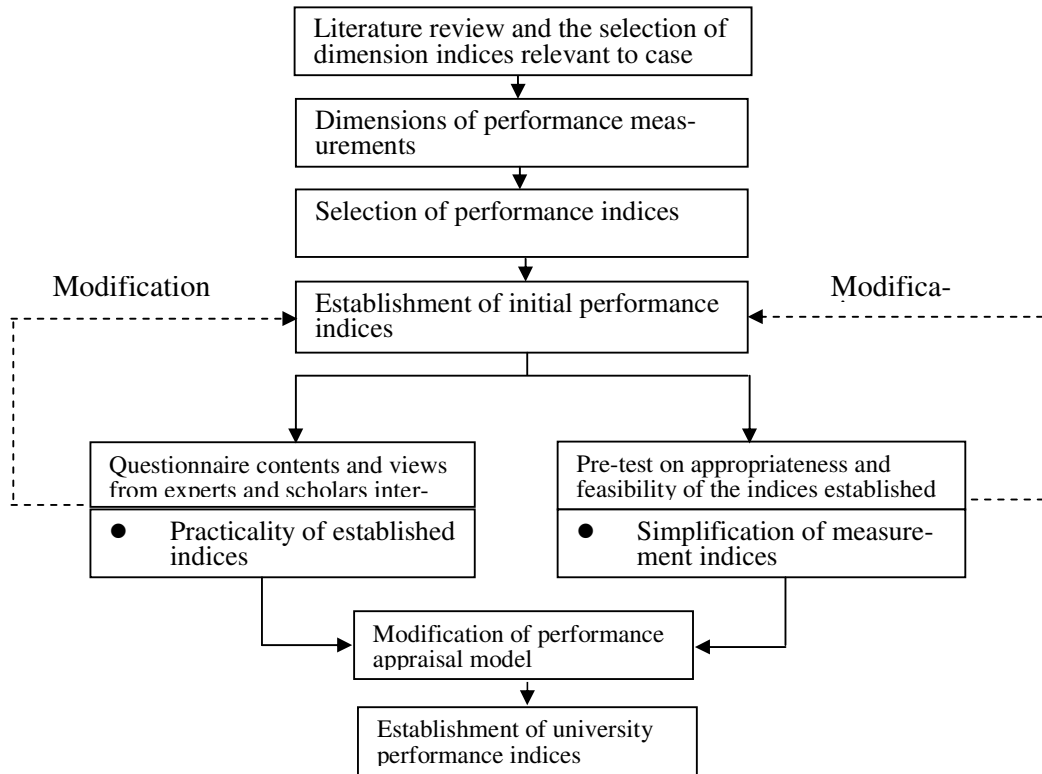


Figure 2. Implementation

indices and dimensions, in order to gauge the theoretic robustness and practical feasibility of these performance indices. The results serve as a benchmark for the modification of the assessment indices.

4. Modification of performance assessment models: On the basis of the interviews with scholars and experts, this study derives the appropriateness of factors and indices on different hierarchical levels. An initial modification on the assessment indices is made so as to re-build

the set of performance indices for colleges and universities.

The above procedures transform the missions of colleges and universities into a comprehensive set of performance metrics as the architecture for strategy formulations, measurements and management, with an aim to create more value for the management of colleges and universities.

### *Initial Establishment of Strategic Goals and Measurements*

This study refers to the performance indices designed by scholars for industry institutions and selects the appropriate items for colleges and universities based on their operational goals and strategic purposes. The results are the basis of the performance indices for colleges and universities. According to the literature review and the findings from the in-depth interviews with scholars and experts, this study builds the list of performance measurements that are tangible and anchored on the strategic goals of colleges and universities. It is hoped that these efforts can provide a reference to the strategic planning of schools.

### *Questionnaire Design*

On the basis of the above data collection, analysis and generalization, this study sets out three targets, 18 measurements and 66 detailed items for the evaluation of strategic goals of colleges and universities. This serves as the foundation for the drafting of the interview questions. The next step is to validate the reliability and validity of the questionnaire. The researcher forwarded the question draft to three scholars in education for reviews. This study then modified the list of indices and interview questions by consulting with the scholars and finalized the contents and the list were robust and comprehensive

after ensuring the robustness of such contents and the list.

### *Analysis Procedures*

The purpose of conducting case studies is to collect relevant data in a timely basis regarding the researched entities or events. Case studies place an emphasis on an objective understanding of facts and a subjective interpretation of such facts (Chang, 2000). Yin (1994) suggested that case studies are an empirical inquiry. They are a study on the phenomenon of the researched period in a realistic setting. Multiple sources of evidence are required to reach conclusions. Case studies are more than just a method of data collections or design characteristics. Rather, they are a comprehensive study method, covering design logics and methods of specific data collections and analyses. This study performs in-depth interviews as part of case studies, in order to gain an understanding of the practical issues and problems. The results are interpreted in the context of theories. The purpose is to establish a better understanding of contents of the performance indices for colleges and universities or to come up with new perspectives. To this end, this study performs face-to-face interviews in order to understand how performances are measured in the schools concerned. The findings are compared against the dimensions and measurements constructed by this study, based on the literature review, for the evaluation of feasibility. The face-to-

face interviews put together a complete and realistic picture of the situations in schools. This makes up the insufficiency of data, statistics and documents. Wu (1997) indicated that despite the problems associated with a lack of complete representation, case studies provide researchers a wide scope for interpretations in the situations. This is particularly true with the case studies on the issues previously not addressed or additional experienced required to reach conclusions from the real life situation. Given these benefits, case studies are widely applied by researchers in social sciences. Below is an explanation of the data collection and analysis procedures of the case studies in this study.

#### *Samples and Sampling*

Eisenhardt (1989) pointed out that the selection of cases is critical to the establishment of theoretic frameworks. The selection of appropriate cases helps to control extraneous variations and define (and conceptualize) the restrictions of research findings. To reduce the interference of extraneous variations, this study locks in the population on the non-profit educational institutions of a single region. A total of five colleges and universities in Kaohsiung are selected as the research objects. This study aims to construct a set of performance indices for colleges and universities and hopes such indices can be applied to the management of colleges and universities. Therefore, the interviewees

must be well-versed in the operations of schools or involved in dealings with students and other departments. The participants in this study include former principals, current vice principals, former head of teaching affairs and department deans in colleges and universities. The interviewees are or were holders of the key positions in departments or faculties in colleges and universities. They have years of experience under their belt in key decision making in schools and in academics. They understand well the current operations in different levels of colleges and universities and can contribute to the construction of performance indices for colleges and universities. Meanwhile, the interviewees in the schools of the case studies are the administrative executives, IT department executives and other employees.

#### *Research Limitations*

The adoption of performance management systems is prevalent and mature around the world. However, there are a lack of studies concerning the construction of performance indices for colleges and universities in Taiwan. Therefore, this study focuses on the success stories in the corporate world in the literature review and theoretic explorations. Also, it is not easy to construct the list of performance indices for colleges and universities and it is not a common practice either. Despite the efforts to be as comprehensive as possible, this study encounters the following difficulties and research restrictions:

1. This research model focuses on literature gatherings. Due to a lack of real-life practices, it is difficult to perform empirical validations concerning the application of performance indices in colleges and universities.

2. There are many types of colleges and universities. Also, case studies may not be representative enough. As far as the principle of universality is concerned, there may be biases in research findings due to variances in the nature, resource allocations and environmental conditions of colleges and universities.

3. Niven (2002) indicated that it takes four to twelve months to plan and construct a set of performance indices. This is a much longer period that goes beyond the time limitations of this study. It is suggested that follow-up studies can perform in-depth research concerning the overall construction and implementation process.

The ultimate goal of the construction of performance indices is to ensure the implementation of organizational strategies. The performance metrics aim to provide a benchmark for employees to as to promote implementation effectiveness and efficiency maximization. However, it takes time to observe the effectiveness. Due to time limitations, this study relies on the rule of thumb drawn from senior executives and subjective assessments for effectiveness evaluation, in the construction of performance indices and the feasibility of such indices for colleges and universities.

### *Data Processing*

This study collects primary and secondary data:

1. Sources of primary data: This study performs face-to-face interviews with senior executives working in departments or faculties of the sampled five colleges and universities in Kaohsiung.

2. Sources of secondary data:

(1) Master's or PhD dissertations in Taiwan;

(2) Academic journals and research reports in Chinese or English in Taiwan or overseas;

(3) Books, monthly magazines, speeches and literature from seminars;

(4) In-depth relevant reports, reviews in journals, magazines, and on the Internet.

There are three steps in the analysis of the interview data. These steps are (1) data collection; (2) content analysis; (3) data interpretations. The description of the details is as follows:

1. Data collection

(1) Confirmation of the completeness of data, including transcripts, notes, questionnaires, observations and texts. Contacts with the interviewees are made for verification for any missing parts.

(2) Raw material is summarized and condensed into snapshots of current situations. Interview contents are classified into case study materials.

2. Content analysis

This study gathers key data via in-depth interviews. The analysis is performed with a cross-case-study method.

Before the cross-case-study analysis, the individual cases are described in the following steps:

- (1) Determination of content analysis methods;
- (2) Tidying-up of case study records by eliminating unnecessary data;
- (3) Connections with individual data components;
- (4) Classification of data;
- (5) Labeling and indexing of data;
- (6) Data analysis.
  - a. Case studies: An analysis is performed on the different issues based on the interview contents. At this stage, the focus is on the integrity and uniqueness of each case.
  - b. Cross-case-study method: This is to break the barriers between different cases and generalize the similarities and differences of different cases.

#### *Data Interpretations*

This is to explain the key implications of the research data and to make relevant inferences, associations and conclusions. The focus of this stage is the subjective findings and interpretations of researcher concerning the content of data analyzed.

#### **Research Results**

##### *Interview Results Analysis*

This study summarizes the indicators in knowledge management developed

by Will (1999) and the assessments of universities and educational services (Chuang, Wang et al., 2002; Yeh, 2003; Su, 2003; Huang, 2004; Liao, 2004a; Yen, 2004; Huang, 2005; Huang, Su, 2005; Amaratunga et al.2000; Stufflebeam, 2003; Karathanos, 2005; Papenhausen, 2006; Chen Shun-Hsing, 2006; Umashankar, 2007; Nayeri, 2008). A list of the performance indices for colleges and universities is generalized accordingly and then modified on the basis of the feedback from scholars and experts in knowledge management and performance measurements.

There are four dimensions: (1) internal operations orientation; (2) improvement of teaching and curricula orientation; (3) students and markets orientation; (4) innovations and research orientation. The fourth dimension is a new addition. This study lists the performance indices for the effectiveness of innovation and value creation and the achievement of operations and strategic goals. The strategic relevance is modified at the initial stage so as to make definitions of the indices more specific and clear. The indices less meaningful or impractical are eliminated. The indices more meaningful or required are added, in order to facilitate the renewal and modification of strategic goals and performance indices. All these efforts aim to derive the indices relevant to the management requirements of colleges and universities.

This study summarizes literature and the suggestions from experts and scholars concerning the performance evaluation system. The developed list of

performance indices for colleges and universities can be classified into four dimensions, 23 sub-dimensions and 85 items, as shown in Table 1.

Table 1. University Performance Indices

<b>Strategic goals</b>	<b>Performance metrics</b>	<b>Details</b>
<i>A. Internal Operations Orientation</i> A1. Increase of budgets for education	1-1 Budgetary proposals	Appropriateness of annual budgets for individual departments
	1-2 Appropriate budgetary planning for different functions	Finalized annual budgets/implementations on annual budgets
	1-3 Increase of implementation ratios for budgets of different functions	Implementation status of the allocated budgets
A2. Control of budget implementations	2-1 Enhancement of the implementations of departmental budgets	Budgets spent each month/budgets allocated each month
	2-2 Reminder of the adjustments required for budgets not yet spent	Budgets spent in total/budgets yet to be spent
	2-3 Improvement of the coordination between departments in terms of budget utilization	Coordination of the transferable items between departments for budgetary utilization
A3 Reduction of operational costs	3-1 Reduction of the average personnel costs for admissions	Promotional expenses/personnel expenses
	3-2 Reduction of the average personnel time allocated to each task	No. of days required to finish a task/No. of tasks
	3-3 Reduction of the expenses spent on each task (including paper, photocopying and stationery)	Office expenses/No. of tasks
	3-4 Reduction of personnel expenses as a percentage of total annual budgets	Annual personnel expenses/total annual budgets
A4. Promotion of the Internet penetration	4-1 Digitalization of the administrative system	
	4-2 Online processing for the applications, leaves, grade reports by students	No. of official documents digitalized/Total No of official documents
	4-3 Distance learning	No. of online applications submitted by students/Total No. of applications per annum
	4-4 Increase of PC penetration among students	Curriculum offered to mature students any time, any where
	4-5 Utilization of club influence to enhance penetration among students	Regular classes
	4-6 Effective access to diversified teaching	Regular classes
A5. Improvement of service attitude	5-1 Deployment of a letterbox for students to provide feedback	No. of days required to process of case/No. of cases
	5-2 Reduction of overdue projects and disputes with students	No. of overdue projects and the total number of projects undertaken
	5-3 Reduction of complaints from students	No. of complaints to each department/each month
A6. Employees' education & training – IT competences and skills	6-1 Enhancement of employees' abilities to process tasks with IT facilities	No. of seminars and training sessions participated per person/per month
	6-2 Increase of training hours and times in different functions	No. of training hours per person/each month

	6-3 Increase of employees' log-on learning hours	No of hours per person/per month
A7. Improvement of human resources quality	7-1 Improvement of the professionalism of employees	No. of times in use/No. of times in use by all personnel
	7-2 Enhancement of appropriate human resource allocations	HR planning
	7-3 Enhancement in manpower utilization	Idle time of manpower, machinery and equipment
A8. Simplification of administrative workflows and improvement of operational efficiency	8-1 Encouragement of IT applications	No. of reports each function/Total No. of reports each year
	8-2 Improvement of service flows via training & education	Integrated and simplified operations
	8-3 Increase in the standardization of operational procedures	No. of standardized operational procedures/No. of total procedures
	8-4 Improvement of the speed of official document processing and reduction of overdue projects undertaken	No. of days to close the loop of official documents – No. of days to close the loop of official documents before scheduled deadlines/No of overdue projects undertaken/Total No. of projects undertaken
	8-5 Encouragement of digitalization of official documents internally	No. of digitalized official documents/Total No. of official documents
	8-6 Encourage of electronic document exchanges to enhance productivity	(No. of documents received electronically+ No. of documents sent electronically) and (Total No. of documents received + Total No. of documents sent)
	8-7 Simplification of enrolment procedures for new students	No. of online applications and validations on the payment of tuitions
	8-8 Enhancement of the function of emergency processing centre serving students	No. of applications/per month
	8-9 Increase in the number of students' complaints processed before deadline	No. of projects closed before deadline/No. of projects due
A9. Satisfaction of all employees	9-1 Promotion of the performance incentive system	Regular awards and incentives to top-performing employees
	9-2 Enhancement of leadership of senior executives	Response and solutions to resource crises
	9-3 Fairness of performance reviews	Openness and fairness of annual performance reviews
A10. Personal development planning – communication and coordination capability	10-1 Encouragement of employees learning	Incentives and promotions
	10-2 Focus on personal career development of employees, enhancement of identification and solidarity of employees toward the organization	Average quarterly performances/per annum
	10-3 Increase of the regular hours and times of training workshops in communication	No. of participants and No. of hours/per month
<i>B. Teaching and curricula orientation</i>	1-1 Promotion of Excellence Project	No. of times per person
	1-2 Increase of school-corporate cooperation projects	Multiple choices
B1. Development and promotion Fund raising	1-3 Promotion of opportunities in learning services	External cases
	1-4 Support from alumni to raise funds from businesses	Average No. of times per person/No. of person/time



B2. Curriculum planning	2-1 Provision of curricula catering to industry needs	No. of regular proposals/No. of total proposals per annum	
	2-2 Offering of professional qualification training courses to meet industry needs	No. of regular classes/Total No. of classes per annum	
	2-3 Offering of out-of-campus and overseas internships	No. of regular offerings	
B3. Interactions between teachers and students	3-1 Listening to students to reduce complaints	No. of data collections/Annual No. of data collections	
	3-2 Listening to students to enhance their level of satisfaction	No. of new students increased each month/Total No. of new students increased	
	3-3 Understanding of the needs of students via feedback channels	Regular surveys	
	3-4 Frequency of interactions between students and teachers	No. of times per week/No. of person/time	
	3-5 Difficulties and needs of students in schoolwork	No. of immediate solutions/No. of person/time	
B4. Career planning for students	4-1 Collaborations with businesses	Immediate job openings with partner businesses	
	4-2 Strategic alliances with other schools	Sharing of learning resources with partner schools	
	4-3 Assistance to students in job-skill training	Multiple job options	
B5. Students' identification	5-1 Enhancement of administrative and service quality to reduce complaints	No. of services tested	
	5-2 Regular questionnaire surveys on students' satisfaction	Regular surveys	
B6. Value-added services	6-1 Establishment of a single contact window (timeliness)	Application times/No. of days required to collect results	
	6-2 Unlimited access to online learning	Senior citizens, computer novices and people without computers	
	6-3 Rotation system to ensure familiarity with multiple functions	No. of rotations per person on the average/per annum	
<i>C. External students and markets orientation</i>	1-1 Planning of an innovation and incubation centre	Regular training sessions/per annum/No. of times	
	1-2 Provision of job-seeking support	Multiple choices	
C1. Social services	1-3 Combination of theories and practices via school-corporate cooperation projects	No. of students per annum	
	1-4 Contributions from alumni to the society	Society development	
	1-5 Support and return from alumni to school activities	No. of times per person/No. of persons	
	1-6 Leveraging of the influence of outstanding alumni to attract new students	No. of students increased	
	C2. Benchmark learning—creation of a learning environment	2-1 Encouragement of the acquisitions of professional licenses and qualifications	No. of training hours/No. of people obtaining licenses or qualifications
		2-2 Enhancement of on-the-job training and education	No. of training sessions attended/per annum
2-3 Combination of learning and life experience for students		No. of sessions organized on a regular basis/per annum	
C3. Promotion of continuing education	3-1 Promotion of second expertise via diversified curricula	No. of times per annum	
	3-2 Increase in the number of seminars and academic workshops	No. of regular seminars and workshops/per annum	

	3-3 Promotion of continuing education by enhancing the quality of personnel	No. of regular classes/per annum
	3-4 Improvement of continuing education to develop high-caliber professionals	No. of persons per annum
<i>D. Innovation &amp; research orientation</i>	1-1 Encouragement of proposals by employees regarding service innovation	No. of proposals per person/per month
	1-2 Encouragement of new and innovative services to students	No. of proposals per person/per month
D1. Innovation services—service innovation capability	1-3 Establishment of proposal systems	No. of meetings each month
	2-1 Encouragement of students' participation in research projects administered by teachers	No. of times per annum/per person
D2. Research & innovation	2-2 Patent transfers	No. of transfers per person
	2-3 Patents obtained	No. of patents per person
	2-4 Research and innovation applications	No. of applications per person/No. of applications per annum
	3-1 Quality and quantity of school-corporate cooperation projects	No. of companies
D3. Application of research practices	3-2 No. of famous papers used in teaching materials	No. of papers per person
	3-3 Publication in internationally renowned journals	No. of papers per person/per annum
	4-1 Number of papers published in high-quality journals	No. of papers per person/per annum
D4. Contribution of research findings	4-2 Research findings adopted by companies	No. of companies

Source: This study

Knowledge is a resource that requires proper management and development to become meaningful (Senge, 1990; Drucker; Davenport et al., 1998). The top priority of educational reforms is the improvement in strategic management. The knowledge and philosophy in modern management are incorporated in the formulation of feasible projects. The purpose is to enhance education quality and fulfill education functions. Will (1995) defined knowledge management as a series of activities that assists an organization to obtain knowledge internally and externally and a deliberate process to achieve organizational missions. This study applies the knowledge management indices developed

by Will (1999) in its construction of performance indices for colleges and universities. The four dimensions are as follows: (A) The effectiveness of internal operations orientation: Effective knowledge management ensures members to stay motivated to learn within an organization; (B) Improvement of teaching and curriculum orientation; (C) The effectiveness of external students and market orientation: This aims to create an external environment that fosters trust, sharing and contributions. The purpose is to complete the vision of knowledge sharing and achieve the ultimate goals of an organization; (D) Innovation and research orientation. As different colleges and universities have slightly dif-

ferent visions, missions and strategies, they should modify the performance assessment mechanism and performance indices accordingly. The purpose is to provide guidance in the application of school performance indices so as to realize the visions and strategies. It is important to align performance assessments with strategies.

### Conclusion and Suggestions

Educational institutions are basically domesticated and maintenance organizations. Their key mission is to deliver knowledge and preserve cultures and traditions. In the context of knowledge management, colleges and universities accumulate knowledge via learning and store such knowledge in knowledge banks. On the other hand, schools are constantly innovating, by sharing the acquired knowledge extensively and internally. Either in a systematic heritage or an individualized delivery, all the knowledge is stored via the practice tasks of knowledge management. Knowledge creates value and values support the working of the knowledge economy. Colleges and universities have to understand that constant learning is the foundation of the knowledge economy. This study attempts to identify the performance indices suitable to colleges and universities in the context of the management philosophy of the knowledge economy. This is to ensure the sustainability and management effectiveness of colleges and universities.

This study provides a performance appraisal mechanism that links strategic formations with implementations. The purpose is to apply such a mechanism in the management of colleges and universities so as to achieve their strategic goals. Knowledge management and the effective application of the performance assessments assist in the development of appropriate performance indices and drive colleges and universities to achieve competitive advantages and create school value. This study constructs the performance indices for the evaluation of the creation effective in the context of knowledge management. These four dimensions are (A) the effectiveness of internal operations orientation; (B) the improvement of teaching and curriculum orientation; (C) the effectiveness of students and markets orientation; (D) innovation and research orientation. This is to anchor on value creation of colleges and universities by learning, creating and providing services to students. It is important to cater to the needs of parents and students and effectively implement the internal workflows to foster innovations. The internal workflows are a starting point of school learning and societal services. It aims to encompass both researches and innovations. In fact, research, innovation and learning are the catalyst of the potential for innovation in colleges and universities. The purpose is to ensure the operational results of colleges and universities. Going forward, the innovation of colleges and universities is multifaceted and across-the-board. It covers

concepts, organizational structures, administration, leadership and management, curriculum and teaching, systems and external environments. All these are important contents of innovation and management. Colleges and universities can anchor on their own environments and needs, internally and externally, and focus on a small number of indicators in innovation management before pursuing a sweeping set of innovative activities. The goal is to create an innovative atmosphere and culture within colleges and universities. This is the vision this study foresees. Hence, the construction of the performance indices for innovation management of colleges and universities should drive to revitalize school functions, establish school characteristics and encourage students' learning. The content of such performance indices should cover visions, goals, implementation strategies, budgets, effectiveness evaluation and anticipated benefits, as the foundation for innovation management in colleges and universities.

This study suggests that the construction of the performance indices for colleges and universities is more than just a need to pursue total results. It is, in fact, it is a performance assessment tool that serves as a benchmark of performance management for colleges and universities.

The contributions of this study are as follows:

(1) The application of knowledge management in the construction of performance indices for colleges and universities com-

bines the concept of knowledge management with the results of performance assessments;

(2) The extension of the value of the performance indices for colleges and universities makes it possible for schools to cope with societal changes and cater to market demands. The focus is on speed, innovation, flexibility, quality and services. All the efforts to create and extend value aim to modify the performance indices so that they address the needs of the management mechanism of schools;

(3) The construction of the performance appraisal mechanism for colleges and universities is an application of knowledge management in value creation. Improvements are made with an orientation on internal operations, teaching and curriculum, the benefits to students and markets, innovations and research. Value creation is the fundamental of all the effort and the starting point is the development of internal workflows. The purpose is to enhance learning, social services, research and innovations so that colleges and universities become the engine of innovations and achieve substantial results;

(4) The research findings can serve as a reference to the managers of colleges and universities in strategic planning;

(5) Finally, this study hopes that the performance indices constructed for colleges and universities can serve as guidance to performance management, so that effective performance indices can be a benchmark for educational assessments of colleges and universities.

## References

- Amaratunga, D., & Baldry, D. (2000). *Assessment of facilities management performance in higher education properties*, Facilities, Volume 18, 293-301.
- Arthur Andersen Business Consulting (1999). *Zukai Knowledge Management* by Arthur Anderson Business Consulting. TOYO KEIZAI INC., Tokyo
- Arverson, P. (1998). *Measuring performance in government research agencies, The balanced scorecard institute*, <http://www.balancedscorecard.org/> Working paper.
- Center for Educational Research and Innovation (2000). *Knowledge Management in the Learning Society*. Paris: OECD.
- Chen, S. H., & Yang, C. C. & Shiao J. Y. (2006), *The application of balanced scorecard in the performance evaluation of higher education*, The TQM Magazine. Bedford: 2006, 18(2), 190-205.
- Corrigan, J. (1996). *The balanced scorecard : The new approach to performance measurement*. Australian Accountant, 47-48.
- Drucker, P. F.(1993). *Post-capitalist society*, Harper Collin, New York.
- Drucker, P. F. (1989). *The Practice of Management*. Butterworth-Heinemann LTD.
- Drucker, P.F. (1998), Peter Drucker on the Profession of Management. *Harvard Business School Press*, Boston, Mass.
- Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: how organizations manage what they now*. Boston, Massachusetts, *Harvard Business School Press*.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.
- Evans, H., & Ashworth, G., & Chellew, M., & Davidson, A., & Towers, D. (1996). Exploiting activity-based information: Easy as ABC? *Management Accounting*, 74(7), 24.
- Galbreath, J. (2000). Knowledge management technology in education: An overview. *Education Technology*, 40(5), 28-33.
- Hammer, M., & Champy, J. (1994). *Reengineering work: A manifesto for Business revolution*. New York: Harper Business.

- Hargreaves, D. H. (2000). The production, mediation and use of professional knowledge among teachers and doctors: a comparative analysis. In Center for Educational Research and Innovation (Ed.). *Knowledge management in the learning society*. Paris: OECD.
- Jackson, P. M. (1999). *Productivity and performance of public sector organizations*, International Journal of Technology Management, 17(7/8), 753-766.
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: Translating strategy into action*. Harvard Business School Press.
- Karathanos, D., & Karathanos, P. (2005). Applying the balanced scorecard to education, *Journal of Education for Business*, March/April, 222-230.
- Kelley-Salinas, G. (2000). Different Educational Inequalities: ICT an Option to Close the Gaps. In Centre for Educational Research and Innovation and National Center on Adult Literacy (Eds.) *Learning to Bridge the Digital Divide*. Paris: OECD.
- Kotnour, T. G. (1997). Organization learning in a project environment, *American Society of Engineering Management*, Virginia Beach.
- Nayeri, M. D., & Mashhadi, M. M., & Mohajeri, K. (2008). *Universities strategic evaluation using balanced scorecard*, *Proceedings of world academy of science, engineering and technology*, ISSN 1307-6884.
- Niven, P. R. (2002). *Balanced scorecard step-by-step: maximizing performance and maintaining results* (1<sup>st</sup> ed.), New York: John Wiley & Sons.
- Niven, P.R. (2005). Driving focus and alignment with the balanced scorecard-why organizations need a balanced scorecard, *The Journal for Quality and Participation*, 28(4), 21-43.
- Papenhausen, C., & Einstein, W. (2006). Insights from the balanced scorecard implementing the balanced scorecard at a college of business, *Measuring Business Excellence*, 10(3), 15-22.
- Schuler, R. S. (1995). *Managing human resources*, Fifth ed., West Publishing Company, New York.
- Schuler, R. S., & Jackson, S. E. (1996). *Human resources management: Positioning for the 21<sup>st</sup> century*, sixth ed., West Publishing Company, New York.
- Scriven, M. (1991). *Evaluation thesaurus* (4<sup>th</sup> Ed.). Beverly Hill, CA: Sage.
- Senge, P.M. (1990). *The fifth discipline: The art and practice of the learning organization*. New York: Doubleday.
- Stufflebeam, D. L. (2000). Foundational models for 21st century program evaluation. In D. L. Stufflebeam, A. J.

- Shinkfield, & T. Kellaghan (Eds.), *Evaluation models: Viewpoints on educational and human services evaluation* (2nd Ed.) (33-83). Boston: Kluwer Academic.
- Stufflebeam, D. L. (2003). The CIPP model for evaluation. In T. Kellaghan, D. L. Stufflebeam, & L. A. *educational and human services evaluation* (2<sup>nd</sup> ed.) (185-194). Boston: Kluwer.
- Umashankar, V., Dutta, K. (2007). Balanced scorecards in managing higher education institution: an Indian perspective, *International Journal of Educational Management*, 21(1), 54-67.
- Wang, Ru-Zhe (2000). Knowledge Management and School of Educational Innovation, Setout in the Educational Research Bulletin,45,35-54.
- Wang, Cheng-Yin (2001). Knowledge-based economy, investment in education-oriented, *Adult Education*, 63, 2-11.
- Wiig, K. (1995). *Knowledge management methods. Practical Approaches to Managing Knowledge*. Schema Press, Arlington, Texas.
- Shih, Zi-Yi (1996). Change the rules of the game. In the transformation of enterprises II sequence (Yang Youlan Translation) 1-7. Taipei : Newton Publishing House.
- Wiig, K. M., (1999). *Establish, Govern, and Renew the Enterprise' s Knowledge Practices*, Arlington, TX: Schema Press.
- Zhu Qi- Cheung (2005). Construct military factories of the Air Force Logistics aviation business performance measurement model to the Balanced Scorecard—To the Air Force Logistics Command Aviation repair factory, for example. National Pingtung University of Science and Technology, Department of Business Administration master's degree thesis.
- Wise, R. I. (1997). *The balanced scorecard approach to strategy management*. *The Public Manager*, 47-50.
- Lee, Tzong-Ru , Chen, Ai- Ping (2001). Knowledge and knowledge management, definition and classification of, *Grains and livestock*, 336, 17-20.
- Yin, R. K. (1994). *Case study research: Design and methods* (2<sup>nd</sup> ed.), Thousand Oaks, CA: Sage Publications, Inc.
- Yin, R. K. (2000). Case study evaluations: A decade of progress. In D.L. Stufflebeam, G. F. Madaus, & T. Kellaghan *Evaluation models: Viewpoint on edu-*



- Li, Jian-hua (1999). Balanced Scorecard theory on the determination of accounting education performance indicators. *Accounting Research Monthly*, 163, 33-36.
- Wu, An-nie (2006). Combination of the balanced scorecard and intellectual capital. *Intellectual Capital Management*. First edition. Chengchi University in Taiwan Intellectual Capital Research Center. Taipei : Huatai.
- Wu, Star (2000). Vocational school of Total Quality Management System Construction. National Kaohsiung Normal University Department of Education thesis, Unpublished.
- Wu, Ching-Shan & Lin, tian -You (2002). School reorganization. *Education Research Monthly*, 96,115.
- Wu, Ching-Shan (2004). Schools and innovative business ideas and strategies. *Teacher's world*, 128, 30-44.
- Wu, Chung-Fern (1997). Depth exploration of the accounting case study method. *Accounting Research Monthly*, 140,106-116.
- Wu, Yu-lin (2001). National secondary school administrator's use of knowledge management. National Taiwan Normal University Department of Education master's thesis research program. (Unpublished).
- DU, Zhi-yong (2005). Balanced Scorecard Perspective on Performance Evaluation of Private Universities executives. South China University of Management Science, Vol, Unpublished.
- Chow, Chee W. & Duh , Rong-Ruey & Yan, Xin-hui <2000> . Department of Accounting math performance evaluation of research. *Accounting Research Monthly*, 170 113-122.
- Qiu, Ji-zhi (2004). *Learning Organization*. Taipei, Huali.
- Zhuo, Chio-Chi (1998). OEM model and innovation relations - Taiwan's Technology Industry, for example. NCCU division tube master's thesis.
- Lin, Dong-qing (2008). *Knowledge Management*, Taipei : Wise cultural undertakings.
- Lin, Shu-han (2002). Critical Success Factors and Performance Evaluation of the international tourist hotel industry—Balanced Scorecard application. Nan-Hua University Institute of Tourism Administration Master Thesis.

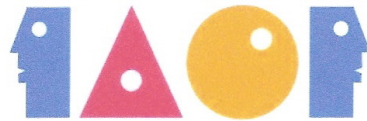
- Lin, Hai-qing (2001). Rescah for Reengineering of the local educational administrative organizations. Education Policy Forum, 4 (2), 87-98.
- Lin, Qing-Hua (2006). Rescah for Balanced Scorecard dimensions used in the National University of Administration and Management Performance - National Pingtung University of Science and Technology, for example. National Pingtung University of Science and Technology Agribusiness Management, Vol.
- Hong, Ming -Zhou Translation (2000). (James B. Q. Original). Knowledge Management and Innovation, Taipei : Business Week.
- Qin Meng-Chun 、Pu, Shi-Wei (2006). School of innovative business ideas and implementation of research. Educational Research and Development Journal, 2 : 3,123-150.
- Chen, Yi-Ching (2003). On reorganization of the Library Transformation.2003 National High School library director of business conferences. February 10, 2003, Taken from : [http://www.lib.ltsh.ilc.edu.tw/wwwlib/lib\\_conference/doc/meeting52.pdf](http://www.lib.ltsh.ilc.edu.tw/wwwlib/lib_conference/doc/meeting52.pdf)
- Chen, Mei-jing 、Chen, Jian-sheng (2003). Higher vocational schools the study of school performance. Business and Management Technology Quarterly, 4(3).
- Chen Wei-lung 、Yang Yin-Xing (2006). Discussion on the job training of elementary and junior high school teachers Performance Indicators— Intellectual capital combined with the application of the Balanced Scorecard Perspective. Tai-Tung University of Education of, 17(1), 107-131.
- Shi, Xue-cheng (2005). Balanced Scorecard to assess the case studies of private universities operating performance - For example in Da-YehUniversity. Da-YehUniversity Business Research Master of Master's thesis.
- Xu, Qing-Fen (2006). Research of Balanced Scorecard to measure application performance in school administration- A Central Institute of Technology, for example. Chao-Yang University of Technology Department of Business Administration Master's thesis.
- Zhang, Shao -Xun (2000). Research Methods, Taipei : Blue Sea Bookstore.
- Chung,Ming-Hui、 taken from(2002). School business philosophy of the era of knowledge economy.[http://web.ed.ntnu.edu.tw/~mifei/article/article\(schooladmin\)-14.html](http://web.ed.ntnu.edu.tw/~mifei/article/article(schooladmin)-14.html).

- Chung, Ming-Hui (2004). Use of the Balanced Scorecard system in performance management in schools. *Education Research Monthly*, 123, 19-25.
- Zhang, Xi-Feng, Liu, Jun-Ru, Chow, Chee-Wu (1997). Design class of Accounting Department of the Balanced Scorecard. *Accounting Research Monthly*, 138, 73-81.
- Zhuang, Lee-Ming, Wang, Ding-Ming (2002). Balanced Scorecard Perspective construct University of performance evaluation mode processes and methods Discussion. The eleventh management education seminars, Taipei: Institute of Management, Yuan Ze University.
- Zhuang, Qian-Ben (1999). Construction of comprehensive high school rubrics. Taipei: Commissioned by the Ministry of Education, National Taiwan Normal University Educational Research Center project.
- Zhuang, Guan-Zi, Zeng, Heng-Juan, Qiu, Wan-Yu taken from (2005). School administrators report Ch8-Reorganization. February 10, 2005, <http://www.tep.tcu.edu.tw/%BE%C7%AE%D5%A6%E6%ACF%A6U%B2%D5%B3%F8%A7i/8-1.ppt>
- Huang, Zong-Xian (2004). The basic concept of the Balanced Scorecard in school innovation management. *Education Research Monthly*, 124, 52-58.
- Huang, Cai-Yuan (2003). Research of knowledge Management in the Elementary School Organization and recycling applications. Unpublished master's thesis, National Taichung Teachers College, Taichung City.
- Huang, Shu-Qing (2002). Research of junior high school administrative reorganization. Master's thesis of National Sun Yat-sen Institute for Education, (unpublished).
- Huang, Shu-Dong translation (2005). (Stufflebeam D. L. original). The CIPP model for evaluation. On Su, Jin-Li (Ranking of), Evaluation model: Evaluation point of view of education and human services (Evaluation models: Viewpoints on educational and human services evaluation) (333-383). Taipei City: Higher Education.
- Huang, Shu-Dong, Su, Jin-Li (2005). Meta-evaluation research: Implementation of self-evaluation report of the project achievements, for example 90 Annual colleges. *Bulletin of Educational Research (TSSCI)*, 51(2), 31-65.
- Department of Higher Education (2007): <http://www.edu.tw/high/index.aspx>

- Peng, Tian-Hong (2006). Application of the Balanced Scorecard to explore the assessment of the performance of the national army basic education - To the National Defence University, for example. Fu Jen Catholic University of Applied Statistics, Vol.
- Ye, Lian-Qi (2003). Balanced Scorecard. Education Research Monthly, 116, 144-145.
- Ye, Lian-Qi (2004). Construction of school rubrics for balanced performance orientation. Educational Research, 126, 106-121.
- You, Zi-Da (2000). Research of constructing the primary and secondary education indicators. Set out in the National Science Council ( compiled ) , Archives of Research on Integrated Educational Index System , National Science Council, Executive Yuan, Taiwan, 3 (1), 3-31. Taipei City: National Science Council
- Yang, Jin-Zhou (2004). Balanced Scorecard is an important tool for business continuity. Quality Magazine, 40(6), 67-71.
- Liao, Li-Xin (2008). Research of the application of fuzzy AHP to explore the Balanced Scorecard in a private university business strategy. Nan-Hua University, Department of Business Administration Management Master of Science thesis.
- Liao, Chun-Wen (2004a). Study of Balanced Scorecard (BSC) in the school performance measure of the applicability. Bulletin of Research on Elementary, 12, 1-18.
- Tsai, Yi-Mei (2007). Research of Case studies created by the Balanced Scorecard indicators - A private institutes of technology, for example. Nanhua University, Department of Information Management Vol.
- Tsai, Chun Zi (2005). Research of School of innovative business models and measuring construction. Tainan National University of Education, Institute of Management and Administration doctoral thesis (Unpublished).
- La, Zhen-Zhao (2005). Research of knowledge services implementing knowledge management –Architectural firm in Taiwan, for example. National Pingtung University of Science and Technology, Department of Business Administration Master's thesis.
- Zhon, Guang-Ci (2004). Balanced Scorecard to measure the application of indicators of performance in school administration. Taiwan Normal University Education Institute Master's thesis ,unpublished.

Yan, Guo-Liang (2004). Hospital of a large school self-evaluation process and innovation direction. 2004 Strait of higher education quality management mechanism Symposium, The National Ji-Nan University.

Su, Jin-Li ( 2003, March ) . Analysis of American Council of the University Evaluation recognized standards—To WASC as an example. Paper presented at Tam-Kang University, Higher Education Research Center . "Big school quality indicators established theory and practice” Seminar jointly organized by Institute for National Policy Research Foundation, Taipei County.



ASSESSING STUDENT DORMITORY SERVICE QUALITY BY INTEGRATING KANO ELABORATIVE MODE WITH QUALITY FUNCTION DEPLOYMENT METHOD - A CASE STUDY IN A HOSPITALITY COLLEGE IN SOUTHERN TAIWAN

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Abstract

In order to receive the specific vocational education, it is necessary for many students to leave their residence places and stay in dormitories. However, due to the effect of international financial crisis and governmental financial difficulty, the financial supports from the government are limited. To avoid leaving student dormitory unused and wasting college resources, and to compete with other colleges, it is necessary to assess and improve the satisfaction of college dormitory service.

By understanding students' satisfaction to accommodation, a college can generalize their requirements and the way to attract young students to study in. In this research, Kano Elaborative Mode and Quality Function Deployment Method were integrated to educe the improvement priority of dormitory service. The top three important service quality were "hot water supply", "private space" and "air-conditioning". The top three degrees of satisfaction of service quality are "fire fighting and escaping", "air-conditioning" and "consultancy service". The top three for improvement with less different indexes were "hot water supply", "automatic laundry" and "private space". The priorities in quality and technology implementation were "response capability of service" in administrative category, and "cooperation degree of service" in management category, and "security of dormitory design" in environment category.

Keywords: Kano Elaborative Mode, Quality Function Deployment Method,  
Dormitory Service Quality

## Introduction

As a result of wide distribution and the various characteristics of vocational colleges in Taiwan, some students have to leave their residence places and reside in college dormitory, or rent rooms nearby or lodge with their friends or relatives nearby. Atmosphere and feeling arisen from hardware facilities and software facilities in environment exert a subtle influence on the people herein. Moreover, dormitory life may affect students' learning performance; therefore, the accommodation quality of universities is worthy of research.

By international financial turmoil, compounded by government financial difficulties, schools are required to self-financing. Moreover, the amounts of student decreases year by year, and some other private institutes with competition also offer student dorms, such as Taiwan Sugar Institute is managed by Taiwan Sugar Company. These factors raised colleges' crisis consciousness, and force them to pay attention to dormitory quality. They considered the new mode of management and created the advantages for student dormitory management. Colleges should be aware of the importance of dormitory service quality so as to avoid leaving student dormitory unused.

The high education in Taiwan faced a market economy effect because of the rapid increase in college quantity. A college will certainly be eliminated by market

if being unable to manifest its education function. As to the educational quality of colleges, the most important core value lies on students' learning achievements. To improve educational quality, a college should first provide a performance-emphasized learning environment to help students study grow up. Student dormitory is just an important place to effectively help students study and develop. Therefore, creating high-quality student dormitory and understanding students' needs are important items that colleges should focus on. Besides, colleges can attract young students with their joyful learning space, and raise students' sense of identification. College fund should be used effectively to exert the biggest efficiency.

In order to make all improvement measures in conformity with student requirements, Kano Elaborative Mode was used to analyze the priority of improvement. Then by Quality Function Deployment Method was used to reduce the priority of dormitory service as a reference when a college tries to improve the dormitory service quality.

The research questions in this study are as below.

1. What are the requirements of college boarders?
2. What are the domains of dormitory service quality based on the Kano Elaborative Mode?
3. What is the priority of the dormitory service quality improvement for the col-



lege based on the Quality Function Deployment Method?

4. What are the key techniques for improving dormitory service based on the results of integrating the Kano Elaborative Mode with the Quality Function Deployment Method?

Note: All Figures and Tables are found at the end of the article.

## Literature Review

### *Concept of Service Quality*

Service quality is the comparison between the expected service and the after-service perceived by consumers. The different value between these two qualities is termed as overall perception quality (Gronroos, 1982). Lewis & Booms (1983) proposed that the service quality depended on the satisfaction degrees of service to customers' expectation. Parasuraman et al. (1985) furtherly stated that service quality perception was the results of the customers' comparison between service expectation and actual service-receiving process. Thus, service quality is defined as the difference between customer expected service quality and actually-perceived service quality. In a word, service quality is the perception of a consumer to service quality offered by a service provider. In this dynamic process, it denotes good service quality if the service meets the customers' expectation, and vice versa.

### *Category of Service Quality*

Juran et al. (1974) divided service quality into 5 categories, the internal quality, the hardware quality, the software quality, the instant service quality, and the psychological quality. The internal quality refers to the quality that a consumer cannot see. Due to invisibility, it completely depends on whether internal operation of service provider is sufficient or not.

The hardware quality is visible, so a consumer will have immediate perception and response to it. The software quality is visible like hardware quality, but it refers to the tangible product while hardware quality is to the "operation". The instant service quality refers to rapidity of service, and the psychological quality means whether a service provider offers consumers with polite response and the service makes consumers feel comfortable.

Xu (2005) pointed that the dormitory quality contained 3 categories. The Environmental Part of Student Dormitory Environment (Function for Habitation), which includes dormitory facilities, dormitory cleanness, dormitory security, dormitory maintenance, bedroom facilities. The Administrative Part of Student Dormitory, which includes dormitory supervisor service attitude, dormitory cadre service attitude, service, management mode. The Tutorial Part of Student Dormitory, student tutorship (Function for Study), which includes professional competency of academic staff, tutorship of leisure and companionship.

Liao (2003) divided the student accommodation satisfaction into 3 categories with 19 sub-categories as below.

1. Habitation Function: “dormitory task and target”, “dormitory planning activities”, “dormitory physical environment (containing dormitory facilities, technology and equipments)”, "dormitory leadership", "organization and human resource", "financial resources" , "dormitory norms", “equality, respecting pluralism and ethic”, “assessment for dormitory”.

2. Study and Development Function: “dormitory task and target”, “dormitory planning activities”, “dormitory physical environment”, “dormitory leadership”, “organization and human resources”, “equality, respecting pluralism and ethic”, “relationship between college and community”.

3. Leisure and Companionship Function, including “dormitory planning”, “dormitory physical environment”, “equality, respecting pluralism and ethic”.

In Lin’s (2002) study, the student accommodation satisfaction questionnaire was divided into 9 categories: service attitude of administrators, service attitude of dormitory committee, professional of administrators, counseling, service mode, equipments for life, invironment in and out of dormitory, security, as well as management and maintenance of public facilities.

Synthesizing the literature above, the researcher divided service quality into 4 categories as equipment, security, service and counseling when conducting the service quality survey.

#### *Kano Two-dimensional Quality Mode*

Generally, the satisfaction of indicator is high when the quality element is sufficient and vice versa. However, not all the quality elements are in this way based on the Two-dimensional Quality. It does not always indicate satisfaction when the quality element is sufficient. It might result in feeling fair or even unsatisfaction. Related theories of Two-dimensional Quality are introduced as below.

#### *1. Noriaki Kano’s Two-dimensional Quality Mode*

Rumiko Fumio and Noriaki Kano (1984) introduced Herzberg’s (1959) working motivation, M-H Theory, into quality-related field and termed it as “Quality M-H Feature”. The he worked with Seraku Nobuhiko, Rumiko Fumio, and Tsuji Shinichi to present the “Two-dimensional Quality” Mode and some empirical studies. They divided the quality into 5 quality elements and applied to the product quality development: “Attractive Quality Element” which satisfie people when the element is sufficient, but it will not result in dissatisfaction while insufficient,” One-dimensional Quality Element” which simply indicates satisfactory and dissatisfaction, “Must-be Quality Ele-

ment”, “Indifferent Quality Element” and “Reverse Quality Element”.

Figure 1. shows the Kano Two-dimensional Quality Mode, in which horizontal axis represents the sufficient degrees of the quality element, and vertical axis the degrees of satisfactory. One-dimensional Quality is a straight line through origin, indicating sufficient One-dimensional Quality causes satisfaction while insufficient One-dimensional Quality causes dissatisfaction. Reverse Quality is also a straight line through origin, but the direction is opposite to the One-dimensional Quality. Both Attractive Quality and Must-be Quality are camber lines. One is above horizontal axis and another is below, indicating Attractive Quality will not cause dissatisfaction no matter whether sufficient or not. The Must-be Quality will not away from the “dissatisfaction” no matter how sufficient it is. Indifferent Quality is a straight line superposed with horizontal axis, indicating that it will not cause satisfaction or dissatisfaction no matter whether it is sufficient or not.

## *2. Classification of Two-dimensional Quality Mode*

This study referred to the Two-dimensional Quality Mode Classification Table by Noriaki Kano (1984) and Matzler and Hinterhuber (1998), and classified the qualities as “Must-be Quality”, “Attractive Quality”, “One-dimensional

Quality”, “Indifferent Quality” and “Reverse Quality” (see Table 1).

## *3. Kano Two-dimensional Quality Elaborative Mode*

Yang (2005) re-elaborated Kano’s Mode, and termed it as Kano Elaborative Mode. He classified the qualities according to the Kano Two-dimensional Quality Classification Mode. And then he divided the qualities into 4 categories based on whether the average value of quality attribute importance in each question item is larger than that of the overall importance (the Reverse Quality was not included). Finally, he furtherly divided these four qualities into eight quality modes, as each quality was divided into two, high and low level. The eight elaborative qualities are illustrated with curves in Figure 2.

According to Yang’s (2005) viewpoint, both of the cost and the attraction to customers should be considered when the strategies were manipulated. Therefore, quality attribution and importance must be taken into consideration. So the Key Quality should be listed as a standard service. The Required Quality should be listed as a standard service, but its cost should be reflected in selling price. High Attractive Quality should be listed as selective service and standard service. Low Attractive Quality should be listed as selective service or outsourcing service. High-added-value Quality should be listed as standard service and selective service. Low-added-value Quality should be listed as standard

service and outsourcing service. Potential Quality should be listed as selective service or outsourcing service. Unnecessary-care Quality should be listed as selective service or outsourcing service. However, Wasserman (1993) ordered the ranks of importance as Must-be Quality, One-dimensional Quality and Attractive Quality (Wasserman, 1993).

Integrating the viewpoints of Yang (2005) and Wasserman (1993), the author ordered the priorities of characters based on the Kano Elaborative Mode as Key Quality, Must-be Quality, High-added-value Quality, Low-added-value Quality and High Attractive Quality.

#### *Quality Function Deployment Method*

Quality Function Deployment (QFD) was originally applied in manufacturing field. Lately, the servicing industry also uses such methods to improve service quality (Cheng and Lin, 1998; Bai and Li, 1999; Wang, 1998; Chen, 1999; Tsai, 2000; Xue, 2001).

To sum up, dormitory service quality may not get high satisfaction only depending on the sufficient supply. Moreover, the budget for improvement is limited. It may receive better effect if the budget is aiming at the preferential-improvement elements and key techniques. The author believes that it is helpful to use Kano Elaborative Mode combined with QFD Method to figure out the student dormitory service quality.

## Methodology

By integrating the Kano Elaborative Mode and the QFD Method, the author evaluate the student dormitory service quality of a hospitality college in Southern Taiwan. The research framework, research procedures, the subjects of questionnaire survey, as well as the data analysis of this research are described in the following sections.

#### *Research Framework*

The research framework was drawn up based on the reviewed literature as shown in Figure 3. Conducting the investigation in a hospitality college in Southern Taiwan, the author tried to understand the connotation of each variable and their relationship with student dormitory service quality satisfaction. And then he tried to reduce the ranking priority of dormitory service qualities and key technical qualities.

#### *Research Procedures*

This research integrated the Kano Elaborative Mode with the QFD Method and used weight adjustment to selected the key quality techniques. Research procedures are shown in Figure 4.

Step 1: In order to establish service quality measure elements, the author designed a questionnaire on the basis of literature review to understand the student's viewpoints towards the dormitory service quality.

Step 2: To evaluate the importance and satisfaction based on the results of the questionnaire analysis.

Step 3: To classify the service qualities based on the Kano Two-dimensional Quality, and then classify the Kano Elaborative Mode quality attributions according to whether the average importance value of each question item is larger than that of all question items.

Step 4: To adjust the ratio of the improvement according to the classification of the Kano Elaborative Mode, and then to evaluate the weights of the Key Quality Attribute, Required Quality Attribute, High-added-value Quality Attribute, Low-added-value Quality Attribute and High Attractive Quality Attribute with the numbers 1, 2, 3, 4, 5, and 6.

Step 5: To calculate the after-adjustment importance of each quality. Based on the results of Step 5, the author combined the results and the students' expectation to calculate the weight of each dormitory service quality.

Step 6: to determine rankings of importance. By inputting the correlation between after-adjustment weight elements and technical elements into HOQ (House of Quality) Matrix, the author calculated the importance of each technical element and determine the ranking of importance. Step 7: to establish the priorities of quality

improvement, the author used HOQ results to determine the quality and technics for implementation.

#### *Preparation of Survey and Subjects*

The subjects were the boarders of a hospitality college in Southern Taiwan. Among them, the 1000 subjects were randomly chosen as samples. They were interviewed with the questionnaire, which was amended and prepared on the basis of relative literature mentioned above. Before answering the questions, the subjects were asked to fill out the personal information includes grades, school system, new or old student, hometown, financial support and the motivation of lodging. The 5-ranking questionnaire contains four aspects, which focused on "the importance", "the satisfaction", "when college can do" and "when college cannot do". In these questionnaires, dormitory service quality was divided into four categories as "equipment", "security", "service" and "tutorship", and then they were subdivided into "suite facilities", "leisure facilities", "sports facilities", "laundry facilities (laundry field, clothes-hanging filed)", "automatic laundry facilities (washing machine, dewatering machine, drying machine)", "individual private space", "network facilities", "vending facilities", "dietary facilities", "drinking water facilities", "air-conditioning", "sound-proof", "sanitary equipment", "bedroom facilities", "outside phone connection", "public phone", "Fire control", "regular facilities maintenance", "disease & pests prevention",

“safety surveillance”, “entrance control”, “escape drill”, “hygiene of public area”, “suggestion processing”, “prompt response of suggestions”, “accommodation service in summer and winter vacation”, “friendly attitude”, “hospitality and enthusiasm”, “mail service”, “hot water supply”, “hospital-delivery service”, “violation handling”, “counseling service”, “recreational activities”, “education for respecting to others”, and “academic consulting” etc. the higher the rank was, the more the students was satisfied.

In the questionnaires of “when college can do” and “when college cannot do”, 1 indicated “I dislike it that way”, and 2 indicated “I can live with it that way”, and 3 indicated “neutral”, and 4 indicated “It must be that way” and 5, “I like it”. In the questionnaire which surveyed the importance, the five points represented “extremely unimportant”, “unimportant”, “fair”, “important”, and “extremely important”. In the survey of satisfaction, the 5 points represented “extremely dissatisfactory”, “dissatisfactory”, “fair”, “satisfactory” and “extremely satisfactory”, respectively.

#### *Data Analysis*

In order to ensure the consistence of questionnaires, items were set based on the “service quality element”, “importance” and “satisfaction” for the whole research. The validity and reliability analysis were conducted also. The validity was used to judge whether the contents of questionnaire could really measure the items to be

measured. The reliability measurement was to calculate the items’ reliability by coefficient  $\alpha$ . According to Guieford (1965), reliability was high if coefficient  $\alpha$  was more than 0.7, reliability was acceptable if coefficient  $\alpha$  was between 0.35 and 0.7, and reliability was low if coefficient  $\alpha$  was less than 0.35.

The author used the Kano Two-dimensional Quality Mode to classify the dormitory service quality. For each question item, answers were selected according to the sufficient or insufficient quality element (see Table 1). Furthermore, According to Yang’s (2005) Kano Two-dimensional Quality elaborative Mode and comparing with the overall average value, the author revised the five mode into eight modes according to each item’s average, as “High Attractive Quality Element”, “Low Attractive Quality Element”, “High-added-value Quality”, “Low-added-value Quality”, “Key Quality Attribute”, “Must-be Quality Attribute”, “Potential Quality” and “Unnecessary-care Quality”.

#### *Quality Function Deployment Analysis*

Referring to the QFD designed by Ermer & Kniper (1998), the first phase of this research was to convert customer opinions into key service quality measurements. The second phase was to convert key service quality measurements into the characteristic of service designs. The third phase was to convert the characteristic service design into daily quality management techniques.

Phase 1: Converting customers' opinions into Key Service Quality Measurement. The key service quality was rooted in the definitions of quality requirements. In preparation of quality deployment table, accurate understanding of requirements of customers was helpful for grading qualities and designing service features. After the classification of each quality by Kano Two-dimensional Quality Elaborative Mode, it was clearly that the Low Attractive Quality could be abandoned under the consideration of cost. The Unnecessary-care Quality could not improve quality no matter whether it was provided or not. Therefore, neither Low Attractive Quality nor Unnecessary-care Quality were not listed in HOQ.

Phase 2: Converting key service quality measurement into the characteristics of service design. Referring to the studies of Juran (1986) and Parasuraman et al. (1985, 1988), the author had an in-depth interview with college administrators to establish the categories of the questionnaire. Firstly, the author decided to establish three categories, environment, equipment and administration. And then, the category of environment was subdivided into such 6 items as dormitory facilities location, safety, dormitory accessible facilities, environmental beautifying, and hygiene. The category of equipment was subdivided into security, fire-fighting equipment, network communication facilities and leisure facilities. The category of administration and management was sub-

divided into dormitory regulations and management, staff adequacy, crisis management ability, cost control appropriateness, in-service education and training, professional ability and technique, service friendliness, service responsiveness, service cooperation, communication skills and privacy.

Phase 3: Convert the characteristic service designs into daily quality management techniques.

#### 1. Weight of service quality element

The service quality element weight was decided by Wasserman's Quality Attribute Ranking (Wasserman, 1993) and Yang's (2005) Kano Elaborative Quality Attribute. Firstly, the author subtracted 3 from original indexes of importance and satisfaction respectively to form new evaluation values. This value of importance multiplied by this new value of satisfaction gave the new index of improvement quality. And then the author subtracted the new value of satisfaction from the new value of importance to produce the index of difference. Smaller difference index should take priority of improvement. If two difference indices were identical, the one with smaller quality improvement index should be improved first.

Secondly, according to priority of improvement, the author decided the original priority weight ( $Z_i$ ) and the sequence ( $i$  refers to item  $i$  quality element). The original weight ( $X_i$ ) referred to the



converse ranking of original priority weight (i refers to item i quality element). The standardized weight (Yi) was the result that the original weight divided by

sum of original weights ( $Y_i = \frac{X_i}{\sum_{i=1}^n X_i}$ ), i refers to item i quality element and n stands for number of quality element).

## 2. Correlation between Quality Element and Quality Technique

After discussing with the administrative personnel in the hospitality college, the author synthesized the correlation between quality element and quality technique. In this relationship matrix, 5 stood for high correlation, 3 stood for medium correlation and 1 stands for low correlation.

## 3. Quality Technique Weight

The quality technique absolute weight (Wi) refers to the weighted sum of each element's standardized weight multiplied by Kano elaborative quality, i.e.

$W_i = \sum_{i=1}^n Y_i * T_i * S_i$ . In this formula, Ti stood for the weight of item i quality attribute classification and Si stands for the correspondent relationship between item i quality element and quality technique. Based on Berger et al. (1993) and Yang's (2005) indications, in this research, the Key Quality Attribute weight was 6, Required Quality Attribute weight was 4, High-added-value Quality Attribute weight was 3, Low-added-value Quality Attribute weight was 2 and High Attractive Quality Attrib-

ute weight was 1. Yang (2008) argued that High Attractive Quality was more valuable than Attractive Quality, and Low Attractive Quality was unnecessary in consideration of cost. Therefore, Low Attractive Quality was not weighted in this research. The quality technique relative weight (Ui) was the result that the quality technique absolute weight divided by the sum of the quality technique absolute weight, i.e.  $U_i =$

$\frac{W_i}{\sum_{i=1}^n W_i}$ . Ranking by this weight gives the priority of improving technique.

## Analysis and Results

### *Pilot Study*

A questionnaire survey was made by random sampling on the borders of a hospitality college in Southern Taiwan during May 1st to 25th in 2008. A total of 209 copies out of 230 copies of questionnaires were collected, and the rate was 90.8%. Among them, 171 copies were valid, and the validity rate was 81.8% (see Table 2).

As Chiou's (2003) item analysis method, the scores less than 27% was in low-score group and those more than 73% was in high-score group. The t-test was conducted in both low-score group and high-score group. The result showed that all the 144 questions have high consistency in content for different testees. On the other hand, as shown in Table 3, all the coefficient  $\alpha$  were more than 0.7. This subscale had high internal consistence as

well as internal consistence reliability index according to Guieford's (1965) claim.

### *Formal Study*

#### *Subjects*

Since all the questions were within the acceptable range in the pilot study, a formal questionnaire survey was conducted on the borders of a hospitality college in Southern Taiwan during period from Nov. 3rd to 26th in 2008. A total of 1050 copies of questionnaires were distributed and 759 copies were collected with a collected rate of 72%. Among them, 561 copies of valid samples were got with a validity rate of 77% as shown in Table 4.

#### *Factor Analysis*

In order to confirm the stability of sample group in dormitory service quality category, the factor analysis of formal questionnaire on the 561 testees was conducted. As Wu and Lin (2001), Chiou (2003), and Wu (2004) indicated, when repeatedly conducting a series of exploratory research, the items whose load were smaller than 0.05 could be deleted. In addition, the question whose absolute value of difference between its two factor loads was less than 0.2 should be deleted. Furthermore, the factor should be deleted when it had less than three questions about it. To decide the amount of factors, the author only chose the factors whose Eigenvalues ( $\lambda$ ) were larger than 1. The authors first estimated the loads of factors based on the principle component analysis, and then he conducted the orthogonal axis

based on Kaiser's normalized Varimax method. There were totally 6 exploratory factor analyses conducted. Eleven questions were deleted.

Finally, there were 4 components extracted whose explicable variance reached 65.019% as shown in Table 5. In addition, it can be understood from Table 6 that the sampling adequacy set by Kaiser was 0.900, and the value of chi-square distribution test was 8777.445 micro (degree of freedom is 300) by Bartlett spherical which indicated that the common factors existed in correlation matrix of parent group. Therefore, it was suitable to set as a basis for naming the factors. The result of factor analysis and its variables contained in each factor were sorted as shown in Table 7.

#### *Reliability Analysis*

In order to re-establish the reliability of this questionnaire survey, the author calculated the coefficient Cronbach  $\alpha$  of each subscale and the general measurement. All the coefficients were larger than 0.780, which were acceptable. The coefficient of general measurement was as high as 0.845, indicating that this questionnaire survey was highly reliable. The details are shown in Table 8.

#### *Overall Analysis by Kano Two-dimensional Quality*

Kano Two-dimensional Quality Mode was used to classify the quality characteristics of dormitory service. For each ques-

tion, when deciding the possessing and not possessing quality element, the relative majority were selected. Referring to “Kano Quality Classification” in Table 1, the author sorted the attribute for each element in a diagram as in Figure 6. Among the 25 dormitory service quality attributes, 10 of them belonged to the One-dimensional Quality such as “perfect air-conditioning” and “good sound-insulated effect”. All these dormitory service quality attributes were worthy of being paid attention by college runners’. Therefore, a college should list these quality elements as primary object to be improved. The 5 items such as “automatic laundry facilities” and “fire fighting and escaping” in Must-be Quality were necessary qualities for college dormitory service and they could not be ignored because of not bring higher satisfaction when being possessed. The 10 items such as “suite facilities” and “sports facilities” in Attractive Quality indicated that the testees felt satisfied with these quality elements existed, and they were dissatisfied without these quality elements.

#### *Kano Two-dimensional Elaborative Mode Attribute Analysis*

According to Table 9 which is the analysis of “Two-dimensional Quality Elaborative Mode Analysis”, totally 7 items such as 14, 16, 18, 20, 21, 22 and 24 belonged to High-added-value Quality, which had very high contributions and could improve college dormitory service quality performance. Therefore, a college should try its best to provide such attrib-

utes of quality elements. On the contrarily, “Bathroom equipment” and “fire-fighting drill” belonged to the Low-added-value Quality, which could make fewer contributions to customers. However, colleges cannot ignore these attributes. Instead, they should avoid insufficient supply of these two qualities for fear of redulting dissatisfaction among students.

There were 5 items such as 5, 7, 10, 12 and 13 belonged to the High Attractive Quality Element, which were optimal efficient instruments to attract customers. There were 6 items such as 1, 2, 3, 4, 6 and 11 belonged to the Low Attractive Quality Element, which had very low attraction to students and could be ignored if in consideration of cost. There were 5 items such as 9, 15, 19, 23 and 25 belonged to the Key Quality, which were necessary to be fulfilled.

#### *Quality Function Deployment Analysis*

Firstly, the author analyzed the Service Quality Importance, Satisfaction and Difference Index. He found that the hot water supply, private space and air-conditioning served the top 3 of important service quality in turn. Fire-fighting and escaping, air-conditioning and consultancy service served the top 3 of service quality satisfaction in turn. Beside, the smaller the difference index was, the more it needed to be improved. In this principle, the hot water supply, automatic laundry and private space served top 3 of being more neces-

sary for improvement. See details in Table 10.

Secondly, the author analyzed the Correlation between Quality Element and Quality Technique. After in-depth interview with college executives, the author established the techniques and divided the techniques of quality evaluation into 3 main categories such as “environment”, “equipment” and “administration and management”, which contained 20 sub-items. For the purpose of establishing quality technique weight, the author selected the important quality elements by Kano Two-dimensional Quality Elaborative Mode based on the correlation between quality elements and quality techniques by relationship matrix. The correlation between quality elements and quality techniques is shown in Table 11.

Thirdly, the author tried to decide the sequence of implementation. He multiplied the standardized weight by the correlation between quality element and quality technique, and then he found out top 3 quality techniques that should be improved based on the Kano Two-dimensional Elaborative Mode Attribute, which are sequentially “response capability of service” and “cooperation degree of service” in the category of administration and management and “security of dormitory” in the category of environment. The result is shown in Table 11.

Conclusion and Suggestions

The service qualities of the dormitories can be discussed in the following four aspects:

#### 1. Positions of Quality Requirements

In the analysis of Kano Elaborative Mode on dormitory service quality, “violations handling”, “outside phone”, “vending facilities”, “suite facilities”, “active enthusiasm”, “patrol video”, “maintenance inspection”, “access control”, “air-conditioning”, “basic equipment”, “sound-insulated effect” and “private space” belonged to High Attractive Quality and High-added-value Quality. These high-contribution qualities were optimal efficient instrument to attract college students, so executives had better fully provide services of such qualities. Contrarily, the services of “Consultancy service”, “academic tutoring”, “recreational activities”, “respect to others”, “sports facilities” and “meal facilities” belonged to the Low Attractive Quality could be ignored in consideration of cost. Among them, such qualities as “sports facilities” and “meal facilities” could be listed as optional service if they meet the principle of user payment.

In the importance of dormitory service quality requirements, such items as “hot water supply”, “private space”, “air-conditioning”, “sound-insulated effect”, “automatic laundry” and “suite facilities” are considered as more important by students. Thus, the executives should value them.

## 2. Satisfaction of Quality Requirements

It is important for the executives to be aware of the students' expectations and satisfaction to dormitory service quality. In this Research, the average satisfaction of hospitality college students to dormitory was 41.6. Among the 25 quality elements, the top 5 items received the students' satisfaction were "fire fighting and escaping", "air-conditioning", "consultancy service", "recreational activities" and "respect to others". The 5 items from the bottom were "automatic laundry", "academic tutoring", "hot water supply", "sports facilities", "sound-insulated effect" and "consultancy service". Therefore, the items of negative evaluation should be improved first for this hospitality college.

## 3. The Index of difference

It was found from indifference index of quality technique sequence table that the top 3 service qualities needed to be improved were "hot water supply", "automatic laundry" and "private space". Among them, a greater difference exists between the satisfaction and importance of "hot water supply", and it was easier to be overcome. Therefore, the executives should promptly improve this service quality.

## 4. Key Quality Improvement Technique

After weighted by Kano Elaborative Mode in accordance with QFD operational technical deployment and integrating the correlation between quality element and operational technique, it was found that the

items needed to be improved was "response capability" in the category of administration and management. In turn, the item for improvement was "cooperation degree of service" in the category of administration and management, and then the item of "security of dormitory" in the category of environment.

According to the importance of quality requirement and the index of difference, it was found that this college should promptly improve the service of "response capability" to meet students' requirements on "hot water supply". They had better highly estimate the importance of "hot water supply", "private space" and "air-conditioning" due to the improvement of "response capability of service". For those items belonged to the High Attractive Quality and High-added-value Quality. As to the items belonging to the Low Attractive Quality, colleges may ignore them or list them as selective services under the consideration of cost. Thus on the principle of properly using resources and attaching importance to customers' voices, the executives can make their dormitory quality up to ideal condition.

The important Contributions of this Research can be discussed in the following three aspects:

1. This research established the model of QFD and integrated the Kano Two-dimensional Elaborative Mode. It also applied in servicing industry to implement

the procedures and the mode of service process deployment. In this way, customer requirements can be grasped more accurately at the time of quality improvement.

2. By understanding the classification of student dormitory quality in Kano Elaborative Mode, we obtained degrees of importance and satisfaction of each service quality. It helped to set the priorities of quality improvement, so that the executives could fully use the college resources and emphasize the requirements.

3. With the help of Kano Elaborative Mode, the items of important requirements were selected. It saved the time for evaluating the intensity in relationship matrix, and it enhanced the efficiency and satisfaction.

The executives are strongly recommended to conduct the detailed analysis and design the procedures of implementa-

tion based on the results of this research. And then, an investigation on post-improvement satisfaction should be conducted so as to understand whether the improvement measures can upgrade the quality of student dormitory service. On the other hand, the items which are not urgent can be listed as user payment. However, they can be supplied as cost-free if they do not cost much.

In this Research, Kano Elaborative Mode was integrated with Quality Function Deployment Method to probe into student dormitory service quality. However, only a hospitality college received this empirical case study. The author expects to expand this research to other vocational colleges to obtain a whole picture and compare the difference in between. With the follow-up researchers, the author can make the index of quality improvement more applicable.

#### References

Berger, C. et al. (1993). Kano methods for understanding customer-defined quality. *Centre for Quality Management Journal, Massachusetts*, 2(4), 11-22.

Bossert, J. (1991). *Quality Function Deployment- A Practitioner's Approach*, New York: ASQC Quality Press.

Bai Diqing, Li Zengxing. (1999). "Research on Service Quality of Enterprise Management Education - The Use of Quality Function Deployment Method". *Tamkang Journal of Sociology Humanities*, 3, 191-21.

Chen Wen Cheng. (1999). The application of Quality Function Deployment to a study on service quality of mobile telecommunication business-A case of Chunghwa Telecom Company in

- telecommunication business. Master thesis, National Chiao Tung University, Taiwan.
- Cheng Powen, Lin Shangping, & Liu Jianzhong. (1998). Quality Function Deployment to hospital outpatient departments to enhance the overall service quality. *National Science Council Research Transactions*, 478-493.
- Chen Yaomao. (1994). *Quality Deployment Method (2)*. Taipei: Linking Publishing Co.
- Cronbach, L. J. (1957). Coefficient Alpha and the Internal Structure of Test. *Psychometrika*, 16, 297.
- Chiou Haw Jeng. (2003). *Quantitative Research and Statistical Analysis. Chinese Windows Version of SPSS Data Analysis Examples of Analysis..* Taichung, Taiwan.
- Ermer, D. S & Kniper, M. K. (1988). Delighting the Customer: Quality Function Deployment for Quality Service Design”, *Total Quality Management*, 9, 10.
- Guilford, J. P. (1965). *Fundamental statistics in Psychology and Education*, New York: McGraw-Hill.
- Gronroos, C. (1982). An Applied Service Marketing Theory,” *European Journal of Marketing*, 30-41.
- Herzberg, F. (1959). One More Time: How do You Motivate Employees? *HBR*, 109-120.
- Hsu, Tzu Fan. (2005). Study on the expectation and satisfaction of college boarder over the student dormitory based on Jen-Teh Junior College of Medicine, Nursing and Management. Master thesis, National Taiwan Normal University, Taiwan.
- Juran, J. M., M. C. Frond, and R. S. Bingham. (1974). *Quality Control Handbook*, New York: McGraw Hill.
- Juran, J. M. (1986), *A Universal Approach to Managing for Quality*, *Quality Progress*, 19-24.
- Kano, N., Seraku, N., Takahashi, F. & Tsuji, S. (1984) Attractive quality and must-be quality. *Hinshitsu, the Journal of the Japanese Society for Quality Control*, 39-48.
- Lewis, R. C. & Booms, B. H. (1983). The Marketing Aspects of Quality. *Emerging Perspectives on Service Marketing Association*, 99-107.
- Lin, Pao Chi. (2002). Research on Dormitory Management Service Quality - National Cheng Kung University Dormitory as an Example. Master thesis, National Cheng Kung University, Taiwan.



- Liao Qian Chun (2003). Social Climate in College Residence Halls and Student Residential Satisfaction in Northern Area of Our Country. Master thesis, National Taiwan Normal University, Taiwan.
- Lai Shun Zhen. (2001). Comment on the Quality of Customer-oriented Approach- Elective Operation as an Example". Master thesis, Chung Yuan Christian University, Taiwan.
- Matzler, K.& Hinterhuber, H. H.,(1998), How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment, *Technovation* , 18(1), 25-38.
- Noriaki Kano, Seraku Nobuhiko, Rumiko Fumio & Tsuji Shinichi. (1984). [Attractive Quality and Must-be Quality](#). *Quality Control Monthly*, 21(5), 33-41.
- Parasuraman, A., Zeithaml, V. A. & Berry, L. B. (1985), A Conceptual Model of Service Quality and Its Implications for Future Research, *Journal of Marketing*, 49, 44.
- Parasuraman, A. et al. (1988). SERVQUAL: A multiple item scale for measuring consumer quality. *Journal of Retailing*, 64(1). 17-23.
- Shigeru Mizuno. (1987). Quality Function Deployment Method-How to effectively grasp the customer needs. *Pioneer Enterprise Management Deployment Center*.22-29.
- Tian, Li Ju. (2005). A Study on the Relationship between Dormitory's Environment and Students' Living Accommodations — a case study of a college. Master thesis, Feng Chia University, Taiwan.
- Tsai, Pei Chuang. (2000). Using Quality Function Deployment in the Study of Service Quality of Taipei Rapid Transit System. Master thesis, National Taipei University of Science and Technology, Taiwan.
- Wu, Wanyi. & Lin Qinghe. (2001). [Business Research Methods](#). Taipei, Taiwan
- Wu Minglong. (2004). [SPSS Statistical Application Practice](#). Taipei: Chung-computer library materials Co.
- Wasserman, G. S. (1993). On how to Prioritize Design Requirements during the QFD Planning Process. *IEEE Transactions*, 25(3), 59-65.
- Wang, Shih Yuan. (1998). Research of Quality Function Deployment for Practical Application - A Case Study of Service Quality of a Chain Convenient Store in North Region. Mas-

- ter thesis, National Taiwan University, Taiwan.
- Xue, Fei Yuan. (2001). Using Quality Function Deployment in the Study of Service Quality of Museum. Master thesis, National Taipei University of Science and Technology, Taiwan.
- Yang Ching Chow. (1993). Two-dimensional Quality Model in the Service Quality Application. *Quality Control Monthly*, 29(5), 28.
- Yang Ching Chow. (2008). The Strategic Thought for Service Providers. *Quality Monthly*, 44(7), 21-28.
- Yang, Ching-Chow. (2005), The Refined Kano's Model and Its Application. *Total Quality Management & Business Excellence*, 16(10), 1127-1137.

Table 1: The Quality Classification Method of this study

		When the elements are not sufficient				
		Like	Deservedly	No feeling	Tolerable	Dislike
When the elements are sufficient	Like	Invalid	Attractive quality	Attractive quality	Attractive quality	One-dimensional quality
	Deservedly	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
	No feeling	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
	Tolerable	Reverse quality	Indifferent quality	Indifferent quality	Indifferent quality	Must-be quality
	Dislike	Reverse quality	Reverse quality	Reverse quality	Reverse quality	Invalid quality

Table 2: Pre-test Questionnaire Recovery Statistics

Category	Released samples	Recovered Samples	Recovery rate	Effective samples systemize	Effective rate
Num	230	209	90.8%	171	81.8%

Table 3: Pre-test Questionnaire on Dormitory Service Quality Reliability Table

Subscales	Questionnaires	Cronbach $\alpha$ Value			
		Possessing elements	No Possessing elements	Importance	Satisfaction
Equipment	16	0.8493	0.8337	0.9187	0.9021
Security	6	0.9169	0.9193	0.8946	0.8005
Servic	9	0.9085	0.8107	0.7337	0.8600
Tutorship	5	0.8151	0.9189	0.7722	0.7075
Total	36	0.9258	0.9259	0.8940	0.9446

Table 4: Formal Questionnaire Recovery Statistics

Category	Released samples	Recovered samples	Recovery rate	Effective samples systemize	Effective rate
Num	1050	750	72%	561	77%

Table 5: Formal Analysis of the Cumulative Total Variance Explained

Element	Initial Eigenvalues			Halves and the load extraction			Shaft square load		
	Total	Variance rate	Accumulate rate	Total	Variance rate	Accumulate rate	Total	Variance rate	Accumulate rate
1	7.625	30.500	30.500	7.625	30.500	30.500	4.547	18.188	18.188
2	4.722	18.888	49.388	4.722	18.888	49.388	4.170	16.681	34.869
3	2.425	9.701	59.089	2.425	9.701	59.089	4.143	16.570	51.440
4	1.482	5.930	65.019	1.482	5.930	65.019	3.395	13.579	65.019

Table 6: Formal Analysis of KMO and Bartlett Test

Kaiser-Meyer-Olkin measure of sampling adequacy		.900
Bartlett Test of Sphericity	Approximate chi-square distribution	8777.445
	Freedom	300
	Significance	.000

Table 7: Formal Questionnaire Structure Analysis of the Factors

Factors	Category	Element			
		Factor 1	Factor 2	Factor 3	Factor 4
<b>Factor 1: Tutorship</b>					
consultancy service		<b>0.867</b>	0.053	0.128	0.098
academic tutoring		<b>0.849</b>	0.192	0.049	0.028
recreational activities		<b>0.816</b>	0.165	0.013	0.071
respect to others		<b>0.795</b>	0.216	0.001	0.002
violations handling		<b>0.773</b>	0.123	0.117	-0.028
sports facilities		<b>0.608</b>	0.406	-0.221	0.124
outside phone		<b>0.602</b>	0.401	-0.179	0.053
<b>Factor 2: Service</b>					
Bathrooms equipment		0.162	<b>0.830</b>	0.216	0.040
Friendly attitude		0.232	<b>0.788</b>	0.240	-0.015
vending facilities		0.132	<b>0.785</b>	0.208	0.008
Catering facilities		0.430	<b>0.727</b>	-0.017	-0.149
suite facilities		0.094	<b>0.687</b>	0.181	0.088
active enthusiasm		0.351	<b>0.637</b>	0.177	0.212
<b>Factor 3: Security</b>					
patrol video		0.061	0.078	<b>0.808</b>	0.246
disease& pests prevention		-0.014	0.276	<b>0.784</b>	0.186
maintenance inspection		-0.027	0.362	<b>0.779</b>	0.207
fire drill		0.056	0.038	<b>0.773</b>	0.234
access control		-0.019	0.021	<b>0.757</b>	0.280
fire fighting and escaping		0.052	0.267	<b>0.731</b>	0.139
<b>Factor 4: Equipment</b>					
air-conditioning		0.100	0.067	0.237	<b>0.748</b>
basic equipment		0.094	0.043	0.181	<b>0.743</b>
sound-insulated effect		0.000	-0.008	0.069	<b>0.736</b>
automatic laundry		0.008	0.060	0.194	<b>0.696</b>
private space		-0.017	-0.010	0.130	<b>0.694</b>
hot water supply		0.061	0.049	0.300	<b>0.613</b>

Extraction: principal components analysis;

Rotation Method: The Varimax with Kaiser normalization method.

Table 8: Formal Questionnaire Reliability Analysis of Dormitory Service Quality

Subscales	Questionnaires	Cronbach $\alpha$ Value			
		Possessing elements	No Possessing elements	Importance	Satisfaction
Tutorship	7	.905	.904	.780	.792
Service	6	.795	.890	.783	.782
Security	6	.917	.903	.895	.846
Equipment	6	.726	.827	.861	.755
Total	25	.913	.902	.845	.924

Table 9: Kano Two-dimensional Elaborative Mode Attribute Analysis

Category	Item	Importance mean	Satisfaction averages	Kano Attribute Analysis	Kano Elaborative Mode	Category	Item	Importance mean	Satisfaction averages	Kano Attribute Analysis	Kano Elaborative Mode
Tutorship	1 consultancy service	3.83	4.43	Attractive quality	Low attractive quality	Security	14 patrol video	4.43	4.28	One-dimensional	High-added-value
	2 academic tutoring	3.81	3.56	Attractive quality	Low attractive quality		15 Disease & pests prevention	4.42	4.30	Must-be quality	Key quality attribute
	3 recreational activities	3.63	4.41	Attractive quality	Low attractive quality		16 maintenance inspection	4.45	4.32	One-dimensional	High-added-value
	4 respect to others	3.97	4.41	Attractive quality	Low attractive quality		17 fire drill	4.35	3.94	One-dimensional	Low-added-value
	5 violations handling	4.34	3.93	Attractive quality	High attractive quality		18 access control	4.40	4.40	One-dimensional	High-added-value
	6 sports facilities	3.70	3.73	Attractive quality	Low attractive quality		19 fire fighting and escaping	4.42	4.45	Must-be quality	Key quality attribute
	7 outside phone	4.41	4.37	Attractive quality	High attractive quality		20 air-conditioning	4.62	4.44	One-dimensional	High-added-value
Service	8 Bathrooms equipment	4.24	4.40	One-dimensional	Low-added-value	Equipment	21 basic equipment	4.50	4.23	One-dimensional	High-added-value
	9 Friendly attitude	4.35	4.02	Must-be quality	Key quality attribute		22 sound-insulated effect	4.57	3.74	One-dimensional	High-added-value
	10 vending facilities	4.31	4.39	Attractive quality	High attractive quality		23 automatic laundry	4.55	3.49	Must-be quality	Key quality attribute
	11 Catering facilities	3.91	4.07	Attractive quality	Low attractive quality		24 private space	4.63	3.88	One-dimensional	High-added-value
	12 suite facilities	4.55	4.18	Attractive quality	High attractive quality		25 hot water supply	4.83	3.65	Must-be quality	Key quality attribute
	13 active enthusiasm	4.30	4.13	Attractive quality	High attractive quality		Overall average	4.29	4.12		

Table10: Service Quality Importance, Satisfaction and the Difference Index Analysis Table

Quality Element Category	Quality Element	Service Quality Importance			Service Quality Satisfaction			Improvement Index	Difference Index
		Before Conversion	After Conversion	rankings	Before Conversion	After Conversion	rankings		
Tutor-ship	1 Consultancy service	3.83	0.83	22	4.43	1.43	3	1.1869	19
	2 academic tutoring	3.81	0.81	23	3.56	0.56	24	0.4536	-1
	3 recreational activities	3.63	0.63	25	4.41	1.41	4	0.8883	21
	4 respect to others	3.97	0.97	20	4.41	1.41	4	1.3677	16
	5 violations handling	4.34	1.34	16	3.93	0.93	19	1.2462	-3
	6 sports facilities	3.7	0.7	24	3.73	0.73	22	0.511	2
	7 outside phone	4.41	1.41	12	4.37	1.37	9	1.9317	3
Service	8 Bathrooms equipment	4.24	1.24	18	4.4	1.4	6	1.736	12
	9 Friendly attitude	4.35	1.35	14	4.02	1.02	17	1.377	-3
	10 vending facilities	4.15	1.15	19	4.39	1.39	8	1.5985	11
	11 catering facilities	3.91	0.91	21	4.07	1.07	16	0.9737	5
	12 suite facilities	4.55	1.55	5	4.18	1.18	14	1.829	-9
	13 active enthusiasm	4.3	1.3	17	4.13	1.13	15	1.469	2
Security	14 patrol video	4.43	1.43	9	4.28	1.28	12	1.8304	-3
	15 Disease& pests prevention	4.42	1.42	10	4.3	1.3	11	1.846	-1
	16 maintenance inspection	4.45	1.45	8	4.32	1.32	10	1.914	-2
	17 fire drill	4.35	1.35	14	3.94	0.94	18	1.269	-4
	18 access control	4.4	1.4	13	4.4	1.4	6	1.96	7
	19 fire fighting and escaping	4.42	1.42	10	4.45	1.45	1	2.059	9
Equipment	20 air-conditioning	4.62	1.62	3	4.44	1.44	2	2.3328	1
	21 basic equipment	4.5	1.5	7	4.23	1.23	13	1.845	-6
	22 sound-insulated effect	4.57	1.57	4	3.74	0.74	21	1.1618	-17
	23 automatic laundry	4.55	1.55	5	3.49	0.49	25	0.7595	-20
	24 sound-insulated effect	4.63	1.63	2	3.88	0.88	20	1.4344	-18
	25 hot water supply	4.83	1.83	1	3.65	0.65	23	1.1895	-22

Table 11: Quality Technique Implementation Sequence Table

Require quality corresponding relation, High correlation =5, moderate correlation =3, low correlation =1  Quality element Quality requirements	Quality Element Classification Tj	Environment					Device					Administration and management										Standardized weight yi			
		Location equipment of dormitory facilities	Dormitory design safety	Dormitory disabled facilities	Dormitory landscaping degree	Dormitory cleaning and disinfection level	Level of supply anti-theft security facilities	Level of supply fire-fighting equipment	Level of supply network Communication Pa-	Level of supply leisure Facilities	Dormitory regulations and properly managed	Staff adequacy	Crisis-management capability	Proper degree of cost control	In-service education and training	Professional competence and technical	Service friendly degree	Services reflecting capability	Level of coordination of services	Communication skills	Emphasis on the extent of privacy		Differences index	Original priority weight zi	
																									1
suite facilities	A1	1	5	3	5	5	5	5	5	5	1	1	3	1	1	1	1	1	1	5	-9	5	15	080	
Bathrooms equipment	V2	3	5	3	1	3	1	3			1	1	3		1		1	3		1	12	19	1	005	
Friendly attitude	Q1			1	1	3	1	1	1	1	1	1	3		3	1	5	3	3	5	3	-3	8	10	053
automatic laundry	Q1	5	1	1		3						1	1	1	3		3	3		1	-20	2	18	096	
private space	V1	1	1	1	1	1	1	1	1	3		1	3	1	1	1	1	1	1	5	-18	3	17	091	
vending facilities	A1	1	1		1	1	3		1	1	1	1	1		1	3	3	1	1	11	18	2	011		
active enthusiasm	A1	1	1	3	3	1	1	1	3	1	1	3		3	1	5	5	5	5	5	3	2	14	6	032
air-conditioning	V1	1	3	1		1			1	1		1	3	1	1	1	1	1			1	13	7	037	
sound-insulated effec	V1	1	3						1	1	1		1	3	1	3	1	1	1		3	-17	4	16	086
basic equipment	V1	1	3	3	3	1	3	1	3	3		1	1	3	1	1	1	1	1		3	-6	6	14	075
outside phone	A1	1	1	1	1				1		1			1		1	1	1	1		1	3	15	5	027
fire fighting and escaping	Q1	5	5	3			1	5			1	1	5	3	3	3	1	1	1	1	1	9	17	3	016
maintenance inspection	V1		3	1	1	1	3	3	3	3		5	1	3	5	5	5	5	5		1	-2	11	9	048
Disease& pests prevention	V1	1	1		1	5					3	1	1	1	3	1	1	1	1		1	-1	12	8	043
patrol video	V1	5	3				5				1	1	1	1	3	3	1	1	1	1	1	-3	8	10	053
access control	V1	3	3	1			5				5	1	1		3	1	1	1	1	1	1	7	16	4	021
fire drill	V2		3	1			1	3			3	1	3		3	3	1	3	3	1	1	-4	7	13	070
violations handling	A1		1	1	1	3	1	1	1	3	3	5	5		5	5	5	5	3	5	1	-3	8	10	053
hot water supply	Q1	1	3	1		1				1	5	1	1	1	1	1	1	5	5		-22	1	19	102	
Quality technique absolute weight Wi		6.12	7.14	3.56	2.04	5.31	3.28	2.64	2.45	3.24	6.13	2.83	4.78	5.11	5.85	5.53	4.70	8.62	8.53	2.62	5.57				
Quality technique relative weight Ui		062	074	037	021	055	034	027	025	033	063	029	049	053	060	067	048	089	088	026	057				
Perform important order		6	3	13	20	9	14	17	19	15	5	16	11	10	7	4	12	1	2	18	8				

Quality element classification: A1 ( 1 ) High Attractive Quality  
V1 ( 3 ) High-added-value Quality  
V2 ( 2 ) Low-added-value Quality  
Q1 ( 6 ) Key Quality



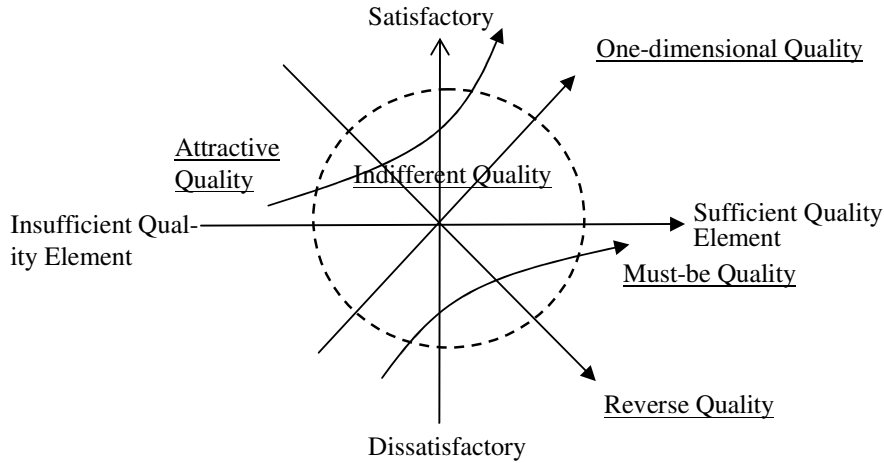


Figure 1: Kano Two-dimensional Quality Mode Schematic Diagram  
Data source: Yang Chingchow (1993)

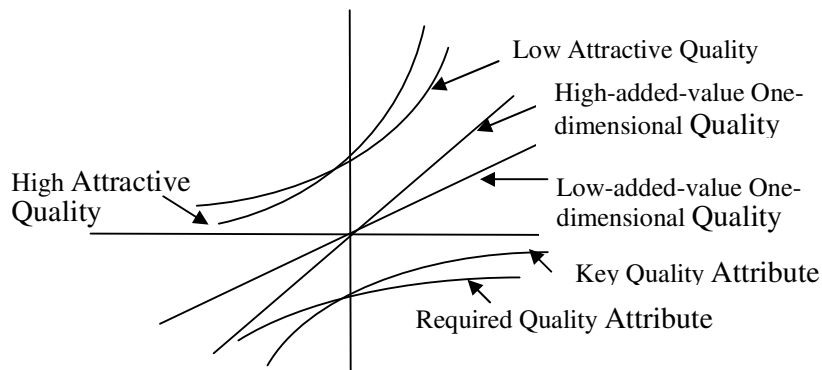


Figure 2: Kano Elaborative Mode Quality Attribute  
Data source: Yang (2005)

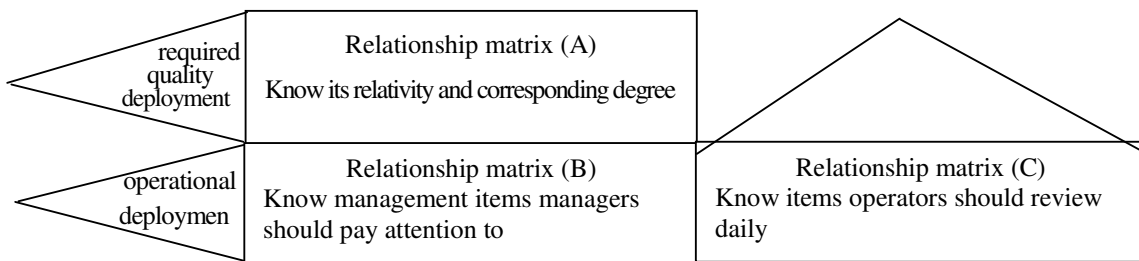


Figure 3: Quality Function Deployment Table (Yoji Akao, 1994)

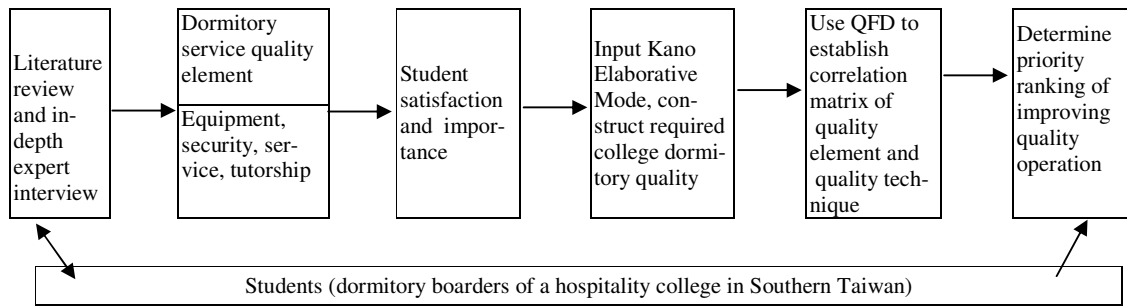


Figure 4: Study of Structure

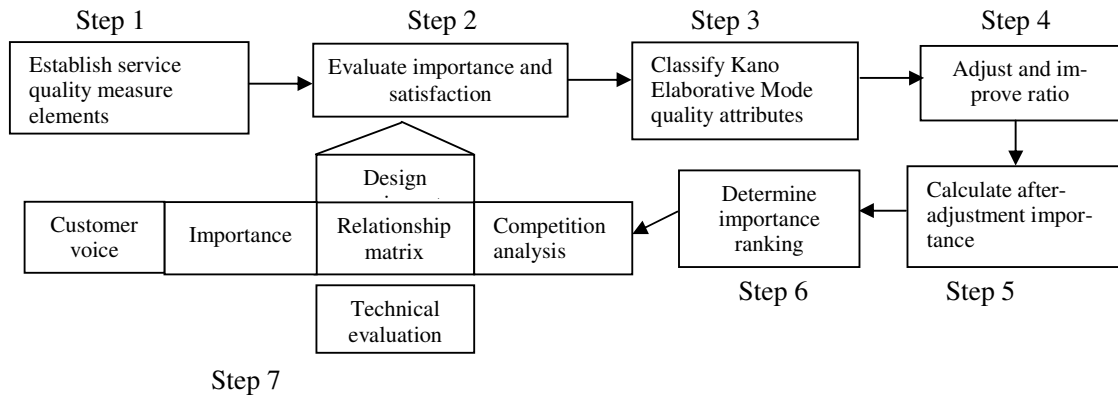


Figure 5: Research Procedures

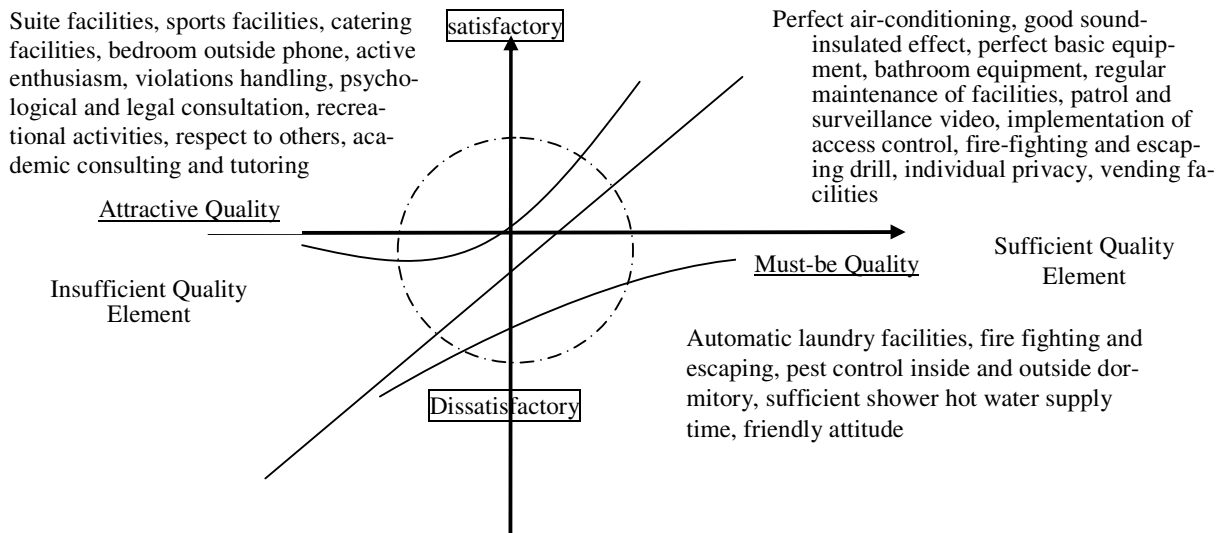
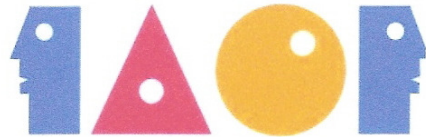


Figure 6: Schematic Diagram of Each Element Quality Attribute



STRATEGIC GROUPING OF FINANCIAL HOLDING COMPANIES: A  
TWO-DIMENSIONAL GRAPHICAL ANALYSIS WITH APPLICATION OF  
THE THREE-STAGE MALMQUIST INDEX AND CO-PLOT METHODS

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Abstract

This study uses the three-stage Malmquist Index to calculate the efficiency scores of marketing, operation, and profit performance from 2003 to 2011 and further uses them as 3 strategy dimensions. The strategic groups of Taiwan's 14 financial holding companies (FHCs) are grouped together using the co-plot method. The empirical results show that Shin Kong is in the leading group, followed by Hua Nan, MEGA, and Chinatrust as the following groups. Finally, Fubon, Cathay, and Waterland are grouped as the laggard group. The co-plot analysis clearly shows 14 FHCs on the 2-dimensional surface. The results also allow the financial holding industry to understand the industry configuration and competition from other companies.

Keywords: Malmquist index, dimensions of strategy, co-plot, financial holding company

## Introduction

Scholars have long been questioning whether different strategic groups perform differently. Some believe no significant difference exists in performance among the various strategic groups (Lewis & Thomas, 1990; Wiggins, & Ruefli, 1995). Research results from other scholars show that different strategic groups exist with different performances (Fiegenbaum & Thomas, 1990; Reger & Huff, 1993; Kale & Arditi, 2003). This may be because scholars adopt different strategy dimensions that produce different results (Dikmen, Birgonul, & Budayan, 2009).

Strategic group analysis is a descriptive analysis. However, it cannot predict and discern the performance differences of firms within the industry (Grand, 1995). Strategic group analysis can only provide further understanding of industrial structure, business strategy, and competitors in a dynamic, changing environment (Dikmen et al., 2009). Traditional cluster analysis cannot provide this function and the most common criticism of the cluster analysis method is that it is too dependent on researcher subjectivity. No statistical tools are available to test whether the groups are meaningful (Ketchen & Shock, 1996; Houthoofd & Heene, 2005; Prior & Surroca, 2006).

This study sets up objective FHCs strategy dimensions through the three-stage Malmquist Index and configures

industrial competition using the co-plot method. The graphic analysis provides an important basis for developing a different method to supplement the deficiency of cluster analysis.

## Literature Review

Berger, Hunter, and Timme (1993) suggested data envelopment analysis (DEA), as a comprehensive method for measuring efficiency, to be used for measuring financial institution performance. The advantages of this method include the ability to manage problems related to multi-input and multi-output, maintaining unit invariance, and avoiding the weights from subjective factor influence.

Because establishment of FHCs in Taiwan is new, literature employing a two-stage DEA to investigate FHC performance is scant. Lo and Lu (2006) used a two-stage DEA to research 14 FHCs in Taiwan in 2003. They found that larger FHCs perform better than smaller FHCs and FHCs based on life insurance are better than FHCs based on banking and securities. Using a traditional two-stage DEA, Sheu, Lo, and Lin (2006) discovered that FHCs with low diversification have better profit efficiency than FHCs with high diversification. FHCs with related diversification also have higher profit efficiency than FHCs with unrelated diversification. Chen (2002) further divided the banking production process into three-stages of bank operational efficiency, marketing

efficiency, and analysis of bank profit efficiency.

Regardless of whether two-stage, three-stage, or multi-stage methods are used, if they are in line with actual management activities, they clearly reflect the different stages of efficiency. However, CCR or BCC models have been adopted in most previous studies. When the efficiency scores of many decision-making units (DMU) are simultaneously 1, the disadvantage of the inability to sort them emerges.

In contrast to DEA, Raveh (2000) employed the co-plot to analyze the performance of Greek banks. The major contribution was to turn the variables and observation values (banks) into  $n$  points, draw the points on a 2D surface, classify 16 banks into four grades, and investigate them by basing results on return on assets (ROA) and return on equity (ROE). Nath, Mukherjee, and Pal (2001) used DEA and co-plot simultaneously to analyze the performance of Indian banks. The results showed that the banks with better DEA profitability also performed better among related financial variables in the strategic groups analyzed by co-plot.

Adler and Raveh (2008) investigated the efficiency scores of 35 major cities in China, first using DEA calculated efficiency scores, and then through co-plot analysis. They observed the relationship between variables and observation values,

clearly shown on a 2D surface. Desarbo, Grewal, and Wang (2009) adopted MDPREF of multidimensional scaling (MDS) to investigate the Bank of America. The research periods included 1995, 1999, and 2003 because such an analysis can clearly display the longitudinal change of a strategic group over time.

Hence, a strategic group analysis is a descriptive analysis and cannot predict and discern firm performance differences within an industry (Grand, 1995). However, strategic group analysis provides further understanding and analysis of industrial structure, business strategy, outlook, and competitors during dynamic changes in the environment (Dikmen et al., 2009). The MDPREF of MDS and co-plot are able to do this.

When scholars derivate the frameworks of the strategic group, the results are often inconsistent. This may be because different strategy dimensions are adopted. Strategy dimensions are used to describe different types of strategies and strategic variables are used to distinguish the strategies and other differences between firms as a classification standard for a strategic group. The choice of dimensions for the strategy directly affects the research results. Strategy dimensions often vary with the characteristics of industry differences. Therefore, choosing good dimensions for a strategy does not have a set of optimum standards. The choice of strategy dimensions should focus on industry characteris-

tics (Hitt, Irland, & Hoskisson, 2001; Houthoofd & Heene, 2005).

### Research Design

The research period was from 2003 to 2011, nine years in total. The data were obtained from the archives of the Taiwan Economic Journal (TEJ) data bank. The 14 FHCs in Taiwan were employed as the research objects. To obtain an efficiency score for marketing performance, operation performance, and profit performance, the Malmquist Index (MI) was applied in the study. Using the efficiency scores above, it was possible to build up the strategy dimensions. Using the co-plot method makes it possible to turn the variables (marketing performance, operation performance, and profit performance) and observation values (FHCs) into n points, and draw these points on a 2D surface to analyze the relationships among them. Similar business behaviors and character-

istics were grouped together into the same group.

### Framework of the three-stage Malmquist Index

This study earlier referred to relevant literature on FHC performance (Seiford & Zhu, 1999; Lo & Lu, 2006; Chen, 2002). Fixed assets and employees were regarded as input items, and interest income and fee income were employed as output items to measure marketing performance in the first stage. In the second stage, the output items of the first stage (interest income and fee income) were regarded as input items, and asset turnover and revenue per person were employed as output items to measure operation performance. In the third stage, asset turnover and revenue per person were used as input items, and shareholder equity and market value were employed as output items to measure profit performance as Fig. 1 shows.

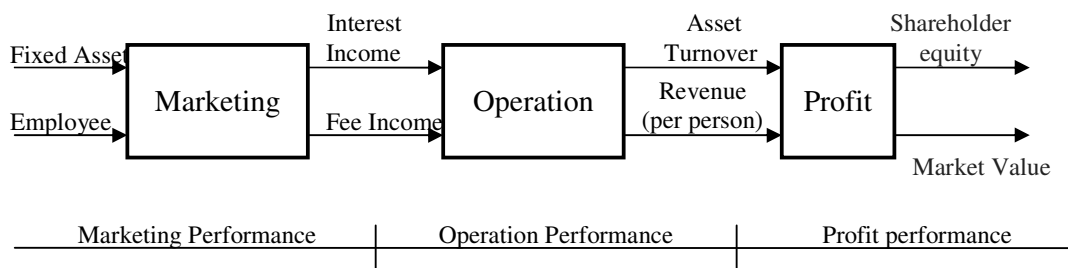


Figure. 1 The Three-Stage Framework

### Data sources

In most of the literature related to the financial services industry, an intermediate

approach was adopted to determine input and output items (Isik & Hassan, 2002; Bonin, Hasan & Wachtel, 2005). This study adopted this approach when selecting input and output items. When an input or output item is added, the discriminating power of the DEA is reduced, but when a DMU is added, the discriminating power is increased. Therefore, the number of DMUs should be double the sum of the input and output items (Bowlin, 1987; Golany & Roll, 1989). In this study, two input items and two output items were selected in the

first, second, and third stages, and the number of DMUs was 14, so the rule was met. The definitions of the input and output items are detailed in Table 1.

A correlation analysis can prove that isotonicity exists between input and output items; that is, the increase of an input item should not cause an output item to decrease (Huang, 1993). The higher the correlation coefficients are, the more correlated the input and output items are. The

Table. 1 Definitions of inputs and outputs

Variables	Definition	Unit
Fixed assets	Assets, such as land, houses, and equipment, which an FHC has to own for long-term business operations	NT\$ million
Employees	The total employees hired by an FHC annually	Persons
Fee incomes	An important business activity income of an FHC, which is highly related to the profits	NT\$ million
Interest income	Including interest on deposits, interest on loans, interest on bonds, and interest on debt	NT\$ million
Asset turnover	Revenue /asset	%
Sales per employee	Revenue / employee	NT\$ million
Shareholder equity	Total assets minus liabilities	NT\$ million
Market value	The stock price of an FHC multiplied by the total share capital	NT\$ million

Table. 2 Correlation coefficients of marketing performance

	Total Asset	Employees	Interest Income	Fee Income
Total Asset	1			
Employees	.8435	1		
Interest Income	.7351	.6278	1	
Fee Income	.7547	.9484	.5131	1



Table. 3 Correlation coefficients of operation performance

	Interest Income	Fee Income	Asset Turnover	Sales per employee
Interest Income	1			
Fee Income	.8163	1		
Asset turnover	.3362	.5097	1	
Sales per employee	.8164	.8464	.5131	1

Table. 4 Correlation coefficients of profit performance

	Asset Turn-over	Sales per employee	Shareholder equity	Market value
Asset Turnover	1			
Sales per employee	.8163	1		
Shareholder equity	.2471	.5841	1	
Market value	.5157	.6998	.7736	1

data will also be positively correlated. Pearson's correlation coefficient was adopted to verify the rationality of the input and output variables. The results show that the selected input and output items, between 2003 and 2011, are all positively correlated, as shown in Tables 2, 3, and 4. The input and output items in this study thus demonstrate isotonicity.

#### *Malmquist Index*

From the perspective that managers control the resources, the financial industry expects to gain greater outputs through current inputs. Therefore, this study started from input control and employed an input-oriented MI as the research model to evaluate FHC performance.

A DEA can only be applied to the static evaluation of each DMU in a single year. Therefore, to evaluate the relationships between dynamically inter-temporal productivity changes, technical changes, efficiency changes, PTE changes, and SE changes, (Fare, Grosskopf, Norris & Zhang, 1994) this study adopted an MI. This enabled evaluation of the changes of intertemporal total factor productivity (tfpch), further investigation of the annual changes of DMU when the input was oriented under the various returns to scale, discovery of the key influential factors in productivity plus the total TE changes (effch), productive technical changes (techch), PTE changes (pech), SE changes

(sech), and total factor productivity changes (tfpch). The relationships are detailed as follows:  $tfpch = effch \times techch$ , and  $effch = pech \times sech$ . When the value of  $tfpch$ ,  $effch$ ,  $techch$ , and  $pech$  is higher than 1, it indicates that the period measured by the DMU has progressed. When the value of  $tfpch$ ,  $effch$ ,  $techch$ , and  $pech$  is smaller than 1, it indicates that the period measured by the DMU has regressed. When the  $sech$  is higher than 1, it indicates that the DMU has gradually approached the long-term optimal production scale or has become close to the constant return to scale (CRS). When the  $sech$  is lower than 1, it indicates the DMU has gradually left the long-term production scale or has become detached from the CRS. When the value is equal to 1, it means the DMU did not change during the measured period.

#### *Co-plot Analysis*

In MDS, the co-plot indicates a non-metric MDS method should be applied (Guttman's Smallest Space Analysis, SSA). This method can also be applied to data measurement. Proposed by Raveh (1993), the method displays the relationships between variables and observation values through simple two-dimensional graphs so that it is unnecessary to view complicated statistical reports. When the P rays (variable axes) scatter from the origin of a graph point at the same place, it indicates that the variables have a significantly positive correlation with one another (Pau- car- caceres & Thorpe, 2005). When the n points of the observations are located on a

two-dimensional surface, similar observation points will be very close to one another, indicating the observations are of similar characteristics and behavior.

#### *The four co-plot stages*

(1) Standardization. To equalize the different units and measurements between variables, the  $Y_{n \times p}$  matrix is transformed into

the  $Z_{n \times p}$  matrix (Backhaus, Erichson,

Plinke & Weiber, 2003). The standardization formula is:

$$Z_{ij} = (Y_{ij} - \bar{Y}_j) / S_j \quad (1)$$

(2) The measurement of different points. The measurement ( $S_{ik} \geq 0$ ) of different points is selected in each pair of observations ( $Z_{n \times p}$ ); a symmetric  $n \times n$  matrix ( $S_{ik}$ ) is generated among different paired observations.

(3) The locations of points. The  $S_{ik}$  Matrix was drawn on a two-dimensional surface by means of MDS and n observation values, ( $P_i = 1, 2, K, n$ ) are thus located in a Euclidean space, in which SSA was used to find a discrete coefficient,  $\Theta$ , for measuring the goodness-of-fit of each observation. Here, each row of  $Z = (Z_{i1}, K, Z_{ip})$  is drawn on a two- dimensional surface (Guttman, 1968).

(4) Regression equations are employed to display the P variables in the Euclidean

spaces of the aforementioned  $n$  located observation values.

#### *The Judgment Index of Co-plot*

(1) Coefficient of Alienation: This is used to display the goodness-of-fit between the original data and the data in the two-dimensional space. The goodness-of-fit model can be regarded as a good one, usually when the value is lower than 0.15 (Guttman, 1968; Weber, Shenkar, & Raveh, 1996). Alternatively, when the coefficient of alienation is too high, it indicates those observation values are not suitable for display on a compressed two-dimensional surface.

(2) Average of Correlations. This is used to examine whether variables are closely related to the rays projected in a graph and to employ one average correlation value to explain whether the  $P$  rays can be used to reflect the degree of the real data structure. A correlation value higher than .4 is usually ideal (Mindali, Raveh & Salomon, 2004). Lipshitz and Raveh (1998) argued that when a correlation value is lower than .6, the result will be insufficient to explain the relationship.

#### Empirical Results

DEAP Version 2.1, designed by Coelli (1996), was employed to evaluate and analyze the marketing, operation, and

profit efficiency scores of the FHCs as shown in Table 5. The marketing efficiency scores of Hua Nan, China Development, MEGA, Shin Kong, Sinopac, Chinatrust, and Jih Sun were greater than 1, meaning they perform better than others FHCs. For operation efficiency, the score for China Development was the only score over 1. Finally, the profit efficiency scores for all FHCs were over 1, meaning they all performed well during the search period. The co-plot results are shown in Fig. 2. The judgment indexes are detailed in Tables 6 and 7. The coefficient of alienation was .08, which was lower than .15 and could thus be regarded as a fine goodness-of-fit model (Guttman, 1968). The average of correlations was .947, which was higher than 0.6, indicating that the real data structure was reflected (Lipshitz & Raveh, 1998).

Figure 2 shows that the marketing efficiency, operation efficiency, and profit efficiency of Shin Kong Financial Holdings relative to other FHCs exhibited better performance. Consequently, it is regarded as the leading group. With similar results, Hua Nan, MEGA, and Chinatrust Financial Holdings follow closely behind the leader, particularly in the efficiency of marketing and operations; therefore, this study presents these three FHCs as the following group. However, First Financial Holding has preferential marketing

Table 5. Efficiency scores of the Malmquist Index

DMU	Marketing efficiency	Operation efficiency	Profit efficiency
HN	1.101	0.969	1.064
FB	0.758	0.893	1.002
CA	0.819	0.913	1.003
CD	1.022	1.043	1.014
ES	0.869	0.876	1.12
YT	0.984	0.893	1.191
MG	1.124	0.973	1.078
TS	0.952	0.855	1.145
SK	1.421	0.96	1.076
WT	0.801	0.871	1.045
SP	1.011	0.897	1.109
CT	1.203	0.944	1.058
FI	0.973	0.968	1.109
JS	1.022	1.004	1.02

Notes : HN (Hua Nan); FB (Fubon); CA (Cathay); CD (China Development); ES (E.Sun); YT (Yuanta); MG (MEGA); TS (Taishin); SK (Shin Kong); WT (Waterland); SP (Sinopac); CT (Chinatrust); FI (First); JS (Jih Sun).

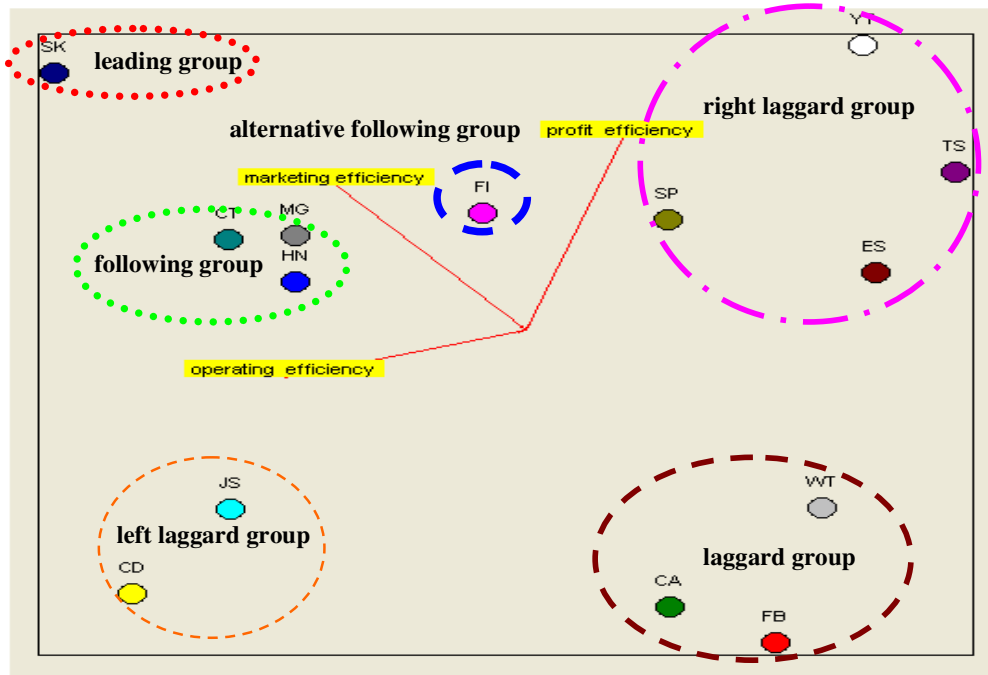
Table 6. Results of the observation map

Coefficient of Alienation : .08		
Center of Gravity : (52.20, 43.70)		
Firm	X	Y
HN	26.70	50.29
FB	80.02	0.00
CA	68.38	4.98
CD	8.60	6.91
ES	91.17	51.72
YT	89.75	83.36
MG	26.65	56.75
TS	100.00	65.71
SK	0.00	79.41
WT	85.24	18.78
SP	68.17	59.06
CT	19.28	56.34
FI	47.52	59.91
JS	19.45	18.68

Notes : HN (Hua Nan); FB (Fubon); CA (Cathay); CD (China Development); ES (E.Sun);  
 YT (Yuanta); MG (MEGA); TS (Taishin); SK (Shin Kong); WT (Waterland); SP (Si-  
 nopac); CT (Chinatrust); FI (First); JS (Jih Sun).

Table 7. Results of the variables map

Average of Correlations: .947			
		Degree of Correlation	
Marketing efficiency	136		0.97
Operating efficiency	-166		0.91
Profit efficiency	68		0.96



Notes: HN (Hua Nan); FB (Fubon); CA (Cathay); CD (China Development); ES (E.Sun);  
 YT (Yuanta); MG (MEGA); TS (Taishin); SK (Shin Kong); WT (Waterland);  
 SP (Sinopac); CT (Chinatrust); FI (First); JS (Jih Sun).

Figure. 2 The strategy group of the financial holding industry.

efficiency and profit efficiency referred to as the alternative following group in this paper.

Despite that Sinopac, E.Sun, Taishin, and Yuanta Financial Holdings have good performance in profit efficiency, their

marketing and operation efficiency is relatively backward. Consequently, this study presents these as the right laggard group. China Development and Jih Sun Financial Holdings had better operation efficiency performance but poor performance in marketing and profit efficiency; therefore, this paper names them as the left laggard group. Finally, Waterland, Cathay, and Fubon Financial Holdings are classified as the laggard group because their performances are behind the other groups.

### Conclusion

Previous literature has discussed whether different strategy groups have different performances (Wiggins & Ruefli, 1995; Reger & Huff, 1993; Kale & Ardit, 2003). This paper adopts the views of Grand (1995), who stated that strategic group analysis is a descriptive analysis and can only provide an analysis of the industrial structure and firm strategy preferences, relations with competitors, and changes in the environment, and cannot predict performance differences within an industry.

This paper, using a three-stage MI, identified the efficiency scores (marketing, operation, and profit efficiency) as the strategy dimensions. Such an objective

method enables researchers to subjectively decide which strategy dimensions are superior. The co-plot method can form a 2D surface where variables (marketing, operations, and profitability) and observations (14 FHCs) are drawn on a graph to provide further understanding of the industry competitive structure relationships and to explore differences in the various strategic groups. This process helps FHCs understand their competitive positioning within the entire industry.

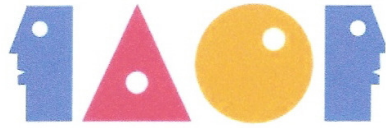
The results of this paper show that co-plot analyses indicate the relative positioning of observation values, variables, and the change of relationships, using a 2D surface. The greatest advantage is the ability to portray the competitive situation using visual graphics. This makes it easy to analyze firm behavior showing similar characteristics and to form strategic groups. Practically, it also enables the industry to understand a firm and its competitors, the competitive configuration, or even as a reference of the competitive strategy of an opponent. Other methods, such as a cluster analysis, cannot replace these advantages. The graphic analysis presented in this paper can be developed as an important basis for future strategy dimensions.

## References

- Adler, N., Raveh, A., (2008). Presenting DEA Graphically. *Omega*, 36(5), 715–729.
- Backhaus, K., Erichson, B., Plinke, W., Weiber, R., 2003. *Multivariate Analyse Methoden*, 10th ed, Berlin: Springer.
- Berger, A. N., Hunter, W. C., Timme, S. G., (1993). The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present, and Future. *Journal of Banking and Finance*, 17(2/3), 221–249.
- Bonin, J. P., Hasan, I., Wachtel, P., (2005). Bank Performance, Efficiency and Ownership in Transition Countries. *Journal of Banking and Finance*, 29(1), 31–53.
- Bowlin, W. F., (1987). Evaluating the Efficiency of US Air Force Real-Property Maintenance Activities. *Journal of the Operational Research Society*, 38(2), 127–135.
- Chen, T. Y., (2002). Measuring Operation, Market and Financial Efficiency in the Management of Taiwan's Banks. *Services Marketing Quarterly*, 24(2), 15–28.
- Coelli, T., (1996). A Guide to DEAP Version 2.1: A Data Envelopment Analysis (computer) Program, CEPA Working Paper 96/08, Centre for Efficiency and Productivity Analysis, University of New England.
- Desarbo, W. S., Grewal, R., Wang, R., (2009). Dynamic Strategic Groups: Deriving Spatial Evolutionary Paths. *Strategic Management Journal*, 30(13), 1420–1439.
- Dikmen, I., Birgonul, M. T., Budayan, C., (2009). Strategic Group Analysis in the Construction Industry. *Journal of Construction Engineering and Management*, 135(4), 288–297.
- Färe, R., Grosskopf, S., Norris, M., Zhang, Z., (1994). Productivity Growth, Technical Progress and Efficiency Changes in Industrialized Countries. *American Economic Review*, 84(1), 66–83.
- Fiegenbaum, A., Thomas, H., (1990). Strategic Group and Performance: The U. S. Industry 1970-84. *Strategic Management Journal*, 11(3), 197–215.
- Golany, B., Roll, Y., (1989). An Application Procedure for DEA. *Omega*, 17(3), 237–250.
- Grant, R. M., (1995). *Contemporary Strategy Analysis: Concepts, Techniques, Applications*, 2nd Ed., Blackwell Publishing, Oxford, U.K.
- Guttman, L., (1968). A General Nonmetric Technique for Finding the Smallest Coordinate Space for a Configuration of Points. *Psychometrika*, 33(4), 469–506.
- Hitt, M. A., Ireland, R. D., Hoskisson, R. E., (2001). *Strategic Management: Competitiveness and Globalization* (4th ed.), Cincinnati, OH: South-Western College Publishing.
- Houthoofd, N., Heene, A., (2005). The Quest for Strategic Groups and the Competence-Based View. *Advances in Applied Business Strategy*, 8, 189–232.
- Huang, X. N., (1993). On the Methods and Applications of Data Envelopment Analysis for Measuring the Effi-



- ciency of Non-profit Organizations, PhD Dissertation, NCTU University.
- Isik, I., Hassan, M. K., (2002). Technical, Scale and Allocative Efficiencies of Turkish Banking Industry. *Journal of Banking and Finance*, 26(4), 719–766.
- Kale, S., Arditi, D., (2003). Differentiation, Conformity, and Construction Firm Performance. *Journal of Management in Engineering*, 19(2), 52–59.
- Ketchen, D. J., Shook, C. L., (1996). The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. *Strategic Management Journal*, 17(6): 441-458.
- Lewis, P., Thomas, H., (1990). The Linkage between Strategy, Strategic Groups, and Performance in the U.K. Retail Grocery Industry. *Strategic Management Journal*, 11(5), 385–397.
- Lipshitz, G., Raveh, A., (1998). Socio-Economic Differences among Localities: A New Method of Multivariate Analysis. *Regional Studies*, 32(8), 747–757.
- Lo, S. F., Lu, W. M., (2006). Does size matter? Finding the Profitability and Marketability Benchmark of Financial Holding Companies. *Asia Pacific Journal of Operational Research*, 23(2), 229–246.
- Mindali, O., Raveh, A., Salomon, I., (2004). Urban Density and Energy Consumption: A New Look at Old Statistics. *Transportation Research Part A: Policy and Practice*, 38(2), 143–162.
- Nath, P., Mukherjee, A., Pal, M. N., (2001). Identification of Linkage between Strategic Group and Performance of Indian Commercial Banks: A Combined Approach Using DEA and Co-plot. *International Journal of Digital Accounting Research*, 1(2), 125–152.
- Paucar-Caceres, A., Thorpe, R., (2005). Mapping the Structure of MBA Programs: A Comparative Study of the Structure of Accredited AMBA Programs in the United Kingdom. *Journal of the Operational Research Society*, 56(1), 25–38.
- Prior, D., Surroca, J., (2006). Strategic Groups Based on Marginal Rates. An Application to the Spanish Banking Industry. *European Journal of Operational Research*, 170(5), 505–515.
- Raveh, A., (1993). Co-plot Display Technique as an Aid to Climatic Classification. *Journal of Geographical Analysis*, 25, 377-353.
- Raveh, A., (2000). The Greek Banking System: Reanalysis of Performance. *European Journal of Operational Research*, 120(3), 525–534.
- Reger, R. K., Huff, A. S., (1993). Strategic Groups: A Cognitive Perspective. *Strategic Management Journal*, 14(2), 103–124.
- Seiford, L. M., Zhu, J., (1999). Profitability and Marketability of the Top 55 U.S. Commercial Banks. *Management Science*, 45(9), 1270–1288.
- Sheu, H. J., Lo, S. F., Lin, H. H., (2006). Linking Diversification Strategy to Performance: A Case for Financial Holding Companies in Taiwan. *Journal of Transnational Management*, 11(3), 61–79.
- Weber, Y., Shenkar, O., Raveh, A., (1996). National and Corporate Culture Fit in Mergers/Acquisitions: An Exploratory Study. *Management Science*, 42(8), 1215–1227.
- Wiggins, R. R., Ruefli, T. W., 1995. Necessary Conditions for the Predictive Validity of Strategic Groups: Analysis Without Reliance on Clustering Techniques. *Academy of Management Journal*, 38(6), 1635–1656.



ENHANCING A LEARNING VECTOR QUANTIZATION NEURAL  
NETWORK CLASSIFICATIONS MODEL WITH THE  
ORTHOGONAL ARRAY

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Abstract

This study used LVQ to establish a classification model, and applied the Taguchi experimental design method (TEDM) to select the meaningful important factors. TEDM was then used to adjust the LVQ core factors and determine the optimal factor combination in an online medical dataset, in order to improve the classification accuracy rate and operating efficiency. Furthermore, LVQ could be used to help doctors make diagnoses and achieve the purpose of early identification for early treatment. According to the experimental results, the accuracy rate of disease classification could be above 90%, and the classification effect could be superior to that of other classification models introduced in the literature.

Key Words: Classification, Artificial Neural Network, Learning Vector Quantization, Orthogonal Array, Taguchi Experimental Design Method

## Introduction

Due to rapid technological progress, management work in various fields has gradually entered the era of information technology. In particular, the developments in computer technology have made data storage more convenient, thus bringing about ever-increasing amounts of data. When faced with complex problems in various fields, researchers need to select a fast, accurate and stable algorithm that can find useful information in complex data, and then establish good mechanisms relating to forecasting and classification through these data, in order to meet the optimal forecasting and classification performance.

As one of the important artificial intelligence (AI) research tools, artificial neural network (ANN) schemes have been widely applied in many fields of business (Perez and Holzmann, 1997; Packianather and Drake, 2004; Giordano, La Rocca and Perna, 2007; Wu, Huang and Meng, 2008; Gketsis, Zervakis and Stavrakakis, 2009; Saravanan and Ramachandran 2010). Moreover, learning vector quantization (LVQ) neural networks are one of the most commonly used types of ANN, and have been successfully applied to solve numerous data classification problems (Filippi and Jensen, 2006; Martin-Ualdivia et al., 2007; Alegre et al., 2008; Liu et al., 2010; Blachnik and Duch 2011).

As indicated in previous studies, learning vector quantization (LVQ) has good performance when applied to a variety of identification and classification issues, and it is characterized by rapid training and higher classification accuracy in identification and classification applications. This study applied LVQ to classification problems, and selected and adjusted the important LVQ variables in the pre-processing stage, and then conducted the LVQ classification for im-

proving and enhancing the classification effectiveness. Hence, during the pre-processing, this study selected data and columns with distinguished features, and made use of the advantages of LVQ, such as easy training, fast speed and high accuracy, in order to achieve the purpose of effective and good classification.

The application of the Taguchi experimental design method (TEDM) in factor optimization is common. It is mainly used in experimental arrangements and planning, as it is very convenient and economical. In addition to common applications in quality engineering, it has also been widely used in other engineering fields, such as manufacturing, production, economic principles, and product quality enhancement. This study used TEDM to explore the optimization of an artificial neural parameter combination.

Packianather & Drake (2004) applied the Taguchi orthogonal array L9(3<sup>4</sup>) in a wood veneer inspection neural network (WVINN) for veneer defect inspection classification. The neural network architecture was composed of 17 input units (neurons), 13 output units, and a two-level hidden layer. Taguchi orthogonal arrays are mainly used in the optimization of neural network factors. It has four neural network factors, which are the learning rate, the momentum factor, the number of neurons in hidden layer 1, and the number of neurons in hidden layer 2. In each factor, orthogonal array planning is based on three levels, which could effectively save experimental times at the neural network training and testing stage. According to the experimental results, a classification accuracy of 84.16% could be reached, thus achieving the purpose of accurate classification.

Kuo & Wu (2006) combined the back-propagation neural network

(BPNN) with TEDM to determine optimal learning factors, and applied the objective forecasting model in the film coating process, in order to judge the surface coarseness at various levels. The orthogonal array L9 was used in the four-factor and three-level pattern, which was then applied to the BPNN to determine the optimal learning factors. The four selected factors were the learning cycle, the number of hidden neurons, the learning rate and momentum factor. It can thus be seen that TEDM has been widely applied to achieve the purpose of factor optimization through integration with the neural network method.

Wu & Chen (2006) selected and applied the Taguchi orthogonal array L9(33) in the process of injection molding and injection compression molding. The four main factors of the orthogonal array were the melt temperature, the injection velocity, the mold temperature and the packing pressure. Comparison and discussion on the optimization of the process factors were conducted.

As mentioned above, TEDM has been widely used in various applications, showing good performance in manufacturing process and medical image optimization. When applying in the medical-related fields, the experimental results have shown good effects. Referring to the selection of the Taguchi orthogonal array in the previous studies, this study applied Taguchi orthogonal array L9(33), which requires fewer experimental times. It first selected the main neural network factors of LVQ, which included the learning rate, the number of hidden neurons, and random seed, to be input into the orthogonal array. Then, it arranged and planned the experimental procedures using the L9 orthogonal array of factors at three levels to determine the optimal LVQ factor combination.

## Method

This study attempted to propose an optimization model of neural network factors for online medical diagnoses. A Taguchi orthogonal array was used to arrange and plan the experiments and to determine the optimal factor combination for disease diagnosis. This study used the Taguchi orthogonal array, and applied the LVQ of the ANN to establish a classification model, in order to effectively shorten the experimental procedure and times of experiments. This method could also allow research personnel without much experience to easily complete the complex experimental procedure and reduce the waste of time and cost. In addition, the combination of the optimized factors could enhance the classification accuracy of LVQ.

### *Learning vector quantization (LVQ) neural network*

LVQ Neural Network is an important division of ANNs, extensively applied in the field of classification issues, by T. Kohonen in 1988, the output and the logical binary of LVQ are rather suitable for the applications of classification such as Disorder Diagnosis, Signal Classification, and Image Recognition (Zurada, 1995).

The procedure of LVQ, shown in Figure 1, is divided into learning and recalling processes. The learning process is the training process, in which the training data are first input into a network, which then learns to classify the target, reacting, through the neuron to the output, until the classification accuracy reaches convergence or satisfies the setting times of learning cycles, which is the end of the calculation of the learning process. The recalling process involves testing the steps and the procedure of data classification, which first inputs the testing data into the network, then loads

in the acquired weighting value in convergence after training, reacting, through the neuron, the deduction value, to yield the data classification at the end of the calculation.

#### *Taguchi Experimental Design Method*

The procedure of the TEDM experiment is as follows: select the number of experimental factors, define the number of levels of each factor, and measure the possible difficulty of each factor level combination; after all of the conditions are confirmed, the suitable Taguchi orthogonal array is selected according to the selected experimental factors and levels; configure the experimental factors and levels to implement the experiments.

This study used orthogonal array  $L_9(3^3)$ . The LVQ factors included the learning rate, the number of hidden layers and the random seed. These three neural network factors were set as the three factors and the factor levels in the Taguchi orthogonal array (Table 2). For the consistency and convenience of the experiments, the number of learning cycles (epochs) was set at 400 iterations. The initial weight values of the learning vector quantified network were generated using a random number and set in a range from -1 to 1, in order to provide the basis for the initial weights.

#### *Calibrating LVQ model using the Taguchi method*

The controllable factors of the LVQ were calibrated by performing a Taguchi design process to solve the classification problems described above. In performing the Taguchi design process, the controllable factors of the LVQ were assigned to three levels, i.e. Learning rate (0.1, 0.5, 0.9), number of hidden neurons (2, 20, 40), and seed (2, 4, 6). The experimental levels of these controllable factors are

summarized in Table 2. (See all Tables at the end of this article).

#### *Experimental procedure of OA*

As discussed in previous section, the controllable factors of the LVQ were calibrated using a Taguchi design procedure based on an  $L_9(3^4)$  OA. As shown in Table 3, this array prescribes nine experimental trials involving four factors, each with three level settings. Columns 1, 2, and 3 are assigned to the controllable factors, as follows: Column 1: Factor A (learning rate), Column 2: Factor B (number of hidden neurons), and Column 3: Factor C seed). The numbers in columns A, B, and C correspond to the factor level settings shown in Table 3. In the calibration procedure, the optimal LVQ network structure for each of the three data classification problems was identified using the factor level settings specified in the nine experimental trials. The quality of the corresponding solution (i.e. the classification performance of the resulting LVQ network) was evaluated using the ER metric. The corresponding results are presented in the last columns of Table 3.

#### *Index evaluation on network performance*

To examine the learning effect, the research, based on the index, error rate or accuracy rate, evaluates the quality of the artificial neural network. The Error Rate, ER, is calculated, as follows:

Error Rate = the sample number of error classification /the total sample number. The value of ER ranges from 0 to 1. The error rate is appropriate for the classification problems of the supervised learning neural network, as well as the applied direction and the artificial neural types, and therefore, is accepted as the evaluation criterion for the quality of artificial neural convergence.

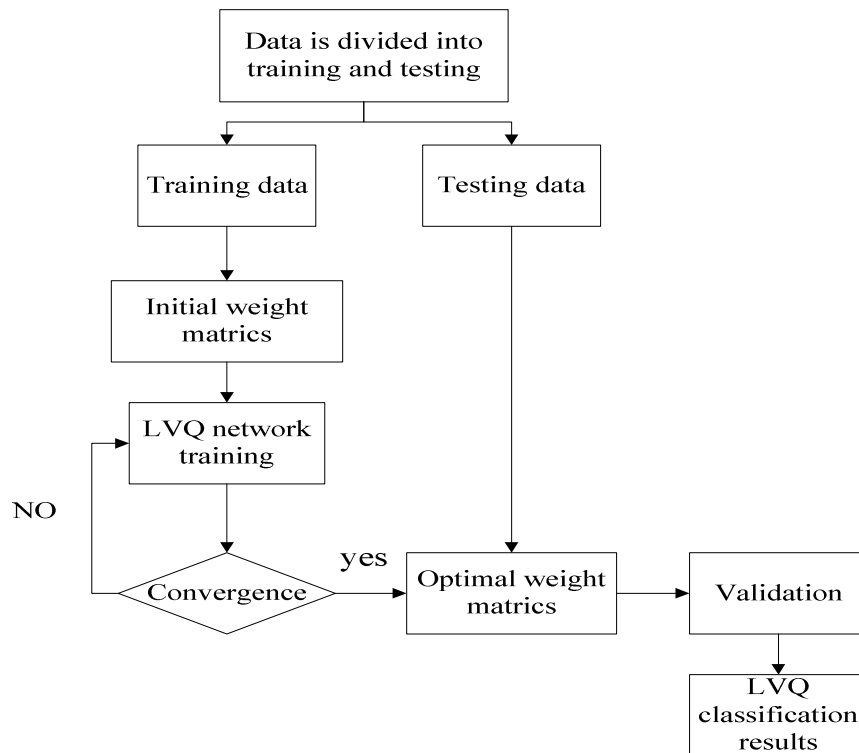


Figure 1. The operation procedure of LVQ

This section presents the experimental procedures of LVQ models when applied to authentic databases downloaded via File Transfer Protocol (FTP) from a server of the Department of Information and Computer Science (ICS) at the University of California, Irvine (<http://www.ics.uci.edu/~mlern/MLRepository.html>). The research data are sampled at random in 2:1 as the training and testing data for calculation.

The Breast-cancer Wisconsin Database, offered by Wolberg (University of Wisconsin Hospitals, 1992) with 683 data samples, is composed of nine clinic attributes, and ranges from 1 to 10 in disperse, all of which contain two class at

tributes, which can be shifted into logical binary form, where the “2” in Class, for positive, is displayed as [0 1], while the

“4”, for negative, is [1 0]. In the experiment 456 training data are chosen (including 269 positives, 187 negatives), and 227 testing data (including 175 positives, and 52 negatives), with which the LVQ network categorizes nine attributes for the input bits, and two attributes for the class output bits, whose specific classes and columns are illustrated in Table 4.

According to the ANOM of TEDM, as shown in Table 4, the optimal factor combination was found in Experiment 4 of the  $L_9(3^3)$  orthogonal array. The experimental effect was optimal for the learning rate (2), the number of hidden neurons (1), and the random seed (2). This study further repeated the experiment to confirm the combination of the optimal factors. According to the experimental results, the factor combination was set as a learning rate of 0.50, a number of neurons in the



hidden layer equal to twice that of the output units, and a random seed set at 4. This combination provided the optimal classification effect with an ER value rate of 0.44% (Table 5). A comparison with the experimental results described in the literature showed that the LVQ with the optimal factor combination could produce the optimal classification results.

According to the above experimental results, this study used LVQ to construct the classification model, and then planned the experimental procedure using the Taguchi orthogonal array, in order to reduce the complex experimental procedure. Then, the orthogonal array experiments were conducted to determine the optimal combination for the adjustment of the factor values of the core functions of LVQ. It was confirmed that the optimal classification accuracy rate could be determined.

### Conclusion

This study used TEDM to enhance the LVQ classification effects, and the experimental result had a good classification accuracy rate. According to literature relating to online medical databases, this study selected databases using the optimal classification accuracy rate for comparison and analysis. It was found that the proposed method was superior to the classification model of SVM+FS-PP-EROS applied to a breast cancer database in terms of the classification error rate, as described in the literature.

During the research process, besides using LVQ as the experimental classification tool, this study integrated TEDM-related technologies and methods. The group of LVQ optimal factor level combinations obtained from the Taguchi experiment could enhance the classification quality robustness in LVQ applications. The experimental results indicated that the optimal factor combination of LVQ under

TEDM could help to achieve good classification effects.

To date, no literature has shown a classification model that can achieve the optimal performance for any type of data; therefore, future studies should discuss more classification models and collect more types of medical data, in order to analyze the data characteristics and improve the classification accuracy rate.

### References

- Alegre E, Biehl M, Petkov N, Sánchez L (2008) Automatic classification of the acrosome status of boar spermatozoa using digital image processing and LVQ, *Comput. Biol. Med.*, 38(4), 461-468.
- Blachnik M, Duch W (2011).LVQ algorithm with instance weighting for generation of prototype-based rules. *Neural Netw.*, 24(8), 824-830.
- Filippi AM, Jensen JR (2006). Fuzzy learning vector quantization for hyperspectral coastal vegetation classification. *Remote Sens. Environ.*, 100, 512-530.
- Giordano F, La Rocca M, Perna C (2007). Forecasting nonlinear time series with neural network sieve bootstrap. *Comput. Stat. Data Anal.*, 51, 3871-3884.
- Gketsis ZE, Zervakis ME, Stavrakakis G (2009). Detection and classification of winding faults in windmill generators using wavelet transform and ANN. *Electr. Power Syst. Res.*, 79, 1483-1494.
- Hu Q, Yu D, Xie Z, Li X. (2007). EROS : Ensemble rough subspaces. *Pattern Recognit.*, 40(2), 3728-3739.



- Kuo CF, Wu YS. (2006). Application of a Taguchi-based neural network prediction design of the film coating process for polymer blends, *Int. J. Adv. Manuf. Technol.*, 27, 455-461.
- Liu J, Zuo, B, Zeng X, Vroman, P, Rabenasolo B (2010). Nonwoven uniformity identification using wavelet texture analysis and LVQ neural network. *Expert Syst. Appl.*, 37(3), 2241-2246.
- Martin-Valdivia MT, Urena-Lopez LA, Garcia-Vega M (2007). The learning vector quantization algorithm applied to automatic text classification tasks. *Neural Netw.*, 20, 748-756.
- Packianather MS, Drake PR (2004). Modelling neural network performance through response surface methodology for classifying wood veneer defects. *Proc IME B J Eng. Manufact.*, 218, 459-466.
- Perez CA, Holzmann CA (1997). Improvements on handwritten digit recognition by genetic selection of neural network topology and by augmented training. *IEEE Int. Conf. Syst. Man Cybern.*, 2, 1487-1491.
- Saravanan N, Ramachandran KI (2010). Incipient gear box fault diagnosis using discrete wavelet transform (DWT) for feature extraction and classification using artificial neural network (ANN). *Expert Syst. Appl.*, 37, 4168-4181.
- Wu CH., Chen WS. (2006). Injection molding and injection compression molding of three-beam grating of DVD pickup lens, *Journal Sensors and Actuators A : Physical*, 125(2), 367-375.
- Wu TK, Huang SC, Meng YR (2008). Evaluation of ANN and SVM classifiers as predictors to the diagnosis of students with learning disabilities. *Expert Syst. Appl.*, 34, 1846-1856.
- Zurada JM (1995). *Introduction to Artificial Neural Systems*. West Publishing Company, St. Paul.

Table 2. Factor levels of LVQ

<b>Factors</b>	<b>Level-1</b>	<b>Level-2</b>	<b>Level-3</b>
Learning rate	0.1	0.5	0.9
Number of hidden neurons <sup>1</sup>	2	20	40
Seed	2	4	6

<sup>1</sup>Multiple of output layer neurons

Table 3.  $L_9(3^4)$  Orthogonal Array

<b>Experiment number</b>	<b>Factor/Level</b>			<b>Learning rate</b>	<b>Number of hidden neurons</b>	<b>Seed</b>	<b>Error Rate (%)</b>
	<b>A</b>	<b>B</b>	<b>C</b>				
1	1	1	1	0.10	2	2	0.44
2	1	2	2	0.10	29	4	1.32
3	1	3	3	0.10	40	6	1.76
4	2	1	2	0.50	2	4	0.44
5	2	2	3	0.50	20	6	1.32
6	2	3	1	0.50	40	2	1.32
7	3	1	3	0.90	2	6	0.44
8	3	2	1	0.90	20	2	1.32
9	3	3	2	0.90	40	4	1.32

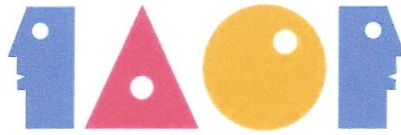
Table 4. The Breast-cancer Wisconsin Database

<b>Name of Variable</b>	<b>Range</b>
1. Clump Thickness	[1...10]
2. Uniformity of Cell Size	[1...10]
3. Uniformity of Cell Shape	[1...10]
4. Marginal Adhesion	[1...10]
5. Single Epithelial Cell Size	[1...10]
6. Bare Nuclei	[1...10]
7. Bland Chromatin	[1...10]
8. Normal Nucleoli	[1...10]
9. Mitoses	[1...10]
10. Class	[2=Good, 4=Bad]

Table 5. Comparison of classification results

	<b>Breast cancer databases / Error rate (%)</b>	
	Proposed	SVM+FS-PP-EROS <sup>1</sup>
<b>Literature</b>	0.44	1.23

<sup>1</sup>Hu, Yu, Xie & Li, 2007



MODERATING EFFECT OF PERCEIVED USEFULNESS ON THE  
RELATIONSHIP BETWEEN EASE OF USE, ATTITUDE  
TOWARD USE AND ACTUAL SYSTEM USE

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Abstract

Direct selling industry is prevailing in Taiwan as well as on the globe. This study used the technology acceptance model (TAM) to explore the use of the industry itself instead of the IT products employed by the direct sellers. One year after the Financial Tsunami, this study formulated a self-developed questionnaire to investigate the direct selling sellers in major cities of Taiwan. The nonparametric test results showed that the perceived usefulness, in terms of self-esteem, self-affirmation, self-actualization and professional development, was an important determinant of both the attitude toward using and actual system use. The perceived ease of use was partially correlated with perceived usefulness and the attitude toward using, but not correlated with actual system use. The attitude toward using was strongly correlated with actual system use. For comparative purpose, we suggested that TAM be conducted spatially over the diverse population of ethnic Chinese in Asia, or temporally over the population in Taiwan.

Key Words: Direct Selling Industry, TAM, Nonparametric Correlation Analysis

## Introduction

The direct selling industry is characterized as being centered at individual person, lacking of mandatory organizational relationship between uplines and downlines (Lan, 2005), and needing not retail locations. Its popularity has led to some interesting explanatory terms such as “guanxi.” However, the conceptual framework of “guanxi” was not attempted until recently (Luo, Huang, & Wang, 2012). On the other hand, the technology acceptance model (TAM) has been widely adopted to examine the use of information technology (e.g., Adams, Nelson, & Todd, 1992; Legris, Ingham, & Collerette, 2003) to consumer acceptance of e-shopping (Ha & Stoel, 2009). Although research exists on the use of technology in the direct selling industry (Crittenden, Peterson, & Albaum, 2010; Ferrell, Gonzalez-Padron, & Ferrell, 2010a), very little addresses the adoption of the industry itself.

In response to this dearth of knowledge, we conducted an exploratory study to explore the moderating effect on the relationship between TAM constructs.

## Review of Literature

### *Direct Selling Industry*

The World Federation of Direct Selling Association (WFDSA) defines direct selling as “a dynamic, vibrant, rapidly expanding channel of distribution for the marketing of products and services directly to consumers.” The WFDSA (2012) reported that its member associations accounted for more than US\$132

billion in retail sales in 2010, through the activities of more than 87 million independent sales sellers. Direct selling enhances the retail distribution infrastructures of the economy, and serves consumers with a convenient source of quality products. The cost for an individual to start an independent direct selling business is typically very low. Therefore, once the channel of distribution is in place, the distinction of products and decrease of price and increase of promotion soon follow.

Direct selling in Taiwan has reached the mature stage over the past three decades. However, one year after the Financial Tsunami of 2008, the number of registered multi-level sales enterprises dropped nearly 45%. Nonetheless, the number of operating business remained; while the output value and the number of direct sellers increased by 9% and 8% per year, respectively (Fair Trade Commission, 2009, 2010). From 2010 to 2011, the direct selling output values grew from US\$ 2,574 to US\$ 2,845 million or 4.29% increase in retail sales, and the number of direct sellers from 2.12 to 4.67 million or 120% increase (WFDSA, 2012).

Although discrepancy existed between domestic and global statistics, the trend was almost the same. What the direct sellers had experienced during the critical year deserved further study.

### *Related Works*

The approach to business by mega companies such as Amway and Mary Kay Cosmetics seemed to violate many of the basic tenets of modern American commerce. Instead of

the standard contention that the rationalization of social institutions is an inevitable consequence of advanced capitalism, Biggart (1990) argued that less rational organizations built on social networks may actually be more economically viable. However, direct selling is about the process of selling a consumer product or service from one person to another. Therefore, relationship marketing has grown in popularity and practice (Wong & Leung, 2001).

Numerous researches have attempted to explore relationship marketing in Chinese context (Guanxi) (e.g., Fernando & Long, 2012; Wong & Leung, 2001). Several factors have contributed to the increase in relationship marketing; for example, communication technologies eliminate the need for a middleperson altogether (Yuliana, 2005). Social media such as Facebook, YouTube, and Twitter has evolved as a driver of strategy, and will become even more important in the future (Ferrell & Ferrell, 2012). Chang *et al.* (2012) used TAM to analyze website user's behavioral intentions in travel agent sectors. Others focused on the use of technology in direct selling industry (Crittenden *et al.*, 2010; Ferrell *et al.*, 2010a).

#### *Technology Acceptance Model (TAM)*

Figure 1 shows the Technology Acceptance Model (TAM) that was proposed by Davis (1989) to describe how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. The two key

factors are perceived usefulness, the degree to which a person believes that using a particular system would enhance his or her job performance; and perceived ease-of-use, the degree to which a person believes that using a particular system would be free from effort. The other two factors are attitude toward using and actual system use.

Earlier TAM researches focused on the individual user of a computer and ignored the essentially social processes of IS development and implementation (Legris *et al.*, 2003). Later studies seemed to embrace e-shopping (Ha & Stoel, 2009), e-learning (Liu, Liao, & Pratt, 2009; S. Y. Park, 2009), e-health care (Holden & Karsh, 2010; Mohamed, Tawfik, Norton, & Al-Jumeily, 2012) or e-government (Belanche, Casaló, & Flavián, 2012). However, most TAM research has been centered at the use of information technology. Hence, our attention was drawn to exploring the use of the organizational system that creates or sells the products.

Even though TAM has its flaws according to some critics (e.g., Bradley, 2012; Chuttur, 2009), it is still an accepted and established model for explaining and predicting user acceptance of various information technologies (Y. Park, Son, & Kim, 2012). Therefore, this study aimed to utilize TAM as a tool for exploring the use of direct selling industry.

#### Research Methodology

##### *Research Design*

Figure 2 represented the research framework based upon TAM and the structure of the research

questionnaire. Each of four TAM constructs had different questions developed from various sources.

Perceived ease of use (PEOU) consisted of seven systems that were suggested by high ranking managers. The seven systems were organizational culture system, administrative services system, product supply system, product line development system, produce service system, education and training system, and bonus system.

Perceived usefulness (PU) started with twenty questions modified from various sources. After reliability and validity tests, we found four important components, namely, self-esteem (Ghiselli, La Lopa, & Bai, 2001; Rabinowitz & Hall, 1977), self-affirmation (Dessler, 1976; Lawler & Hall, 1970), self-actualization (Brown, 1996; Patchen, 1970) and professional development (Robbins, 2005).

Single question was given to measure the attitude toward using (AU) and actual system use (SU).

The questionnaire had two parts. The first part was basic information. The other was the core questions. Likert five-point scale was applied to all questions except for actual system use.

#### *Sampling Plan*

According to the online survey by Fair Trade Commission of Taiwan (2009), 396 companies registered as multi-level sales enterprises, 302 were actually conducting business and 250 were running direct selling business solely. Although northern cities had more direct sellers than

other cities, half of the sample was located in cities in central Taiwan for geographical reasons. The other half came equally from the northern and southern cities.

One year after the Financial Tsunami, we organized this survey. From late 2009 to early 2010, a total of 508 out of 540 questionnaires were retrieved from the direct sellers. About 81.2% (487 out of 508) were effective samples. Most direct sellers were female (65.5%); 84.8% was married; 64.7% was over forty-one years of age; and 58.1% was part-time.

#### *Research Hypotheses*

The hypotheses were designated as follows:

*Hypothesis 1: PEOU has a strong impact upon PU.*

*Hypothesis 2: PU has a strong impact upon AU.*

*Hypothesis 3: PEOU has a strong impact upon AU.*

*Hypothesis 4: PU has a strong impact upon SU.*

*Hypothesis 5: PEOU has a strong impact upon SU.*

*Hypothesis 6: AU has a strong impact upon SU.*

#### *Statistical Analysis*

The one-sample Kolmogorov-Smirnov test procedure was used to test whether variables were normally distributed. Cronbach's  $\alpha$  reliability test and content validity test was performed to identify relevant components of PU. Since the variables fit the normal distribution poorly (Table 1), we employed nonparametric Spearman's rho ( $\rho$ ) estimate to test the hypotheses.



## Result

Table 1 showed the normality test results. Clearly, all variables were not normally distributed.

Cronbach's  $\alpha$  value of the PU components were larger than .7; therefore, the reliability test was achieved. The four components were well documented elsewhere; hence, the content validity was matched.

Table 2 detailed the test results from the nonparametric correlation estimate, Spearman's  $\rho$ . Three hypotheses were fully supported, two were partially supported and one was not supported. Figure 2 illustrated the hypothesized path.

All but two systems of perceived ease of use were strongly correlated with perceived usefulness at the .01 level (*H1*), and with attitude toward using at the 0.05 level (*H3*). Perceived usefulness was strongly correlated at the .01 level with attitude toward using (*H2*), and with actual system use (*H4*). Attitude toward using was strongly correlated with actual system use at the .01 level (*H6*). Perceived ease of use was not correlated with actual system use (*H5*).

Some results of this study were consistent with previous researches (Adams et al., 1992; Davis, 1989), suggesting that perceived usefulness of a particular system is an important determinant of actual system use. Here "a particular system" usually refers to products of information technology. Many researchers have done brilliant works on the use of technology (e.g., Aboelmaged, 2010;

Alsajjan & Dennis, 2010; Fang, Chan, Brzezinski, & Xu, 2006; Ferrell, Gonzalez-Padron, & Ferrell, 2010b), see also the Literature Review section.

However, this particular system meant the direct selling industry in our study. The key findings was that usefulness as of personal perception was strongly correlated with attitude and action (*H2* and *H4*). This result was analogous to Belanche et al. (2012) who used personal values such as time consciousness and environmental awareness to study the strategic marketing of the e-government. Li & Ghosh (2012) also reported on how the small- and medium-sized enterprises deal with the dual-model of physical and online sales channel. Recent works expand the use of TAM in the context of behavioral science and gain fruitful results (e.g., Abbasi, Chandio, Soomro, & Shah, 2011; H. H. Lee & Chang, 2011; W. Lee, Xiong, & Hu, 2011; Svendsen, Johnsen, Almås-Sørensen, & Vittersø, 2011), also refer to the Literature Review section.

Nonetheless, very few had adopted TAM for studying direct selling industry. Ferrell et al. (2010b) was one of the few, but their interest was on the technology used in the industry. Therefore, this study was perhaps the first attempt of applying TAM to the direct selling industry itself.

## Conclusion

This study was valuable for two reasons: we recorded what the direct sellers had experienced one year after

the Financial Tsunami, and the attempt of using direct selling industry as the subject matter of TAM. Although our approach seemed to yield fruitful results, it deserved further investigation.

The moderating effect of perceived usefulness on the other TAM constructs was rather complicated. We found that perceived usefulness, in terms of self-esteem, self-affirmation, self-actualization and professional development, was an important determinant of both the attitude toward using and actual system use. Attitude toward using was also highly correlated with system actual use. However, the perceived ease of use was only partially correlated with perceived usefulness and the attitude toward using, and not correlated with actual system use. Obviously, perceived usefulness was the key factor in direct selling industry. Improvements on the ease of use did not seem to matter much.

The main limitation of this study was that we derived findings mainly from the geographical rather than the distributional center. Furthermore, the adoption of TAM posed a little concern because of criticisms of TAM as “theory” (Chuttur, 2009).

For further research, we suggested that TAM be conducted in other countries such as China. Alternatively, one can replicate this survey to obtain temporal comparison of the sample in Taiwan.

## References

- Abbasi, M. S., Chandio, F. H., Soomro, A. F., & Shah, F. (2011). Social influence, voluntariness, experience and the internet acceptance: An extension of technology acceptance model within a south-Asian country context. *Journal of Enterprise Information Management*, 24(1), 30–52.
- Aboelmaged, M. G. (2010). Predicting e-procurement adoption in a developing country: an empirical integration of technology acceptance model and theory of planned behaviour. *Industrial Management & Data Systems*, 110(3), 392–414.
- Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly*, 16(2), 227. doi:10.2307/249577
- Alsajjan, B., & Dennis, C. (2010). Internet banking acceptance model: Cross-market examination. *Journal of Business Research*, 63(9), 957–963.
- Belanche, D., Casaló, L. V., & Flavián, C. (2012). Integrating trust and personal values into the Technology Acceptance Model: The case of e-government services adoption. *Cuadernos de Economía y Dirección de la Empresa*. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1138575812000345>

- Biggart, N. W. (1990). *Charismatic Capitalism: Direct Selling Organizations in America*. University Of Chicago Press.
- Bradley, J. (2012). If We Build It They Will Come? The Technology Acceptance Model. *Information Systems Theory*, 19–36.
- Brown, S. P. (1996). A meta-analysis and review of organizational research on job involvement. *Psychological Bulletin*, 120(2), 235.
- Chang, K.-C., Chen, M.-C., Hsu, C.-L., & Kuo, N.-T. (2012). Integrating loss aversion into a technology acceptance model to assess the relationship between website quality and website user's behavioural intentions. *Total Quality Management & Business Excellence*, 23(7-8), 913–930.  
doi:10.1080/14783363.2011.637793
- Chuttur, M. (2009). Overview of the technology acceptance model: Origins, developments and future directions. *Sprouts: Working Papers on Information Systems*, 9(37). Retrieved from <http://sprouts.aisnet.org/9-37/>
- Crittenden, V. L., Peterson, R. A., & Albaum, G. (2010). Technology and Business-to-Consumer Selling: Contemplating Research and Practice. *Journal of Personal Selling and Sales Management*, 30(2), 103–110.  
doi:10.2753/PSS0885-3134300201
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319.  
doi:10.2307/249008
- Dessler, G. (1976). *Organization and management: A contingency approach*. Prentice-Hall Englewood Cliffs, NJ. Retrieved from <http://octopus.library.cmu.edu/cgi-bin/tiff2pdf/simon/box00079/flid06433/bdl0001/doc0004/simon.pdf>
- Fair Trade Commission. (2009). *2009 Report on the Online Survey of Multilevel Direct Selling* (p. 20). Fair Trade Commission, Executive Yuan.
- Fair Trade Commission. (2010). *2010 Report on the Online Survey of Multilevel Direct Selling* (p. 20). Fair Trade Commission, Executive Yuan.
- Fang, X., Chan, S., Brzezinski, J., & Xu, S. (2006). Moderating effects of task type on wireless technology acceptance. *Journal of Management Information Systems*, 22(3), 123–157.
- Fernando, I. N., & Long, W. (2012). Is Guanxi a successful business tool? A literature review on Guanxi as a relationship marketing tool in business. *Proceedings of International Conference on Business Management*, 8.
- Ferrell, L., & Ferrell, O. C. (2012). Redirecting direct selling: High-touch embraces high-tech. *Busi-*

- ness Horizons, 55(3), 273–281.  
doi:10.1016/j.bushor.2012.01.004
- Ferrell, L., Gonzalez-Padron, T. L., & Ferrell, O. C. (2010a). An Assessment of the Use of Technology in the Direct Selling Industry. *Journal of Personal Selling and Sales Management*, 30(2), 157–166. doi:10.2753/PSS0885-3134300206
- Ferrell, L., Gonzalez-Padron, T. L., & Ferrell, O. C. (2010b). An Assessment of the Use of Technology in the Direct Selling Industry. *Journal of Personal Selling and Sales Management*, 30(2), 157–166.
- Ghiselli, R. F., La Lopa, J. M., & Bai, B. (2001). Job satisfaction, life satisfaction, and turnover intent among food-service managers. *The Cornell Hotel and Restaurant Administration Quarterly*, 42(2), 28–37.
- Ha, S., & Stoel, L. (2009). Consumer e-shopping acceptance: Antecedents in a technology acceptance model. *Journal of Business Research*, 62(5), 565–571.
- Holden, R. J., & Karsh, B. T. (2010). Methodological Review: The Technology Acceptance Model: Its past and its future in health care. *Journal of biomedical informatics*, 43(1), 159–172.
- Lan, P. C. (2005). Networking capitalism: Network construction and control effects in direct selling. *The Sociological Quarterly*, 43(2), 165–184.
- Lawler, E. E., & Hall, D. T. (1970). Relationship of job characteristics to job involvement, satisfaction, and intrinsic motivation. *Journal of applied psychology*, 54(4), 305.
- Lee, H. H., & Chang, E. (2011). Consumer attitudes toward online mass customization: An application of extended technology acceptance model. *Journal of Computer-Mediated Communication*, 16(2), 171–200.
- Lee, W., Xiong, L., & Hu, C. (2011). The effect of Facebook users' arousal and valence on intention to go to the festival: Applying an extension of the technology acceptance model. *International Journal of Hospitality Management*. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0278431911001629>
- Legris, P., Ingham, J., & Colletrette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & management*, 40(3), 191–204.
- Li, X., & Ghosh, S. (2012). Power-Dependence and Reseller Influence on SMEs' Continued Use of Online Direct Sales Channels: An Empirical Study. *Journal of Organizational Computing and Electronic Commerce*, 22(1), 87–106.

- Liu, S. H., Liao, H. L., & Pratt, J. A. (2009). Impact of media richness and flow on e-learning technology acceptance. *Computers & Education, 52*(3), 599–607.
- Luo, Y., Huang, Y., & Wang, S. L. (2012). Guanxi and Organizational Performance: A Meta-Analysis. *Management and Organization Review, 8*(1), 139–172. doi:10.1111/j.1740-8784.2011.00273.x
- Mohamed, A. H. H. M., Tawfik, H., Norton, L., & Al-Jumeily, D. (2012). Does e-Health technology design affect m-Health informatics acceptance? A case study. *Biomedical and Health Informatics (BHI), 2012 IEEE-EMBS International Conference on* (pp. 968–971). Retrieved from [http://ieeexplore.ieee.org/xpls/abs\\_all.jsp?arnumber=6211750](http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6211750)
- Park, S. Y. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. *Educational Technology & Society, 12*(3), 150–162.
- Park, Y., Son, H., & Kim, C. (2012). Investigating the determinants of construction professionals' acceptance of web-based training: An extension of the technology acceptance model. *Automation in Construction, 22*(0), 377–386. doi:10.1016/j.autcon.2011.09.016
- Patchen, M. (1970). *Participation, achievement, and involvement on the job*. Prentice-Hall Englewood Cliffs, NJ. Retrieved from <http://www.getcited.org/pub/101700135>
- Rabinowitz, S., & Hall, D. T. (1977). Organizational research on job involvement. *Psychological bulletin, 84*(2), 265.
- Robbins, S. P. (2005). *Essentials of organizational behavior*. Prentice Hall.
- Svendsen, G. B., Johnsen, J. A. K., Almås-Sørensen, L., & Vittersø, J. (2011). Personality and technology acceptance: the influence of personality factors on the core constructs of the Technology Acceptance Model. Retrieved from <http://www.tandfonline.com/doi/abs/10.1080/0144929X.2011.553740>
- WFDSA. (2012). World Federation of Direct Selling Associations. Retrieved July 23, 2012, from <http://www.wfdsa.org/>
- Wong, Y. H., & Leung, T. K. (2001). *Guanxi: Relationship Marketing in a Chinese Context*. Routledge.
- Yuliana, Y. (2005, January 1). *Comparative Study of Direct Selling Systems in Taiwan and Indonesia* (Master). Tamkang University, Graduate Institute of Management Sciences.

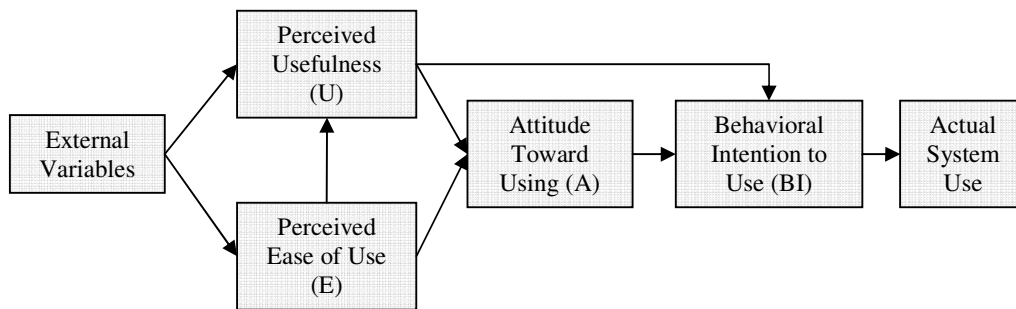


Figure 1: The Technology Acceptance Model (Davis, 1989)

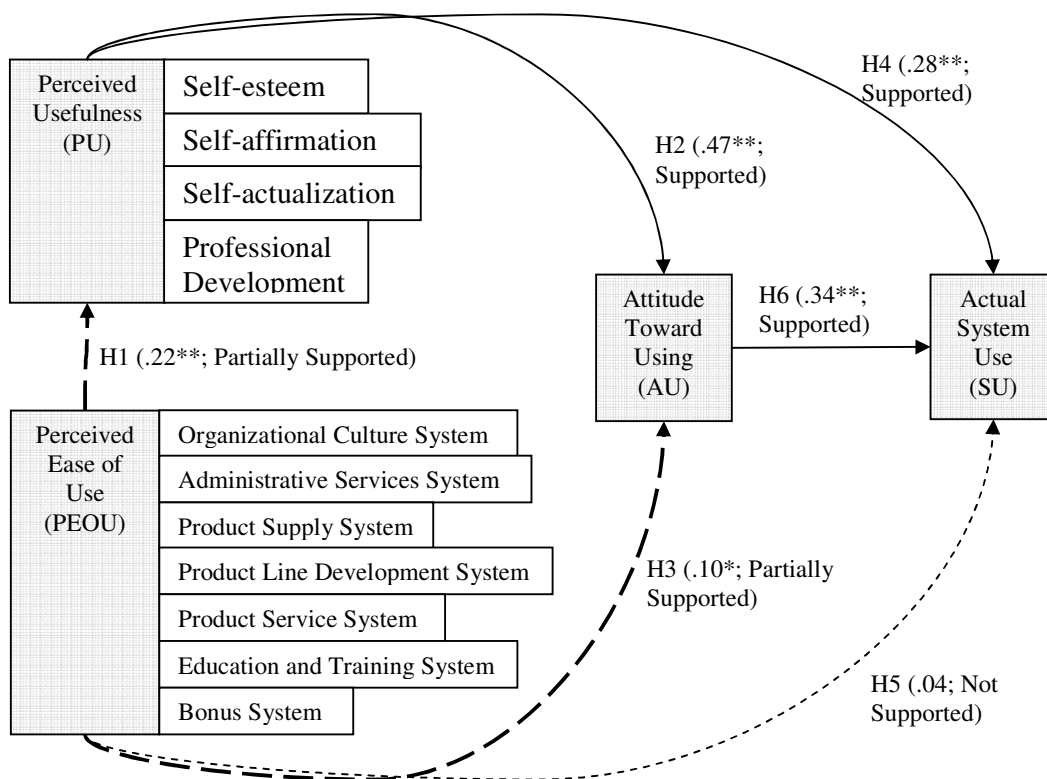


Figure 2: Research Framework and Hypotheses Test Results

Table 1. Normality Test Results

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Perceived Ease of Use (PEOU)	.157	487	.000	.904	487	.000
Organizational Culture System	.211	487	.000	.836	487	.000
Administrative Services System	.227	487	.000	.835	487	.000
Product Supply System	.184	487	.000	.935	487	.000
Product Line Development System	.130	487	.000	.918	487	.000
Product Service System	.129	487	.000	.934	487	.000
Education and Training System	.161	487	.000	.935	487	.000
Bonus System	.220	487	.000	.883	487	.000
Perceived Usefulness (PU)	.107	487	.000	.955	487	.000
Self-esteem	.167	487	.000	.904	487	.000
Self-affirmation	.139	487	.000	.954	487	.000
Self-actualization	.120	487	.000	.937	487	.000
Professional Development	.164	487	.000	.907	487	.000
Attitude Toward Using (AU)	.304	487	.000	.813	487	.000
Actual System Use (SU)	.528	487	.000	.355	487	.000

a. Lilliefors Significance Correction



Table 2. The Nonparametric Correlation Test Results

No.	Hypotheses	$\rho$	Result
H1	Perceived Ease of Use (PEOU) has a strong impact upon Perceived Usefulness (PU).	.22**	Partially supported
H1-1	Organizational Culture System has a strong impact upon PU.	.28**	Supported
H1-2	Administrative Services System has a strong impact upon PU.	.15**	Supported
H1-3	Product Supply System has a strong impact upon PU.	-.21**	Supported
H1-4	Product Line Development System has a strong impact upon PU.	-.05	
H1-5	Product Service System has a strong impact upon PU.	-.04	
H1-6	Education and Training System has a strong impact upon PU.	-.10*	Supported
H1-7	Bonus System has a strong impact upon PU.	-.09*	Supported
H2	Perceived Usefulness (PU) has a strong impact upon Attitude Toward Using (AU).	.47**	Supported
H2-1	Self-esteem has a strong impact upon AU.	.33**	Supported
H2-2	Self-affirmation has a strong impact upon AU.	.41**	Supported
H2-3	Self-actualization has a strong impact upon AU.	.50**	Supported
H2-4	Professional Development has a strong impact upon AU.	.27**	Supported
H3	Perceived Ease of Use (PEOU) has a strong impact upon Attitude Toward Using (AU).	.10*	Partially Supported
H3-1	Organizational Culture System has a strong impact upon AU.	.13**	Supported
H3-2	Administrative Services System has a strong impact upon AU.	.05	
H3-3	Product Supply System has a strong impact upon AU.	.01	
H3-4	Product Line Development System has a strong impact upon AU.	.2	
H3-5	Product Service System has a strong impact upon AU.	-.10*	Supported
H3-6	Education and Training System has a strong impact upon AU.	-.03	
H3-7	Bonus System has a strong impact upon AU.	-.11*	Supported
H4	Perceived Usefulness (PU) has a strong impact upon Actual System Use (SU).	.28**	Supported
H4-1	Self-esteem has a strong impact upon SU.	.17**	Supported
H4-2	Self-affirmation has a strong impact upon SU.	.31**	Supported
H4-3	Self-actualization has a strong impact upon SU.	.21**	Supported
H4-4	Professional Development has a strong impact upon SU.	.23**	Supported
H5	Perceived Ease of Use (PEOU) has a strong impact upon Actual System Use (SU).	.04	Not Supported
H5-1	Organizational Culture System has a strong impact upon SU.	.02	
H5-2	Administrative Services System has a strong impact upon SU.	.06	
H5-3	Product Supply System has a strong impact upon SU.	.12**	Supported
H5-4	Product Line Development System has a strong impact upon SU.	.12**	Supported
H5-5	Product Service System has a strong impact upon SU.	-.12**	Supported
H5-6	Education and Training System has a strong impact upon SU.	-.11*	Supported
H5-7	Bonus System has a strong impact upon SU.	-.10*	Supported
H6	Attitude Toward Using (AU) has a strong impact upon Actual System Use (SU).	.34**	Supported

\*\* p < .01 level (two-tailed); \* p < .05 level (two-tailed).

## STUDY OF THE ARRIVAL SCHEDULING SIMULATION FOR THE TERMINAL CONTROL AREA AT SUNG-SHUN AIRPORT

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### Abstract

The objective of this research is to proceed to flow control through locating a set of arrival scheduling method targeting to Sung-Shun control area, and the application simulation software will serve as the tool for aircraft flight operations and related performance appraisal. Within them, this research adopts the primary performance appraisal indices in 40-seconds time interval ratio, average time delayed and flight early arrival ratio. And these will be used to compare the performance from two alternatives in addition to proceeding to experimental designs so as to understand whether these two models can possess significant differences in the performance criteria or not. Lastly, based upon the findings from performance appraisals, it is expected to cut down workload for Air Traffic Control Personnel and also ensure the safeties for both the passengers as well as the aircraft.

Keywords: Sung-Shun Airport, Arrival Scheduling, Simulation

### Introduction

In recent years, due the rapid economic development and vast increase in domestic incomes, there has been witnessed with large volume increases in privately owned vehicles. Therefore the

freeways are constantly jammed which results with the capacity of the ground level transportation unable to satisfy the needs for the passengers. For this reason alone, it comparatively facilitates the fast growth for domestic air transports, entailing with massive increases in the air trans-

portation and this would further aggravate the workload for both the airport as well as ATC organization. Within these, the traffic flow problem at Taipei Sung-Shun Airport seems to be the gravest among all.

Amid impacts by high-priced oils as well as the completion and activation for high-speed rail of west corridor in addition to highway transportation system, Sung-Shun Airport had been greatly affected besides off-island flights. Not until government opening up for direct cross-strait flights in 2008, then Sung-Shun Airport would be able to regain its transportation volume significantly. Additionally, the activation for flights destined to Tokyo, Japan, and routes to Seoul, Korea, this enables Sung-Shun Airport gaining the status of “Capital City commercial airport”.

Moreover, the flow capacity issues for Flight Intelligence Region (FIR) are usually resulted from the densely-packed airport and scheduled flights as well as the domestic flights with short flight distance. Nonetheless, these densely-packed flights not only create the social cost through wasting the time for those planes staying in the air for waiting, but also it is an flight safety issue that no longer can be ignored. Hence, how to base upon the schedules for domestic flight and proceed to arrange reasonable arrival scheduling, in addition that prior the scheduled flight takes

off at the airport, it is preferred to calculate the flow volume of ensuing flights entering into Sung-Shun control area. And basing upon these prerequisites, the control measures are proceeded accordingly which can cut down the workload for ATC personnel as well as ensuring the safeties for passengers and the airplanes.

Thus, the objective of this research is to proceed to flow control by locating a set of arrival scheduling through targeting to Sung-Shun ATC and applying the simulation software as the tools for aircraft taking-off operation and related performance appraisals. In these, this research adopts the ratio for time duration of 40 seconds, average time delayed and early flight arrival ratio as the primary performance appraisal indices. Then it is followed with comparison made against these two alternatives so as to understand whether there exist significant differences in the performance criteria for these two models. Lastly, this research provides recommendations as opposed to which supply chain systems be selected through basing upon the findings from the performance appraisals.

#### Literature Review

Regarding to the research exploration for airport ATC, it can generally be broken down to the following control definitions and categorizations, flow management, and factors impacting the runway, a total of three items for further illustration.

### *ATC Definition And Categorization*

The so called Air Traffic Control is that in order to gain effective control for operation status on the ground level, it can provide the aircrafts with safe as well as economical air traffic services. And in the advent of progress made in aircraft and economical development, the performance of the aircraft also has been raised significantly. Therefore it cannot simply rely upon the pilot to avoid collisions it must also depend upon the ATC organization on the ground as well as arrangements made for the airlines and the routes scheduled. This is also the cause why we require the ATC and in the future we also expect to utilize the satellite guidance so as to increase the accuracy for ATC as well as raise the level of ATC services to an even more comprehensive level.

In the ATC categorization, the ATC for Taipei control can be divided into three types: Air Route Control, Terminal Control and Tower Control, and they are illustrated as follows.

1. Air Route Control: It is also known as En route control, currently it is located at the Taipei Air Route Control within Taipei FIR (Flight Information Region) and it is also the domestic control center based upon region. Internally, this can be broken down into five control regions: North, Central, South, Kinmen and Ma-gong, and they are responsible of the controlling airspace which the aircrafts follow the Instrument Flight Rule (IFR) while

offering the service of en-route flight. In addition it can exchange and coordinate with neighboring control centers so as to ensure the safety of transnational and transoceanic flights.

2. Terminal Control: It is also known as Departure and Arrival Control. And this organization normally locates at the main airport which it serves under, with the objective of providing the Departure and Arrival services for aircrafts under its jurisdiction while ascending and descending.

3. Tower Control: It is also known as Aerodrome control which provides ATC services for airport airlines as well as the airspace neighboring to the airport as the hub within 5 nautical miles and under 3,000 feet. Its main objective is to enable the both ATC personnel and the pilots applying SOP and controlling methods, etc, during the aircraft taxing, taking-off and various phases and so on in addition to achieve the purpose of flying safely and rapidly as well.

### *Flow Control*

The so called Flow Control refers that when the flight activity of the aircraft within the flow control region exceeds the loading for ATC system, the necessary control measures are taken so as to alleviate the crowded aircrafts within the region. When arrival aircrafts proceed to queuing, and the flow control will be processed according to the queued sequence. And there are many flow control measures as depicted in Table 1.

Table 1. Flow control measures

Flow control measures	Illustration	Strength	Weakness
Speed control	Demanding the acceleration and slowing down for aircraft	Can absorb the en route time delayed	Unable to control
Route change or detoured path	Alter original route or switch to another route	Can alleviate the crowding phenomenon	High cost and difficult to control
Queuing in the air	En route queuing in the air	Can alleviate the crowding phenomenon	High cost and difficult to control
Ground queuing to control the departure time	Request the aircraft to proceed to ground queuing	Low cost and high safety ratio	If overly conservative, it can cause the loss in capacity

### *Factors Affecting Runway*

The so called runway capacity is defined as that, under the known conditions, the maximum number of the processed operational departure/arrival flight. In application, the runway has the so called Runway Blockage. When an aircraft is taxiing on the runway, all other landing or take-off is not allowed. Other than this, at the time when the aircraft arrives, the runway is also blocked as well. And the fact that other on-the-ground aircraft tries to cut across the land or take-off or landing is prohibited. Therefore the runway blockage scenario differs according to the type of aircraft as well as the length of the runway.

Runway at Sung-Shun Airport is restricted to one; therefore both the departure and arrival of the aircraft use the same runway. And the planes that are departing and arriving could interfere each other; nonetheless the queuing for domestic flow control is prioritized to have the

flight in the air implemented with arrival control for landing first, and then allow the departure flight to take off. The factors affecting runway capacity can be complex at best and the primary factors include those depicted in Table 2.

### Research Methodology

#### *Current Status Description*

There are a total of 11 domestic airports including Sung-Shun Airport. In this research, the simulation takes place according to the queuing sequences for both the departure and arrival to Sung-Shun airport. The basic assumption and conditions for the model are as follow. The time and duration generated by aircraft are known (flight schedule).

Table 2. Factors affecting runway capacity

Factors	Content illustration
Climate and weather	Include wind direction, wind speed, visibility
Runway configuration	Such as single lane runway or multiple lane runway and orientation of the runway, etc
Close-by terrain	Suppose Sung-Shun Airport has 10 to 28 runways, since they are all affected by the close-by terrain therefore the capacity for 28 runways would be much less for those with 10 runways.
Ratio for departure/arrival	Normally the airport capacity is defined by two constants: the arrival and departure capacities; and different ratios would alter the capacity of the runway as result.
Aircraft type	Due to different aircraft types, the isolation approaches and required runway lengths would also differ as well.

1. Types of the aircraft are two (large or small).
2. The minimum safety distance is 40 seconds apart.
3. Due to factor of passenger boarding, the plane can not take off ahead of the schedule.
4. Arrival flights take higher priority over departure ones.
5. Small aircraft precedes larger aircraft.
6. Only 10 runways are taken into consideration and the 28 runways are ruled out.
7. Temporarily, the climate and the weather factors are not being evaluated.
8. There are two procedures: ordering and merging at the arrival phase.

#### *System Simulation*

The main architecture for this model has two tiers and the following are the contents for each tier.

1. First tier: Interconnections between each airport and Sung-Shun Airport depicted as in Figure 1.
2. Second tier: Configuration for all domestic airports.
3. Entity: Entity configured in this model is the Entity 1 aircraft, and it is generated at each airport and then enters into the system.
4. Resources: The resource within this model is a single runway.
5. Attributes: Setup for the attributes is detailed in Table 3.

#### *Brief Introduction Of The Model*

System models can be mainly divided into two major categories: Procedural control for special time and flight schedule generation.

For Sung-Shun Airport, its flight schedules are between 7 am to 12pm, and during this period, there are 77 take-offs,

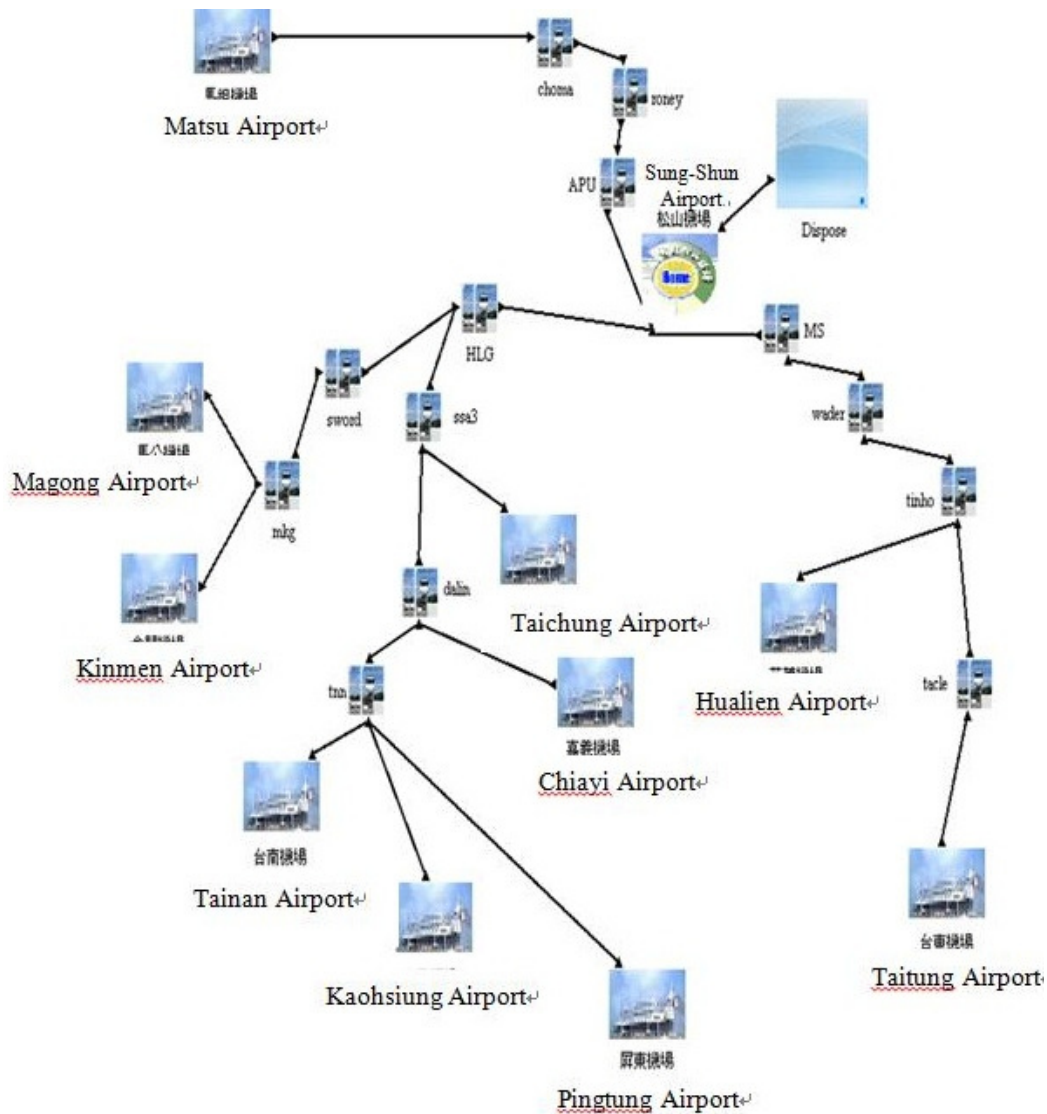


Figure 1. Relevant diagrams for domestic routes

66 landings and a total of 143 flights scheduled.

*Control Procedure For Arrival Tower*

Since the topics explored within this research are primarily focused on “arrival control” at Sung-Shun Airport, therefore the aircraft simulation time sequence

is preset from the System Analysis Record (SAR) information. Unless for the sake of the arrival tower, its flight time should adopt the normal distribution with the average flight time shown in Table 5 and the variable of 1. Suppose for the sake of arrival tower, and its flight required time is a fixed value then they can be shown as in Table 4.



*Illustration for Critical Activity*

(1) Sung-Shun Airport

The configuration for Sung-Shun Airport activity is shown in Fig. 2. The approach of alternative 1 is to have Sung-Shun Airport maintain the minimum of 40 seconds between each flight regardless whether taking-off or landing. Therefore the adopted approach is to preset as striving for a single resource (runway) and the required time is 40 seconds. Therefore if no resource is available, at this moment the Entity would wait. Thus it can meet the

standard of minimum 40-second interval for the aircraft take-off or landing.

Moreover, the priority setting for aircraft landing includes alternative 1 which adopts the first-come-first-serve approach. Suppose the arrival time is the same, then the priority of landing precedes that for the take-off. Then it is followed with small aircraft priority preceding the large one. Therefore, to meet the priority setting, this team adopts the “Assign” priority setting which assembles all landing and take-off aircrafts under the Assigns.

Table 3: Setup for the attributes

Type	Global		
	Name	Mode	Function
Entity Instance	adtime	String	Arrival or departure flight schedule at Sung-Shun Airport
	airtype	Real	For small aircraft, it is 1.0; and the large aircraft is 0.0.
	method	Real	Aircraft type at Sung-Shun Airport: 1.0 for landing and 0.0 for take-off.
	flight	Real	It records the time gap between Sung-Shun Airport flight schedule and system initial setup time interval
	Temp	Real	Algorithm priority weights
Model	output	String	Recorded flight schedule time and the actual landing or take-off time

Table 4: A list of the required flight time for each tower (airport)<sup>4</sup>

Line <sup>4</sup>	W4 <sup>4</sup>							Arrival Control <sup>4</sup>
From <sup>4</sup>	Pingtung Airport <sup>4</sup>	Kaohsiung Airport <sup>4</sup>	Tainan Airport <sup>4</sup>	Chiayi Airport <sup>4</sup>	DALIN <sup>4</sup>	Taichung Airport <sup>4</sup>	SSA3 <sup>4</sup>	HLG <sup>4</sup>
To <sup>4</sup>	TNN <sup>4</sup>	TNN <sup>4</sup>	TNN <sup>4</sup>	DALIN <sup>4</sup>	SSA3 <sup>4</sup>	SSA3 <sup>4</sup>	HLG <sup>4</sup>	LK <sup>4</sup>
Time <sup>4</sup>	21.4 min <sup>4</sup>	11.9 min <sup>4</sup>	5.2 min <sup>4</sup>	6.7 min <sup>4</sup>	15.2 min <sup>4</sup>	10.9 min <sup>4</sup>	9.0 min <sup>4</sup>	11.4 min <sup>4</sup>
Line <sup>4</sup>	W6 <sup>4</sup>							Arrival Control <sup>4</sup>
From <sup>4</sup>	Kinmen Airport <sup>4</sup>	Magong Airport <sup>4</sup>	MKG <sup>4</sup>	SWORD <sup>4</sup>				
To <sup>4</sup>	MKG <sup>4</sup>	MKG <sup>4</sup>	SWORD <sup>4</sup>	HLG <sup>4</sup>				
Time <sup>4</sup>	8.3 min <sup>4</sup>	3.3 min <sup>4</sup>	18.1 min <sup>4</sup>	10.5 min <sup>4</sup>				
Line <sup>4</sup>	W2 <sup>4</sup>							Arrival Control <sup>4</sup>
From <sup>4</sup>	Matsu Airport <sup>4</sup>	CHOMA <sup>4</sup>	RONEY <sup>4</sup>					APU <sup>4</sup>
To <sup>4</sup>	CHOMA <sup>4</sup>	RONEY <sup>4</sup>	APU <sup>4</sup>					LK <sup>4</sup>
Time <sup>4</sup>	23.8 min <sup>4</sup>	2.4 min <sup>4</sup>	2.4 min <sup>4</sup>					2.6 min <sup>4</sup>
Line <sup>4</sup>	MT2 <sup>4</sup>							Arrival Control <sup>4</sup>
From <sup>4</sup>	Taitung Airport <sup>4</sup>	TACLE <sup>4</sup>	Hualien Airport <sup>4</sup>	TINHO <sup>4</sup>	WADER <sup>4</sup>			MS <sup>4</sup>
To <sup>4</sup>	TACLE <sup>4</sup>	TINHO <sup>4</sup>	TINHO <sup>4</sup>	WADER <sup>4</sup>	MS <sup>4</sup>			LK <sup>4</sup>
Time <sup>4</sup>	13.3 min <sup>4</sup>	26.6 min <sup>4</sup>	105 min <sup>4</sup>	7.1 min <sup>4</sup>	7.1 min <sup>4</sup>			9.5 min <sup>4</sup>

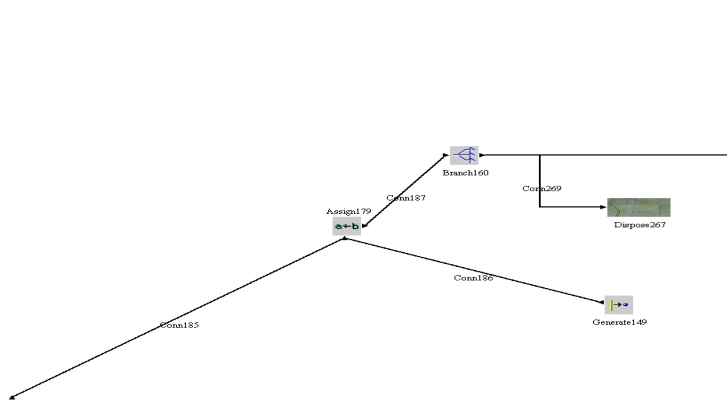


Fig. 2: Configuration for Sung-Shun Airport Activity

activity. And under the premise of accept Entity, the expression for priority is set as such:  $Entity.temp := (10.0 * (6.0 - Entity.EnterTime)) + (Entity.method * 2.0) + Entity.airtype$ . For the alternative 2, the approach would adopt the longer delay time for flight schedule at Sung-Shun Airport which would have the priority of using the runway. Hence the priority setting would assemble all take-off and landing aircrafts to the Assign's activity. And under the accept Entity, the expression for setting priority is:  $Entity.temp$

$$= (10.0 * (Entity.EnterTime - Entity.flight)) + (Entity.method * 2.0) + Entity.airtype.$$

## (2) All domestic airport generation

The configuration figure for all domestic airport Activity is shown in Figure 3. Since this system is the kind that generates aircraft within specific timeframe according to flight schedule therefore it generates Entity (aircraft) at specific timeframe and applies generation to read file which can input into the flight schedule.

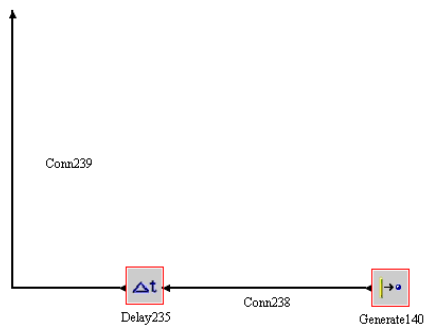


Figure 3: Domestic airport Activity configuration

## 2. Recording from the findings

Since the analysis information required by this team cannot be generated from basic information report, therefore the final empirical finding will be recorded via file inputting. And the content of the recording is as follow:

1. The actual time for aircraft landing and take-off.
2. The time allotted for Sung-Shun

Airport flight schedule.

## Experimental Setting

Each simulation timeframe starts from 6 am till 12 noon, and there are 15 simulations implemented with two experimentations:

Alternative 1: At Sung-Shun Airport, it does not matter whether it is take-off or landing, its interval should be at a minimum of 40 seconds. And the runway used will adopt the approach of “First-Come-First-Serve”. If the timeframe is identical then the priority of landing aircraft pre-

cedes that of take-off and the smaller aircraft precedes larger one.

Alternative 2: At Sung-Shun Airport, it does not matter whether it is take-off or landing, the interval should be at a minimum of 40 seconds. And the occupied runway should adopt the approach of “Key ratio: The shortest time duration in the flight schedule at Sung-Shun Airport should have the precedence in using the runway”. If the time is identical, then landing aircraft should precede the take-off, smaller aircraft precedes the larger one.

### *Findings Analysis*

This research shall adopt three appraisal indices to explore the empirical performance.

#### 1. Ratio of 40-second time interval

Probability from the occurrence for original flight schedule without the 40-second interval is 28.87%. It does not matter whether it is prior or after the alternative, the probability of the occur-

rence for the time without the 40 second interval is 0.0%.

#### 2. Average time delayed

Alternative 1: The average time delayed as opposed to the original flight schedule at Sung-Shun Airport is 156.4022 seconds with SDV of 7.4468. Alternative 2: The average time delayed as opposed to the original flight schedule at Sung-Shun Airport is 154.9830 seconds with SDV of 8.2815.

Since both alternative 1 and 2 adopt identical seed from flying time normal distribution therefore it can be explored via pair-t test and after applying SPSS, the findings are shown in Table 5.

#### *Ratio for early arrival of scheduled flight*

The defined early arrival ratio is the number of early landing flight /the number of total landing flight. For each experiment, the provided early arrival ratio for both alternative 1 and 2 is shown in Table 6.

Table 5. Finding analysis from pair-t test

Alternative 1 - Alternative 2			
average	standard deviation	95% confidence interval	
		lower limit	upper bound
1.4192	5.6187	-1.6923	4.5308
t	degrees of freedom	Sig.	
.978	14	.345	

Table 6. List of scheduled flights early arrival

The number of experiments	Alternative 1	Alternative 2
1	22.82%	21.62%
2	21.33%	22.45%
3	20.81%	21.48%
4	22.15%	21.62%
5	21.62%	21.62%
6	22.00%	20.81%
7	20.67%	22.15%
8	21.48%	21.09%
9	21.33%	21.48%
10	22.67%	22.15%
11	20.81%	22.30%
12	22.15%	21.62%
13	21.33%	22.30%
14	21.48%	21.62%
15	20.81%	22.45%
Ratio	21.56%	21.78%

From the above three indices, we can tell that suppose the evaluation is focused upon the “safety”, then it does not matter whether it is alternative 1 or 2, both can reach the 40 seconds interval between all aircrafts landings and take-offs; whereas suppose we focus on the alternative’s difference between alternative 1 and 2, specifically in average number, then one can find that the alternative 2 is found superior to alternative 1. Nonetheless if by going through pair-t test, we can find that there is no significant difference between these performances. As for the probability of this kind of occurrence, this team predicts that it could be resulted from too little experimentation. Therefore it is recommended that the number of experimen-

tion be exceeded 30 then there should be the existence of significant difference.

#### *Algorithm problems encountered*

As for Sung-Shun Airport arrival control simulation by Simprocess, this team uncovered the problems for the algorithm detailed as follow:

1. In acquiring the actual arrival time, it adopts the format of having information written into the file and within the information written into the file, all of them are the experimental results at the last try. This could duplicate the file content. And this team also verified that during file opening and closing stage, both start simulation and end simulation would only record

the last experimentation result.

2. Due to the fact that the actual time format adopts the string approach, this would likely pose problem to flight schedule time (which is also in string format) and the system cannot directly calculate the time difference therefore it creates the undue complexity for information processing by this team.

### Summary

Sung-Shun Airport currently shoulders the responsibility of transportation for domestic flights. Its frequent aircraft landing and take-off control operation would generate the workload and stress for all ATC personnel involved and this could become the major concern for flight safety. Alternatively, the flow problems observed for Taipei FIR are usually created by densely-packed airport and flight schedules as well as domestic airlines with short flight path.

Nevertheless the densely packed flight schedule not only renders waste in time for aircrafts queuing in the air but also create social costs and the flight safety can not be ignored either. Hence making reasonable arrival queuing sequence by basing upon the flight schedule for domestic airlines in addition to pre-calculating

the ensuing flight flow which enters the Sung-Shun Airport control region to allow the prior controlling be implemented, these can be essential to cut down workload for ATC personnel in addition to ensure the safety for both passengers as well as aircraft.

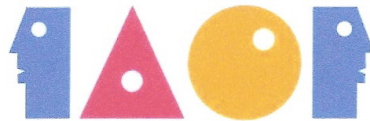
Consequently this main objective of this research is to locate a series of arrival queuing sequences for Sung-Shun control so as to proceed to successful flow control mechanism. This research applies simulation software to serve as the tool to evaluate flight operations and related performance appraisals. Within them, this research adopts ratio of time interval in 40 seconds, average time delayed and ratio for early flight arrival as the major performance appraisal indices. Then it is followed with performance comparisons between these two alternatives so as to understand whether there is any significant difference existed between these two models. And according to the test findings from these models in addition to essentials from evaluating the “safety” for both the passenger and flight aircraft, we found that whether be it as alternative 1 or 2, both can meet the 40 seconds interval requirement between all the landings and take-offs. And this can ensure the safety for our passengers and flight aircraft as result.

## References

- Andres Zellweger, 2003. Simulation in CNS/ATM research with examples from the United States. *Simulation Modelling Practice and Theory*, II, 173-185.
- Amedeo R. Odoni, Jeremy Bowman, Daniel Delahaye, John J. Deyst, Eric Feron, R. John Hansman, Kashif Khan, James K. Kuchar, Nicolas Pujet, Robert W. Simpson, 1997. Existing and Required Modeling Capabilities for Evaluating ATM Systems and Concepts. International Center for Air Transportation, Massachusetts Institute of Technology
- ATAC Cooperation, 2003. The Simmod PLUS! Reference Manual.
- Beasley, J. E., Krishnamoorthy, M. Y., Sharaiha, M., and Abramson, D., 2000, Scheduling Aircraft Landings-The Static Case, *Transportation Science*, 34, no.2, pp. 180-197.
- CAA, 2007, Air Traffic Management Procedures.
- CAA, 2008, Air Traffic services Division, Taipei, Taiwan.
- Dallas, G. D., and Erzberger, H., 1995, The Center-TRACON Automation System: Simulation and Field Testing, NASA Ames Research Center.
- Davis, T. J., Krzeczowski, K. J., and Bergh, C., 1994, The Final Approach Spacing Tool, The 13th IFAC Symposium on Automatic Control in Aerospace, Palo Alto, California.
- Dugail, D., Feron, E., and Bilimoria, K., Stability of Intersecting Aircraft Flows using Heading Change Maneuvers for Conflict Avoidance, *Proc. American control*, pp. 760-766.
- Elsa, F., Potential Benefits of a Time-based Separation Procedure to Maintain the Arrival Capacity of an Airport in Strong Head-Wind Conditions, *Proc. 5th USA/Europe Air Traffic Management Research and Development Seminar (ATM2003)*.
- FAA, 2010, Air Traffic Control, Jo 7110.65T.
- Federal Aviation Administration, 1999. Airspace Management Handbook – Guidelines. Department of Transportation, Washington, DC.
- Federal Aviation Administration, 1999. Airspace Management Handbook – Metrics. Department of Transportation, Washington, DC.
- Federal Aviation Administration, 1999. Order 8260.3B United States Standard for Terminal Instrument Procedures (TERPS), Third edition. Federal Aviation Administration



- Hartmut, H., Ronny, H., Maria, U. R., Daniel, M., and Dennis, W., Time-Based Arrival Management for Dual Threshold Operation and Continuous Descent Approaches, Proc. Eighth USA/Europe Air Traffic Management Research and Development Seminar (ATM2009).
- IATA, 2009, Commission for Aviation Regulation's (CAR), Dublin.
- Jimmy, K., and Mark, P., Strategic Conflict Detection and Resolution for Free Flight, Proc. the 36th Decision & Control
- Klaus Eyferth, Cornelia Niessen, Oliver Spaeth, 2003. A model of Air Traffic Controllers' Conflict Detection and Conflict Resolution. *Aerospace Science and Technology*, 7, 409-416.
- Kupfer, M., Scheduling Aircraft Landings to Closely Spaced Parallel Runways, Proc. Eighth USA/Europe Air Traffic Management Research and Development Seminar (ATM2009).
- Lee E. Paul, 1990. Using Simulation to Evaluate the Safety of Proposed ATC Operations and Procedures. Federal Aviation Administration Technical-Center.
- Lin, C. E., and Jian, S. G., 2008, A Fast Queuing Observer for Flow Control using FDP in Excel Environment, *Aeronautic, Astronautics and Aviation*, 40, no1, pp. 1-10.
- Mao, Z. H., Feron, E., and Bilimoria, K., 2001, Stability and Performance of Intersecting Aircraft Flows under Decentralized Conflict Avoidance Rule, *IEEE Transactions on Intelligent Transportation Systems*, vol. 2, no. 2, pp. 101-109.
- Taha, H. A., 2007, *Operations Research*
- Resmerita, S., and Heymann, M., Conflict Resolution in Multi-Agent Systems, Proc. Proceedings of the 42nd IEEE Conference on Decision and Control, pp. p.2537-2542.
- Zhang, X., Zhand, X., Zhang, J., and Liu, B., Optimization of Sequencing for Airport Arrival Based on Approach Routes, Proc. The 2007 IEEE Intelligent Transportation Systems Conference, pp. 592-596.



## COMMUNICATION MEDIA (E-COMMERCE) AS A SUPPORTING FACTOR IN INDONESIA'S FASHION INDUSTRY IN THE INTERNATIONAL BUSINESS COMPETITION

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### Abstract

The globalization era has disentangled the international economic competition and has stimulated the increasing economic interdependence of national economies worldwide through a rapid increase in the expeditious movement of goods, services, technology, and capital. The international industry and business arena has spurred cross-border business transactions and business access, and eventually have stimulated domestic industries, particularly the creative industry, to be able to compete in the international arena.

A competitive company is a company capable of implementing technology internally. One of the types of technology implementation in order to increase business competition and sale of products is the utilization of electronic commerce (e-commerce) that may help market a wide range of products or services, either physical or digital.

In this research, the author will try to describe and examine the importance of implementation of e-commerce communication media by the creative industry, particularly in the fashion industry subsector as a supporting factor in the international business competition. This research used the qualitative approach with the descriptive type of research aiming to make a systematic, factual, and accurate description of particular facts and characteristics.

**Keywords:** E-commerce, Communication, Media, International Business, Creative Industry, Fashion

### Introduction

The euphoria of globalization has disentangled the international economic competition, moreover for developed countries and developing countries that are expanding their competitive business access.

Underlain by different resource potentials, each country often utilizes its comparative advantage or competitive advantage in performing its business activities. In face of this matter, certainly the logical consequence arising is the demand for domestic local industries to make use of existing resources, specifically by optimizing local resources.

The creative industry, as an economic activity that truly reflects the potential and productivity of local resources, plays an important role in creating added values through the existence of creative products or services. There is no doubt that the creative industry potential is currently highly promising, with its foreign exchange contribution to the national economy. Indonesia's creative industry has become one of the most successful and promising industries since 2002, (the Ministry of Commerce of the Republic of Indonesia started to recognize the existence of this industry, resulting in the mapping of its contribution to the economy since 2002). During the period 2009 - 2015, the annual contribution of the creative industry to export was predicted to reach 12 percent and provide jobs for 7% of the workforce (Ministry of Commerce, 2005).

However, apart from all this, the local creative industry still faces competition constraints, specifically in respect of global market access. Information Technology serving as the supporting factor in creating an effective business communication has not been optimally utilized. This rests on the assumption that by means of information technology, it may automatically create corporate competitive advantage in international business.

One of the utilizations of information technology is the existence of e-commerce being a form of technology implementation to increase competitive business competition. With it, various corporate needs in relation to business communication activities such as the transfer of information and resources may be satisfied. Indeed, the subsequent impact is the capability of improving services to customers and increasing corporate competitiveness. This vital thing becomes the benchmark of domestic industries, specifically the industry creative, as we know that it has extraordinary potential. If the local creative industry may optimally apply this form of technology,

i.e. e-commerce in carrying out its business strategies, certainly the competitiveness challenge of the global industry may be addressed.

Electronic Commerce (e-commerce) greatly supports corporate improvement and development that may provide feasibility for the management to process various resources used. E-commerce supports the management in the marketing process in order to achieve objectives, as e-commerce may alter the form of services from originally one must come in person to the intended agency or by phone, but now the services become online anytime and anywhere, making it easier to handle each transaction.

## Literature Review

### *International Business Communication*

The rise of business world or other human life sectors will not be successful without the existence of communication. In principle, communication may alter the opinions, attitudes, and behaviors of the society. Initially communication was defined as a one-way communication in the business world or other sectors. In line with its development, communication is defined as a two-way process between business actors. Not only that, the business world development is also supported by the rapid technological advancements.

To put it simply, it may be said that Business Communication is defined as communication used in the business world, covering various forms of communication, either verbal or non-verbal communication to achieve particular objectives. In the business world, an excellent communicator, in addition to possessing excellent communication skills (definitely), must also use various kinds of communication tools or media available to convey business messages to other parties in an effective and efficient manner so that the objec-

tives of conveying business messages may be achieved (Djoko Purwanto. 2006).

The international business communication activity concerns the promotion of business and product (export) that attempts to embrace both the government and the private sector of other countries to conduct business transactions (commerce, investment, travel, tourism, etc.). The actors in this activity include communicators that come from the business circle, while the communicatees usually come from the officials of government agencies, business circle, and the public in other countries.

The international business advertising media may be divided into three areas: 1) commerce or industry, aiming to reach distributors, attempting to convince them to add the stock of goods advertised and giving sales commission to sellers that have successfully secured purchase orders. 2) Consumer advertising, on the other hand, attempts to convince consumers to purchase brands or names of products advertised from shops or any other mercantile establishment that serves consumers. 3) Professional or ethical advertising attempts to influence professionals to write a review or suggestion in order for the publicized products to be used.

In a broader scope, business communication covers all issues related to "how to express the ideas" or "how to share the ideas in business". Based on such definition, it may be said that the business communication activity covers the forms of communication, which demand communications skills. Business communication requires the mastery and comprehension of use of all forms of communication, in receiving or sending messages.

In relation to international business communication, it clearly involves cross-culture communication, which is a form of communication performed by two individuals or more, each having a different

culture due to geographical differences in domicile. In this matter, communication may occur at the interregional, interterritorial, or international level. Max Weber, the father of modern sociology, in his writing, says that "If we learn something from the history of economic developments, it is the culture that makes a difference". Although the Global Crisis and World War II slowed down commerce worldwide, when either of these ended, globalization flourished. The increasingly advanced transportation, communication technology and product distribution systems have brought forth what Cairncross referred to as the "death of distance" with the decreasing or disappearing hindrance of time and space. The importance of national boundaries has lessened during a period marked with multi-national companies, mergers, licensing agreements, foreign investments, and offshore productions. This results in economic interdependence of nations. This interdependence becomes part of the global economy where one day of global trading today is equivalent to one year of trading in 1949. This global interdependence was clearly demonstrated in January 2008, when the world saw the effects of the U.S. Stock Market collapse (Larry A. Samovar. 2010).

Developed countries and developing countries are now directly bound to the system of international economic interdependence and most countries have at least one national asset needed by other countries. International interdependence in this century is not limited to commerce and finished goods. However, communication technology has enabled the services industry to give contribution. As stated by Hanvanich "the pressure to establish and maintain the benefits of global competition has changed the way companies do business." Likewise, Thomas has the same view in his writing, "almost all currently existing businesses are global businesses." Comprehension of how to do business in a manner that accommodates different cul-

tural norms. In this new market, knowledge of cultural differences, cross-culture teamwork and multicultural collaboration constitute vital factors for the success of an organization.

#### *Cross-Culture Communication*

The relationship between culture and communication is deemed important to be understood in order to comprehend cross-culture communication. Cross-culture communication occurs when the communicator is a member of a culture and the communicatee is a member of another culture. In this situation, the issue arising is the encoding of a message in a culture and the decoding of such message in another culture.

Cross-culture communication is communication used in the business world, either verbal or non-verbal communication, with due regard to the cultural factors of a region, territory or nation. In this case, the meaning of cross-culture does not solely constitute foreign cultures but also cultures growing and developing in various regions within a national territory. Communication is assumed to be related to the behavior and fulfillment of human needs for interactions with other human beings. These interactions are performed through the exchange of messages serving as a bridge to unite human beings, who would be isolated without any communication.

The free trade and globalization era marked with the increasingly expanding products and services, including communication technology, cause the exchange of information from one country to another country to be more flexible, as if the world were no longer bound by boundaries that limit the territory of a nation. In behaving towards the free trade and globalization era, large companies operating domestically in the sectors of manufacturing, exploration or services engage foreign con-

sultants to help develop their companies. Likewise, there are also large domestic companies that expand their business to various countries.

Given the current developments or trends, cross-culture business communication becomes crucial for the established business harmony amongst them. However, it is necessary to have a mutual understanding between two individuals or more in performing cross-culture communication, either in writing (including via internet) or verbally (face-to-face).

In the globalization era with its highly advanced communication technology and transportation technology, the roles of multicultural persons are vital. According to Dedy Mulyana in his book "*Komunikasi Antar Budaya*", one of the roles is helping resolve multicultural conflicts and serving as mediators for people of diverse cultures. In addition, according to Wilbur Scramm in the book "*Komunikasi Antar Budaya*" it is stated that the role of multicultural persons is developing a cultural bridge. In respect of international business, human beings as business actors are expected to be able to build a broader network and apply e-commerce as one of the factors for international business success.

The increasing multitude of economic cooperation and agreement patterns in various world regions today will make cross-culture business communication more important. Today, there are several economic cooperation patterns in various world regions such as the ASEAN region (AFTA/ASEAN Free Trade Area), the Asia-Pacific region (APEC), the North American region (NAFTA/North American Free Trade Area), the Canadian region (CFTA/Canada Free Trade Area), the European region (EFTA/European Free Trade Area), and the Latin American region (LAFTA/Latin American Free Trade Association).

Given the increasingly open window of opportunity for multinational companies to enter the territory of a nation and driven by the increasingly rapid advancements of communication and information technology, then that is the time when the need for cross-culture business communication becomes increasingly more important.

*Globalization, World Trade and International Business*

Globalization is a common term in many languages and widely used in various disciplines. Some use it positively and some do the opposite. Globalization is construed in diverse ways, depending on the point of view and objective of the user. Cameron views globalization as "a continuous integration of economies"; for Gannon, "Globalization refers to the increasing interdependence amongst governments, business companies, non-profit organizations, and individual citizens". From the point of view of an anthropologist, globalization is "Interconnectedness as a whole, a proof of the global movement of resources, trade of goods, labor, financial capital, information".

This relation, which underlies the essence of globalization, constitutes a product of "growth of the commercial world and the accompanying business activities; dramatic improvement of telecommunications, ease of data storage and transmission; increased facilities and business opportunity.

The capability of moving products, equipment, people, information and security at a fast pace to all parts of the world, without national or international boundary issues, has increased what is commonly referred to as international cooperation. Continuous technological advancements in the fields of transportation, communication, and data transfer facilitate the capability of transnational companies to put the production process in areas that offer

lower production costs, particularly labor costs, and swiftly move products and services to developing markets. This great cooperation is expected to continue to develop in the future and its growth holds important principles. One of the important principles is how an economy is managed and controlled. According to Mandel, "Globalization covers the capability of Washington to control the economies." Giant commercial companies now have an immense capacity to influence regions, states, and national governments, in the framework of open market and free market, capable of moving goods across national boundaries without any obstacle.

*The Roles of Information Technology in the Global Business World*

One of the significant changes in Indonesia in terms of internet usage, everyone can run their business via internet network, specifically the market place and trading. For example, how we make payments online, sell and purchase airplane tickets and particular events online, purchase computers, printers, books online and many more.

E-commerce facility in the internet is highly useful, particularly for businesspersons whose business is export-based. Businesspersons no longer need to bring sample goods to their clients abroad. For prospective buyers desiring to conduct transactions, they may purchase the goods as sample goods via internet. If they feel satisfied with the appearance of the goods, they may contact the e-commerce site.

Global business activities will bring in more people of diverse cultures, creating relationships that may be established through face-to-face interactions or virtual relationships via electronic devices. Technology will enhance the capability of everyone around the world to stay connected. There is no limit to communication. Re-



ardless of the time and space that enable human beings to interact with others.

Information Technology (IT) is defined as a collection of technological components commonly regulated in an information-system-based computer. Computer is an effective tool to gather, manipulate, and distribute information. Information Technology has become a necessity for personal and professional growth, is capable of changing lives, and will continue to play a greater role in daily lives. Companies must focus on their strategies and overcome the business pressures. Given the huge competitive markets, organizations continue to find breakthroughs that will put them at an advantage over their competitors. IT helps organizations in many things such as strategic decisions, punctuality, and reliability. IT systems enable the management to increase the speed of decision-making, swift implementation of strategies, which change the relationship between customers and suppliers that may drastically increase production and the rating market (Novie Wirawan Arief, 2011).

Information Technology involves the use of information to create products and services. Information Technology includes the use of computer to transfer interdepartmental information within a company and the use of internet to provide information to customers. Information Technology only makes up 8% of the total output generated in the United States of America, but more than one third of the output growth is generated in the United States of America. Based on the results of study conducted by the Ministry of Commerce of the United States, it was estimated that half of the whole U.S. workforce would be employed by industries that create information technology. The study also found that information technology decreased production costs and created lower product prices.

Information Technology booming has become a great encouragement for businesspersons. When computer technology and communication technology unites, accompanied with seemingly lower costs, businesspersons acquire tools that may aid them to compete with large companies. Information Technology aids businesspersons to work in a fast and efficient manner, provide attentive consumer services, increase sales and project a professional image. Advancements in information technology have also created demands for new products, and businesspersons have risen to face the challenge Boone and Kurtz, 2006). Information Technology greatly helps human beings to identify and solve problems. The main usage of information technology is helping to solve problems with high creativity and to make human beings more effective in its utilization. A series of domestic and foreign events also slows down the recovery of national economy, business certainty and business climate erode, and business risks are increasingly higher. Eventually in several years later, there will be increasing cases of company closures and bankruptcies (Novie Wirawan Arief. 2011).

One of other technology-related services is e-business, also known as e-commerce, which is the use of electronic communication to create or sell products and services. E-business includes business transactions such as sale via internet or interactions between a company and its suppliers via internet. In fact, many people use the term information technology and e-commerce interchangeably (Jeff Madura. 2007).

#### *E-Commerce as Business Communication Media*

Electronic commerce (EC) is a new concept that may be described as the process of selling and purchasing goods or services on the World Wide Web or the sale & purchase or exchange of products, ser-



vices, and information through the information network, including the internet. Thus, some perspectives may be defined as follows:

- From the communication perspective, EC is a delivery of information, products/services, or payment through the phone line, computer network or by other electronic means.
- From the business process perspective, EC is a technology application towards automation of transactions and corporate workflow.

A number of people regard the term commerce as a transaction conducted amongst collaborating companies. Many people prefer the term e-business, which refers to the broader definition of e-commerce, not only selling and purchasing, but also serving customers and collaborating with business partners, and implementing electronic transactions in an organization.

According to Suyanto (2003), the benefits that may be obtained from e-commerce for organizations are:

1. Expanding the market place to national and international markets
2. Reducing the costs of paper-based information production, processing, distribution, storage and search
3. Enabling the reduction of inventory and overhead by simplifying the supply chain and the "pull" type management
4. Reducing the time between capital outlay and receipt of products and services
5. Supporting reengineering process business efforts
6. Minimizing the internet telecommunication cost that is less expensive than that of VAN
7. Faster access to information

As for the benefits perceived by companies, specifically in favor of customers,

it has been shown that e-commerce may give the following benefits:

1. Gaining new customers. The use of e-commerce allows companies to gain new customers from either the domestic market or the foreign market.
2. Attracting customers to retain them. E-commerce may create customers loyal to particular products / services.
3. Enhancing the quality of services. The existence of e-commerce allows companies to enhance the quality of services by having more personalized interactions, thus capable of providing information as desired by consumers.
4. Serving consumers with no time limit. Customers may conduct transactions and utilize the services of a company without having to be bound by time limit.

#### *Companies Successful with e-Commerce*

The computer company Dell has achieved success through a tortuous journey. It started with the failure of selling computers by mail orders met with fierce competition from Compaq, which resulted in USD 65,000.00 in loss within a period of six months, nearly bankrupting the company. However, the computer company Dell finally used e-commerce as its secret weapon, eventually leading it to become the largest PC makers in the world. Next, a company that has successfully used e-commerce is a second rank company that amazes the world, i.e. Wal-Mart, the largest retail company. Becoming the largest retail company in the world is not always a guarantee for success. Fierce competition caused large retail companies, such as Montgomery Ward, to go out of business due to bankruptcy. Wal-Mart realized the importance of innovation. Later on Wal-Mart used information technology (e-commerce), immediately arose and swiftly responded to the market fluctuation (M. Suyanto. 2003).

According to Era Kitty Hawk, he said that in 1997, the whole volume of business sale transactions was conducted online. Also based on the Forrester research, e-commerce may affect the commercial advantages for both the consumers and the business world. The success of a national economy is greatly determined by advertising activities in order to support the sale business, which determines the industrial viability, the creation of jobs, and the return on investment from all money invested. This is evidenced by the fact that developed countries or world's top companies are always accompanied with aggressive advertising activities. World's 50 top companies spent US\$ 49.3 billion on advertisements for 56 countries in 1996. Some was spent on internet ads (Saiful Ahmadi. 2011).

### *Creative Industry*

The creative industry is projected to become a dominant economic sector following banking and processing industry. In resource-poor developed countries, the creative industry is prioritized, even over banking activities. The creative industry is an industry heavily relying on high creative power with a touch of innovation to create new and quality products. Some of the small groups possessing skills and innovative ideas became pioneers of the creative industry. The creative industry produces works through ideas by creating added values through the works produced with a high level of effectiveness and efficiency. Through quality, unique products, and approaches that are more acceptable to consumers, these will boost increased revenues and the turnover of national economy. In view of the fact that the creative industry is a reflection of small and medium enterprises, which give real contribution to the regional economy, i.e. the creation of jobs, decline in unemployment rate, and growth of the locals' economy (.Eddy Soeryanto Soegoto. 2009).

Not only viewed from the economic perspective, the creative industry is also capable of giving positive contribution to and have impact on several other aspects of life, such as improved national image and identity, growing innovation and creativity of national subjects, being an industry that uses renewable resources, and positive social impacts. For the reasons above, the creative industry should appropriately become an appealing industrial sector to be developed with a mature development concept Indonesia Division ( Ministry of Commerce of the Republic of Indonesia, 2008).

### *Research Method*

This research used the qualitative approach with the descriptive type of research aiming to make a systematic, factual, and accurate description of particular facts and characteristics. Thus in this qualitative descriptive research, the writer describes how communication media (e-commerce) may increase international business competition.

According to Satory (2009: 22), the qualitative research method is a method emphasizing on the quality or the most important characteristic of particular goods / services. The most important characteristic of particular goods / services in the form of social event / phenomenon / symptom is the meaning behind the event. The qualitative research may be designed to give its contribution to practical theories, policies, social problems, and actions. In this research, in order to support the methods above, the researcher used documentation, i.e. any written materials relevant to the research. Documents in the form of archives were obtained from companies or information, news and articles available in the mass media.

### *Discussion*

#### *Domestic Creative Industry and*

### *Business Competition*

The creative industry has a fairly large potential and contribution, i.e. capable of giving significant contributions in terms of GDP, workforce absorption, exports and the number of companies involved. This creates the optimism that the creative industry may be made into one of the strategic industries to address short-term and medium-term basic economic problems: 1) relatively low economic growth in the aftermath of the crisis (averaging 4.5% per year); 2) high unemployment rate (9-10%), 3) high poverty rate (16-17%), and 4) low competitiveness of industries in Indonesia Ministry of Commerce, 2005).

Looking at such conditions, the motion of creative economy should appropriately be developed and empowered. The support of various relevant entities, i.e. the government and the society themselves may truly be optimized, particularly in managing local resources and definitely with the support of clear infrastructure. As previously mentioned, the industrial competition becomes one of the issues hitting the national creative industry. The government has made efforts to design a foreign promotion and commercialization service system in order to support competition in the global arena. The objectives thereof are the creation of a clear mechanism for business actors when promoting and selling their products (commercialization) abroad, as well as better efficiency and effectiveness of the promotion and commercialization.

In the blueprint of policy on creative industry development, the National Ministry of Commerce states that there are some competition commercialization activities in the global market, inter alia: 1) Studying the strengths and weaknesses of the promotion and commercialization system mechanism; 2) Designing a measureable and easily-evaluated promotion and com-

mercialization service system; 3) Socializing the promotion and commercialization service system to business actors and the government; 4) Evaluating continuous improvements to the designed promotion and commercialization service system (Ministry of Commerce of the Republic of Indonesia 2008).

The globalization process has become a highlight and focus of concentration on the economic studies in each country. Thus competitiveness constitutes a criterion that determines the success of a country in international trade. According to the world competitiveness rating agency, the IMD World Competitiveness Yearbook 2006, Indonesia ranked sixtieth (60<sup>th</sup>). The IMD World Competitiveness Yearbook (WYC) ranks and analyzes the capability of a country in creating and maintaining the environment where companies may compete with each other. Competition will make a country more competitive than other countries (Yohan Naftali, 2006).

Here we may see that the global industry competitiveness has directly encouraged the local industries to move and maximize the available potentials. Despite being acknowledged as having great potentials, the local industries, particularly our creative industry is judged as incapable of aggressively promoting the products created. Improvement of the competition climate remains inseparable from the support and role of the government, such as fostering and maintaining an open and efficient environment in both the domestic market and the global market.

Indonesia's aviation pioneer, PT Garuda Indonesia, Tbk (Garuda Indonesia), also applies the development of e-commerce used by domestic aviation industry in Indonesia to support its business value. Garuda Indonesia applies e-Commerce with the purpose of increasing the competitiveness of its services in order to create cheaper costs, faster service and

desirable quality by changes in customer behavior and other external environments. Garuda Indonesia is a producer that markets its services in general via website and provides services on demand, where consumers make the first initiative, e.g. booking online, which is then responded by Garuda Indonesia. In addition, Garuda Indonesia also uses website as promotion media, such as new services, as well as tourist areas. This will help prospective passengers to understand what is offered by Garuda Indonesia.

(<http://dewisuryani.blogstudent.mb.ipb.ac.id/files/2011/07/E-commerce-PT-Garuda-Indonesia-Catleya.pdf>)

#### *E-Commerce as Global Communication Business Support*

Each company definitely expects successful business by gaining sales and profits in significant amount. In this case, companies definitely need an effective pattern of business communication in order to support their business strategies or expansions, specifically for reaching the access to global market. Communication media becomes a decisive tool in the successful sale of a product. E-commerce as a tool that may be used in the business communication process has significant benefits to face the competitive business world. One of the benefits is marketing a wide variety of products or services, either physical or digital. In addition, no less important is the creation of a more integrated communication process in which various parties related to companies such as investors, consumers, and the government will take part.

Entrepreneurs with sizable investments (Small and Medium Enterprises) may start up their business easier by accessing the internet to reach customers around the world. Some Indonesian companies, for example, became members of ProNetLink to promote their products in e-commerce services. E-Commerce in the

sense of internet business is how to use internet to establish a closer relationship with customers and business partners.

Through the utilization of information technology, it may be seen as well that the hindrance of distance and constraint is no longer an issue. In media, which in this regard may be made into a form of support for the development of a more quality and highly competitive creative industry? As stated in his book "*The World is Flat*", Friedman says that information technology constitutes an important part as an indicator that determines the operation of international business (Thomas L. Friedman. 2005). The concept of business is no longer restricted to local companies but also the development of international network into the realized trade distribution. Another opinion that also strengthen the importance of technology application, i.e. in Manardo (2007) where via internet network, a new concept of consumer and market unrestricted by space and time is created, consumers gain the ability to conduct transactions transcending geography, time and space . The results are business opportunities that create a very different consumer relationship.

If we observe and compare the patterns or strategies of the creative industry in several countries, the utilization of information technology is truly formulated such that the channelization of creative ideas is truly accommodated. Similarly, the technology is also used for building an effective business network to expand the market capture. For example, the flooding products made in China take the local market by storm; the key to success of the rapid development of the Chinese industries is technology-based support. It is in line with the research conducted by Nurrahim (2006), which states that companies applying global strategies and using flexibility undertaken by their international network will increase their competitive advantage. Likewise, the result of study

conducted by Rosenbloom (2003) states that “*internet based e-commerce would replace all of people-centered communication process*”. This means that the efforts to be able to expand network, i.e. the use of e-commerce into something crucial and worthy to be developed, specifically our domestic creative industry.

Given the statement above, as well as looking at the euphoria of the fashion industry both local and international, there is nothing wrong if we try to compare the application of online business media already carried out by the fashion industry actors. Christian Louboutin, for example, one of the fashion designers who, via his online site, is able to demonstrate his position as the designer of shoes for world celebrities. Another interesting point to make is that the site has a sense of humor that makes its visitors stand viewing it for a long duration, thus it is no wonder that his online site is one of the 10 most visited websites in the world. (<http://www.christianlouboutin.com/>). Furthermore, who does not know Alexander McQueen, a designer with unquestionable works. Via internet media, he makes use of it by creating a truly informative website for fashion lovers, and the website is also one of 10 most informative fashion websites. (<http://alexandermcqueen.com/>)

If we observe and take a positive lesson from the examples above, surely it is not impossible for domestic fashion industry to do the same. Indeed, several national designers have also utilized online sites to exhibit their works. However, they must relearn the strategies to attract more fashion lovers to visit their sites. Considering that, the potential of human resources, more precisely our designers, is no less great than that of foreign designers. Currently many of our young designers whose works have gone international and have been able to compete in the global market, e.g. Ardista Dwiasri or Carmanita whose works have adorned various world-

renowned magazines. Thereby, marketing and branding strategies via online media should be an important thing that must be prioritized.

### *Global Competitiveness of National Creative Industry*

Given the increasingly mature internet and web technology, this will definitely increase the corporate capability in respect of business communication and in respect of information sharing, in addition thereto, there are also various valuable resources. However, some of the local industries, particularly creative industry actors, have not applied all of these maximally. According to Almilialia, in the research on the application of e-commerce in corporate business competition, the use of e-commerce in Indonesia is highly limited. Based on the initial survey, relatively few companies use e-commerce as a business tool. Thus, its usage as a competitive advantage tool has not been much realized. National creative industry actors must be more mature in relation to mastery of technology by remaining aware of the changing trends of such technology. This is as expressed by the Minister of Tourism and Creative Economy Mari Elka Pangestu that the creative industry still has obstacles, one of which is the issue of technology. According to her, in order to be able to compete globally, the creative industry needs to be supported by an adequate technology to enhance creativity on which it relies. The role and support of various parties are also greatly needed, academicians, business actors, and of course the government in this regard may move in a synergic manner to create the competitiveness and endurance of national economy. Seeing also that based on the results of discussion on the creative industry development through the World Bank's Focus Group Discussion, the obstacle still faced by the creative industry is the low competition level. This emerges given the mini-



imum number of distribution channels and the use of technology.

### *Fashion Industry Potential*

John Howkings discovered the presence of creative economy wave after he had realized that for the first time in 1996 the U.S. copyrighted works had selling values as did other exports such as automotive, agriculture and aviation. Then emerged 15 industrial categories falling into the scope of creative economy, i.e. advertising, architecture, fine arts, handicrafts, design, fashion design, movies, music, performance arts, publishing, research and development, software, toys and games, TV and radio and video games. The market value of these fifteen creative industrial sectors was US\$2,2 trillion in 1999 as shown in Table 1. The global creative economic value was predicted with the assumed growth rate of 5% per year to grow from US\$2,2 trillion in January 2000 to US\$6,1 trillion by the year 2020 Togar M. Simatupang ).

When observing the global market value for fashion, the portion of fashion design is relatively small (0.05%) as compared to that of other sectors. From there, the opportunity for domestic fashion industry may be seen. With the assumed growth rate of 5%, then the global market value for fashion was predicted to be around 16.8% in 2006. According to the Minister of Commerce, Mari Elka Pangestu, the growth of Indonesia's creative economy reached 7.3% in 2006, higher than the growth of national economy of 5.6%. The amount of contribution to GDP reached IDR 46 trillion (constant price), with the average percentage of creative industry contribution exceeding 44%. The seven largest contributors are 1) fashion, with its contribution reaching 29.85%, 2) Handicrafts, with its contribution reaching 18.38%, and 3) advertising, with contribution reaching 18.38%, 4) TV and Radio, 5)

Architecture, 6) Music and 7) Publishing and Printing (Togar M. Simatupang).

Based on the potential of domestic fashion industry above, we may definitely make use of the available global market opportunity, of the whole portion of fashion market value, it just contributes 16.8% of the entire sector, then the opportunity for our fashion industry to penetrate the global market remains wide open. If we compare the existing contribution value of the fashion industry to GDP, i.e. 13.7 trillion (29.85%), then if utilized and undertaken optimally, domestic fashion industry may be able to dominate more than 80% of the global market. Indonesia's fashion industry is one of the appealing industries. In addition, the booming factory outlets and distros in Indonesia also indicate a subsector that has a strong foundation in Indonesia. They have quite surprising revenues, some even capable of gaining US\$75-100 thousand/month.

In consideration of the foregoing, the fashion subsector and the activities relevant thereto, if they can be developed properly as a creative industrial subsector, they will be able to demonstrate their potential in the global market. In particular, given the increasing promotion and commercialization efforts by means of information technology, such efforts will ease access to the global market significantly. Thus, it is necessary to accommodate the facilities and infrastructure thereof, from making explicit rules up to creating conducive situations for the subsector to develop. In addition, the support of development is definitely followed by socialization to use domestic products.

Another e-commerce application in business is in the medium cooperative unit of woven songket in Pandai Sikek, Tanah Datar District, West Sumatra. Pandai Sikek is one of the "nagari" or "villages". Nagari is a region or a group of kampongs led or headed by a chief. Pandai Sikek

Nagari is an administrative division of X Koto Subdistrict. It is located about 40 km away from the centre of Batusangkar City towards Bukittinggi (via Padang Panjang). The region is known for its woven cloth products, i.e. Pandai Sikek Woven Cloth. Almost each household in the area of Pandai Sikek produces woven cloth, the craft of which is handed down for generations.

In the course of its development, Pandai Sikek is no longer widely known abroad due to the presence of many brokers who reap multiple profits from Pandai Sikek. The brokers purchase goods from Pandai Sikek at a cheap price and sell them to foreign or domestic tourists at a high price of up to eight times the purchasing price. In addition, the tourists are only introduced to songket cloth already purchased by the brokers from the original artisans. This makes the tourists unaware of the production process and origin of the

songket cloth. The tourists only know that songket cloth comes from Padang, the capital city of West Sumatra. This condition is detrimental to the artisans of songket cloth in Pandai Sikek. In addition, the lack of marketing makes Pandai Sikek less known by most of domestic and foreign tourists. This condition is detrimental to not only the owners of medium cooperative unit in Pandai Sikek but also indirectly makes the livelihood of existing people of Pandai Sikek, particularly the womankind who make songket cloth weaving as their main livelihood decrease. Today, with the development of internet, the medium cooperative units of woven songket in Pandai Sikek need an online marketing and sale system with the purpose of facilitating buyers to purchase songket cloth or wood-carving without having to visit any shop

Table 1. Market Value of Fifteen Creative Industrial Sectors in 1999

No.	Sector	Global	The United States of America	The United Kingdom
1	Advertising	45	20	8
2	Architecture	40	17	2
3	Arts	9	4	3
4	Handicrafts	20	2	1
5	Design	140	50	27
6	Fashion Design	12	5	1
7	Movies	57	17	3
8	Music	70	25	6
9	Performance Arts	40	7	2
10	Publishing	506	137	16
11	Research and Development	546	243	21
12	Software	489	325	56
13	Toys and Games	55	21	2
14	TV and Radio	195	82	8
15	Video Games	17	5	1
	Total	2240	960	157



and enabling transactions as long as they are connected to the internet. This online sale is referred to as e-Commerce. E-Commerce is a new system or paradigm in the business world, which shifts the paradigm of traditional commerce to electronic commerce, i.e. by using Information and Communication Technology (ICT) or in other words internet technology. (<http://blog.sivitas.lipi.go.id/blog.cgi>)

### Conclusion

E-Commerce and the activities relevant thereto via internet may become the driving force to recover domestic economy by means of liberalization of domestic services and accelerate integration with global production activities. Since e-Commerce will integrate domestic trade with world trade, diverse forms of talks or negotiations will not only be limited to the aspect of world trade but also how domestic policies on supervision in a country, particularly the fields of telecommunications, financial services, delivery and distribution.

The globalization process now leads the economy to a strategic phase, particularly in capturing and utilizing the global market. All this is inseparable from the assurance and demand for the stabilized capability of the local industries, particularly the creative industry, to have their own positioning. To that end, it is necessary to have an effective business communication process capable of accommodating all forms of transactional activity or commercialization promotion needs.

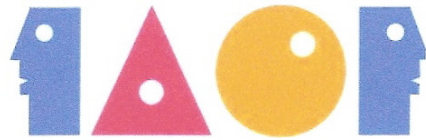
Information technology in the form of e-commerce is a form of communication media that plays a strategic role in supporting communication service and convenience for all parties involved in business activities. The factor then determines whether an industry is capable of demonstrating its competitiveness in the industry arena. The national creative industry, par-

ticularly, the fashion industrial subsector as one of the economic sectors, in this regard must also be able to make use of the vital moment of globalization flow. With the utilization of existing local resources and with the support of adequate utilization of technology, the creative industry is expected to be able to demonstrate its existence and dominate the global market, so that the vision of "Quality Indonesian nation with a creative image in the eyes of the world" may be realized in accordance with the government program in the framework of 2025 creative economy development.

### References

- Aw, Suranto. 2010. *Komunikasi Sosial Budaya*. Yogyakarta: Graha Ilmu
- Ahmadi, Saiful. 2011. *Strategi Meningkatkan Persaingan Bisnis Perusahaan dengan Penerapan E-Commerce*. STMIK AMIKOM Yogyakarta.
- Arief, Novie Wirawan. 2011. *Aspek Teknologi Informasi dalam Lingkungan Bisnis*. College of Informatics and Computer Management, Yogyakarta.
- Boone and Kurtz. 2006. *Pengantar Bisnis Kontemporer*. Jakarta: Salemba Empat
- Djoko Purwanto. 2006. *Komunikasi Bisnis*. Jakarta: Erlangga
- Eddy Soeryanto Soegoto. 2009. *Entrepreneurship Menjadi Pebisnis Ulung*. Jakarta: Elex Media Komputindo Kompas Gramedia
- Friedman, Thomas L. *The World is Flat*. London, England: Penguin Books, 2005.

- Jacques Manardo. 2000. Globalization at internet speed. *Strategic & Leadership*
- Jeff Madura. 2007. *Introduction to Business*. Jakarta: Salemba Empat
- Luciana Spica and Lidia Robahi. Penerapan E-Commerce Sebagai Upaya Meningkatkan Persaingan Bisnis Perusahaan. STEI Perbanas Surabaya
- Ministry of Commerce of the Republic of Indonesia, *Pengembangan Ekonomi Kreatif Indonesia 2025*, Creative Indonesia Division, Ministry of Commerce of the Republic of Indonesia, 2008.
- Kriyantono, Rachmat. (2006). *Teknik Praktis Riset Komunikasi*, Kencana Prenada Media Group: Jakarta.
- Madura, Jeff. 2007. *Introduction to Business*. Jakarta: Salemba Empat
- Manardo, Jacques. 2000. Globalization at internet speed. *Strategic & Leadership*.
- Mulyana, Deddy and Jalaluddin Rakhmat. 2006. *Komunikasi Antar Budaya*. Bandung: PT Remaja Rosdakarya
- Ministry of Commerce of the Republic of Indonesia 2008. *Pengembangan Ekonomi Kreatif Indonesia 2025*. Program Kerja Pengembangan Ekonomi Kreatif Nasional 2009-2015.
- Ministry of Commerce of the Republic of Indonesia, *Pengembangan Ekonomi Kreatif Indonesia 2025*, Creative Indonesia Division, Ministry of Commerce of the Republic of Indonesia, 2008.
- M. Suyanto. 2003. *Strategi Periklanan pada e-Commerce Perusahaan Top Dunia*. Yogyakarta: Andi
- Naftali, Yohan. 2006. Peningkatan Daya Saing Indonesia di Dalam Perdagangan Internasional. Post-graduate Programme of Doctor of Philosophy in Economics of the University of Boro-  
budur.
- Novie Wirawan Arief. 2011. *Aspek Teknologi Informasi dalam Lingkungan Bisnis*. College of Informatics and Computer Management, Yogyakarta.
- Nurrohim, Hasa. 2006. *Mengelola Strategi Global: Menuju Terciptanya Keunggulan Bersaing Perusahaan dalam Bisnis Internasional*. *Sinergi, Journal of Business and Management Studies* Vol.8 No.2 June
- Panuju, Redi. 1995. *Komunikasi Bisnis*. Jakarta: Gramedia Pustaka Utama
- Priyatna, Soeganda and Elvinaro Ardianto. 2008. *Tujuh Pilar Strategi Komunikasi Bisnis*. Bandung : Widya Padjadjaran
- Purwanto, Djoko. 2006. *Komunikasi Bisnis*. Jakarta: Erlangga
- Rosenbloom, Bert. 2003. *Communication in international business-to-business marketing channels Does culture matter?*, *Industrial Marketing Management*. North Holand
- Samovar, A. Larry, etc. (2010). *Komunikasi Lintas Budaya*. Salemba Humanika: Jakarta.
- Satori, Djam'an and Aan Komariah. (2009). *Metodologi Penelitian Kualitatif*, Alfabeta, Bandung.
- Simatupang, Togar M. *Perkembangan Industri Kreatif*. School of Business and Management of the Bandung Institute of Technology
- Soeryanto Soegoto, Eddy. 2009. *Entrepreneurship Menjadi Pebisnis Ulung*. Jakarta: Elex Media Komputindo Kompas Gramedia
- Sugiyono. (2011). *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Alfabeta: Bandung



SERVICE QUALITY: AN EMOTIONAL CONTAGIONS PERSPECTIVE

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Abstract

The tendency of an individual to catch and express emotions which are similar to and also expressed by those that he or she associates with, has been a subject of debate for many years. In most cases, psychologists and human relation scholars have agreed on the basic model that the underlying emotional mechanism acts like a chain of events where persons can mimic varied feelings as well as synchronize their facial expressions, movements, postures and vocalizations with those of other people. Henceforth, this process spreads to other people and eventually reaches a large group of people either through unconscious or conscious induction of behaviour temperaments or emotional states. The same case applies to service providers who wear gloomy faces because they will always create a cold consumer experience, an issue that will perhaps worsen customer relations leading to low profits and customer dissatisfaction, compared to a jovial and friendly mood of a service provider which may catalyse good consumer relations and better marginal profits. For this reason, this study critically examines various impacts that emotional contagions have on service quality and consumer satisfaction.

Keywords: Service Quality, Emotional Contagions, Emotional Labour

## Introduction

Sales and marketing managers are always interested in understanding various motivating factors behind the customers' post-purchase behaviour, specifically, what provokes them to seek for similar services over and over again? In line with Bui et al. (2011), this question becomes critical in answering two concerns; the circumstances under which the consumers are satisfied with delivered services, and, when they regret having used the same services and how this affects their future relations in the market (Andrade and Cohen 2007). The central purpose of the paper is to determine the range of emotional factors and how they influence customer satisfaction.

Emotional contagion can be likened to a contagious process because it is more automatic and easily spreads from one person to another. It has been argued that when a service provider expresses a certain emotional behaviour towards other colleagues, the entire workplace is likely to be under such a mood (Barsade 2002; Howard and Gengler 2001; Belkin 2009; Du et al. 2011). Therefore, building on emotional contagion and emotional labour theories, a clear model for this research

has been developed to facilitate for easier understanding and testing of the differential effects of two aspects of service provider emotions (behaviour and authenticity of the emotional labour display) and how they relate to changes in customer affect in a given service setting.

The above concerns make it necessary to examine whether factors related to consumer perception of service quality influences consumer satisfaction and post-purchase relations. The hypothesis is that there are a number of underlying factors which either lead to negative or positive benefits between consumers and service providers with the key being a strong culture of positive emotional contagion (Gountas and Gountas 2007; Bui et al. 2011). In summation, using the model of extended sales and marketing approach and in comparison to what other scholars have found out, the paper examines at length various issues closely linked to emotional contagion including various concepts in emotional service interactions namely primitive and conscious emotional contagion, the basics of emotional labour and how it is connected to deep and service acting, and customer consequences that emerge from service satisfaction and customer rapport. All these mentioned issues

lead to some important propositions which are also discussed in the paper to emphasize the gravity of the matter at hand (Smith and Bolton 2002).

#### Literature Review and Proposition Development

##### *Emotions in Service Interactions*

Allen et al. (2010) point out that the behaviours which frontline service providers portray, whether in good or bad faith, are highly decisive to consumer evaluations of service. More specifically, Curtis and Upchurch (2008) argue that the type of emotional interaction between the customers and service providers is considered a central element on the final relationship that bonds the customers and service providers. This fact is particularly true because in a reputable organization, the quality of service and how it is presented to the end consumers, determine the competitive power of that organization in relation to other similar firms (Curtis and Upchurch 2008; Hopp et al. 2012). However, although there has been substantial pragmatic research on service connections and customer valuations of service quality, the role of how emotions correlate with service interactions have remained of little interest to many researchers (Grandey et al. 2012).

In line with the above challenge, Barsade (2002) notes that emotions play a critical part on how various persons will relate to each other. As such, marketing managers as reported by Allen et al. (2010) encourages service providers to uphold to the basics of positive organizational display rules whether it is through surface or deep acting. The effect that positive emotions have on service encounters is that it encourages repeat and customer satisfaction through out the entire duration of customer interactions (Hill and Tombs 2011). Moreover, Dallimore et al. (2007) have also noted that the displayed emotions during service interaction plays a key role in determining customer outbursts and facial display of the involved parties during service interactions.

However, it is not only the service providers who shape how the outcome of the service should be like because the current study findings by Dallimore et al. (2007), presents a confirmation that consumers also play a critical role in shaping their own service experiences. This takes place in many ways including the fact that through their personalities and through their emotional display of negative or positive moods, the process of contagion may get to service providers who may be emotionally affected, thus influencing

final consumer experience (Du et al. 2011). One of such occurrence is presented by Dallimore et al. (2007) who notes that when dealing with the customer grievances or hostile customers, service provider employees should handle the situation immediately to avoid escalation of the problem through such measures as providing an apology, offering compensation, and rectifying the problem.

Besides, Schoefer and Diamantopoulos (2009) objects that during customer service interactions, subjective and interactional aspects of the problem should be dealt with clearly because the affected display of negative emotions Pugh (2001) may lead to poor consumer experience assessment reports which may lead to loss of clients and other potential business opportunities. As a result, service provider managers also commit most of their research efforts finding ways to create environments that can prompt pleasing service encounters (Lloyd and Luk 2011). In addition, service interactions may be both dyadic and shared because whatever one person initiates to talk about, it will be followed by the reaction of second person which is again followed by the reply of the first individual triggering a chain of events (Luong 2005). In a

nutshell, emotions play a critical part during service interactions and both the service provider and the consumer's emotions have the power to influence the decision made by the other.

### *Emotional Contagion*

When service providers are in a certain mood, whether depressed or delighted, this type of emotion is constantly communicated to others. This type of approach has been exemplified by Söderlund and Rosengren (2007) stating that when service providers converse with consumers in a depressed mood, the same may make consumers themselves feel depressed while if the conversation between them is that of self-confidence and buoyant, the client will also express a positive mood towards the provided service. This displayed transfer of emotional phenomenon from one person to the other is known as emotional contagion (Pugh 2001; Hennig-Thurau et al. 2006). Du et al. (2011) defines emotional contagion as the tendency to feel and express emotions which are similar and also influenced by those of other persons. In its broadest sense, it portrays a tendency for one party to automatically mimic and synchronize a various of facial expressions postures, vocalizations and movements with those of close individuals and consequently leading to an emotional

merger (Howard and Gengler 2001; Pugh 2001; Barger and Grandey 2006). Though theorists do not agree on the specifics that make up emotional family, majority of them agree that emotions are packaged of many components among them conscious control such as posture, facial and focal expressions, autonomic and neurophysiological nervous system (Barsade 2002).

The Emotional Contagion model was intended to assess how people are susceptible to catching such things as love, joy and happiness, anger, anxiety, and depression and other general emotion issues (Doherty et al. 1995). In various studies to assess the effectiveness of the model, it has been unanimously agreed upon that consumers that experience affirmative emotional contagion always catalyses enhanced and improved collaboration, lessened conflicts, and improved opinions of task execution. The contrary is true; negative emotional contagion leads to constant frictions, dis-satisfaction and constant complaints and low production (Du et al. 2011).

In his argument on emotional contagion, Pugh (2001) affirms on a number of antecedents and outcomes of exhibited emotions in different organizations. He proposes that indeed

customers do "catch" the contagious emotions from employees throughout service interactions. His findings further confirm that when service providers display positive contagion, the same is also positively relayed to the customer's positive affect in evaluation of service quality and service encounters. In a duplication and extension of previous research, employee expressiveness, and transaction husyness have been found to be able to foretell displays of emotions among the customers (Dallimore et al. 2007; Allen et al. 2010). To be precise, emotional contagion can be perceived as a two-stage process that centers on unintentional imitations of other people's responsive behaviour, that in effect triggers a congruent emotional state in the spectator.

According to Neumann and Strack (2000) they propound that at times facial expressions and postures by service providers are accidentally synchronized. Similar sediments have also been expressed by Belkin (2009) in his study about emotional contagion where the major findings rests on the argument that even if postural and facial expressions of employee emotions are capable of provoking similar affective reactions, future research must be conducted to cement and support similar findings and on



what the consumers feel about the whole process. However, Hennig-Thurau et al. (2006) in their research have found out that marginal activation from the point of view of a listener, or a consumer for this case, is not a necessary requirement for the feelings of emotional contagion to occur.

#### *Primitive Emotional Contagion*

Du et al. (2011) agrees on the proposed definition of primitive emotional contagion as a factor that is extensively catalysed by behavioural mimicry. Besides, a certain level of interactional cooperation has been reported to emerge from conversations that both include positive and negative emotional episodes (Curtis and Upchurch 2008). However, concerns on whether or not interpersonal and intrapersonal relationships alter primitive emotional contagion, remains to be researched and explored in the future. For instance, the effects that behavioural mimicry by the service provider has on the client during a service experience can be analysed using a model of face-to-face communication. However, close studies by Barger and Grandey (2006) have given a possible theory that closely connects to works by Pugh (2001) that primitive emotional contagion, namely facial mimicry, indeed does mediate a close connection between service provider em-

ployees' emotional displays and customer evaluation of service. Further, this work was the first of its kind and the major findings indicated that the overall facial smile by the employees, in a counter wise manner, also initiated the customer's final smile strength throughout the service experience. Similar findings by (Grandey et al, 2005) observed that from to dissimilar coders that recorded customer and employee smiles, concluded that smiles spark an element of unity between strangers in a chain of events. Therefore, their study confirms that primitive emotional contagion non-consciously occurs as a matter of natural outcome inwardly expressed from person to person. Thus, dispositional customer-employee primitive contagion influences negative or positive displays during service interactions (Skarlicki et al. 2008).

Moreover, in different settings, other researches such as Barsade (2002) and Belkin (2009) have proposed the idea of primitive emotional contagion to argue out on various notions about why service with a smile has a high likelihood of promoting encounter satisfaction. Johanson and Woods (2008) in addition to believes about primitive contagion, agrees with the former researchers that display rules in an

organization such as service with a smile have always been made up of two components; one is that service provider's emotional labour is either is good faith which is also expressed in deep acting, or two, the service providers may be reacting in bad faith that is synonymous with surface acting. This is particularly true in a study conducted by Grandey et al. (2005) where from 500 service workers in service and contacts positions, findings reported that how customers orient themselves has an effect in increasing the actions of good faith. At times, primitive contagions can also be faked by enhancing emotions of suppressing some feelings for the sake of being paid. (Grandey et al. 2012).

Whether primitive emotions are faked or not, such imitated expressions at the end of a service encounter have been reported by Gountas et al. (2007) to result in positive or negative effects mainly through feedback mechanisms. For instance, Pugh (2001) remarks that such imitated expressions usually result in affect infusion where emotions may predict consumer appraisals. Later on, Grandey et al. (2012) found that a client that smiles during a service encounter suggests a facial feedback which can uniquely predict the quality of an offered service and consumer

encounter satisfaction. Neumann and Strack (2000) have also argued that current findings demonstrate that primitive or automatic emotional contagion have been considered of as an instrument by which consumers express their emotional states which are induced without even the participants knowing their source. These confirm that emotions are stimulated if persons are provided with dissimilar credible reasons for an affective reply whose origin is unknown.

#### *Conscious Emotional Contagion*

Conscious emotional contagion is centred on social practices where people relate their moods with those of other people and apply the same emotions as a source of communal information to appreciate how they ought to be feeling (Hennig-Thurau et al. 2006). Du et al. (2011) have argued that conscious emotional contagion is most likely to take place when consumers obtain trustworthy emotional labour displays from service provider employees. Similar findings by Curtis and Upchurch (2008), Gountas and Gountas (2007) and Harris et al. (2011) presume that when service providers obtain an emotional consciousness about various organizational goals in line with service provision and the duties and standards that govern them,

they become better in directing various customer-employee processes as they also satisfy the demands of the set goals. In such a model, the level of consciousness was proven to be the main mediator that catalyses customer-employee relationship.

In line with customer orientation, Susskind et al. (2003) point out that service provider employees should be encouraged repeatedly to uphold customer-consciousness while the same employees must also be supplied with adequate feedback and necessary information on a consistent basis, to measure the effectiveness of their consumer approaches and interventions. As such, Hopp et al. (2012) find it necessary for marketing managers to formulate a code of conduct that will enable service providers to have a strong service culture that will result in high retentions, job and customer satisfaction, and lesser turnover rates. Among the various elements of emotional contagion, is closely related to conscious contagion because during interactions people match their movements rapidly and replicate voices, facial expressions or postures of other persons (Curtis and Upchurch, 2008). The following proposition then emerges:

*Proposition 1: Service providers' emotional displays positively influence customers' emotions during service encounters.*

#### *Emotional Labour*

Emotional labour is described as an art of managing conscious and primitive emotions for pay (Scott and Barnes 2011; Allen et al. 2010) and it includes forging, subduing, and enhancing moods so as to provide a specific emotional appearance for the sake of achieving organizational goals (Grandey et al. 2012). Trougakos et al. (2011) further outlines that emotional labour is achieved through surface, deep acting and/or in the event of expressing genuine emotions. This is because; it may expedite task efficiency and creativity, while on the other hand it may prime consumer prospects which may not be achieved, eventually triggering disagreements and self-alienation. Trougakos et al. (2011) however, in their social identity theory, they propound on the facts by stating that particular effects related to emotional labour are controlled by one's personal and social identities because emotional labour tends to kindle pressures among consumers when they evaluate identify during service encounters. Because display guidelines exist to control service provider employees from overreacting negatively

or unnecessarily to the behaviours and moods of those with whom they intermingle (Curtis and Upchurch 2008), then (Söderlund and Rosengren 2008) feels that the likely course of the contagion effect is from that employee to the next interaction respondent.

Trougakos et al. (2011) and Allen et al. (2010) have also found that some of the organizational display rules for instance “service with a smile,” have led to mixed reactions towards employee emotional labour both in the form of surface acting or “bad faith” which includes faking or suppressing expressions, or deep acting also referred to as “good faith” while primarily entails modification of inner feelings. And because findings (Allen et al. 2010; Grandey et al. 2012) have shown that positive affective emotions in service interactions forecasts customer outcomes such as loyalty, personal differences in customer alignment relate to these acting policies in response to display regulations. In their views, Hennig-Thurau et al. (2006) believes that emotional labour is a mere display of predictable moods by service provider employees during an event of service encounters. For instance, (Pugh 2001) states that there are high chance for employees to engage in emotional labour in cases where organizational expression rules

that stipulate which moods are suitable or not suitable to express to the consumers. Display rules such as “service with a smile” is a positive factor that are universally acceptable for all the employees to comply with (Grandey et al. 2005); conversely, how employees control their sentiments in response to such organizational ethics, and consequently the quality of the emotional expression, is less clear.

Moreover, Gountas and Gountas (2007) explicitly affirm that affective emotional expressions which front-line employees are expected to adhere to lead to envisaged beneficial consumer responses; even so, employees may not express positive feelings all the time. In that case, Gountas and Gountas (2007) criticise surface acting and as well as deep acting as prognosticators of emotional fatigue, and colleague-rated sentimental service delivery. As argued by (Kelly and Hoffman 1997), surface acting is believed to be more harmful service provision compared to deep acting, employee job satisfaction and expressive exhaustion (Pugh 2001).

Therefore, a primary verdict from a number of emotional labour literatures (Allen et al. 2010) is that the regulating emotions at the workplace is indispensable for conveying the mood expres-

sions as expected by the customers while at the same time, acting as a stress source that lead to eventual deterioration of the worker's well-being. Moreover, previous experiential study has established these effects principally in positive employee expression rules indicate that neutral display influences both inter- and intrapersonal outcomes. Still, from emotional labour literature it has been formulated that employees' self-moods are congruent with their emotional labour display (Troughakos et al. 2011).

### *Surface Acting*

Emotional surface acting includes altered actions without necessarily changing one's inner feelings (Scott and Barnes 2011). This involves undergoing emotional dissonance, or the tension felt when expressions and moods deviate (Neumann and Strack 2000; Grandey 2003). For example, a service provider may put on a jovial mood during service transactions while in the real sense he or she may be actually irritated. Therefore, the fundamental reason for surface acting or "faking in bad faith" (Allen et al. 2010) is to ensure consumer satisfaction and avoiding post-purchase regrets (Kelly and Hoffman 1997) while controlling undesired customer outbursts (Dallimore et al. 2007). On the other hand, other scholars correlate

employees' adherence to surface acting to as a conformity measure to avoid losing the customers and job layoffs (Söderlund and Rosengren 2010; Groth et al. 2009).

Further evidence from other works has indicated the need to hide hostile feelings and express friendly approach considering that personal differences in emotional control tendencies with consumers are a predominantly fruitful in many occasions (Labroo and Rucker 2010). Grandey et al. (2005) have argues that from a control theory point of view, surface acting and the idea of display rules are both likely to be adhered to in an event of a high value service or valence, for emotional displays. Besides, an employee that is high in consumer orientation makes it an individual objective to engage with customers even if its by acting through bad faith, and as a result is less likely to engage in insincere and inauthentic emotional expressions (Grandey et al. 2005). This way, the idea of acting through surface presentations profits consumer experience because it eliminates conflictics with high costomer oriented employees (Allen et al. 2010; Hennig-Thurauetal et al. 2006).

In contrast, similar experience may be difficult to be exercised by

someone that is low in customer orientation even through faked expressions save for the fact that an organization makes it mandatory for its employees that they should observe display rules (Pugh 2001). If such measures are not observed, then Allen et al. (2010) express their concerns that employees that are low in consumer orientation are less likely to apply display rules as their guide and in adherence to organizational guidelines. However, a positive relationship exists if the such rules are in place and the employees are mandated to follow them (DeWitt and Brady 2003). Accordingly, one can easily predict that there is a positive association between emotional display rules for employees with low customer orientation and whose surface acting may not do any good in consumer experience. This is because, most probably they would respond to emotional display rules with a bad faith tactic that basically meets the sensitive goal of customer satisfaction (Allen et al. 2010).

### *Deep Acting*

The process of deep acting consists of an attempt of modifying certain feelings that are aimed at satisfying required displays. The intention then is to appear authentic to the customers, hence it has been termed “faking in good faith” (Allen et al. 2010; Groth et

al. 2009). This virtuous intention, just like in “fake in bad faith” cannot be expected always to be present among the employees, predominantly those employees who fail to identify with such motives but admit their job obligations (Lin et al. 2008). Moreover, employees may not always express deep acting if they are not fully aware about how they should regulate their emotional displays (Grandey et al. 2011). As such, efforts which are committed to ensure that good faith actions modify negative internal states and change them for the good of the customer, also helps to cover any leakage of such negative feelings. This implies that deep acting is sufficient for few individuals while for the majority, both forms of emotional acting, is prone to be reported (Biedenbach et al. 2011).

Whereas deep acting may come with more optimistic effects (Grandey et al. 2012; Johanson and Woods 2008), these conclusions are consistent other previous work by (George 1998) where deep acting has been cited to lead to less emotional fatigue compared to that which employees with surface acting try to imitate. Though friendly positive expressions are usually perceived as an “in role” job necessity (Pugh 2001), the genuineness and truthful expression may at times

surpass and go way beyond these marginal requirements (Harris et al. 2011).

In order to control such over-expressions deep acting ensures employees' effortful regulation with a primary objective of the purpose being the expression of more authentic dealings, so as to predict advanced evaluations of reliable and enjoyable positive facial, emotional and postural expressions (Grandey et al. 2005). The same has also been reported to be associated with some sense of individual achievement during the consumer-service encounters (Gountas et al. 2007). In addition, Bui et al. (2011) notes that when the goals of an organization easily intersects with an individual's goals, there will be more pleasant consumer experience and even more likely to engage in more effortful "faking in good faith" to achieve better customer service provision and a higher quality client satisfaction. Thus, the connection between organizational display rules and the notion of deep acting has to be stronger among persons with high customer oriented goals (Schoefer 2008). Out of this discussion the following propositions emerge:

*Proposition 2:* Service providers' inauthentic emotion displays relate negatively to perceived service quality.

*Proposition 3:* Service providers' authentic emotion displays relate positively to perceived service quality.

## Conclusion

The effects of emotional feelings between the customers and service provider employees plays a critical part in ensuring that each party gets a positive share after each service encounter. However, things may not always be positive as anticipated due to a number of emotional setbacks. In such an event, employees are at least expected to fake their feelings for the sake of maintaining the customer and boosting the sales. On their part, customers should be cooperative to boost customer-consumer rapport, a move that would finally result in maximal service satisfaction, positive influence and future loyalty. However, concerns on whether or not interpersonal and intrapersonal relationships alter primitive emotional contagion, remains to be researched and explored in the future.

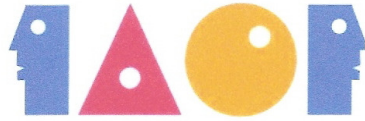


## References

- Allen JA, Pugh SD, Grandey AA, Groth M (2010) Following Display Rules in Good or Bad Faith?: Customer Orientation as a Moderator of the Display Rule-Emotional Labour Relationship. *Human Performance* 23(2):101-115.
- Andrade EB, Cohen JB (2007) On the Consumption of Negative Feelings. *Journal of Consumer Research* 34(3): 283-300.
- Barger PB, Grandey AA (2006) Service with a Smile and Encounter Satisfaction: Emotional Contagion and Appraisal Mechanisms. *Academy of Management Journal* 49(6): 1229–1238.
- Barsade SG (2002) The Ripple Effect: Emotional Contagion and Its Influence on Group Behaviour. *Administrative Science Quarterly*, 47(4): 644-675.
- Belkin LY (2009) Emotional Contagion in the Electronic Communication Context: Conceptualizing the Dynamics and Implications of Electronic Emotional Encounters in Organizations. *Journal of Organizational Culture, Communications and Conflict* 13(2): 105-122.
- Biedenbach G, Bengtsson M, Wincent J (2011) Brand Equity in the Professional Service Context: Analyzing the Impact of Employee Role Behaviour and Customer–Employee Rapport. *Industrial Marketing Management* 40(7): 1093–1102.
- Bui M, Krishen AS, Bates K (2011) Modelling Regret Effects on Consumer Post-Purchase Decisions. *European Journal of Marketing* 45(7-8): 1068-1090.
- Curtis CR, Upchurch RS (2008) A Case Study in Establishing a Positive Service culture: Attachment and Involvement in the Workplace. *Journal of Retail and Leisure Property* 7(2): 131 – 138.
- Dallimore KS, Sparks BA, Butcher K (2007) The Influence of Angry Customer Outbursts on Service Providers' Facial Displays and Affective States. *Journal of Service Research* 10(1): 78-92.
- DeWitt T, Brady MK (2003) Rethinking Service Recovery Strategies: The Effect of Rapport on Consumer Responses to Service Failure. *Journal of Service Research* 6(2): 193-207.
- Doherty RW, Orimoto L, Singelis TM, Hatfield E, Hebb J (1995) Emotional contagion, gender and occupational differences. *Psychology of Women Quarterly* 19(3): 355–371.
- Du J, Fan X, Feng T (2011) Multiple Emotional Contagions in Service Encounters. *Journal of the Academy of Marketing Science* 39(3): 449–466.
- George JM (1998) Salesperson Mood at Work: Implications for Helping Customers. *Journal of Personal Selling & Sales Management* 18(3): 23-30.
- Gountas J, Gountas S (2007). Personality Orientations, Emotional States, Customer Satisfaction, and Intention to Repurchase. *Journal of Business Research* 60(1): 72-75.
- Gountas S, Ewing MT, Gountas JI (2007) Testing Airline Passengers' Responses to Flight Attendants' Expressive Displays: The Effects of Positive Affect. *Journal of Business Research* 60(1): 81-83.

- Grandey AA (2003) When 'The Show Must Go On': Surface and Deep Acting as Determinants of Emotional Exhaustion and Peer-Rated Service Delivery. *Academy of Management Journal*, 46 (1): 86-96.
- Grandey AA, Fisk GM, Mattila AS, Jansen KJ, Sideman LA (2005) Is "Service with a Smile" Enough? Authenticity of Positive Displays during Service Encounters. *Organizational Behaviour and Human Decision Processes* 96(1): 38-55.
- Grandey AA, Goldberg LS, Pugh SD (2011). Why and When do Stores With Satisfied Employees Have Satisfied Customers? The Roles of Responsiveness and Store Busyness. *Journal of Service Research* 14(4): 397-409.
- Grandey AA, Foo SC, Groth M, Goodwin RE (2012). Free To Be You and Me: A Climate of Authenticity Alleviates Burnout From Emotional Labour. *Journal of Occupational Health Psychology* 17(1): 1-14.
- Groth M, Hennig-Thurau T, Walsh G (2009) Customer reactions to emotional labour: the roles of employee acting strategies and customer detection accuracy. *Academy of Management Journal* 52(5): 958-974.
- Harris K, Harris R, Elliott D, Baron S (2011) A theatrical perspective on service performance evaluation: The customer-critic approach. *Journal of Marketing Management* 27(5-6): 477-502.
- Hennig-Thurau T, Groth M, Paul M, Gremler DD (2006) Are All Smiles Created Equal? How Emotional Contagion and Emotional Labour Affect Service Relationships. *Journal of Marketing* 70(3): 58-73.
- Hill SR, Tombs A (2011) The effect of accent of service employee on customer service evaluation. *Managing Service Quality*, 21(6): 649-666.
- Hopp H, Rohrmann S, Hodapp V (2012) Suppression of Negative and Expression of Positive Emotions: Divergent Effects of Emotional Display rules in a Hostile service Interaction. *European Journal of Work and Organizational Psychology* 21(1): 84-105.
- Howard DJ, Gengler C (2001) Emotional Contagion Effects on Product Attitudes. *Journal of Consumer Research* 28(2): 189-201.
- Johanson MM, Woods RH (2008) Recognizing Emotional Element in Service Excellence. *Cornell Hospitality Quarterly* 49(3): 310-316.
- Kelly SW, Hoffman KD (1997) An Investigation of Positive Affect, Prosocial Behaviours and Service Quality. *Journal of Retailing* 73(3): 407-427.
- Labroo AA, Rucker DD (2010) The Orientation-Matching Hypothesis: An Emotion-Specificity Approach to Affect Regulation. *Journal of Marketing Research* 47(5): 955-966.
- Lin MQ, Huang LS, Chiang YF (2008). The moderating effects of gender roles on service emotional contagion. *The Service Industries Journal* 28(6): 755-767.
- Lloyd AE, Luk STK (2011) Interaction behaviours leading to comfort in the service encounter. *Journal of Services Marketing* 25(3): 176-189.
- Luong A (2005) Affective Service Display and Customer Mood. *Journal of Service Research* 8(2): 117-130.

- Neumann R, Strack F (2000). 'Mood Contagion': The Automatic Transfer of Mood Between Persons. *Journal of Personality and Social Psychology* 79(2): 211-223.
- Pugh SD (2001) Service with a smile: emotional contagion in the service encounter. *Academy of Management Journal* 44(5): 1018-1027.
- Scott BA, Barnes CM (2011) A Multilevel Field Investigation of Emotional Labor, Affect, Work Withdrawal, and Gender. *Academy of Management Journal* 54(1): 116-136.
- Skarlicki DP, van Jaarsveld DD, Walker DD (2008) Getting Even for Customer Mistreatment: The Role of Moral Identity in the Relationship Between Customer Interpersonal Injustice and Employee Sabotage. *Journal of Applied Psychology* 93(6): 1335-1347.
- Smith AK, Bolton RN (2002) The Effect of Customers' Emotional Responses to Service Failures on their Recovery Effort Evaluations and Satisfaction Judgements. *Journal of Academy of Marketing Sciences* 30(1): 5-23.
- Söderlund M, Rosengren S (2007) Receiving word-of-mouth from the service customer: An emotion-based effectiveness assessment. *Journal of Retailing and Consumer Services* 14(2): 123-136.
- Söderlund M, Rosengren S (2010) The Happy Versus Unhappy Service Worker in the Service Encounter: Assessing the Impact on Customer Satisfaction. *Journal of Retailing and Consumer Services* 17(2): 161-169.
- Schoefer K (2008) The Role of Cognition and Affect in the Formation of Customer Satisfaction Judgements Concerning Service Recovery Encounters. *Journal of Consumer Behaviour* 7(3): 210-221.
- Schoefer K, Diamantopoulos A (2009) A Typology of Consumers' Emotional Response Styles during Service Recovery Encounters. *British Journal of Management* 20(3): 292-308.
- Susskind AM, Kacmar KM, Borchgrevink CP (2003) Customer Service Providers' Attitudes Relating to Customer Service and Customer Satisfaction in the Customer-Server Exchange. *Journal of Applied Psychology* 88(1): 179-187.
- Trougakos JP, Jackson CL, Beak DJ (2011) Service Without a Smile: Comparing the Consequences of Neutral and Positive Display Rules. *Journal of Applied Psychology* 96(2): 350-362.



## A STUDY OF THE STATISTICAL ANALYSIS FORMULAS OF NEW PRODUCT EVALUATION

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### Abstract

What is the purpose of design evaluation in design education? This study considered that should do better to popularly analysis the value and meaning of design. Thus, this study attempted to search effective approaches to evaluate design of new product from statistical analysis techniques; and formulated the results to promote the methodology of design education. After finishing empirical research, this study found as following: 1) by MANOVA (Multiple analysis of variance) and discriminant analysis, observe the consumers' different attitudes from population towards evaluation criterions; 2) by hierarchical regression analysis, observe the evaluation influence caused from design variables towards value variables; 3) by cluster analysis and hierarchical regression analysis, observe the moderate situation because of the price consciousness intervening between the consumer clusters and evaluation criterions; and 4) by multiple regression analysis, extract the critical success factors of design from design variables. Finally, this study suggested that design scholars may refer to these analysis formulas to evaluate design and new product because of this study's contribution to design education such as: 1) improve to understand the future opportunities of new product; 2) predict the market performance of new product; 3) assess the value and price of new product; 4) grasp the future consumers' needs, aspects and design standards of new product; 5) appraise the new product relative to the marketing contribution; 6) evaluate the factors of success / defeat influencing product's design and development.

Key Words: Statistical Analysis, New Product Evaluation, Value Analysis

## Introduction

What is the purpose of design evaluation in design education? Perhaps want to understand the existence value of new product? Maybe want to assess the good or worse of new product? Maybe want to explore the meaning of new product? Perhaps want to refer the comments for improving new product? In view of design and business, Cooper & Press (1995) considered to evaluate product, ie to execute value analysis. Therefore, the new product evaluation can be used to decide product's value / price; to understand the future consumers' needs, aspects, and design standards of new product; and to evaluate the factors of success / defeat influencing product's design and development (Cheng, Chen & Cai, 2008).

Ozer (1999) considered to evaluate new product in order to apply in the different purpose, for example: 1) predict the market performance of new product; 2) apply the evaluation model and results to design new works and to create opportunities and value; 3) appraise the new product relative to the marketing contribution; or 4) understand the whole environment of marketing in order to appraise the future tendency and life-cycle type of new product.

Obviously, it has better meaning that carries on new product evaluation in order to popularly analysis and to understand the value and meaning of new product. Thus, this study mainly explored the methodology of new product evaluation by statistical analysis techniques; understand how to apply them and effec-

tive analysis; and then, promote the methodology of design education.

## Literature Review

Popovic (1999) once assembled a table of evaluation approaches to be the "Common Evaluation Methods and Techniques", as shown in Table 1. (See Tables 1. & 2. at the end of this article). By Table 1, they are all qualitative inquiries. But, where are quantitative inquiries? About the research issues of new product development and performance evaluation, there are to explore the factors of success / defeat influencing new product development by qualitative inquiries; to explore the consumer clusters' intention or attitude of new product by cluster analysis; and popularly to explore the population on the view of new product by ANOVA (analysis of variance) (Cheng et al., 2008).

Therefore, this study attempted to collect some assembly of analysis formula from statistical analysis techniques to apply the design education, as shown in Table 2. By Table 2, this study lists five kinds of analysis formulas; moreover, but also two kinds of classification method and one extract method. Obviously, there are also other evaluation methods and techniques to be not yet applied to new product evaluation by qualitative inquiry. However, this is an opportunity to promote the methodology of design education for us. This study would develop a few of analysis formulas to evaluate new product and process them.

## Methods

This study reviewed some the methodology of evaluation, and assembled to be a process of product evaluation by referring to Andrews (2004) and Chiarello (1995), as follow: 1) establishes an evaluation team which has multiple professionals; 2) selects the correlation data and criterions to relate product which team wants to evaluate; 3) presents the focus and purposes of evaluation according to needs, such as samples, size, items, and scales and so on; 4) develops a few of objective evaluation approach such as evaluation method, measuring instruments, relevant criterions, and process and so on; 5) plans evaluation management and monitoring procedure; 6) develops analysis plans; 7) establishes timetable; and 8) plans the application of evaluation information in new product development.

Therefore, firstly, this study established an evaluation team and selected the correlation data and criterions relate design / product. In this stage, this study developed the first analysis formula for new product evaluation and research, namely as shown in Figure 1 (Cheng et al., 2008). Because of design not only is a simple concept or idea, but also it has an important economic role (Cooper & Press, 1995; Bruce & Bessant, 2002).



Figure 1. The effect caused from design variables towards value variables.

Bruce & Bessant (2002) once considered that an attractive product which possibly joined the esthetics and value with highly fashionable style and design contributions. Thus, this study assumed that the design variables can influence product's value variables; and attempt to observe design variables how to affect value variables on the process of new product evaluation for consumers (Cheng et al., 2008). In fact, may also have another analysis formula (as shown in Figure 2) which is valuable application to observe the interaction between design variables and value variables. Then, this study wanted to compare the two analysis formulas which can make a more suitable analysis.

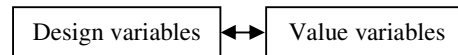


Figure 2. The interaction between design variables and value variables.

Secondly, after assuring these evaluation criterions by focus group method, this study developed two variables of evaluation criterions such as: one is the “design variables”, and another one is the “value variables”. Through editing to be a questionnaire from the two variables of evaluation criterions, this study had run a pilot study to evaluate product which is developed to be the prototypes of the bamboo furniture by this study's design team in school. After rejecting the invalid responses and running factor analysis, each of variables of evaluation criterions presented three composition factors.



This study named the three factors of design variables such as: human factors, form, and innovation and so on; and named another the three factors of the value variables such as: aesthetic sensitivity, usability, and marketability and so on. These structure matrix and factor loadings yielded of design variables as following: 1) there are calm (.798), comfort (.791), security (.782), solidity (.743), and functions (.711) in “human factors”; 2) there are texture (.807), colors (.802), appearance (.727), style (.660), and space (.607) in “form”; and 3) there are originality (.829), production techniques (.738), modernity (.732), and components (.666) in “innovation”. The structure matrix and factor loadings yielded of value variables as following: 1) there are pleasure (.883), collectibility (.878), and quality (.713) in “aesthetic sensitivity”; 2) there is only utility (.998) in “usability”; and 3) there are cleanliness (.958), and commerce (.563) in “marketability”. Finally, this study assured these evaluation criterions and composition factors of design / value through running factor analysis (Cheng et al., 2008).

Afterward, this study developed the second analysis formula, as shown in Figure 3, because it is necessary to observe the different intention of evaluation form the population viewing product. Because the consumer satisfaction is extremely important performance indicator for designer (Ehrenfeld, 1997), Marzano (1998) considered that designers must understand consumers in order to reflect on their deep value through product; and then promotes the dif-

ferent social types and their life quality. Therefore, this study assumed when the population evaluate product, their evaluations will significantly present different attitudes on the evaluation criterions. Therefore, this study listed a few of items on questionnaire such as: gender, age, location of residence, level of education, field of education, occupation, and income and so on, in order to investigate the population.

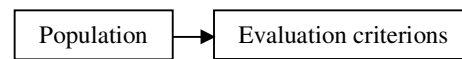


Figure 3. The different attitudes caused from population towards evaluation criterions.

Moreover, after running MANOVA, there are statistics scholars to suggest resume running discriminant analysis, because it can significantly discriminate and predicate population through this procedure (Cheng et al., 2008). Therefore, this study developed another analysis formula, as shown in Figure 4, and assured that the evaluation criterions can significantly predicate population.

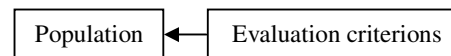


Figure 4. The predictions caused from evaluation criterions towards population.

Again, this study developed an analysis formula, as shown in Figure 5, because Oh (1999) considered that consciousness value always intervenes in coordinating consumers’



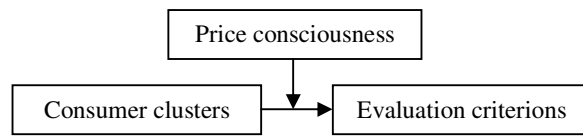


Figure 5. The moderate situation involved price consciousness in the consumer clusters towards evaluation criteria.

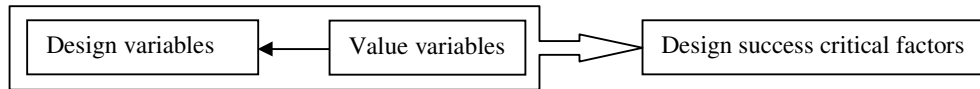


Figure 6. Extract the critical success factors of design from evaluation criteria.

shopping intention. According to Oh's views, this analysis formula was developed to assume the price consciousness could intervene between the consumer clusters and evaluation criteria; and it would cause a moderate situation. For processing this analysis, this study also added two items such as "price" and "purchase intention" on the questionnaire. Finally, this study again developed another analysis formula, as shown in Figure 6, for assuring further the critical success factors of design on new product (Cheng et al., 2008). Thus, this study would process this analysis in order to extract the critical success factors of design from evaluation criteria.

After establishing above analysis formulas and hypothesis, this study would invite attendees to test and evaluate the prototypes of the bamboo furniture. Finally, this study collected 278 valid responses and rejected invalid them (Cheng et al., 2008). Then, this study processed these raw data by above analysis formulas and statistical analysis techniques, as shown in Table 2.

## Results and Discussions

After analyzing the descriptive statistics of population and evaluation criteria, the means of evaluation criteria distribute between 3.46 and 4.19, and there is also a section of distances from the "extremely good" (above 4.50). So, the prototypes of the bamboo furniture still need to improve. This study also found that the attendees mostly are student because of basing on the descriptive statistics of population.

This situation would cause sampling error. Therefore, the two items of occupation and income would not involve in the following analysis formulas. After processing above analysis formulas, these results and findings is as following:

### 1. *The different attitudes caused from population towards evaluation criteria*

After running MANOVA, this study found that only "age" of population can significantly present different evaluations when the population views the evaluation criteria. This situation of significantly different evaluations may be that the elder samples once experience the magnificent age of tradi-

tional bamboo furniture and sat or used them. Therefore, they can understand the further innovation performance of the bamboo furniture which was developed by this study's design team. Bont and Schoormans (1995) considered that the young need more interactive advice than the elders from experts, only if the samples once experienced to buy or to use the product. Thus, the young need more product knowledge and illustrative quotation from experts. According to above results, this study infers that the evaluators' experience could moderate their evaluation performance; and designers must pay attention to the age of population and satisfy consumers' needs for each level of ages.

### 2. *The predictions caused from evaluation criteria towards population*

After running discriminant analysis, this study found that the middle age samples can appreciate the prototypes of the bamboo furniture because of their form uniting the mixed style of tradition and contemporary. So, the bamboo furniture can attract the elders and the middle age consumers rather more appreciative than the young. The results also show that the elders can appreciate the degree of innovation to the bamboo furniture more than the young and the middle age samples. Thus, this study infers that the young's innovation needs are rather higher than the elders. Moreover, the consumers, who are higher urbanization, need further highly qualitative product to purchase in order to satisfy their aesthetic sensitivities; and who are lower urbanization, always refer their local culture and aesthetics to appreciative design / product.

Compared with above two kinds of analysis formulas, this study found that

the process of MANOVA is easy and its summary table is simple; but the results always are scarcity so that the inference is not easy. However, the process of discriminant analysis is complicated and long and their summary tables are too; but the researcher could obtain more information of results to infer.

### 3. *The effect caused from design variables towards value variables*

After running hierarchical regression analysis, this study found that the aesthetic factors of design is mainly caused from "form" ( $\beta=.663$ ), innovation" ( $\beta=.639$ ) and "human factors" ( $\beta=.630$ ). Therefore, the aesthetic factors of design can be highly affected by form, innovation, and human factors. Moreover, this study also found that the marketability factors of design is mainly caused from "form" ( $\beta=.341$ ), innovation" ( $\beta=.403$ ) and "human factors" ( $\beta=.373$ ); and the usability factors of design is mainly caused from "form" ( $\beta=.501$ ), innovation" ( $\beta=.515$ ) and "human factors" ( $\beta=.551$ ). The path diagram of design variables toward value variables was illustrated by this study such as Figure 7. According to above results, this study infer that the prototypes of the bamboo furniture need more attractive form to achieve aesthetic value; need excellent innovation to improve usability value; and need satisfactory human factors to promote marketability value. The new bamboo furniture must be made very well on the sections of form, innovation, and human factors and so on. However, the value variables composed of aesthetic sensitivity, usability, and marketability will be made very well.

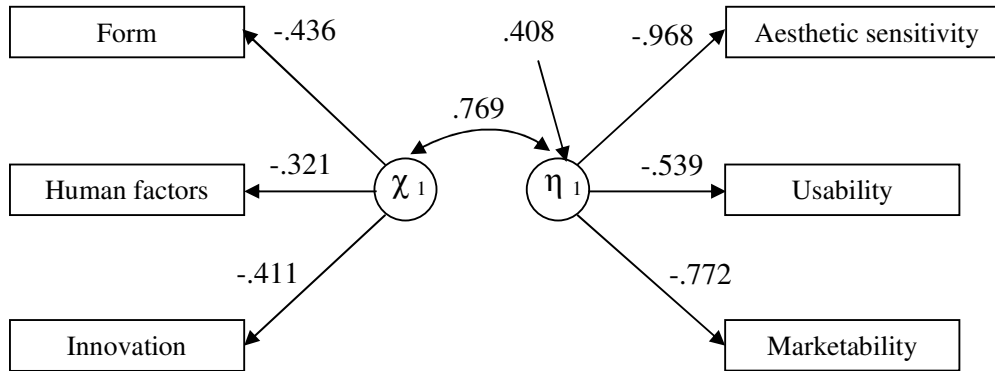


Figure 8. The path diagram of interaction between the design variables and value variables.

4. *The interaction between design variables and value variables*

After running canonical correlation analysis, this study found that if the (-.968), usability (-.539), and marketability (-.772) all are not ideal and satisfactory to value variables for samples. According to above results, this study illustrated the path diagram of interaction between design variables and value variables such as Figure 8. Compared with above two kinds of analysis formulas, this study found that the process of hierarchical regression analysis is very complicated and these summary tables are too; but the researcher could obtain more information of results to infer. Moreover, the process of canonical correlation analysis is easy and its summary table is simple; but the results always are scarcity so that the inference is not easy too.

5. *The moderate situation involve price consciousness in the consumer clusters towards evaluation criterions*

Before processing this analysis formula, firstly executed the cluster analysis. After running cluster analysis,

“form” (-.872) has little attraction, the “human factors” has little satisfaction, and the “Innovation” has little excellence; then the aesthetic sensitivity

this study found that the analysis can separate the four clusters of attendees, such as: coolness, shrewdness, realist, and passion and so on. Among these clusters the samples of coolness cluster whose evaluation attitudes are casual. They could not appreciate the prototypes of the bamboo furniture, if not they were caustically evaluating to product. The samples of shrewdness cluster could appreciate the prototypes, but they could not present their purchase intention. Maybe their purchase behavior is thrifty and conservative so that they don’t like to be found their purchase intention. Moreover, the samples of realist cluster’ evaluation attitudes are friendly, but they would carefully assess the value of marketability and usability. As for the samples of passion cluster express their high interest and favor. They are the latent consumers for the prototypes. Then, this study computed and analyzed each clusters’ purchase intention by Chi-square test in order to calculate the ratios of latent consumers.

Finally, by multiple regression analysis, this study tested the hypotheses of moderate, i.e. the price consciousness could involve in the consumer clusters towards evaluation criterions. According to analysis results, this study found that there is an enhancing effect coming from the low-price consciousness interfering between the realist cluster and evaluation criterions. Thus, this study infers that the new product could decide the fixing of price levels on middle-price. Then, the managers of new product could promote them with low-price in order to enhancing the realist consumers to purchase.

6. *Extract the critical success factors of design*

After running multiple regression analysis, this study found that the critical success factors of design on the new bamboo furniture are as following: functions, components, style, comfort, modernity, production techniques, and texture and so on. Thus, the designer and manager of bamboo furniture could assure them to be core competences in order to maintain and manage.

In summary, the evaluation approaches except Popovic's "Common evaluation methods and Techniques" could process and analysis design evaluation by quantitative inquiries. Compared with the two kinds of research inquiries, this study considered that the quantitative inquiries could obtain assured information to help designer / manager to assess such as the factors of success / defeat, the future consumers' needs, aspects, design standards, and relative to the marketing contribution of new product. However, these analysis formulas, provided by

this study, are worthy to apply for design evaluation in design education.

### Conclusions and Suggestions

According to above results and inference, this study got the conclusions as following:

1) By MANOVA and discriminant analysis to explore the population's evaluations, researchers could carefully assess different population background to view design / product in order to obtain their evaluations and to understand the future opportunities of design / product.

2) By hierarchical regression analysis or canonical correlation analysis to explore the influence / relationship between design variables and value variables, researchers could understand that design variables how to influence value variables in order to assess the future consumers' needs, aspects, and design standards of new product.

3) By cluster analysis and hierarchical regression analysis to explore the moderator variable involve in the consumer clusters to evaluate product, researchers could understand the clusters of samples in order to infer to population, predict the market performance, and assess the value / price of new product.

4) By multiple regression analysis to explore the critical success factors of design on new product, researchers could extract them in order to assess the factors of success / defeat influencing product's design and development, and help designer / manager to manage the core competences of developing new product.

Finally, this study suggested that the designers, managers, and scholars could apply above analysis formulas and statistical analysis techniques to evaluate design / product in order to popularly and carefully obtain their value and meaning. Moreover, this study suggested that the researchers could explore such as: to understand the future opportunities; predict the market perform-

ance; assess the value and price; grasp the future consumers' needs, aspects and design standards of new product; appraise the new product relative to the marketing contribution; and evaluate the factors of success / defeat and so on for the design evaluation of new product development.

### References

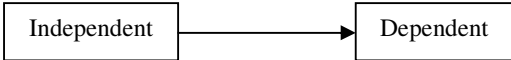
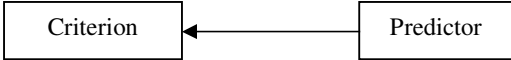
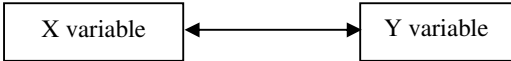
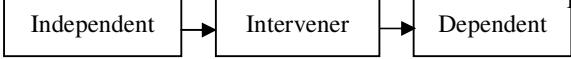
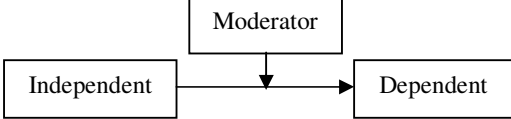
- Andrews, A. B. (2004). Start at the: empowerment evaluation product planning, *Evaluation and Program Planning*, 27, 275-285.
- Bont, C. J. P. M. & Schoormans, J. P. L. (1995). The effects of product expertise on consumer evaluations of new-product concepts, *Journal of Economic Psychology*, 16, 599-615.
- Bruce, M. & Bessant, J. (2002). Why design, in M. Bruce & J. Bessant (eds) *Design in Business: Strategic Innovation Through Design*, Harlow, London: Pearson Education Limited, 18-35.
- Cheng, Y.-P., Chen, C.-H., & Cai, D. (2008) An evaluation for new bamboo furniture: through examining the relationship between design and value, *Bulletin of Japanese Society for the Science of Design*, 55(4), 93-102.
- Chiarello, L. A. (1995). Selection of needlestick prevention devices: a conceptual framework for approaching product evaluation, *Am J Infect Control*, 23, 386-395.
- Cooper, R. & Press, M. (1995). *The Design Agenda: A Guide to Successful Design Management*. Chichester, England: John Wiley & Sons Ltd.
- Ehrenfeld, J. R. (1997). Industrial ecology: a framework for product and process design, *J. Cleaner Prod.*, 5(1-2), 87-95.
- Marzano, S. (1998). *Thoughts: Creating Value by Design*. Blaricum, Netherlands: Royal Philips Electronics.
- Oh, H. (1999). Service quality, customer satisfaction, and customer value: a holistic perspective, *Hospitality Management*, 18, 67-82.
- Ozer, M. (1999). A survey of new product evaluation models, *J PROD INNOV MANAG*, 16, 77-94.
- Popovic, V. (1999). Product evaluation methods and their importance in designing interactive artifacts, in W. S. Green & P. W. Jordan (eds) *Human Factors in Product Design: Current Practice and Future Trends*, London: Taylor & Francis Inc.

Table 1. Common Evaluation Methods and Techniques

<b>Evaluation Methods /Techniques</b>	<b>Purpose</b>	<b>Design Process Stages</b>
Checklists	To define operations of a product/system and identify user's needs.	Early stage of the design process and field test.
Focus Group	To identify user issues and their importance.	Any stage of the design Process.
Interviewing Users	To identify user's needs.	Any stage of the design Process.
Observation Techniques	To define dynamics of the artifact/ system/ environment.	Final design stage and field test.
Protocol Pnalysis	To evaluate a design, users' expertise levels and understand users' concept of products.	Any stage of the design Process.
Task-Analysis	To define and evaluate operational procedures of human/ product/ system.	Concept development stage, final design stage and field test.
<b>Tools</b>	<b>Purpose</b>	<b>Design Process Stages</b>
CAD simulation and Virtual reality (VR)	To evaluate design and its perceived use.	Concept development stage.
Mock-up Evaluation	To evaluate product usage with users' participation.	Concept development stage.
Prototype Evaluation	To verify a design outcome under real conditions.	Different stages of the design process.

**Source:** "Product evaluation methods and their importance in designing interactive artifacts", Popovic, V., 1999, in W. S. Green, & P. W. Jordan, (Eds.), *Human Factors in Product Design: Current Practice and Future Trends*, Taylor & Francis Inc., London.

Table 2. Statistical Analysis Formulas

Types	Analysis Formulas	Statistical Analysis Techniques
Comparison/ Influence		Analysis of variance; Multiple analysis of variance; Chi-square test; Hierarchical regression analysis
Prediction		Discriminant analysis; Regression analysis
Correlation		Canonical correlation analysis
Intervening		Hierarchical regression analysis
Moderation		Hierarchical regression analysis
Classification		Cluster analysis; Factor analysis
Extract		Multiple regression analysis



THE MEASUREMENT OF ECO-COMPONENTS OF SERVICE QUALITY IN TAIWAN'S  
INTERNATIONAL TOURIST HOTELS - AN EMPIRICAL CASE

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Abstract

In this study, patrons to Taiwan's tourist hotels were chosen as our research object to identify their expectations and perceptions with respect to the green hotel operations, and also to understand the specific perception of patrons with respect to eco-component of green hotel service. In this study, a literature review was done and then a questionnaire survey was used to collect first-hand information about patrons' perceptions for use in subsequent analysis. The measurement tool was a green hotel service quality measurement scale adapted from the SERVQUAL scale first developed by Bastič and Gojčič (2012). The measurement scale incorporated 6 dimensions, including equipment, energy, behavior, food, green products, and environments. As data are collected from patrons to presently operating hotels, a factor analysis was made on collected data. This study attempted to verify the gap between patrons' perceptions and hopes concerning the green hotel service quality. The analysis outcome will serve as reference materials for green hotels at large. This information will be good reference source for hoteliers when they try to understand the expectations from patrons, when designing and implementing specific green initiatives. Also, it could be used as specific reference by the hotel industry associations and relevant government organizations in formulating consistent evaluation standards for green hotel operations.

Keywords: eco-friendly or green hotel, green hotel service quality

## Introduction

As news reports of global climate changes keep pouring in, images of natural disasters seen through media have brought about strong personal feelings, bringing people their awareness of the counterattack from nature. As Taiwan is situated on a tropical island, we cannot avoid the effects of climate changes (Tsai et. al. 2010). Since the hotel industry needs to maintain high-quality services, conservationists are concerned with its energy consumption, because its considerable energy demand cannot be underestimated. With the rise of environmental awareness, this eco trend is going to affect the so-called smokeless hotel industry. For newly built hotels, outside building materials as well as inside consumable items all have to meet the eco-friendly requirements. Tzschentke, Kirk and Lynch (2008) pointed out that hoteliers shall realize that the green hotel management does not necessary require major changes or huge capital outlay, all it needs is the eco-friendly green concept. If hotels are operated with the green concept, they are called green hotels, eco-friendly hotels, or eco-efficient hotels, meaning that the main objectives of the hotels are focused on its ecological benefits. The research of Manaktola and Jauhari (2007) demonstrated that more and more hotel patrons will pick eco-friendly hotels next time when they choose a hotel.

Since the concept of eco-friendly hotels was first proposed, many hoteliers have participated in the green hotel operations to various extents. Many countries and regions have developed own evaluation standard for

eco-friendly hotels. Since the late 1990s, eco-friendly labeling systems have emerged in Europe and North America, such as the Nordic White Swan, Canadian Maple Leaf, German Blue Angel, etc. The hotel management organizations and green organizations of the United States, Britain and other countries also enacted the green hotel standards for hotels operating in their countries or regions. Taiwan's Environmental Protection Administration (2008) also declared that it has started to promote eco-friendly hotels and guest houses, which can reduce the production of carbon dioxide during guest stay, thus minimizing the global warming effect. However, Pizam (2009) was aware that the evaluation standards for green hotel operations are not the same among various countries, due to a lack of a uniform reference standard.

Therefore, such situation will seriously affect the popularity and patrons' recognition of eco-friendly hotel service standards strongly promoted by the hospitality industry. At present, consumer research on green hotel management is still viewed as an emerging academic subject. To a certain extent, the practices of green operations in various tourist hotels have failed to reflect the patron feedback. Therefore, this study is done from the patrons' perspective, hoping that hoteliers can identify patrons' expectations and perceptions with respect to green hotel operations. In addition, this study wishes to help hotelier's identify patrons' expectations if they are thinking of converting to a green hotel. This study also wishes hoteliers to draw reference from the research information provided here when

they design and implement their green hotel operations.

## Literature Review

### *Green Hotels*

In view of the shortage of resources on Earth, rising awareness of environmental protection, and ecological conservation, eco-friendly hotels shall be the answer for the above issues, so that natural resources can be recycled, re-used, and energy can be conserved. These are the future goals of the hotel accommodation industry. The term green hotel (eco-friendly hotel) was first introduced following the emergence of the above concepts. Eco-friendly Hotel Association (2000) was set up to create the green hotel requirements that promote the economical use of water and energy, and reduction of solid waste, so as to safeguard the Earth resources. Green Mountain State (2010) has focused on the creation of an eco-friendly environment, possibly allowing for contribution from all staffs and guests alike. It carefully scrutinizes each area of the hotel operation to find ways to reduce the impacts on the environment. It also looks for ways to educate the public, and to remind everyone that every bit counts no matter how tiny the contribution may be. At the same time, it maintains its commitment to provide the kind of quality service that is expected by hotel guests. Ecomall (2000) is viewed as a temporary lodging, but the manager of Ecomall is enthusiastically committed to the conservation of water resources and other forms of energy, and the reduction of fixed waste. Also, it is committed to save the Earth resources and to pre-

vent environmental destruction. The Tourism Council Australia (1998) also proposed that the accommodation facilities of a green hotel shall depend on the natural environment in the surrounding area. It has adopted environmentally sensitive operating styles, and has maintained the operating environment to provide customers with green products, green services, and emulated ecological, healthy, fresh and comfortable living environment, allowing tourists to stay and enjoy the natural environment, and to receive the natural experience and related education. After reviewing the above literature, the basic concept of a green hotel is a place of accommodation that can provide eco-friendly services, but its main goal shall be focused on ways to maintain its sustainable operation. Under the premise of minimizing the environmental impact, a green hotel shall be managed in such a way to provide patrons with a comfortable, healthy, natural accommodation while its service quality is maintained.

### *Development of Green Hotels*

Eco-friendly or green hotels are developed under the concept of sustainable operation of the tourism industry. It shall be based on the capacity to sustain the ecological environment, and shall be in line with local economic development and local ethics. In addition, it can meet the needs of contemporary people, but without endangering the future generations. Furthermore, it shall be able to promote the local economy, resource conservation, and protect the eco-friendly environment, thus creating a harmonious relationship with the nature. As the hotel accommodation is closely tied to the

development of the tourism industry, when the recreation and leisure trend is becoming increasingly popular, increased demand for tourism will also stimulate the demand for hotel accommodation. According to the traditional impression, hotels are places that offer luxury accommodation and services. But, under the global environmental awareness and environmental advocacy, and complying with the environmental management requirements, hotel services are now focused on cleaner production, eco-friendly services, and regular resource conservation. The concept of eco-friendly hotels came into being under the green corporate culture and the above principles. With increasing attention on the environmental issues, and influenced by the concept of green hotels, hotels in every country are urged to implement the environmental management and energy saving measures.

For example, the Eco-friendly Hotels Association (1993) has set their objective to guide the hotel accommodation industry on environmental issues (Kung et. al, 2001). Since then, the U.S. presented the "Green Hotel guidelines" originated from Green Seal, and Norway's " Green Management in Practice (GMIP), and Canada's "Green Leaf Eco-rating Program" in 1998 (Ming-shen Lai, 2000). The main spirits of green hotels are to provide affordable products and services to meet the needs of the public, to improve the quality of life at the same time, to reduce the ecological impact on the environment gradually throughout the life cycle, and to reduce the consumption of natural resource. At least, the pace of energy consumption shall be reconciled with the

Earth's loading capacity. Eco-friendly Hotels Association (2010) firmly supported the green initiatives through encouragement and promotion of the green hotel services. Through appropriate management of the natural resources, the green hotel concept can be applied to the hotel accommodation industry. Green Mountain State stressed the need to preserve and protect the beautiful land and natural resources. In this study, from the viewpoint of patrons, we select the patrons of five-star international tourist hotels in Taiwan to conduct the questionnaire survey. The task is to explore their awareness of the green hotel operations and their attitudes toward the green hotel service quality. The sample data are collected in the questionnaire survey, and then processed with numerical analysis methods for the following purposes:

- (1) To understand the extent of patrons' expectations and perceptions concerning the green hotel service quality;
- (2) To explore any correlation between personal traits of patrons and the green hotel service quality as perceived by patrons; and
- (3) To study patrons' satisfaction with respect to the eco-component of hotel service quality as practiced in existing tourist hotels.

### Research Methods

In this study, patrons to top ten well-known five-star international tourist hotels in Taiwan are chosen as our research object. Through a questionnaire survey, we collected service quality related information

from the patrons' perspective with respect to the green hotels and green operations. For the purpose of our analysis, this study has adopted the SERVQUAL scale first developed by Majda Bastič and Slavka Gojčič (2012) to measure the green hotel service quality. The selection of topical items is based on special characteristics of each tourist hotel, but two topical items are deleted by our research team: natural materials in the hotel building and mattresses and bedding made of natural materials. The number of topical items in the questionnaire is therefore cut down from original 22 to 20. The questionnaires are divided into two components: the first component is about patrons' expectations and perceptions concerning the green hotel service quality, and the second component is related to personal information of hotel patrons.

This survey began from the early part of October 2011, and lasted until mid December 2011 for about 70 days. The survey selected patrons to the top ten well-known international tourist hotels in Taiwan as research object. The questionnaire survey was conducted using the convenience sampling, in which we randomly interviewed guests, who just completed the check out procedures and appeared in the hotel lobby. In this study, a total of 600 copies of the questionnaire were distributed. 189 of those questionnaires were completed by subjects and then collected by our staff, with a recovery rate of about 31.5%. These data were then used for our analysis. Questionnaire data were first encoded, then keyed in, sorted, and lastly analyzed with SPSS 12.0

numerical analysis software to find any meaningful correlation in the sample data.

### Research, Analysis, and Test Results

From 189 valid questionnaires collected, the basic information of respondents is tabulated and summarized as follows: male respondents accounting for 44.6% of the overall samples, and female subjects accounting for 55.4%; married persons accounting for about two-thirds (62.4%); the majority of respondents being middle-aged, between 25-44, accounting for about 50.4%. For the personal income aspect, average monthly income of respondents is in the range 30,000-50,000NTD, accounting for 42.2%. About 83.3% of respondents have college degree. For the purpose of hotel accommodation, most respondents were there to attend official meetings or for tourism and leisure purposes, accounting for 38.4% and 32.9% respectively. Looking at their stay time, the majority of respondents have stayed in the hotels for 2-3 days, accounting for about 53.9%. The above data broadly reflects a basic profile that represents the majority of guests in the five-star tourist hotels. The basic profile is described as tourists or short-term business travelers, married, better educated, young to middle-aged, and with middle to high-income.

The analysis results show that more than 80% of the respondents are overall satisfied with the hotel services. But more than 90% of the respondents tended to agree to various extents that if the hotel services could be more eco-friendly, patron satisfaction would be further enhanced. What is

worth mentioning is that more than 90% of the respondents indicated that they will first consider green hotels the next time they choose a hotel. Although more than 60 % of the respondents think that the green hotel operations are meaningful and are willing to sacrifice comfort to stay in the green hotels, in actual behavior, only 32.3% of respondents said that they will return to the hotels with green operations. Less than 40% of respondents said they will attach great importance when considering whether a hotel has fully implemented their green operations the next time they choose a hotel. This reflects that patrons' acceptance of the green hotel concept is still in the ideological level, and they have not made an effort to transform them into specific action in their daily life. In this study, when the correlation between the personal traits of respondents and their support for the green hotel are analyzed, we used t-test and one-way ANOVA. The test results are explained below.

For perceived attitude of respondents concerning the green hotel operations, no significant differences are found between groups of respondents with different genders and different ages. With respect to the attitude of respondents supportive of the green hotel operations, gender and age are not considered as a significant factor that may influence the supportive attitude of green hotels. It is believed that with continuous promotion of the green concept, any existing differences in supportive attitude between men and women will be gradually moderated over time. In addition, the analysis also shows that the supportive attitude of

respondents concerning the green hotel service quality will change in step with the income level of respondents, which means the demand on service quality will increase as the income of respondents is moved to a higher level. Specifically, respondents in the high-income group with monthly income over 80,000NTD are more likely to identify with the green hotel operations compared with respondents in other income groups.

For the aspect of respondents' education level, significant differences are seen between respondents in different education levels. Specifically, the supportive attitude of respondents toward the green hotels tends to increase as the education level of respondent is raised to higher levels. Also, it is found that college degree is the cut-off point for determining patrons' attitude supportive of the green hotels. Respondents with higher education levels tend to show slightly stronger support for green hotels in relation to respondents with lower education levels. In this study, another purpose of this research is to identify the expectations and perceptions of patrons concerning the green hotel service quality. It is hoped in the process of exploring patrons' expectations more concrete and different types of patron needs can be identified. Thus, it can contribute to the industry's understanding of patron needs (expectations), so that the green hotel operations can be properly implemented to meet the green needs of hotel patrons. Table 1 gives the confirmatory factor analysis (CFA) results using the green hotel service quality measurement

Table 1. CFA outcome for the measurement model

	Factor Loading	Construct Reliability (CR)	Average Variance Extracted (AVE)
<b>EQUIP — Environmentally friendly and healthy equipment</b>			
Equipment is made from natural materials	0.775		
Paintworks are from environmentally friendly substances	0.763	0.820	0.600
Floor coverings are made from natural materials	0.674		
<b>ENERGY&amp;WATER — Efficient use of energy and water</b>			
Efficient use of energy	0.846		
Automatic light control in the hallways and restrooms	0.876	0.917	0.735
Efficient use of water in the hotel	0.886		
Automatic water saving system in restrooms	0.859		
<b>BEHAV — Eco-behaviour of hotel staff</b>			
Waste disposal into recycling cans	0.648		
Well-informed staff with environmentally conscious attitude	0.824	0.775	0.537
Written recommendation to guests about eco-friendly in the hotel	0.773		
<b>FOOD — Bio-food</b>			
Macrobiotic and vegetarian food	0.697		
At least one bio menu as part of every meal	0.636	0.725	0.469
Meals made from organically produced components	0.669		
<b>GREEN PRODUCTS</b>			
Freshly extracted fruit and vegetable juices	0.740		
Products are labeled with the producer's name and ecological	0.715	0.833	0.555
Vegetable, spices and herbs are grown in the hotel's kitchen garden	0.713		
The guests can buy ecological products in the hotel	0.751		
<b>ENVIRONMENT</b>			
Quiet position of the hotel	0.700		
A lot of greenery in and outside the hotel	0.638	0.815	0.601
Pleasant indoor and outdoor wall colors	0.928		



Table 2. Analysis of respondents' level of satisfaction with respect to green hotel service quality (difference between actual perception and expectation)

Factors	Questions asked	Mean values*		Differences (P-E) between expected values (E) and actual perception values (P)
		Actual perceived values (P)	Expected values (E)	
EQUIP	Equipment is made from natural materials	3.384	4.031	-0.647
	Paintworks are from environmentally friendly substances	3.960	4.291	-0.331
	Floor coverings are made from natural materials	3.375	4.516	-1.141
ENERGY&WATER	Efficient use of energy	3.651	4.356	-0.705
	Automatic light control in the hallways and restrooms	3.702	4.416	-0.741
	Efficient use of water in the hotel	3.597	4.484	-0.887
	Automatic water saving system in restrooms	3.631	4.552	-0.921
BEHAV	Waste disposal into recycling cans	3.283	4.376	-1.093
	Well-informed staff with environmentally conscious attitude	3.527	4.255	-0.728
	Written recommendation to guests about eco-friendly in the hotel	3.613	4.263	-0.671
FOOD	Macrobiotic and vegetarian food	3.754	4.343	-0.589
	At least one bio menu as part of every meal	3.778	4.381	-0.603
	Meals made from organically produced components	3.812	4.450	-0.638
GREEN PRODUCTS	Freshly extracted fruit and vegetable juices	3.848	4.475	-0.627
	Products are labeled with the producer's name and ecological effect	3.751	4.342	-0.591
	Vegetable, spices and herbs are grown in the hotel's kitchen garden	3.694	4.333	-0.639
	The guests can buy ecological products in the hotel	3.924	4.456	-0.532
ENVIRONMENT	Quiet position of the hotel	3.652	4.393	-0.741
	A lot of greenery in and outside the hotel	3.574	4.031	-0.457
	Pleasant indoor and outdoor wall colors	3.616	4.320	-0.704

Note: \* Mean value is based on 1 to 5 Likert scale table, where "1" represents totally disagree, and "5" represents totally agree.

model originally constructed by Majda Bastič and Slavka Gojčič (2012). The construct reliability of all latent variables is above 0.70, indicating that the explanatory capability for all observed latent variables is of good quality. Another objective is to test whether the construct model has convergent validity and discriminate validity. Convergent validity is to assess the factor loading of measured variables in relation to latent variables, so as to verify whether each factor loading is statistically significant. Table 1 reveals the factor loadings of all individual items. Since all are above 0.6, they are statistically significant. Also, the average The study has also tested the perceptions and expectations of respondents concerning the green hotel service quality using 20 questions to ask hotel patrons about the green hotel service quality that they expected and the actual conditions perceived.

Then, the survey data are applied to the SERVQUAL model to see if any differences exist concerning the green hotel service quality. The test result reflects the level of satisfaction of patrons with respect to the green operations in existing tourist hotels. The analysis results are given in Table 2. Overall speaking, the analysis shows that respondents generally have higher expectations for green hotel services, but the green hotel services perceived in actual practice is generally lower than expected. This gap (P-E) between actual perception and initial expectations of respondents reflects that respondents are generally more dissatisfied with the green hotel service quality in practice. Specifically, patrons expressed high level of dissatisfaction for equipment used

in tourist hotels and the management of consumables (including energy consumption and the use of natural materials, and so on). In contrast, the satisfaction level is slighter higher for the production of green food, development of eco-friendly green products, resource recycling, and other aspects.

### Conclusions and Recommendations

This study has chosen the patrons to Taiwan's five-star international tourist hotels for analyzing their attitude concerning the green hotel services. In order to obtain preliminary understanding of the expectations and perceptions of hotel patrons with respect to the concept of eco-friendly hotels and green operations, a questionnaire survey has been conducted. The survey results show that most of the patrons interviewed are happy to go to eco-friendly hotels and accept the green operations. This proves that guests in hotel accommodation have increased awareness of the eco-friendly concept. Also, the results show that respondents are willing to accept and support eco-friendly hotels. The only regret is that considerable gap still exists between patrons' expectations of the green hotel service quality and actual perception from their true feelings. We therefore conclude that, between their green consciousness and their green behavior, hotel patrons are somewhat incoherent in their understanding of the green hotel services.

In practice, the green initiatives of the hotel industry cannot meet patrons' expectations of green hotels at this stage, and pa-

trons are generally dissatisfied with the so-called green hotel operations. Such situation therefore creates a new challenge for the hotel industry: how to give patrons more recognition of the green hotel concept, such that they are ready to support the green initiatives and the eco-friendly certification.

Although this study is not too much involved in exploring the correlation between patrons' satisfaction for the green hotel service quality perceived and overall patron satisfaction, it is important to find ways to improve patrons' satisfaction concerning the green hotel service quality to improve the overall patron satisfaction. Therefore, efforts to improve the green hotel service quality and its positive contribution shall not be ignored. Although patrons are more concerned about the hotel rates in reality when choosing a hotel, they pay less attention to the green hotel service quality. Nevertheless, the green hotel concept has become a new trend for the tourism industry. It can effectively raise the competitiveness of a tourist hotel if a hotel's green initiatives are well recognized by its patrons. Thus, this study suggests that the relevant hoteliers shall consolidate different expectations of patrons in order to upgrade the green hotel service quality for improving patron satisfaction. In the future, we recommend that the research scope shall be further expanded to understand specific needs and perceptions of patrons with green needs, using a combination of qualitative and quantitative research methods. By expanding the research scope, the hotel industry is able to better understand the green hotel services as it is growing in popularity, and hoteliers can

utilize more appropriate means to improve the green operations.

## References

- Ecomall (2000). Eco-friendly Hotels Save Money While They Help Save the Planet. [www.ecomall.com/greenshopping/hotels.htm](http://www.ecomall.com/greenshopping/hotels.htm)
- Eco-friendly hotels Association's® (2010). Who has Time What Are "Green" Hotels? Retrieved June, 2010 from <http://greenhotels.com/index.php>
- Eco-friendly Hotel Competition (2008), Taipei: The Environmental Protection Agency of the Executive Yuan. July28, 2010. Obtained from <http://greenliving.epa.gov.tw/GreenLife/info/champion/green-champion-3-list.aspx>.
- Fang-cheng Kung, Hung-che Hsu, Hui-fang Huang, and Yan-ching Fu (90). Environmental Management System of Tourist Hotels-Basing on the Acceptance of Taipei Public. *Outdoor Recreation Research*, 14 (4): 1-26.
- Green Mountain State (2010). What Is a Green Hotel? Retrieved June, 2010, Obtained from <http://www.vtgreenhotels.org/>

Majda Bastič and Slavka Gojčič, (2012),  
Measurement Scale for Eco-Component  
of Hotel Service Quality. *International  
Journal of Hospitality Management*,  
Vol.31, pp, 1012-1020

Manaktola & Jauhari. (2007). Exploring  
Patron Attitude and Behavior towards  
Green Practices in the Lodging Industry  
in India. *International Journal of Con-  
temporary Hospitality Management*, 19  
(5), pp.364-377.

Ming-shen Lai (2000). Eco-friendly Hotels,  
Buildings and Power Rating System in  
Canada. *Eco-labeling Newsletter*,  
19:19-21.

Tourism Council Australia Jointly with  
Commonwealth of Australia. (1998).  
Being Green Keeps You out of the Red:  
An Easy Guide to Environmental Ac-  
tion for Accommodation Providers and  
Tourist Attractions, Tourism Council  
Australia.

Tsai, H.T., Tseng, C.J., Tzeng, S.Y., (2011),  
The Impacts of Natural Hazards on  
Taiwan's Tourism Industry. *Natural  
Hazards*, Vol.59, Iss.3, pp. 1256-1277.

Tzschentke N.A., Kirk D. & Lynch P.A.  
(2008). Going Green: Decisional Fac-  
tors in Small Hospitality Operations. *In-  
ternational Journal of Hospitality Man-  
agement*, 27 (1), pp.126-133.