# 行政院國家科學委員會專題研究計畫 成果報告

## U2.0: SSME 支持的U-社會服務為成功的U-臺灣
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# 行政院國家科學委員會補助專題研究計畫成果報告

（計畫名稱)U2.0: SSME 支持的 U-社會服務爲成功的 U-臺灣

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計畫參與人員： **Yen-Hao Hsieh, etc.**

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# Modeling Service Experience Design Processes with Customer Expectation Management: A System Dynamics Perspective

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## Abstract

**Purpose –** This paper proposes a conceptual framework of customer expectation management and a reference model of service experience design which are regarded as the basic foundation to model the processes of experience design for service operation strategies simulating and testing by employing a system dynamics approach.

**Design/methodology/approach –** System dynamics is the key approach which includes causal loop diagram (CLD) and stock and flow diagram (SFD) used to build the reference model of experience design. Simulations of the processes of the proposed service experience design have also been implemented by Vensim®.

**Findings –** The proposed reference model of service experience involving customer expectations management can successfully capture the key elements of the service experience design within service operation strategies and the system dynamics approach can effectively enable a macro viewpoint of the experience design process for service operation strategies and policies.

**Practical implications –** With the proposed reference model of service experience design and the system dynamics modeling approach, service providers and designers can not only comprehensively examine the processes of experience design in detail but also accomplish the strategies testing and simulating. Hence, service providers can make correct decisions to achieve the business goals via the simulation results beforehand.

**Originality/value –** This paper contributes to analyze and combine the idea of customer expectation management with experience design and give rise to a unique reference model of service experience design that is shown to be valuable to service operation strategies testing and simulating based on the system dynamics perspective.

**Keywords** System dynamics, experience design, customer expectation, service operation strategy, cybernetics

**Paper type** Research paper

## Introduction

According to Heskett et al. (1994), the service industry has played an important role in the experience economy. In many developed countries, such as the US or Japan, service jobs have already reached 40% of the total jobs. The gross output value of service industries has become the major economy source in these countries. On the other hand, with the rapid variation of the globalization service providers have to grasp the importance of the relevance between customer satisfaction and customer expectations during service experiences delivery. Parasuraman et al. (1991) noted that understanding customer expectations will achieve business goals during service experiences delivery. Although it is essential for service providers to realize what customers want, it is still difficult for them to realize customers' desirable needs. The gap between service providers and customers still exists in practice. Hence, how to provide customers with good services to match their expectations is a critical issue for service providers.

Comprehending what customers really expect, what factors influence customer expectations and how service providers fulfill the variable needs are becoming important issues. Accordingly, there have been past studies that focused on the customer expectation issue and the factors influencing the customer expectation (Kurtz and Clow, 1993; Ojasalo, 2001; Zeithaml et al., 1993; Parasuraman et al., 1991). However, customer expectations are

multifaceted and capricious, and service providers should obtain a comprehensible approach about how to practice proper services in terms of diverse customer expectations. For example, service providers can develop a framework, as the development guidance on their operational strategies, to deliver exactly what they should serve in accord with the fluctuations of customer expectations. In other words, there is a strong need of explicit methods for providers to utilize the existing findings for establishing strategies of service operation that can facilitate their business in accelerating the degree of the customer satisfaction.

Zeithaml et al. (1993) provided a concrete conceptual model of customer expectations. Theories explicating the nature of expectations, such as the zone of tolerance, elicited arguments about the factors affecting the size and the position of the zone (i.e., determinants of expectation). However, it has been still a tough task for service providers to deliver the right services for matching various customer expectations. Consequently, service providers have to find ways to develop their operational strategies in order to satisfy their customers. Besides, customer needs are extremely dynamic in terms of their external factors (such as service functions, provider reputations or service surroundings) and internal factors (e.g. customer expectations or emotions). Thus, good experience design is indeed necessary to fulfill customers' needs. To meet diverse customer needs, experience design should take into account these customer external and internal factors. Accordingly, experience design can be considered as a dynamic and comprehensive process. Furthermore, most previous research mainly used empirical methods (such as a questionnaire survey or case studies, etc.) to analyze and investigate these issues, yet they are not sufficient enough to describe the dynamism of the experience design process within the situated contexts. Homer (1993) also mentioned that self-report surveys of respondents meet biases in terms of incorrect reporting.

The study sets out to explore the following three research questions and thereby set the stage for future service experiences research.

- How do service providers manage customers' expectations to accommodate their business goals?
- How do service providers efficiently integrate all kinds of factors in dynamic environments with customer experience design?
- How do service providers accurately implement appropriate strategies to satisfy their customers?

This study based on the knowledge of expectations previously developed attempts to propose a new framework that can aid in developing the service tactics for service providers to deal with the dilemma. For the purpose of assisting in the tactics of business operations in correspondence with customer expectations, it's important to understand that customers engage themselves in the process of service delivery. Customer participation in service encounters makes service tactics that are variously formed so that producers can develop a particular service episode while delivering the service. Service providers can gain the capability of providing appropriate services swinging with customer expectations and also reach the win-win value through manipulating customer expectations. Consequently, this study is to employ system dynamics to build a systematical experience design model. In other words, this study is different from previous empirical research in terms of analyzing the causal process of experience design through the tools of systems dynamics (e.g. causal loop diagram, stock and flow diagram, etc.). Furthermore, using computer-based simulation to test the policy of experience design within service operation strategies is an innovative way for designers and service providers to select appropriate strategies and operations.

## Theoretical Foundations

This study mainly is built on the basis of the customer expectation theory (Parasuraman et al., 1991) and the concept of zone of tolerance (Zeithaml et al., 1993) which are delineated as follows.

### Customer Expectations

In the beginning of a service delivery process, customers are looking forward to their service encounter with eager anticipation. In other words, what customers expect to acquire from the service provider can define diverse customer expectations. Moreover, customer expectations are regarded as desires or wants of customers, i.e., what they feel a service provider should offer more than what would offer. Parasuraman et al. (1991) proposed that understanding customer expectations of service played an important role for delivering good services. Previous researches had presented that how customers assess the performance of a service provider was based on the single level of expectation standard, which meant customer felt a service provider should offer. However, past researchers kept evolving and extending the conceptual model of expectations, putting a lot of effort to pinpoint the critical element within customer expectations. These researchers offered multi-levels of customer expectations (Parasuraman et al., 1991; Zeithaml et al., 1993; Walker and Baker, 2000). According to their propositions, multiple standards would be more likely to completely understand the customer expectations of service.

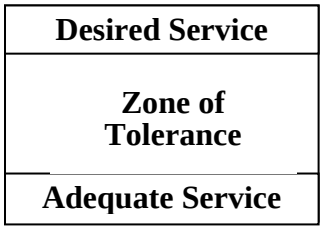


Fig. 1 Expected Service Level

Parasuraman et al. (1991) proposed that customer expectations comprise two levels: desired and adequate (as depicted in Fig. 1). Desired expectations represented the level of service a customer hopes to receive, defined as the level at which the customer wanted the service to perform. It was a combination of what the customer believed "can be" and "should be", while adequate expectations, a lower level of expectation, considered to be customer's acceptable level of performance. It was relied on the customer's assessment of what the service "will be" (Zeithaml et al., 1993). The latter was the basic expectation level for customers to determine the service performance, whereas the former expectation level, which was higher than adequate expectation, could attract the customers, i.e., customers might be surprised and overwhelmed while the service providers were reaching or exceeding customer expectations. These actions directly made the customers tend to think the performance better and be satisfied with the service.

This paper adopts the dual levels of expectations and extends their uses in the dynamic service contexts in terms of customer expectation management during the service delivery process. In other words, the paper regards customer service expectations as dual-level as well as dynamic. The level of desired and adequate expectation could vary from customers to customers and, potentially, from one situation to the next for the same customer. Those situations might differ from various industry sectors might even cause different expectation levels, enlarging the complexity of customer expectation.

**Zone of Tolerance**

The zone of tolerance of a customer would be influenced by several complex and multiple factors within service encounters (Zeithaml et al., 1993). Zeithaml et al. (1993) proposed a comprehensive framework of service expectations and clarified customer expectations by eleven antecedent factors which could affect the desired service level and the adequate service level (as depicted in Fig. 2).

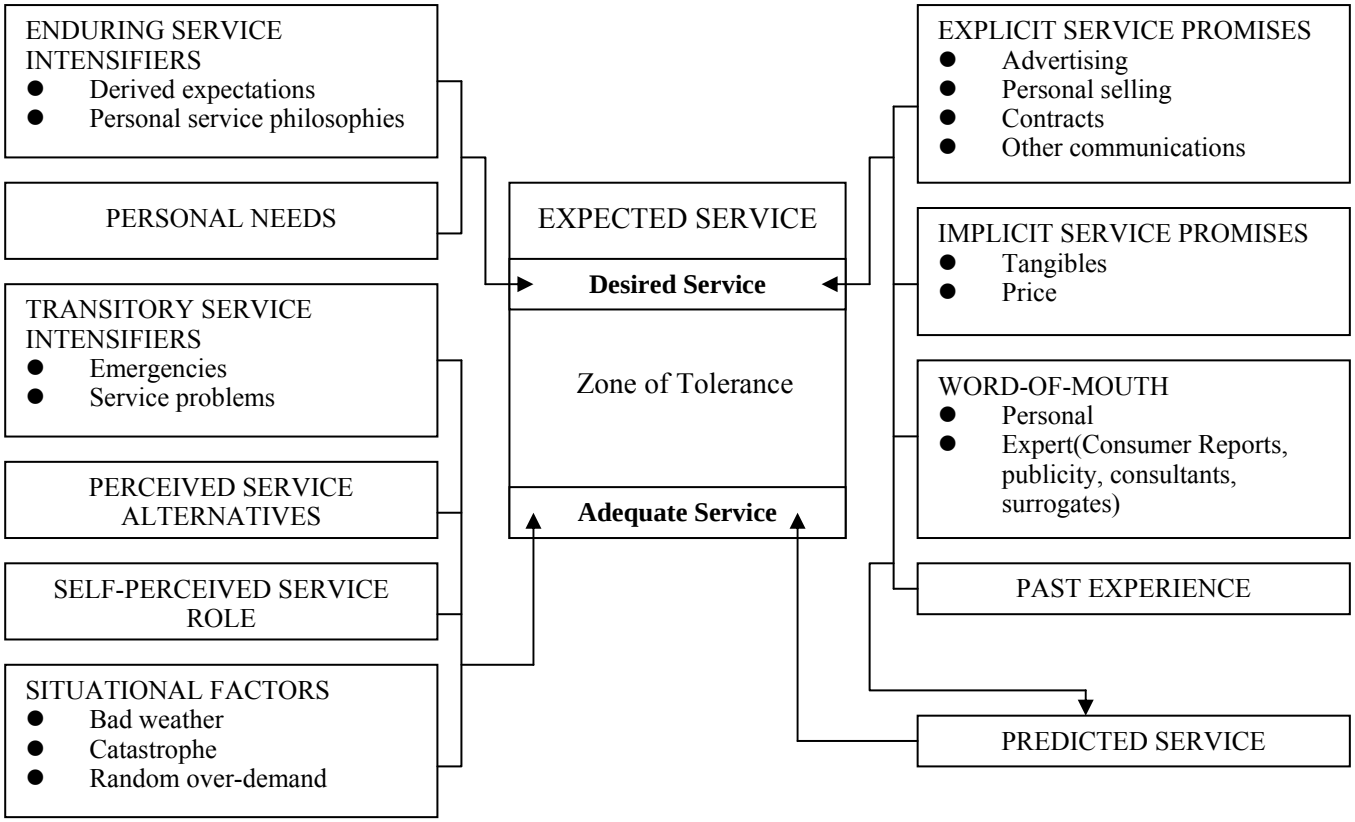


Fig. 2 Nature and Determinants of Customer Expectations of Service

With our extended use of the desired and adequate service levels, they could change spontaneously because customers have physical and mental vibrations across different services as well as different contexts. Accordingly, the zone of tolerance can become wide or narrow dynamically during the service delivery process.

This study attempts to propose a framework to describe the manipulation of customers' expectations during service delivery based on the antecedent factors of zone of tolerance, given the understanding that the nature and determinants of expectations of service is important. In addition, this study divides antecedent factors into three categories, which includes need, context and effort, according to the nature and distinction of factors. The need group contains factors of customers' mental and physiological demands, such as personal needs etc. The context group is about factors happened extrinsically, such like situational factors etc. Moreover, the effort group means that customers would like to expend their money or energy on services (e.g. self-perceived service role) during the

service delivery process. Basically this framework is grounded on the above antecedent factors.

## Research Method

This study attempts to employ system dynamics to build the model of experience design processes. Forrester first proposed the system dynamics concept in 1956. Since human behaviors are correlated with time and context factors, it is useful to realize the nature of problems and raise the capability of solving problems via system dynamics (Forrester, 1994). Senge (1990) noted that it is necessary to consider the human world as a complex and dynamic system while dealing with difficulties. Fowler (2003) stated that systems thinking are a framework for managing the strategies, operations, and implementation of comprehensive and diverse systems. Schwaninger and Grosser (2008) described that system dynamics modeling can be a tool for theory building. Accordingly, system dynamics attempts to analyze the dynamic complexity system by causal loop diagrams (CLDs) and stock and flow diagrams (SFDs).

There are two major characteristics of system dynamics: *feedback* and *time delay*. When a system has feedback loops, the output variables are no longer independent of the input variables. The variables of this system have interactive influences, and then it is different from the linear or sequential systems. The effects of feedback loops would influence the system with the positive or negative results. Besides, the plus sign (+) represents the reinforcing or positive relationship between two variables. In contrast, the minus sign (-) shows the balancing or negative relationship. The feedback loops should lead to the same direction (clockwise or counterclockwise). The positive feedback loop is also called a “reinforcing loop” which contains an even number of negative relations. For examples, Fig. 3 shows that there are four variables (including A, B, C and D) in the circle which consists of two positive relations (i.e. A → B and C → D) and two negative relations

(i.e. B → C and D → A). Hence, this circle represents the reinforcing loop diagram. Moreover, the reinforcing loop means that if the cause increases, the effect increases in the system. In contrast, the negative feedback loop is represented as a "balancing loop" which includes an odd number of negative relations (as shown in Fig. 4). The balancing loop means that if the cause increases, the effect decreases in the system.

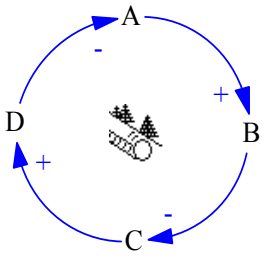


Fig. 3 Reinforcing Loop

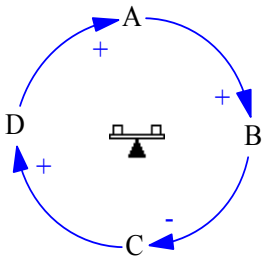


Fig. 4 Balancing Loop

Time delay (||) is the other important property of system dynamics which often occurs in the complicated system. For example, advertisement marketing would affect customers' purchasing expectations, yet the results of buying goods cannot occur in a short time. In other words, an input variable influences an output variable over time or during a period of time, and therefore the effect of the input variable does not immediately take place. Accordingly, feedback and time delay are two major features of system dynamics to portray the process of real world system. This study can utilize these concepts to describe the variation process of designing service experiences during the service delivery in order to demonstrate the real-time circumstances.

## The Conceptual Framework of Customer Expectation Management

As mentioned earlier, customers play an active participative role during service experiences delivery. There is no doubt that customer expectation management is the critical factor of experience design. Accordingly, before modelling the processes of service experience design by system dynamics, this study proposes the conceptual framework first (as depicted in Fig. 5) to show that how the service providers can employ further the

formulation of their service tactics to manage customer expectations during the service delivery. According to the service encounter triad (Fitzsimmons and Fitzsimmons, 2006), there are interactions between the three roles - service provider, contact personnel and customer – in the service encounter. This framework is then described in terms of the three phases:

- Phase 1: Service providers have to classify their objectives into a strategy type. According to different strategy types, such like selling new product or recovery services, each type is associated with a kind of state of expectation attempted (e.g. decreasing the adequate expectation and keeping the desired expectation for low-capability service providers). This sate of expectation would capture a promise that while customers are under this kind of expectation (through the organization's expectation-factor manipulation), the manipulator could not only achieve the objectives but have customer satisfied. For example, when a secondary service provider promotes a new product, their customers' expectations may be too low, such as the lower adequate service level of customers, to expect a perfect and multi-functional product or service. However, if customers suffer a failure service in service encounters, their expectations should become high for the better recovery service from the service provider. In summary, service providers can apply different strategy types to achieve customers' expectations based on different service conditions.
- Phase 2: After completing the stage of state-of-expectation classification, the solution type module, which is a knowledge-based database with three types of influences (e.g. need, context and effort), is to compile factors that affect customers' expectations based on the customer expectations determinants of Zeithaml et al. (1993). The service organization then indicates the factors required to be operated on expectations and how expectations would be effected to pick up directions for forming the service

tactics. However, there is no need to employ every direction recommended. The service organization could just assemble some of them into a particular portfolio (i.e., a service tactic) in response to each individual customer. Briefly, a service tactic is an operational way to affect customers' expectations of service providers. In order to manipulate customers' expectations availably, combining helpful tactics to form a portfolio is essential and spontaneous.

- Phase 3: The service tactics is accordingly executed by personnel or customers themselves.

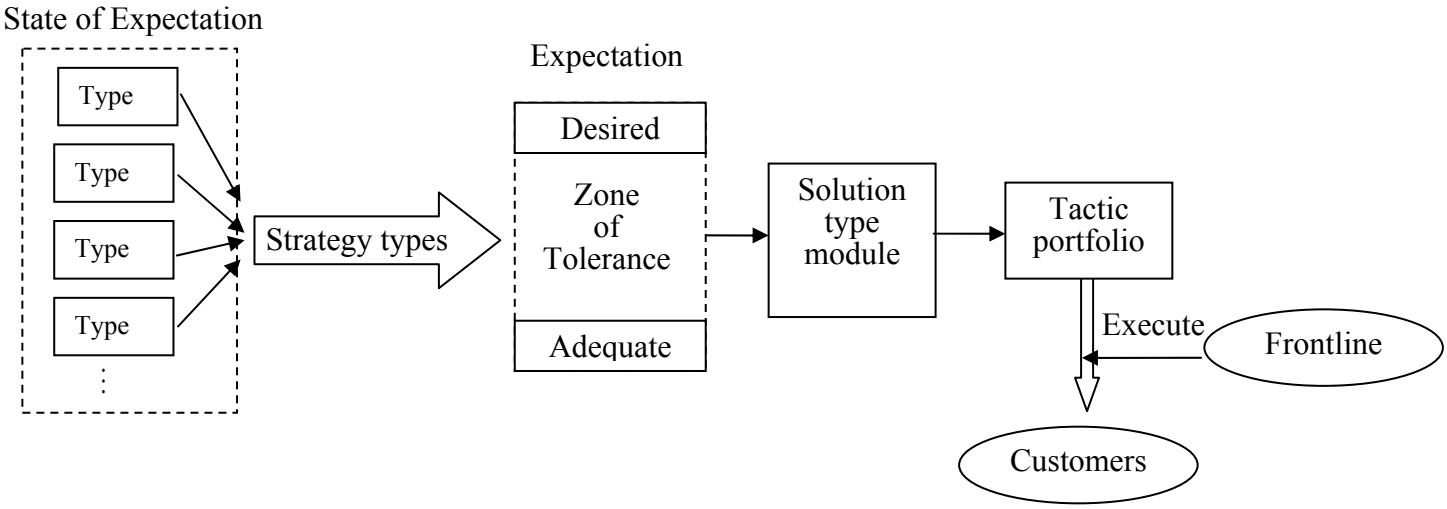


Fig. 5 Conceptual Framework of Customer Expectation Management

Consequently, it is useful to determine what primary processes can be procured according to this conceptual framework, when service providers would like to manage customer expectations during service experiences delivery. This conceptual framework can support the explanation and integrity of delineating the experience design during service delivery.

## The Reference Model of Service Experience Design

After depicting the conceptual framework of customer expectation management, this study, then, proposes a reference model of experience design to be on the basis of system dynamics modeling. Experience design is an approach to promote highly positive emotions

for customers by designing virtual or tangible services (Pullman and Gross, 2004). The objective of experience design is to create functional, purposeful, engaging, compelling, and memorable experiences for customers (McLellan, 2000). Especially, service providers can deliver good services for customers with pleasant and memorable experiences through good experience design. In other words, customer experiences can be divided into several service segments, and then service design can be embedded in experience design. Voss et al. (2008) proposed the architecture of the service delivery system to describe the service design concepts, which includes stageware, orgware, customerware, and linkware. Stageware focuses on the physical servicescape such as facilities layout or flows. Orgware represents the abilities of enterprises to manage and control the business strategies. Customerware pays attention to customer encounter points or touch points in a service delivery system. Linkware is the communication mechanisms that integrate or transfer service information with customers and enterprises (Roth and Menor, 2003). According to the architecture of service delivery system, this study tries to portray the reference model of service experience design (as depicted in Fig. 6) to show the relationship among above important factors. According to Voss et al. (2008) and Zeithaml et al. (1993), this study combines the concepts of service design strategies with customer expectations to form the reference model of service experience design. This study tries to use the reference model to describe the constructional process of service experience design. The reference model can be the fundamental infrastructure to represent the complex and dynamic design circumstances.

Fig. 6 shows that customers would like to have a good service experience; service providers should take service functions and customer expectations into account. Functions represent the nature of services which customers can be served. For instance, services are to provide customers with many basic functions which include purchasing, convenience, or time saving. Besides, the concept of customer expectations is the important factor for

designing services to enable service providers to deliver good services that can meet customers' needs. In addition, customers in pleasant surroundings easily enjoy acquiring a good and memorable service experience. Accordingly, it is necessary to use service operations for implementing the functions and customer expectations in practice in experience design. Besides, the major objective of environment design is to build atmospheric surroundings for customers (Kotler, 1973; Donovan et al., 1982). The employees' external behaviors (such as warm smiles or friendly dialogs) can directly affect the perception of customers (Pugh, 2001; Lewis and Entwistle, 1990). Applying Information Technology into service encounters can enable easily customers to achieve higher satisfaction (Meuter et al., 2000; Johnson et al, 2008). Consequently, service operations are the vital kernels of designing services which contain the environment setting, information technology, and friendly employees. Since three major service operations are built, customers can have an expected and enjoyable service experience to acquire good and appropriate services.

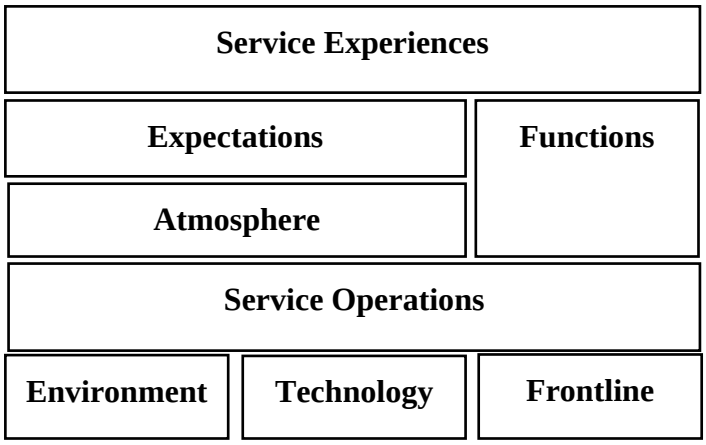


Fig. 6 Reference Model of Experience Design

Therefore, this study, which is based on theoretical literature support, purports to expound and propose the conceptual framework of customer expectation management and the reference model of experience design. According to these two theoretical and structural models (i.e. building blocks), this study can explicitly analyze and model the relationships

in the processes of service experience design within service delivery by utilizing the system dynamics perspective. In this paper, this analysis and modeling is deployed with the system dynamics approach in order to understand the dynamic behavior of the experience design over time in terms of the causal loop diagrams and stock and flow diagrams.

## Analysis of Causal Loop Diagrams in the Service Experience Design

As mentioned earlier, the feedback structure is an important feature of system dynamics. According to Sterman (2000), causal loop diagrams are an analytic tool for portraying the feedback structure of complex systems. Using causal loop diagrams can not only easily define the hypotheses of the causes of systems but also find out the core model of problems (Senge, 1990). This study first uses causal loop diagrams to demonstrate the proposed experience design process (as depicted in Fig. 7).

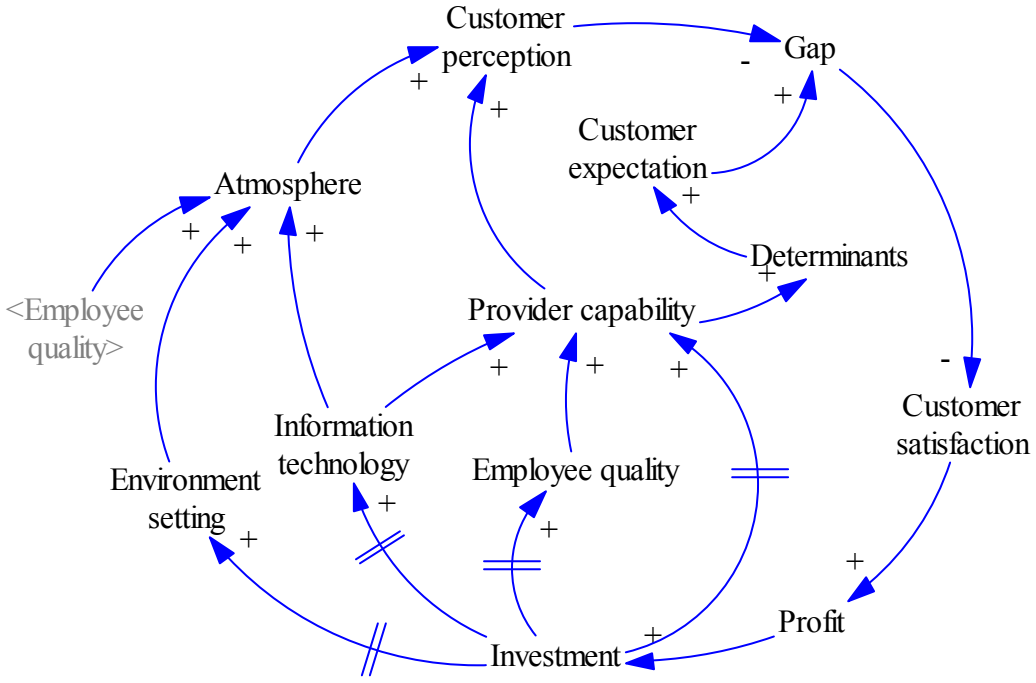


Fig. 7 Causal Loop Diagram of the Proposed Service Experience Design Process

Fig. 7 represents the feedback structure of the proposed experience design process based on the aforementioned conceptual framework and reference model. During the design process, service providers with higher capabilities can utilize more determinants to manage customer expectations simply. Customer expectations are the desires in the customer psychology, while in contrast customer perceptions are the customers' experiences or behaviors in practice. When the perception of a customer does not meet his/her expectation when he/she receives services, a gap is immediately generated between two factors. In other words, as the customer expectation is higher, the gap is wider. Then, the higher customer perception leads to the decrease of the gap. Once the gap becomes narrow, it can result in high customer satisfaction.

Consequently, service providers get high customer satisfaction that can raise the repurchase rate and increase the business profit. It is obvious that service providers with much higher profit would have a greater opportunity to increase investment in environment settings, information technology, and employee quality. However, information technology and employee quality are the major elements of the provider capabilities. Besides, increased service provider investments (such as advertisements, reputation, or service quality management) can also increase their capabilities. Nevertheless, service providers invest their money in environment settings, information technology, employee quality, or provider capabilities that will be observed in a while. Hence, time delay influences the process of experience design. The atmosphere is another important factor in an experience design system that is directly influenced by environment settings, information technology, and employee quality. Use of perfect design strategies and operations of environment settings, information technology, and employee quality will enable customers to have good service experiences in a happy, exciting, or comfortable atmosphere.

According to the concept of system dynamics, this study tries to model the structure of experience design based on the causal loop diagram. The diagram, which can clearly define

the feedback and time delay characteristics of systems, is different from the principles of a linear model. It is useful and distinct for designers to think about and analyze causal and interactive relationships among factors, especially in experience design. Thus, experience design needs to be considered from the customer aspect, service provider aspect and service operation aspect. The causal loop diagram can easily not only describe the whole circumstances but also interpret the influences of factors.

## Analysis of Stock and Flow Diagrams in the Service Experience Design

Sterman (2000) described that "the net rate of change of a stock is the sum of all its inflows less the sum of all its outflows." The definition of stocks is to calculate the net rate of change. In other words, stocks can contain their net flows, and the net flow can be derived from the stock. Using stock and flow diagram is to build a dynamic model for describing the system process. In addition, it can help designers grasp the crux and find the right guide through computer-based simulations. The results of simulations can be regarded as the service operation strategies in order to figure out the above problems. Consequently, it is demonstrable that analyzing the dynamic process of experience design through stock and flow diagram is effective and useful for designing service experiences.

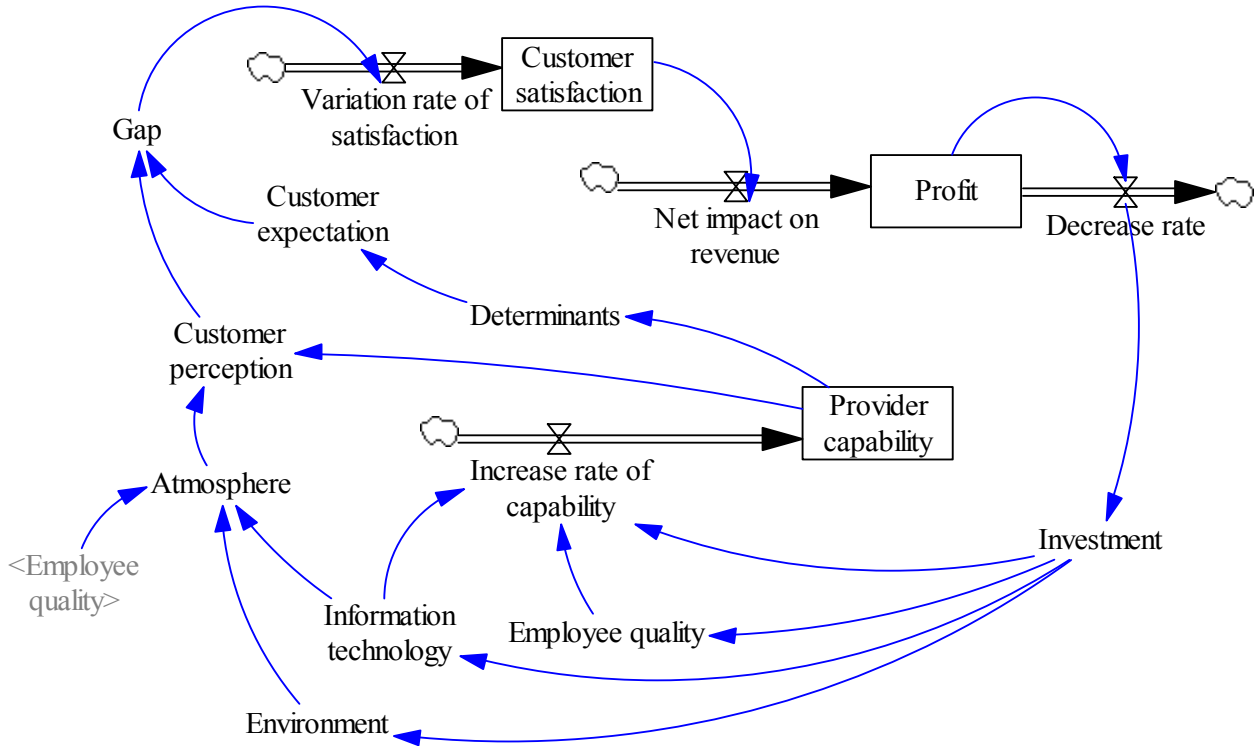


Fig. 8 Stock and Flow Diagram of the Proposed Service Experience Design Process

In this paper, system dynamics is used to understand the dynamic behavior of the experience design and different service operation strategies and policies can then be simulated and tested so that the service providers can obtain some insights regarding the further refinement required for their strategies in order to achieve their business goals.

The stock and flow diagram of experience design is presented in Fig. 8, which is based on the causal loop diagram. There are three stocks, which include profit, customer satisfaction, and provider capability, in the stock and flow diagram. These stocks can be considered as the key performance indexes (KPI) for the evaluation of the variations of the experience design process. According to these KPI, service providers can immediately realize what effect and result will be procured through the experience design. Consequently, it is understandable to observe the dynamic circumstance and modify the design strategies and operations immediately through simulations (as depicted in Fig. 9, Fig. 10, and Fig. 11).

This study uses a software package, called Vensim (www.vensim.com/), to describe the stock and flow diagram and simulate the process of dynamic experience design. Vensim also enables designers to delineate a causal loop diagram such as shown in Fig. 8. Simulations are the major research method used to analyze the dynamic system. In the stock and flow diagram designers can set up the formula or initial value of each parameter according to different situations and times. However, it is different from the traditional simulation method, because there is a clear causal model to express the complex system. Accordingly, it is easy for designers or service providers to test their design strategies and operations dynamically.

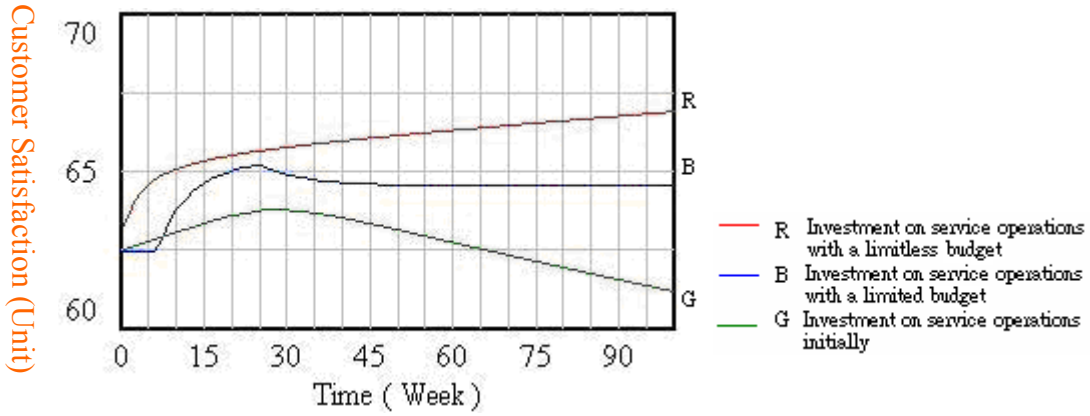


Fig. 9 Distributions of Customer Satisfaction across Different Design Strategies

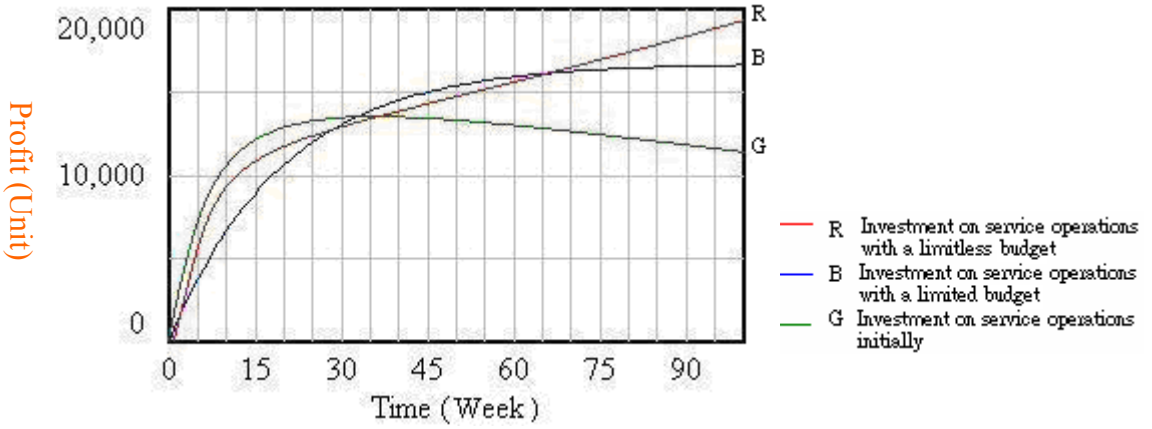


Fig. 10 Distributions of Profit across Different Design Strategies

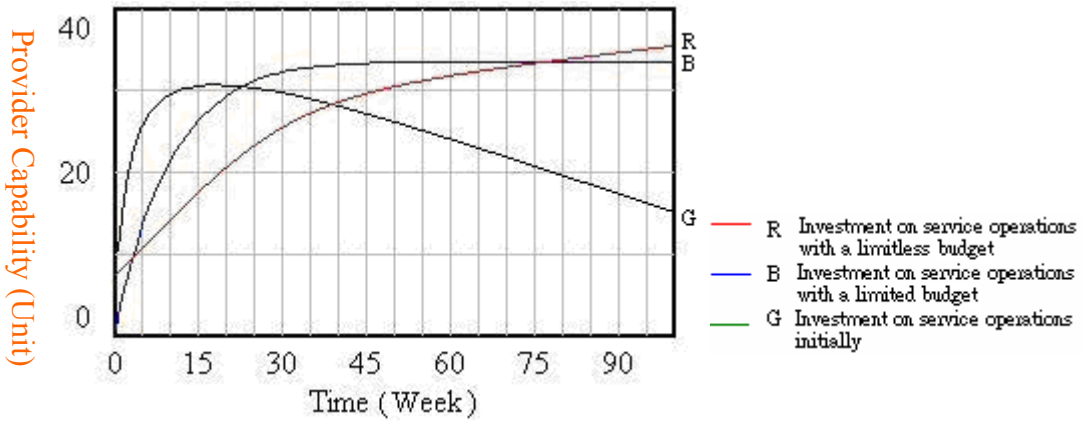


Fig. 11 Distributions of Provider Capability across Different Design Strategies

According to our proposed reference model of service experience design, a service provider can adopt an expectation strategy (e.g. decreasing the adequate expectation and keeping the desired expectation to extend the zone of tolerance) to manage customer expectations. Fig. 9, Fig. 10, and Fig. 11 show a simulation that assumes that a service provider initially has low capabilities and customer satisfactions and changes its experience design strategies leading to the change of its service operations (e.g., increasing investment for environment settings or employees qualities *etc.*). This would improve the functions of services and manage their customer expectations and then its customer satisfactions, profit, and capabilities that are all gradually raised and reach the stable values to make the customers have good service experiences. Designers and the service provider can easily and immediately understand the simulation results, so they can modulate their strategies to achieve their business goals. As mentioned earlier, this study tries to employ customer satisfaction, profit and capability as the performance indexes in order to examine the effectiveness of the proposed experience design. Each index has its unit measurement (depending on the choices made by the service provider); for instance, this paper uses a week as the basic unit of time when simulating the processes of experience design over time.

Taking the Fig 9's simulation as the example, the service provider aims to increase the customer satisfaction by enhancing investment of capabilities as a feasible business strategy with a limited budge. The blue line (Line B) represents that customer satisfaction lies in an initial value (62.5) during the preceding 5 weeks. The effect of implementing the strategies would be begun to observe from the 6th week, which is caused by the time delay. After the 30th week, customer satisfaction gradually increases and tends to a stable value (64) because there is no new strategy applied in the design process. Moreover, the green line (Line G) represents that the investment strategy of service operations only in the early weeks (from 1st to 10th weeks) can immediately raise customer satisfaction. However, owing to the limited influence of the short investment customer satisfaction rapidly decreases as the time pass by. Hence, the influence of implementing the strategy for customer satisfaction, profit and capability is extremely limited, and there is no doubt that the simulation results gradually go down. In contrast, the strategy of the red line (Line R) is to continuously invest money in service operations (i.e. technology, employee and environment) for increasing the provider's capability with limitless budge. Although the values of customer satisfaction, profit and capability increase slower than others at the earlier time, the long-term results are the best of three different strategies testing. In short, Fig. 9 implies that the service provider needs to pay more time to manage customer expectations through appropriate strategies, especially in experience design. Using a simulation tool, such as the stock and flow diagram, for policy testing and analysis to realize the dynamic behavior of the experience design is valuable and essential in terms of different situations, times, and events.

From Fig. 9-11, even though the service provider has the lower capability and customer satisfaction initially, it can adopt an expectation strategy to manage customer expectations first. In addition, the provider must take account of important factors of experience design (e.g. service functions, customer expectation, service tactics and service

operations) to deliver good service experiences to customers to achieve high satisfaction. According to the description of the red line (Line R) in Fig. 11, the provider capability continues to increase in terms of the strategy of continuous investments. Hence, it can easily employ expectation determinants to manage customer expectations in order to raise customer satisfaction with high capability (as depicted in Fig. 9). When customer satisfaction gradually increases, the profit also can continuously accumulate (as depicted in Fig. 10). In other words, the simulation results shown in Fig. 9-10 manifest the positive evidences of our model and approach to serve as a new and systematic foundation to support the customer experiences design process. Therefore, the provider can not only define the expectation strategy and KPI to adapt to its business goals based on the proposed conceptual framework and reference model, but also choose suitable service operation strategies comparing to the simulation results of different strategic policies through the system dynamics approach.

To sum up, good service experience design, as mentioned earlier, needs to take many critical factors into account. The mental status of customers (i.e. customer expectation and satisfaction) is extremely difficult to grasp, even though there have been many empirical approaches used. Hence, the effect of experience design can be procured over an amount of time. This study attempts to apply system dynamics to the modeling of our experience design in order to understand the dynamic behavior of the experience design over time through diverse strategy testing. Stock and flow diagram with the computer-based simulation can be applied to the process of experience design. According to the results of simulations, service providers can not only comprehend the outcome of executing strategies in order to facilitate the strategy making before really implementing the experience design strategy. Therefore, it can facilitate service providers to adjust the appropriate policy to test and recognize the dynamic behavior of the experience design over time in dynamic circumstances.

**Managerial implications**

Since customer experiences have been regarded as the main economic activity in the twenty-first century (Pine and Gilmore, 1998), how to deliver a good service experiences to customers is a critical issue for service providers. Furthermore, Haeckel et al. (2003) mentioned that service providers need to design experiences with a breadth and depth version in order to attract customers. This paper attempts to model the processes of service experiences involving customer expectation management through the system dynamics approach.

Accordingly, there are several implications drawing as follows. First, service providers need to analyze the overall situation of experience design in macro viewpoint rather than the linear thinking. It is helpful for service providers to systematically and theoretically explore the causal relations among all factors of experience design. The proposed reference model of service experience process can serve as a theoretical support of the causal relations required, and the system dynamics approach via the CLD and SFD can attain the systematic influences of the involved factors in service experience design.

Second, with the system dynamics approach service providers can systematically assess different strategies of experience design. With the circumstantiated simulations in accord with the strategies, service providers are empowered to engage the policy testing with respect to their different business goals (e.g. increasing customer satisfaction) and standpoints (e.g. extending the zone of tolerance of customers). Consequently, service providers can realize the predicted effects to decrease the possibility of the failure or risk before implementing the strategy in practice.

Finally, service providers can reduce the cost of time and resources in terms of employing the system dynamics tool. It is very convenient and helpful for service providers to realize the effects of the strategy testing with the tool. Based on the predictions of simulations, service providers can immediately to propose an appropriate strategy to

respond the external variations of dynamic environments. Therefore, service providers can highly decrease the human, machines and time efforts to make the flexible responses and the timely strategic polices to achieve their goals.

## Conclusions

Delivering good service experiences is necessary for service providers to their customers within service encounters. However, customer service experiences can be divided into several key service segments. Each service segment also contains many important service encounters. Hence, good design of these basic segments is most important to attain a good experience. Service providers have to explicitly focus on each service encounter in designing experiences. Customer expectation management is an essential issue for service providers to design proper experiences. Based on the standpoint of zone of tolerance (e.g. desired and adequate expectation), different customers in different situations will generate different kinds of expectations. Realizing the customer's zone of tolerance is important to customer satisfaction (Johnston, 1995). Our research proposes that considering the importance of customer expectations leads to good services and experiences. Hence, businesses should take this concept into account in terms of their strategies and market positions. For example, when the business has high capability or resource levels to serve customers, it can raise customer expectations to increase its competitiveness. Competitors should put forth more efforts to overtake this threshold. Accordingly, using customer expectations management as a strategy for businesses should be an important means in designing experiences.

Accordingly, this study first gives an overview about the customer expectations research. After a critical analysis of the nature and determinants of customer expectations model, this study attempts to propos a conceptual framework to describe what and how providers could manipulate their customers' expectations during service experiences

delivery. Based on these antecedents of customer expectations, which Zeithaml et al. developed, this study comprehends what factors would particularly affect the desired service level and the adequate service level of customer expectations. Then, this study models the process of experience design through the concept of system dynamics based on the conceptual framework. It is extremely different from linear thinking in terms of feedback and time delay concepts. According to the CLDs and SFDs models, designers and service providers can easily realize and analyze the circumstances of experience design. System dynamics provides a tool for understanding the structure responsible for designing customer experiences. However, as mentioned earlier, the simulation results can help designers and service providers to understand the drawback of designing service experiences. System dynamics models (CLDs and SFDs) can apply many scenarios in problems for policy testing that enables service providers to reduce considerable cost.

In other words, this paper presents a reference model of service experience involving customer expectations management that can successfully capture the key elements of the service experience design within service operation strategies. By showing this, we use the system dynamics approach to model the macro system viewpoint of the experience design process based on the proposed reference model, and the model can be used to test and simulate the effects of any given service operation strategy in order to assist service providers to make correct decisions to achieve the business goals via the simulation results beforehand.

However, there are several limitations associated with this paper. First, the parameters of the stock and flow model are based on the past research which could not be completely suitable for real service providers. Hence, this study would like to propose a generalized approach to apply into different domains. Second, in order to achieve the satisfaction of customers, service providers should augment or narrow the zone of tolerance substantially depending on different service strategies. Although our research framework is extremely

digestible and serviceable, how to categorize service providers' strategy types based on the domination of customer expectations is an uncertain problem up to now. For example, what marketing or selling strategies service providers need to increase or decrease customers' expectations is an important issue, nevertheless, literatures are insufficient for us to bind. Third, the conceptual framework just focuses on antecedent factors of the zone of tolerance rather than other influences. According to Zeithaml et al (1993), our research mainly tries to find out what and how service providers can manage their customers' expectations.

Furthermore, there are some further research directions as follows. One important direction of further research is how to set up the appropriate parameters, initial values, and formulas in simulation models, since it is necessary and useful to fit in with the real situation in practice. Second, the evaluation of the models is also a critical issue for designing service experiences. Accordingly, we will continue to address these research issues and apply the results to practices in the future. Third, this preliminary study proposes some ponderable insights and importance of customer expectation management and experience design. Researchers can adopt this conceptual framework and the reference model briskly to build the innovative service systems for delivering proper service strategies in the future. Finally, more research is needed at the zone of tolerance to determine what sizes of the zone should be in terms of different service stages.

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# 出席國際學術會議報告

The Hawaii International Conference on System Sciences (HICSS 43)
Hawaii, US, January 5-8, 2010

## 出席會議經過

HICSS 43 於美國夏威夷舉行。會中共有來自約二十多個國家(包括 Australia, Canada, China, Czech Republic, Germany, Hong Kong, India, Indonesia, Japan, Jordan, Macao, Malaysia, Myanmar, Nigeria, Norway, Pakistan, Russian Federation, S. Korea, Singapore, Sweden, Taiwan, United Kingdom, and United States 等國)的學者一同參與，與會人事逾六百人。HICSS 研討會共計 2 個 keynote speeches, 1 個 panel discussion, 5 場 symposia, 8 場 workshops, 11 場 tutorial 及逾 120 場 sessions，主要包括 Collaboration Systems and Technologies, Decision Technologies and Service Sciences, Digital Media: Content and Communication, Electronic Government, Future Electric Power Systems: Smart Grids, Engineering, Economics, Security, Information Technology in Health Care, Internet and the Digital Economy, Knowledge Management Systems, Organizational Systems and Technology, Software Technology 等相關學術議題。

## 出席會議心得報告

會議中所提若干重要研究方向茲分述如下：

- Future research for health care area:
  - Sharing data and information for public health protection and their seamless exchange across diverse health systems
  - Complexities, challenges and advances in sharing data and practices across healthcare systems
  - Communicating heath-related data
  - Healthcare systems development
- The important subjects of human-computer interaction will include as follows:
  - User task analysis and modeling
  - The analysis, design, development, evaluation, and use of information systems
  - Guidelines and standards for interface design
  - User interface design and evaluation of the Web for
    - B2B, B2C, C2C E-Commerce
    - Group collaboration
    - Negotiation and auction

- Design and evaluation issues for small screen devices and M-Commerce
- Interface issues in the development of other new interaction technologies
- Information system usability engineering
- The impact of interfaces/information technology on attitudes, behavior, performance, perception, and productivity
- Implications and consequences of technological change on individuals, groups, society, and socio-technical units
- Issues related to the elderly, the young and special needs populations
- Issues in teaching HCI courses
- Interface design for group and other collaborative environments
- User / Developer experiences with particular interfaces, design environments, or devices

- Researchers' comments for our presentation (Service Sciences, Management and Engineering) on 1/8 session
  - The theory of service science needs to be developed by integrating different fields and disciplines.
  - The differences between service-dominant logic and good-dominant logic are the key for stating and describing the today's research and the traditional research in service field.
  - Service design combines with customer expectation concept by IT is feasible to generate innovative services.
  - The user of the S-D logic based input-output approach can be further defined and elaborated.
    - The application direction
    - The usage level
    - The practical implementation

**建議事項**

此次 HICSS 國際研討會議規模如此盛大，除大會主辦單位努力籌畫外，臺灣研討會舉辦地相關軟硬體設備齊全，都使所有參與者在研討會過程之中，感到十分舒適與便利。因此，望政府能再投入資源於國際會議所需之相關軟硬體設施，以利爭取更多國際型重要會議。

**攜回文件**

大會論文集電子檔。