

APPLYING SERVICE SCIENCE ON SYSTEMATIC INNOVATION FOR THE CONVENTION AND EXHIBITION INDUSTRY: THE CASES OF WORLD EXPO

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ABSTRACT

The growth of service industry is closely related to the economic development. Valuable service can strengthen the competitiveness of the enterprises and improve the quality of live. Recently the manufacturing industries start to embrace the service concept by integrating intangible service with the tangible products. On the other hand, to increase service quality and customers' satisfaction, service industries need to meet the consumers' demand by utilizing the newly developed technology. Recently Taiwan has held many international large-scale exhibitions which are highly value-added service activities and can be extended to the tourism industry. The convention and exhibition industry can boost service economy. However, the capacity, quality, the level of innovation are still very difficult to be measured. In this study, we try to adopt the methodology of industrial engineering and system management and other newly developed methods of service science to present a systematic innovation for the convention and exhibition industry. First, service blueprint was used to describe the service delivery process of the convention and exhibition industry. Then we prescribed the service construct by conducting literature review and survey from the practitioners' viewpoints. We also applied demand correlation matrix which integrates with TRIZ to obtain the innovation principles that facilitate service innovation could be systematically developed for the designated customers. Further, we used World Expo as a case study to illustrate the process of systematic innovation. Finally, we found that the new dimension of service innovation can be obtained by using the proposed method integrating QFD and TRIZ. The main contribution of this study is to provide a reference model of systematic innovation for convention and exhibition industry. Such methodology can also be applied to the other related service sectors.

Keywords: Convention and Exhibition Industry, Systematic Service Innovation, TRIZ, Service Blueprint, Servicescape

1. INTRODUCTION

At present service industry is closely related to the economic development. It can strengthen the competitiveness of the enterprises and improve the quality of live. The manufacturing industries also can provide more customer value by adopting the concept of service. Meanwhile, in order to increase customers' satisfaction, service industries need to meet the consumers' demand by utilizing the newly developed technology. The convention and exhibition industry is

one of the promising and highly potential service sectors in Taiwan.

Taiwan had achieved a lot of excellence in many manufacturing sectors; however it is following the same development trend of the most developed countries. It is becoming a service-dominant country in the era of service economy.

According to the statistics [11], American service sector employment accounts for nearly 80%; 69% in Japan; 68% in Taiwan. In 2009, the GDP of the agriculture, industry and service are 1.55, 29.79% and 68.66% respectively. Hence service has played an importance role on economic development in Taiwan.

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Although the domestic service has gain momentum in recent years, its quality still needs to be improved. Especially, the Bureau of Foreign Trade (BOFT), under the Ministry of Economic Affairs (MOEA) of R.O.C. had launched Taiwan MICE Advancement Program in January 2009. The BOFT works on several fronts to provide the sector with financial support, skills training, industrial promotions and partnerships. Taiwanese government endeavored to promote tourism industry and MICE (Meeting, Incentives, Conventions, and Exhibitions) programs [18]. Taiwan had held many international large-scale exhibitions, for instance, the international flora exhibition; the 2009 international tool machine exhibition of Taipei, which attracted exhibitors from 15 countries and 895 domestic and international manufacturers with 4871 stands; the 2010 Taipei international automobile accessories exhibition; the international computer exhibition of 2009 Taipei, and many others.

Therefore, there are many research issues and opportunities in this field. The goal of this research is to assist exhibition event organizers, corporations and associations in developing systematic innovation.

2. LITERATURE REVIEW

2.1 Service Science and Innovation

Service can be referred to a broader scope which includes useful things, business trade, information service, finance and insurance, teaching service, health care, accommodation and government's administration and so forth. No matters what form it is in the business world, its goal is to generate profit for the service provider. Service has some characteristics that differ from the product such as intangible, inseparable, perishable, and heterogeneous [28].

In order to improve service quality, create innovation, and meet customer's needs, IBM developed a cross-functional filed called SSME (Service Science, Management and Engineering) in 2004. It is a multidisciplinary study which can facilitate service system through scientific research methodologies. Such methodologies can assist the service providers to create more customer value. Maglio [19] addressed that SSME is a discipline that uses scientific understanding, engineering principles, and management practices to design, create, and deliver service systems. Furthermore, the discipline of art can also be combined with technology and management perspectives to produce new service.

As to service innovation, its aim is to create new value through service design and delivery as well as new business model. According to the previous study, the early research on service innovation focused on case conceptualization of service innovation and innovation research [29, 20, 30].

2.2 The Conventions and Exhibitions Industry

Due to the intangible characteristic, it is very difficult to measure service quality and the customers' satisfaction [18, 23]. Such features are common in the real world environment [21]. The related works on conventions and exhibitions industry are focused on planning and development. To identify the linkage between environment dimension, holistic environment, customer response, and customer loyalty is an importance issue for convention and exhibition industry. In this study, we adopt the servicescape framework proposed by Bitner [6], see Figure 1.

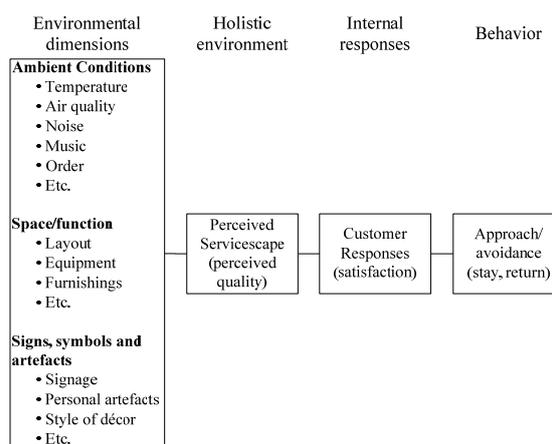


Figure 1: Servicescape framework

2.3 Relevant Methods for Services Innovation

2.3.1 Service Blueprint

Service blueprint has been applied to a variety of industries, such as hospital management, express delivery service management, hotel room service, etc. [15, 16]. It also can be a useful analysis tool for service coordination and planning. Service blueprint can be combined with the activity-based costing system to improve the service cost effectiveness and efficiency [10]. Frauendorf et al. [12] combined servicescape and service blueprint to identify the critical processes and reduce transaction costs.

This study adopted the framework for service innovation and management proposed by Bitner et al. [11] to meet the challenges in today's highly competitive and service-dominated economy. The service blueprint is used to describe service stage and the interfaces between different stakeholders from front-end to back-end service providers.

2.3.2 The TRIZ Methodology

TRIZ (Teoriya Reshenuya Izobreatatelskikh Zadatch) is a Russian acronym that stands for the "Theory of Inventive Problem Solving" (TIPS): A systematic approach to find innovative solutions to technical problems. TRIZ theory does not only use one single method tool to resolve the problem, it has

certain process of specifying the conflict and resolving the conflict. The set of methods include 39 TRIZ engineering parameters and 40 innovative rules. [26].

Originally, the TRIZ theory was used for product design, then its applications have expand to various areas, including management, business decisions, supply chain, food technology and software development and so forth. The TRIZ method provides a systematic approach which allows managers to generate innovative principles to setup a better service system for convention and exhibition industry. Specifically, the rules and methods are used for the events like World Expo.

2.3.3 Innovative Matrix

Lee [29] developed the innovation matrix to analyze the customers' need and the market situation. The innovation matrix, shown in Figure 2, is a 3 x 3 matrix which prescribe the current technical status by different customer situations and the different customers 'need. The scenarios defined in the matrix depend on whether the needs are met as well as whether the service is served or. From the matrix, innovation can be fitted into the specified gap areas. The gap areas indicate where the innovation can be implemented.

| | | | | |
|-------------------|-----------|---------|-----------|------------|
| Needs | Unvisible | Unmet | Gap | Scenario |
| | Visible | Met | | Gap |
| | | | Served | Not Served |
| | | Visible | Unvisible | |
| Customers/Markets | | | | |

Figure 2: Innovation matrix

This study used the methods described above. By using the service blueprint the current service status of the convention and exhibition industry are examined. By using the TRIZ contradiction matrix, the resolution for the conflicts and innovative design are generated through a systematic way of thinking. We mapped the 39 engineering parameters to fit to characteristics of the convention and exhibition industry. Then, we used the innovative matrix to examine the relationship between the produced

results and the possible solutions.

Based on the previous works and empirical practice, the key issue of a service company is always trying to find the innovation patterns that can be followed. How the newly invented discipline of SSMEDA combines multi-functional methods is driven from industrial engineering and systematic perspectives is a valuable issue. The main contribution of this stud is to provide a reference or paradigm for the conventional service industries.

3. RESEARCH FRAMEWORK

3.1 Core Service of World Expo

The reason why we choose World Expos of 2005 and 2010 as our research subject is that the scale and diversity of Expo is large enough to represent the dimensions of convention and exhibition industry. We interviewed those who attended these two expos and collected data from Expo official pages. First we use service blueprint to illustrate the procedures of service delivery and the interfaces between the attendees and various service providers

In order to construct a more thorough depiction for Expo activity, we collected the existing questionnaire results regarding the service quality and customer's satisfaction. Those collected information represented the voice of customers. The voices of the attendees and the design and control items of service managers are simultaneously concerned.

2005 World Expo in Japan was first ever to implement technologic innovation. All the tickets are embedded a tiny, sized 0.4 mm, micro chip which has the function of anti-counterfeiting, and assign each ticket a password and can be easily distinguished by the readers. Moreover, the chip can be also used for different purposes.

In order to enable visitors can visit smoothly, the special ticketing system of 2005 Japan world expo can immediately check whether the appointment has been made or not. It also provides prior appointment service that makes visitors can make appointment in advance to visit the popular exhibition areas.

2010 Shanghai world expo also provided various services, such as traffic, waiting time information are shown in large LCD screen, wireless environment for providing information about weather forecasting, restaurant guides, tour map, collecting comments and suggestions.

Service blueprint is an effective method to describe the service delivery procedures. We classify the service into 12 operation systems. (1) Preparation operation: all the information including transportation, entertainment events, pavilion locations, directions, forums and reservation process are well-presented through website or promotion materials. Such preparation enable the attendees can access the destination of the exhibition easily. (2)

Arrival operation: How to control the order of the waiting line and how to direct the attendee to spread out once they pass the entrance. (3) Ticketing operation: The ticketing service is to provide a variety of tickets selling channels not only for the on-site purchase but also the booking in advance. It also needs to enforce the anti-counterfeit tickets. (4) Guide booklet: How all the printings of guide, maps, and highlights are distributed and in which way by whom are critical to facilitate the attendees to arrange their favorite routes. (5) Security and Checking: Before entering the exhibition venue, the security checking process is essential, but it needs to be very efficient with causing long queue. (6) Facility maintenance: Once the attendees enter the venue, the environment cleanliness and facility reliability need to be maintained properly. Such maintenance will ensure a pleasant visit for each attendee. (7) Reservation operation: Since the area of the exhibition venues of World Expo is so huge and the attendee can be more than 600,000 per day. It needs an effective booking scheme to control the number of the visitors to enter a specific venue. Booking machine is installed at each individual venue so that the visitors can use their own ticket to make a reservation. (8) Directions service: The venues are scattered in different zone. There are so many pavilions in only single zone so the attendees are easily got lost. The directions and guiding service are offered to those who got lost. (9) Food and beverage service: The whole process includes meal ordering, dining experience until customers are served and then leaves. (10) Guiding Services: Some visitors expect to have an in-depth introduction about the theme of the exhibition; therefore, in order to satisfy customer's needs, the world expo center establishes several languages guiding service and provides portable personal guiding machine for customer to rent. (11) Leaving operation: How to guide the visitors to leave the venues and connect to the public transportation or tour bus is the final stage of the procedures within the venue. (12) Traffic operation: The world expo provides the information of shuttle bus, transport operation and traffic guidance and the condition of parking.

3.2 Services Indexes for Conventions and Exhibitions Industry

Although there are some works on the relationship between service quality and service satisfaction for Conventions and exhibition industry, there are still some missing and insufficient parts. Hence in this study we employed the previous results from Chan [7], Jung [14], Butler et al. [6], Breiter and Milman [18] and conducted expert interview with the managers of the convention centers located in central Taiwan. We also gathered information from customers' perspectives to form four main categories:

Ambient conditions, space/function, sign/symbols/artifacts, and information. These four categories and their corresponding expectation and their planning requirement are shown in Table 1.

In this research we further conducted in-depth interview to higher level of manager who is from the exhibition center. The details of process of hosting an exhibition and all requirements are carefully considered. From the interview we understand that we have to estimate the cost before holding the exhibition and achieve the desired outcomes in a cost-effective manner. According to the interview, we consider that the billboard is the key features to affect customer's understanding of exhibition and the willing of participation. In addition, adding new logos and symbols into the billboard can strengthen the attraction of the information content shown in the billboard.

Thus, this study has established practical concerns on attendees' experience and the managers' perspectives to construct the relationship among the customers' expectation, planning requirement, customers' experience and response. That demonstrates the whole process of systematic innovation. The process is shown in Figure 3.

Firstly, we use the service blueprint of world expo as the basic model of service delivery process, and make the exhibition industry's service target as the foundation of servicescape for world expo. Moreover, we divide the environmental entity of world expo into ambient conditions, space/function, signs, symbols, and artifacts, and information such as for main areas.

After the assessment of core service system for Japan and Shanghai Expos, we delete the lighting equipment and music which are not particularly mentioned in the world expos, then divide the device into facilities and equipment, and count billboard as the exhibition facilities, add the number of visitor as the new project consideration. In the section of exhibition information, two new booking system and guidance system are added and these systems cover the whole servicescap of world expo.

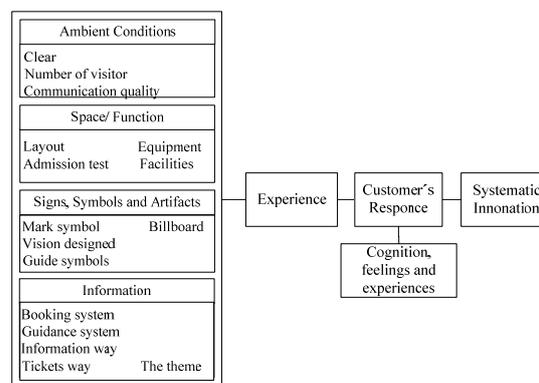


Figure 3: The relationship between servicescape and systematic innovation for World Expo's

4.2 Applying the TRIZ Theory in World Expo Service

In this study, we used the Quality Function Deployment (QFD) to examine the correlation of demands. However, QFD do not provide systematic method to resolve conflicts points. Therefore, we can adopt TRIZ theory to eliminate the negative correlation, which can complement the shortcomings of QFD method. TRIZ has gained numerous success in Engineering problems or product design. It provides 40 inventive principles for the parameters and to identify possible solutions of the problems. Since it contains a systematic thinking, it can also be applied to service systems to achieve the systematic innovation.

Over the past two decades TRIZ theory has opened up new areas of applications in the fields of

product engineering. In the early stage of application of TRIZ theory it is used to improve the engineering parameters, to avoid deterioration of the engineering parameters, as well as to find innovative new product development rules. However, this study is to apply the theory of TRIZ to the service system of the convention and exhibition industry. We extend its application from engineering to non-engineering area. Zhang et al. [31] solved the service problem through a combination of theory based on conceptual design of the actual service development activities and innovative service design concept. In order to apply TRIZ theory to service sector, we need to modify the 39 engineering parameters and mapping to the convention and exhibition industry. The 39 parameters mapping for service design are shown in Table 2.

Table 2: 39 parameters of contradiction matrix for convention and exhibition industry

| No. | TRIZ parameters | | The conventions and exhibitions industry of TRIZ | |
|-----|--|--|--|---|
| | Parameters | Description | Parameters | Description |
| 1 | Weight of moving object | Move weight of the object | Bearing weight of the stand | Acceptable weight of the stand |
| 2 | Weight of non-moving object | Weight of the regular object | Bearing once weight of the hall | Weight with acceptable field of the hall |
| 3 | Length of moving object | One size of the move object | Width of the stand | Any one-dimensional size of width of the stand |
| 4 | Length of non-moving object | One size of the regular object | Width of hall field | Any one-dimensional size of the hall field |
| 5 | Area of moving object | Move within things or external wanton two-dimensional size | Area of the stand | Size of area of the stand |
| 6 | Area of non-moving object | Regular inside or external wanton two-dimensional size | The scene of the hall is accumulated | Size of area of the hall field |
| 7 | Volume of moving object | Move the three-dimensional size of the object | Volume of the stand | Three-dimensional size of the stand |
| 8 | Volume of non-moving object | Three-dimensional size of the regular object | Volume of hall field | Three-dimensional size of the hall field |
| 9 | Speed | Make the speed of one or movements | Response efficiency | Time and speed serving and is sent |
| 10 | Force | The ones that want to change object state are wanton and inter dynamic and influencing | Supply with ability | While changing in the face of the demand, degree and influence that the service can be supplied |
| 11 | Tension/pressure | Strength that unit's area receives | Quantity of load | The hall field can bear the number of people held |
| 12 | Shape | Appearance outline of the system or the object | Appearance | Appearance or outlook of the field building of the hall |
| 13 | Stability of object (resistance to change) | Because the system or the object is relevant mutually the movable property grow the ability to change for the things | The ones that mark with the symbol are clear | Equipment or the association device produced the influencing each other |
| 14 | Strength | The object resists the ability to destroy | Professional lines | The skills needed to possess and professional knowledge |

Table 2: 39 parameters of contradiction matrix for convention and exhibition industry (Continued)

| | | | | |
|----|-----------------------------------|--|--|---|
| 15 | Durability of moving object | Move the time of executable movements of object; Life-span of service before losing efficiency | The stand uses durability | The durable degree of the stand and life cycle |
| 16 | Durability of non-moving object | The system carries out the ability of its function properly | The hall field uses durability | The durable degree of the hall field and life cycle |
| 17 | Temperature | Hot state of the system or the object | Atmosphere | Offer the service degree that the customer experiences |
| 18 | Brightness | Luminous flux of unit's area; Every luminance characteristic | Environmental device | Neat degree that the facility and device of an environment of hall maintain |
| 19 | Energy spent by moving object | Move objects and make the necessary energy while moving | Stand labor intensive degree | Manage and manage the labor that the stand need to consume |
| 20 | Energy spent by non-moving object | Necessary energy during regular object function | Field labor of the hall intensive degree | Labor who manage and deal in the hall place to need to consume |
| 21 | Power | Speed that energy uses; Work and rate of time | Labor paid | Hold total Labor degree that the convention and exhibition needs to pay |
| 22 | Waste of energy | Have not contributed the energy consumed to the system | Labor left unused | Hold it in course of the convention and exhibition, the stand-by Labor that may appear |
| 23 | Waste of substance | Have not contributed the materials consumed to the system | Easy dying of the service | It is unable to store it for future spending to serve, except for the demand appears to disappear |
| 24 | Loss of information | Omission that materials or the system input | Information losing | Official site or indicating that builds the omission constructed |
| 25 | Waste of time | Finish appointing the time that movements increase externally | Waiting time | Time needed to wait for before accepting to the service |
| 26 | Amount of substance | The number of elements of the object or the total amount of material | Quantity of total stand | Quantity of total stand of the convention and exhibition place |
| 27 | Reliability | The system carries out the ability of its function | Reliability | Facilities are planned to carry out the ability to serve with the on-the-spot device |
| 28 | Accuracy measurement of | Quantity of the object examining value and degree with indirect and near truth | Coordinate degree | Coordination between service provider and customer and communication ability |
| 29 | Accuracy manufacturing of | The system, to the easy degree that is operated or using | Accuracy | While offering the customer service, can really meet with the customer's demand |

Table 2: 39 parameters of contradiction matrix for convention and exhibition industry (Continued)

| | | | | |
|----|---------------------------------------|--|--|---|
| 30 | Harmful factors acting on object | The external influence power of the system, cause the reducing of systematic efficiency or the quality | The ones that are unfavorable to serving are harmful to the factor | Act on the external influence power served, cause and serve the reducing of efficiency or the quality |
| 31 | Harmful side-effects | The influence power, cause the reducing of systematic efficiency or the quality within the system | Harmful side effect | Act on the inside influence power served, cause and serve the reducing of efficiency or the quality |
| 32 | Ease of manufacture | The system or the object, making easy degree on | Convenience of the equipment | Operation convenience of equipment providing to customer for use |
| 33 | Ease of use | The system, to the easy degree that is operated or using | Use the convenience | Degree easy to use of the official site of the convention and exhibition or the system |
| 34 | Ease of repair | After the trouble, very easy maintenance resumes the function | Maintain ability | Maintenance and repair ability to the equipment and facility |
| 35 | Adaptability (to external conditions) | As the external condition changes, the system or the object still have positive response | Suitability | When changing in demand, service and system can accord with the degree of customer's demand |
| 36 | Complexity of device | Form objects or the number of elements of the system and diversity | Device complexity of the equipment | Quantity and heterogeneity of equipment or the system |
| 37 | Complexity of control | Quantity examines the quantity and diversity of the component of the monitoring system | Automatic complexity service | For controlling the quantity and heterogeneity of the equipment or system served |
| 38 | Level of automation | When the object or the system carry out the function, there is no artificial effect | automation the degree | When equipment or the system carry out the function, there is no artificial effect |
| 39 | Productivity | The unit finishes operating or carrying out the number of times of the function systematically in time | Serve the performance | Transmission of the service and degree which the customer accept |

4.3 Resolving the Contradiction by TRIZ

In this sub-section, we will demonstrate how contradiction will be resolved in a systematic way. There are four steps of our approach. (1) Negative definition, (2) Corresponding to TRIZ parameters, (3) Resolve the contradiction matrix, and (4) corresponding innovative rules. After the rules are listed and analyzed, we need to screen and exclude the inappropriate rules. Saliminanim and Nezafati [24] proposed non-engineering parameters that can be modified for convention and exhibition areas. Clarke

[8] only applies to works in the field of TRIZ to do an extension, apply to non-engineering fields among the Exhibition Industry.

The engineering parameters are transformed into non-engineering application. The transform processes are indicated by an arrow (\rightarrow). Then the details of the innovative rules are examined. The possible rules are listed and indented by a small diamond (\blacklozenge). The procedures are followed step by step for the contradiction that has been identified previously. Such systematic innovation process is a

standard paradigm for future application of TRIZ in service industries.

There are three contradictions to be investigated as follows: (1) admission check and ticketing, (2) Number of visitors and Equipment, (3) Number of visitor and Cleanliness.

1. Admission Check and Ticketing

- (1) Negative identification: When the tickets are sold to the attendees in more channels, it will make customers more convenient to get the ticket. This can achieve the goal of enhancing the convenience, but more ticketing channels may produce more different types of ticket coupon. That will slow down the speed of admission check, then cause time delay of customers, so customers are not satisfied with these two conflicting service.
- (2) Corresponding to TRIZ Parameters: For convention and exhibition industry, according to the definition of a negative correlation of the MICE industry 39 parameters of TRIZ, during the admission check it will produce wait time (# 15) and lead to customer dissatisfaction and response efficiency (# 9) are low. These two items are used as parameters for improvement. In order to respond to the waiting time and efficiency, it will pay more for the human (# 21) increase as labor increase. Therefore, the relative cost will increase so as to avoid the deterioration of this parameter.
- (3) Expand TRIZ contradiction matrix: The parameters for improvement through (# 15 and # 9) and to avoid deterioration of parameters (# 21) corresponds to the contradiction matrix, the available 02,10,19,35 and 38, a total of five principles of innovation, as Table 3.

Table 3: Contradiction matrix of Admission check and Ticketing

| | |
|-----------------------------------|----------------|
| Avoid deterioration of Parameters | #21 Labor paid |
| Improvement of Parameters | |
| #9 Response efficiency | 02, 19, 35, 38 |
| #15 The stand uses durability | 10, 19, 35, 38 |

- (4) Corresponding innovative rule: #02. Extraction → Extraction service
 - ♦ The ticketing system will provide unique type of ticket through different channel. Or the admission needs to install different reading/scanning equipment.
 - ♦ To avoid selling the tickets through the low-volume and not important agent.

#10. Prior Action → Recognizing and making necessary social situations for the future

- ♦ Book the service which enters the hall, the waste of reducing waiting time in advance.
- ♦ Set up and install the system automatically, and store the customer's records in order to make and plan thoroughly in the future.

#19. Periodic Action → Periodic actions with calculated periods

- ♦ Periodic movements that the plan may be produced in advance.
- ♦ Offer the time of making an appointment automatically promptly while purchasing the ticket, if have conflicts to ask customers to alter with customer's journey by oneself.
- ♦ Offer different visit routes, schemes periodically to give customers, offer guide exhibition hall reservation to visitors periodically.

#35. Transformation of Physical or Chemical States of an Object → Transformation of the structure, function or value in social process units

- ♦ The form of vouchers can be integrated into a magnetic card or RFID so that customers can access free induction.

#38. Use Strong Oxidizers → Using catalysts in social processes

- ♦ Use the stimulus in the course of serving.
- ♦ Use some several coupons to promote the ticket sale regularly and check favorable admission fee, help and unify in the value-added design for the ticket.

2. Number of Visitors and Equipment

- (1) Negative identification: Services of leasing equipment such as wheelchair, baby trolleys and tour guiding machines are sufficiently provided in World Expo. However, as the numbers of the visitors increases, it will not be easier to moderate the demand and the supply of those equipment. Therefore it may cause a long queue for waiting the equipment.

- (2) Corresponding to TRIZ Parameters: Applying TRIZ 39 parameter to the convention and exhibition industry is how to resolve the above-mentioned contradictions. It should enable immediately maintenance of equipment or facilities and repair ability, and offer convenient and reliable equipment to customers. Therefore rules (#32) equipment convenience and maintaining ability (#34) are considered to improve the parameters. When the process of increasing the availability of equipment quantity, it will cause cost incurred and some inconvenient. With the application of rule (#36), equipment device complexity can be eliminated to avoid worsening the parameters.

- (3) Resolve TRIZ contradiction matrix: Through improving the parameters (# 32 & #34), and

avoiding of worsening the parameter (#36) simultaneously, it corresponds to the following six innovative principles can be applied to resolve the contradictions, rules 01, 11, 13, 26, 27 and 35, shown in Table 4.

Table 4: Contradiction matrix of number of visitors and equipment

| | |
|-----------------------------------|--|
| Avoid deterioration of Parameters | #36 Device complexity of the equipment |
| Improvement of Parameters | |
| #32 Convenience of the equipment | 01, 26, 27 |
| #34 Maintain ability | 01, 11, 13, 35 |

(4) Corresponding innovative rule:

#01. Segmentation → Social intermediate

- ♦ The district accommodates visitors that may be possible to lease the equipment through visitor's classification. Then the organizer can estimate the number of equipment is needed to provide sufficient service.
- ♦ The service group can be teamed up to coordinate different needs and different equipment that are needed. The equipment leasing service department can support each other.
- ♦ Classify the lease equipment service by the functions and divide the staffs that are responsible for various service needs. That can speed up the service delivery to the visitors and served them immediately while the demand of leasing equipment is raised.

#11. Cushion in Advance → Cushion in advance

- ♦ Team up a group of emergent maintenance for the equipment and organize a back-up team.

#13. Inversion → Considering social process inversion

- ♦ Offer perfect explanation promptly when the visitor want to lease the equipment, make equipment ready for rental any time, or provide self-serve the visitor can react by oneself.
- ♦ Offer explanation on how to operate the leased equipment automatically.
- ♦ Proactively inquire whether the visitors need to lease the equipment, and offer the maintenance personal ready to inspect the working condition of those leased equipment. Thus the service will keep the equipment down time to the lowest.

#26. Copying → Recognizing similar systems and renewing programs

- ♦ While leasing the equipment, the clearly stated operating manual of operation instructions, should answer the FQA questions at the first hand.

- ♦ Put the instruction manual of the equipment on the systematic platform, it enables the visitors to download through their own cell-phone.
- ♦ Limit the usage time for each individual visitor of the leased guide equipment so that will increase the turnover rate of the equipment.

#27. Inexpensive, short-lived object for higher quality, durable one → Temporary and small systems for old, permanent systems

- ♦ Guide content of guide machine can put on the systematic platform, and open access to each visitor to download the information they need through their own mobile phone or PDA. Thus, it can prevent the insufficient in supply of the guide machine.

#35. Transformation of Physical or Chemical States of an Object → Transformation of the structure, function or value in social process units

- ♦ The equipment like wheelchair, baby trolley and guide machine for leasing can change and offer an appointment service so that the visitor can arrange in visiting routes in advance, perhaps with extra discount or other benefits of the subscriber.

3. Number of Visitor and Cleanliness

(1) Negative identification: When visitor's quantity increases, it will cause the cleanliness more difficult to maintain. Since the visitor's number usually increase not proportionally to the staff numbers. It exceeds the numbers significantly. If each visitor produces one kilogram rubbish, every staff will be responsible for cleaning 100 kilograms or even more rubbish. Due the increase of the garbage the visitors may not be able to have a pleasant experience in such poorly maintained environments.

(2) Corresponding to TRIZ Parameters: The parameter related to the cleanliness of the environment and facility is rule (#18). Due to the workload of maintaining the cleanliness, the efficiency and service quality will be affected. (#31). Therefore, in order to maintain the level of cleanliness, the staff or the labor must increase. The increase of the cleanup crew will increase the labor cost (#21).

(3) Expand TRIZ matrix: To improve the parameters (# 18 & #31) and eliminate the negative effect caused by the parameter (#21), we can construct the contradiction illustrate by Table 5, where innovative principles (02, 18, 32, 35) are generated.

(4) Corresponding innovative rule:

#02. Extraction → Extraction

- ♦ Some exhibition halls limit the number of people that can enter per day or for a certain period. To arrange the number of people of peak load for each exhibition hall, neither excess opening hours nor

enter into the pavilion promptly while the capacity is overloaded.

- ♦ The flow of the visitors is needed to be streamed in a smooth way. If the number of the visitors increases, the number of trash bins will increase accordingly so as to maintain the cleanliness.

#18. Mechanical Vibration → Preparing indefinite social situations

- ♦ Install emergency button at certain positions, let visitor can see trash bins easily and remind the cleanup crew when the trash bin are full.
- ♦ When the visitor flow intensify, i.e., the number of visitors increase at a certain time period. The staff members need to be increased to inspect the areas.

#32. Changing the Color → Changing the structure and renewing action

- ♦ Change the method of installing the trash bins instead of dispatching a plastic bag to each visitor to collect his/her personal garbage temporary. Once they pass by a bigger trash bins, they can dispose their garbage from their hand carrying bag to the bigger trash bins. Such move can reduce the number of the trash bins and remind the visitor to maintain the cleanliness.

#35. Transformation of Physical or Chemical States of an Object → Transformation of the structure, function or value in social process units

- ♦ Install a stand that offer personal disposal bag for the visitors to take away and collect their own garbage when the amount is small.

Table 5: Contradiction matrix of number of visitor and cleanliness

| | |
|-----------------------------------|-------------------|
| Avoid deterioration of Parameters | #21 Labor paid |
| Improvement of Parameters | |
| #18 Environmental device | 32 |
| #31 Harmful side effect | 02, 18, 35 |

4.4 Service Innovation Matrix

In this study we used the upper part of the demand related matrix of QFD (quality function deployment) to determine what features are positive related, negative related, or no related exist between the planning requirements. Then we assessed the association between the parameter to determine which parameters conflict with each other. Some parameters may be mutually supportive. Once the negative effect or relationship is identified through the matrix, we can eliminate the conflict by the corresponding rules of TRIZ contradiction matrix. TRIZ can identify what parameters are necessary to

be improved parameter and what parameter will be worsening in the contradiction matrix. By using 40 inventive principles to determine the suitable parameter and might resolve contradiction situation. The process of Systematic Service Innovation is show in Figure 5.

In this study, innovation matrix for the convention and exhibition industry, some service innovation initiatives are found. Furthermore, we also adopted service innovation matrix to find the inventive principles, depicted in Figure 6.

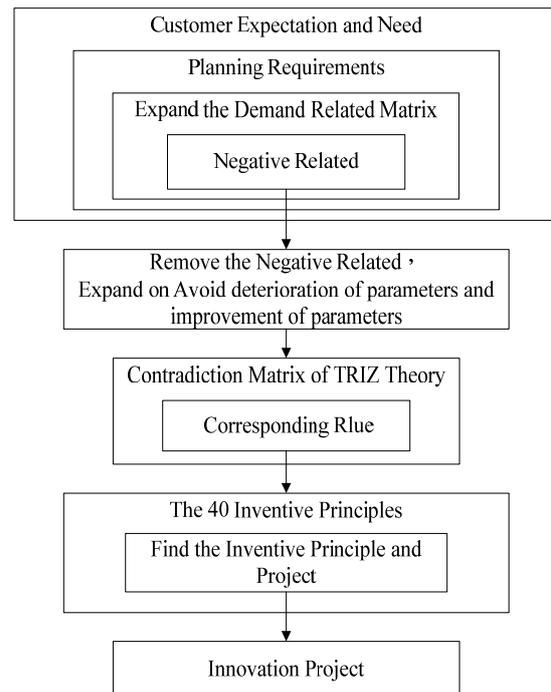


Figure 5: Process of systematic service innovation

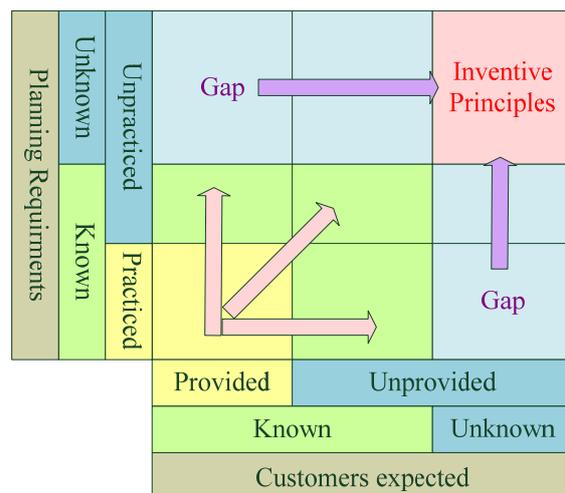


Figure 6: Service innovation matrixes

Through Service innovation matrix, firstly we define the service objectives, and then explore what is expected to be the core service goals. Finally we find out the planning demand that has already offered service of offering to the customer and already

practicing at present. If there exit a gap between the service of the objectives and the service currently served, then we specify a clear destination or objective that we can focus on. Based on the defined gaps we can find the innovative method to resolve the gap systematically. That will provide a new method for generating the new service.

5. CONCLUSION

5.1 Conclusion

Currently due to the rapid improvement of information industry, the convention and exhibition industry has become a rising industry. However, it has become a difficult mission to exhibition's manager to satisfy customer need and expectation. In order to attract more visitors, design and art are important elements in service innovation to be included for service design. In this research we provide a systematic innovation for Convention and Exhibition Industry by integrating QFD, TRIZ, and Service matrix.

Since the hybrid-method for service design and service innovation can contribute to the field of service science discipline. The study extended the existing works on service management, engineering, and design (SSMED). The construction and implementation of the service innovation are demonstrated through convention and exhibition. Such examples can be paradigms and expended to the other related service industries.

5.2 Recommendations for Further Study

Based on the results of this research, we find the methodologies used for convention and exhibition industry can applied to the other service industries, especially we combine QFD, TRIZ, and systematic service innovation matrix, we demonstrated such an integrated method is effective for service innovation. This research still has many aspects that are worth to be developed; therefore, the following suggestions are made for further research:

1. Service innovation will constantly bring out new creation. Therefore, in order to find out where innovation is possible, it is necessary to explore the application in various service industries.
2. Current service blueprints are mostly used for management purpose, it can be applied to experiencing scenarios, it also could inspire a new innovation for other exhibition events.
3. Different service industry has different service scenario, current service scenario are not perfectly matching to each kind of service scenarios, and suitable service scenarios could be created to fit for the different operational necessity.

4. The research is basically investigated on the service innovation of world expo, however, during the research, we found that there are a lot of technology innovation has been used in the world expo, if we can proceed this aspect of research, it should comes out with some valuable findings.

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應用服務科學於會展產業之系統化服務創新：以世界博覽會為例

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摘要

服務業的成長與經濟發展息息相關，且有助於提升企業競爭力與增進人民生活品質。即便是製造業亦逐漸以服務業的概念。基本上服務需兼顧發展趨勢與顧客需求，並且整合資訊科技與工程技術，進而強化服務品質和提升顧客滿意度。台灣近年來增加服務價值並結合觀光旅遊，舉辦過多場國際大型展覽。會展活動帶來服務經濟效益快速成長，然而其生產力、品質和創新的標準全都很難以測量。因此，本研究將從工業工程和系統管理的角度，並以新興服務科學的思維，提出會展產業之系統化服務創新。

關鍵詞：會展產業、系統化服務創新、萃思、服務藍圖、服務場景、應用服務科學於會展產業之系統化服務創新：以世界博覽會為例

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STIS 2015 - Scientific & Technological Innovation Show 2015 for Industrial Equipment & Components, Technologies is held at National Exhibition and Convention Center (Shanghai) (NECC), Shanghai, China on 2015-11-03 -- 2015-11-07 by Shanghai Technology Convention and Exhibition Co., Ltd (STCEC), Shanghai EastBest International (Group) Co., Ltd. SITS 2015 is a famous trade show that focus on scientific and technological innovation industry, and will provide an international platform for the industrialization of the innovative achievements from the research institutes, colleges & universities and R&D department of corporations to showcase the achievements by originated scientific research & development and technical innovations.