Topic 3: Strategies for Industry Foresight and Innovation

Subtopic 2: Strategies for Enhancing Innovation System in Service Industry

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I. Background and Introduction to Case Studies
In response to the changes in the structure of the Taiwanese service sector and the need to develop the knowledge economy, the Executive Yuan began to implement the Guidelines and Action Plans for Service Industry Development starting from March 2004. The Executive Yuan also organized the National Service Industry Development Conference and implemented the “12 Strategies Service Industries” plan to encourage the transformation of Taiwan’s service sector.

In 2009, Taiwan’s service sector had annual production value of NT$8.75 trillion in total, accounting for around 70% of GDP, a level similar to that found in the advanced nations. The service sector alongside with manufacturing serves as two main driving forces of Taiwanese economy. Therefore, how to speed up service system innovation has become one of the key issues in terms of transforming Taiwan’s economic structure.
At the 25th, 26th and 28th STAG Board Meetings, held respectively in 2005, 2006 and 2008, it was decided that the main emphasis in the development of Taiwan’s service sector should be on the **Innovation in R&D System**, **Service Sector Talent**, and **Smart Services Verification**; focusing on these areas would help to drive the growth of the service sector as a whole.

- **Establishment of Classic Cases**
  - (Technology-enabled Services Flagship Project)
- **Establishment of service industry R&D methodology**
  - (Services Ecosystem Research Value (SERVE) Program)
- **Create opportunities for service verification**
  - (i236 Smart Living Technology & Service Program)
- **Business enterprises involved in collaboration**
  - (Technology Development Program)
Challenge: To prevent foreign brands from gaining a dominant position in the micro-payments settlement business

Strategy: Bring together 24 banking associations, information service providers (including Financial eSolution Co., Ltd.) and distributors (including PCHome) to jointly launch a settlement mechanism for online micropayments; this mechanism was formally launched in 2007. To support the introduction of the new mechanism, the revised Act of Issuance & Management of Electronic Monetary Cards was promulgated on January 23, 2009.

Results achieved: 40 million cards issued, and a cumulative transaction volume of NT$1.3 billion (as of September 2010).

Lessons learned: Although the number of cards issued exceeded the critical mass, failure to implement through service testing resulted in unwelcome exploitation of the system by gangs of fraudsters. As a result, banks were forced to tighten up their security at the expense of users’ convenience, leading to slow transaction volume growth.
Challenge: Manpower costs have been rising steadily in the distribution sector, while the quality of service provided is highly variable.

Strategy: Using kiosk technology to create smart unmanned stores with a self-service shopping environment, establishing a new model for innovative technology-enabled services in the distribution sector.

Results achieved: a total of 45 smart unmanned stores established as a pilot project by 6 companies

- Smart unmanned stores (OK Mart-Q-Shop)
- Wine Selection recommendation system (Evergreen Laurel Collection-Dr. Win)
- Smart sales model for 3C (Computer, Communications and Consumer electronics) products (Aurora-A Smart)
- Self Service Voucher Redemption (Shan-Loong Gas Station)
- Smart self-service restaurants (Mercuries)

Lessons learned: At the level of the individual stores, the pilot projects were innovative and successful; however, it proved difficult to achieve an industry cluster effect. Adding to this the high initial cost of unmanned store establishment, there were problems in expanding the project.
Healthcare Sector Case Study: U-care Flagship Plan

- **Challenge**: As Taiwan turns into an aging society, there is urgent and growing demand for home care, emergency care, institutional care and community care for the elderly.

- **Strategy**: Hospitals, security firms, ICT firms, care home operators, drugstore chains and health examination service providers were brought together to establish a new healthcare service model that makes effective use of information and communications technology (ICT) in process innovation.

- **Results achieved**: A group of hospitals and companies that included Chang Gung Memorial Hospital, Taichung Veterans General Hospital, E-Da Hospital, Changhua Christian Hospital, China Medical University Hospital, Secom, FarEasTone, Farnet Technologies, Hamastar, TW-Airnet, Maywufa, and Havo Healthcare Center worked together to establish a comprehensive ICT care system, creating synergy through the integration of the healthcare sector and the medical equipment industry.

- **Lessons learned**: The demand from the general public was definitely there; however, it proved difficult to identify a sustainable, profitable business model.
II. Synthesis & Analysis – Service Experience Engineering (S.E.E.) Methodology
Analysis of Case Studies from the Past

1. Difficulty in identifying market demand

- Only 18% of firms undertook research on customer needs; however, more than 80% reported that they lacked sufficient knowledge of customers’ receptivity to new services, customers’ experience in using services, and of the needs of consumers (and their human relations networks); this was the most widely reported obstacle to successful innovation.

2. Lack of mechanisms for integrated cross-industry service development

- Over 70% of firms reported having trouble finding external collaborative partners, or lacking a sound basis of mutual trust with their collaborative partners; this, together with the lack of an environment in which new services could be validated, was one of the most widely reported problems when planning the launch of new services. Less than 10% of firms had experience in cross-industry R&D alliances.

3. Lack of successful stories to convince business to invest

- Before project implementation began, less than 10% of firms had dedicated budgets for new product or service R&D. Due to the concern that investment in new service development might be wasted, and also because of the lack of successful models in the industry, average R&D investment per firm was only NT$860,000.

4. Lack of systematic methods for new service development

- Large enterprises’ service provision tends to be highly complex, involving integration of the operations of a large number of different firms. 78% of large firms said that they lacked scientific methods for launching new services; the average time spent between development of an initial concept and commercial launch of a new product or service was 6 months - 2 years.
Service system innovation in the service sector requires the adoption of systematic methods – from research on consumer demand, through the creation of mechanisms for cross-industry collaboration, to new service verification and establishment of new examples that other firms can follow – to speed up the pace of innovation in the service sector.
Establishment of a Comprehensive Service Ecosystem

Service development strategy
- Demand analysis
- Customer behavior
- Market opportunities
- Industry trends
- Market strategy

Service model design
- Service issue analysis
- Service process definition
- Service operations models
- Service standard establishment

Technological evaluation and planning
- Technical feasibility
- Information systems

Service framework design
- Enterprise’s organizational structure
- Related Stakeholders
- Collaboration model
- Service verification architecture

Testing and effectiveness evaluation
- Service technology testing
- Service model performance

Source: Collated from interviews conducted by the III with around 100 enterprises, including participants in service industry Technology Development Programs, and other leading firms in the service sector.
III. Case Studies: the establishment of Innovative Service System Methodology - S.E.E.
S.E.E is developed by III, supported by Department of Industrial Technology of MOEA, for the concept of manufacturing the engine for all the service sector players.

- S.E.E. (Service Experience Engineering) accumulates the research momentum of legal foundation from the experience of service-oriented technology projects and combines the international innovation service design methodology.

- This framework has helped more than 60 companies to completed 45 innovation plans and verifications, deriving investment up to NTD 1.5 billions and 10 innovation services launched to the market. The total industry output value has over NTD 2 billions (ie. Formosa Chang, Maywufa, Taipei Port, and etc.)
Methodology and Service Platform

**FIND**
- Market and Trend Research
- Customer Research
- Technology Application Observation

**INNOnet**
- Value Chain Research
- Service Network Establishment
- Open Innovation Platform
- Service Modeling
- Service Insight
- Probing
- Service Design
- Service Prototype

**Design Lab**
- Proof of Concept (PoC)
  - Architecture Design
  - Prototype Creation
  - Technology Performance Analysis
  - Technology Acceptability Analysis
- Proof of Service (PoS)
  - Service Model Design
  - Service Quality Analysis
  - Service Acceptability Analysis
  - Service Performance Analysis
  - Service Maintenance Analysis
  - Service Testing Analysis

**Living Zone**
- Proof of Business (PoB)
  - Sample Design and Selection
  - Demand Analysis
  - Resource Integration
  - Benefits Analysis

**Service Design Databank**
1. Establishment of S.E.E. Technology and Research Methods
   - A total of 50 S.E.E. tools have been developed, including tools for user observation, media scanning, cultural exploration, innovation matrix development, service blueprint formulation, prototype creation, service acceptability analysis, demo kit development, etc. Using these tools, firms can undertake innovative service R&D in a systematic manner.

2. Turning methodology into practical tools to speed up adoption by business enterprises
   - Establishment of the S.E.E. Cloud Service Platform, to provide enterprises with the tools they need to speed up service R&D.
   - Establishment of a Service Design Database, to facilitate systematic collection of firm’s experiences in innovative service development.

3. Promotion of the SIG mechanism to expand collaborative networks
   - Building up a databank of innovative application cases and of details of the firms that make up of the value chains, and building up the networks for members to provide and share the core assets, thereby facilitating the formation of service R&D brands.
Scope of S.E.E. Solutions

Framework, Model, Process, Technology

- Innovation in IT-enabled Service
- Using ICT to Strengthen Service Innovation
- Innovation in cross-industry integration
- Innovation in Value chain
- Innovation in Organization
- Innovation in field verification

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Using ICT to Strengthen Service Innovation

- Currently, over 90% of food product firms use refrigeration to maintain food freshness. However, the food does not taste as good as food that hasn’t been kept frozen; refrigeration is also more wasteful of resources.

- Formosa Chang used the S.E.E. method to design new processes: Comprehensive Frozen Supply Chain Diversified Service Model, and Comprehensive Frozen Supply Chain Temperature Monitoring Mechanism. Using these new processes, Formosa Chang has been able to achieve a 30% saving in energy usage, and 85% customer satisfaction.

- Formosa Chang’s new processes have enabled the company to raise its annual operating revenue by over NT$60 million, and have been expanded to cover new distribution channels, including: HiLife convenience stores throughout Taiwan (1,200 stores), the China Airlines VIP and Business Class catering services; as a result, total sales have risen from 4.44 million bowls to 5.54 million bowls.
The Adoption of a Highly-efficient Container Operations Solution that Makes Use of Wireless Sensors at Taipei Port

Innovation in IT-enabled Service

- Taipei Port used S.E.E. to analyze its existing container distribution processes and realize trucks are kept in long queue and there is high rate of empty cars. Therefore, the wireless sensor network is used to redesign the service process so that employees can monitor the container distribution processes.

- The new solution has speeded up container lorry entry/exit control operations, reducing the amount of time that container lorries are standing idle, and reducing the frequency of errors; as a result, the overall operational efficiency of Taipei Port has been improved by at least 20%. In the future, it should be possible to export this system to harbors in China.
In the past, there has been a lack of outdoor sites for the verification of new services, making it difficult to obtain timely feedback from the general public.

S.E.E. was used to undertake analysis of the communities living in the Song Shan District of Taipei City, and to promote implementation of 10 smart service systems, including smart digital advertising billboards, a bus timetable inquiry system for the elderly, the ComCare home care service for the elderly, e-enabled management services for public spaces, etc. Feedback on these services was received from a total of 52,150 users.
Collating past experience and using the S.E.E. framework, models, processes and technology to enable firms to undertake the development of innovative new services in a systematic manner, making the process more structured, more measurable, and more efficient; leveraging the capabilities of the academic sector to cultivate R&D talents, and helping industry to establish properly organized R&D capabilities. This is the key to achieve successful ongoing strengthening of service system innovation.
The current situation with regard to service system R&D and innovation activity is that, apart from methodology and individual application case studies, most of the emphasis has been placed on helping industry to use ICT to strengthen service innovation, promoting innovation through cross-industry collaboration, promoting technology-enabled service model innovation, and promoting innovation through field testing, etc.

While these initiatives have certainly made a positive contribution towards industrial development, they are unlikely to do much to speed up innovation work that can lead to truly revolutionary, industry-leading innovation.

How to combine strengths from each industry to promote the development of forward-looking, autonomous, and innovative service systems?
Past Experience: The Minsheng Residential Community “Living Lab”

Bring technology-enabled services into people’s daily lives, so that people can experience these services for themselves; analyze usage behavior and feedback to speed up service innovation diffusion.

The Song-Shan District is a residential area, with a population of 209 thousands people. Its population density ranks 2nd among the 12 districts. Seniors and elementary school students account for the major part of the population, both having high demands for the living quality.

There is an international airport and a train station in the Song-Shan District, with frequent schedule buses. Nearby business districts are diverse, including Taipei Arena, Asia World Shopping Area, the Mingsheng District, and Taipei Raohe Street Night Market.
Past Experience: Pavilion of Dreams, Taipei Flora Expo

Taipei Flora Expo’s Pavilion of Dreams is an environment that effectively integrates the technology development results achieved through Technology Development Programs and by industry with forward-looking service innovation, giving members of the public the opportunity to experience a future hi-tech lifestyle, and providing an impressive demonstration of Taiwan’s “Soft Power.”

Using the fruits of high technology development (including the Smart Lifestyle Applications Plan) to provide 1 million visitors to the Taipei Flora Expo with a brand-new experience and get them thinking about the future!
Next Wave of Strategies

- **From Individual Innovation to Cluster Innovation**
  - IT-enabled services need to be implemented in people’s lives. Encourage cluster innovation in industry through existing field verifications to establish a systematic innovation system.

- **From Key Technical Components to Future Service System**
  - Fit into future living scenarios, integrate forward-looking technical results from industry and technology development programs to present the future innovation system and let people experience themselves.

- **From Innovation Service Development to Service Experience Design**
  - Develop Taipei to become a MODERN city where people can truly experience future living styles in the next 10 years and make various types of dream, future living styles and autonomous service systems combine with technology and service innovation systems.
IV. Vision, Strategies and Action Plans
Vision

Transform into a MODERN city, combining service experiencing and innovation supply to become:

• **Role Model of Living**: Everyone in the world comes here to experience the future MODERN city lifestyle.
• **Engine of Innovation**: Innovators from all over the world come here to demonstrate future living design concepts.
**Target:** We have a common dream and needs (We), which is to use 1 integrated living zone — Song-Shan District to build up 6 key future innovation systems and draft 8 future lifestyle experience environments (W168 Program).

**Blueprint: Draft 8 Future Lifestyles**
- Intelligent stores for one stop shop
- Perfect and Considerate Community Center
- Fast and Thoughtful Airport Services
- The Dream Pavilion of Technology
- Eat healthy Food at Will
- Multifunctional Classroom of the Future
- Future Green Living Space
- Autonomous Health Management Service
Strategies

- **Strategy I: Draft Future Living Scenario**
  - It is anticipated that the perspectives and methods of futurology will be employed to enable the residents of major cities and residential communities in Taiwan to participate proactively in, and help to create, future lifestyles (as well as the development characteristics, development philosophy and development vision for the future), thereby helping to build top 10 technology fashion city development blueprint.

- **Strategy II Build Service Innovation Engine**
  - Combine the strengths from industry, academia and research to build service innovation system, including methodologies, tools and verification systems, in order to establish innovative service engines and make industry players implement various types of service systems based on the blueprint.

- **Strategy III Establish Future Experience Environment**
  - Based on the current living labs as the development foundation
    - broaden the management system
    - assist industry players to invest in Future Modern City living types to experience environment through innovative service engines launched by the government, and to facilitate the innovation in industry cluster.

- **Strategy IV Construct a sound ICT environment**
  - Support the effective development of different service innovation systems by providing core IT systems (such as flexible cloud services and terminal devices) aggregated from different sectors and integrating broadband/IOT infrastructure of regional government and companies.
Six Action Plans

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<th>Strategy I: Draft future living scenario</th>
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<th>Strategy II: Build service innovation engine</th>
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<th>Strategy III: Establish future experience environment</th>
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<td>3. Build a Service Prototype Laboratory</td>
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| 4. Broaden the Management of Smart Living Environment |

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| 5. Demonstrate Future Lifestyle Scenarios |

| |
| 6. Construct flexible core IT systems |

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| Strategy IV: **Construct a sound ICT environment** |

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1. Research on Future Trends and Smart Lifestyle Scenarios

- In order to meet the challenges posed by globalization, the rapid pace of technology innovation, and increasing urbanization, a range of smart information collection, analysis and forecasting techniques will be used to achieve effective data collation and build up a database of future consumer behavior and smart lifestyle typologies in the Asia Pacific city of the future, thereby enabling business enterprises to access the results of research on what major Asia Pacific cities will look like in the future, to serve as a reference for future service innovation.

- It is anticipated that the perspectives and methods of futurology will be employed to enable the residents of major cities and residential communities in Taiwan to participate proactively in, and help to create, future lifestyles (as well as the development characteristics, development philosophy and development vision for the future), thereby helping to build outstanding cities that conform to the ideals of future lifestyle service innovation.

- Formulate the development blueprint for 2020 MODERN City, analyzing the current state of 30 major Asia Pacific cities and their strategies to develop future lifestyle services. A wide range of information will be made available from this project for the reference of interested parties in all sectors.
2. Research and Diffusion of Service Innovation Method

- Continue developing S.E.E. methods and tools, use cloud service platforms, and **build up a service design database** to speed up and enhance the efficiency of service innovation by business enterprises.

- Integrate the service innovation research methods and service design databases of different research institutes and organizations, and encourage cross-industry collaboration in the promotion of **various types of innovative service value chain** and **autonomous service ecosystem R&D**.

- Expand the promotion of S.E.E. as an engine for driving service sector innovation; collaborate with industry to gradually develop a **service innovation manpower cultivation system** along the lines of GE’s “Six Sigma” system to meet the needs of business enterprises and speed up service system innovation.

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Service Design Database

Cloud Service Platform
A Service Prototype Laboratory will be built, to include: User observation, usability testing, service scenario modeling, service environment prototypes and service interaction experience laboratory environments, with the aim of providing business enterprises with an environment for service prototype development and verification of innovative service design.

The Service Prototype Laboratory will be used to help business enterprises to adopt a design philosophy that emphasizes the user experience, and to integrate technology and services, in the development of a wide range of lifestyle service prototype systems, thereby developing Taiwan into a 2020 MODERN City.
4. Broaden the Management of Smart Living Environment

- Choose an area and base on existing service demonstration field to follow the results from service prototyping experiment and integrate with the ICT infrastructure of local government as well as the city government budget to build a future service innovation cluster to become an international hub in the service sector.

- Take the intelligent living area within Song-Shan District as an example, using the forward-looking technical results from the Technology Development Programs to build a living area of technology.
  - “Smart Airport” (including fast customs clearance, smart & interactive digital signage, “soft” e-papers, and taxis equipped with in-car information devices)
  - “Smart Shopping Area” (including location-based mobile shopping guidance, “Happy Shopping,” convenient distribution networks, virtual window shopping, and night market virtual assistants)
  - “Smart Exhibition Halls” (including mobile ticketing, mobile phone entrance coupons, 3D/4D interactive displays, and the Taipei Flora Expo Pavilion of Dreams)
  - Basic Information Platforms (including integration of information on real-time flight status, transportation, exhibition, hotel and restaurant, etc.)

- Continue using the methodology mentioned above, apply the mechanism to 3-5 cities/areas.
5. Demonstrate Future Lifestyle Scenarios

- Use Taipei Flora Expo Pavilion of Dreams as the foundation, rotating exhibitions regularly every year to demonstrate cutting-edge technological achievements from the Technology Development Programs while integrating the elements of aesthetics and cultural and creative industry in Taiwan, enabling Taiwanese citizens and overseas visitors to experience future technology application scenarios themselves.

- For example:
  - Display of future lifestyles in the Hsinyi Business District.
  - Annual technology aesthetics exhibition (including displays of items that integrate Technology Development Program research results with industrial design, competition entries, and special performances).
  - Annual presentation of the cutting-edge R&D results achieved through Technology Development Programs.
  - A Disney-style interactive game zone (including a 3D virtual talent show, 3D virtual rollercoaster, interactive games using total-body control, etc.)

- Diffusion: Idle facilities throughout Taiwan can be developed along the same lines as the Taipei Flora Expo Pavilion of Dreams, creating new business opportunities for technology display services.
6. Construct flexible core IT systems

- Construct flexible core IT systems:
  Combine IT systems and facilities of cloud services to facilitate practitioners rapidly developing different service systems (innovation service value chain) and apply these systems in future social systems (Zone)

- Build a Sound ICT Environment:
  Integrating regional government and companies to build broadband/IOT infrastructure so as to support the effective development of innovation services
Engage industry players in investing MORDEN City with government’s guidance as well as the help of various public information infrastructures implemented in the Intelligent Taiwan Project by the Executive Yuan. From 2011 to 2015, the government increases NTD 0.4 billion in funding every year.

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<tr>
<th>Action Plans</th>
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<td>1. Research on Future Trends and Smart Lifestyle Scenarios</td>
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<tr>
<td>3. Build a Service Prototype Laboratory</td>
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<td>4. Broaden the Management of Smart Living Environment</td>
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<tr>
<td>5. Demonstrate Future Lifestyle Scenarios and development elastic IT infrastructure</td>
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<td><strong>Total</strong></td>
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Unit: Billion
V. Conclusion

1. By integrating all kinds of new methods and mechanisms, we could build a service innovation-oriented base to push forward the service industry to innovate together systematically in the next ten golden years. Taiwan then could develop into an innovative service economy and become a MODERN city as well as an international service hub to promote the export of service systems.

2. The service sector is heading toward systematic innovation in the future, and needs government to provide a set of approach and mechanism of innovation and futurology, together with the people to dig into key living fields and secure long-term and stable resources and budget (0.4 billion per year in 5 years), to develop high-quality city/neighborhood of living service innovation for the next generation.

3. Establish service innovation engine for industry, integrate the innovation R&D power from industry, academia and research to choose a field for broad management, build up 6 types of service system and draft 8 future lifestyles based on our common dream to develop future-proof and dominant service innovation systems.
VI. Issues for Discussion

Issue 1: How can S.E.E. be expanded and developed to drive the growth of service sector innovation with the development of a talent cultivation system similar to GE’s “Six Sigma” to speed up the pace of service system innovation?

Issue 2: How can research institute Technology Development Programs be used to achieve important, future-oriented service innovation, with the field verification to demonstrate future innovative service system scenarios and encourage the public to experience these services, thereby promoting the formation of the emerging service sector value chains?

Issue 3: In addition to maintaining the current funding level for Technology Development Programs relating to service sector R&D and maintaining the tax deductions available for service sector R&D, what else can the government’s service innovation system be used to stimulate and encourage the private sector’s investment in innovative service R&D?
Thank your for your attention