



# Modeling the impact of service innovation for small and medium enterprises: A system dynamics approach

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## ABSTRACT

Small and medium-sized enterprises have played an important role in Taiwan's economic development. As the importance of service grows, SMEs could undergo transformation via service innovation. SMEs are likely to encounter within the context of globalization and tried to identify the key factors influencing service innovation. Resource-based theory was used to construct system dynamics models for the SMEs prior to and after service innovation in order to develop a set of evaluation mechanisms. Simulation results showed that SMEs face operational difficulties due to globalization. Thus, SMEs should invest appropriate resources to develop market adaptability, knowledge application capability, collaboration abilities, and the effective application of information technology. This will enhance the overall service innovation capability of the business, which could then establish a new service value and increase market competitiveness.

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## 1. Introduction

Small and medium-sized enterprises (SMEs) have always played a key role in Taiwan's economic development. They account for 97% of Taiwan's enterprises and have provided 78% of its employment opportunities. They have created nothing short of economic miracles for Taiwan. However, as SMEs face a rapidly changing global economic environment, they are encountering an increase in competitors and a loss of customers presently. To overcome these obstacles, SMEs seek to undergo enterprise transformation to ensure business continuity and long-term survival in order for high competition [75]. Nevertheless, SMEs also encounter critical predicaments during the transition process. For example, SMEs have good production capabilities but lack management and marketing capabilities [80]. Therefore, they cannot optimize their utilization of business resources or apply them effectively.

Moreover, SMEs do not have sufficient resources and capabilities to analyze what consumers really want in terms of services. Services that fail to meet the needs of consumers will eventually be eliminated from the market. In a globalized market, SMEs' competitors are no longer limited to the local Taiwan market. They face competitions far and wide, producing even more intense changes in the market [64]. Thus, SMEs have encountered tremendous challenges such as insufficient experience in transition, ineffective utilization of resources, and a failure to meet the challenges of global competition [66]. Despite the wishes of SMEs to transform, they often lack the appropriate strategy and implantation methods to take into account. At the same time, the strategy of transformation has an extensive impact that directly influences the survival of a business, and there are no guarantees that the transformed SMEs will be successful. As SMEs struggle against these unknown

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factors, the need to find a breakthrough in the globalized and increasingly competitive environment has become increasingly urgent [64].

On the other hand, most SMEs in Taiwan belong to the manufacturing industry. Their business development tends to focus on production and manufacturing; efforts are made to enhance the efficiency of the production process, while customer value has been absolutely ignored. The application of product manufacturing as a core concept would not significantly improve customer value. Consequently, SMEs are unable to deliver a quality customer experience that is distinct from previous methods. In addition, the impact of globalization has led to rapid changes in market conditions and high unpredictability, which can generate acute issues such as increased competition, reduced business turnover, operational budget constraints, lack of innovation, ineffective marketing, and loss of customers that further illustrate the operational difficulties of SMEs [66,75]. To maintain sustainable operation, SMEs often undergo enterprise transformation as an attempt to use service innovation to attain competitiveness and improve profitability.

Accordingly, service innovation is regarded as a core concept to improve service performance and add customer value through a systematic and scientific approach nowadays [51]. To optimize overall service effectiveness, service innovation seeks to propose new concepts and introduce new technology or work processes, helping enterprises gain a competitive advantage [10,21,67]. Through a series of service innovation processes, this approach enables companies to create competitive strength in the market, gain economic benefits, and enhance their business longevity [1,3,62,71].

Although service innovation can create many advantages and bring new opportunities to SMEs, there is no specific set of measurements or a systematic evaluation approach by which SMEs can gauge whether the process of transformation is appropriate and whether the outcome meets expectations [39]. That is, several aspects require clarification and exploration, such as an investigation of the key influential service innovation factors that promoted the growth of SMEs during transformation and an evaluation of the effectiveness of service innovation. Therefore, this study focused on SMEs that have used service innovation for business transformation. This study explored the transitional conditions and issues businesses have encountered during transformation and identified the key factors that influenced service innovation. The aim of this paper is to enhance the effectiveness of service innovation in SME transformations, so that service innovation can be applied to create new business values, improve competitiveness, and help enterprises break through the current bottleneck.

Therefore, this study posed two research questions: (i) In the service innovation process of SMEs, what are the key factors that can impact the effectiveness of service innovation, and (ii) for SMEs investing in service innovation-based transformation, how can service innovation be applied effectively to improve operational performance? On the basis of these two questions, this study proposed the following research goals: (i) to investigate all key factors that influenced service innovation and determine the degree of impact and, (ii) from the exploration of SMEs' transitional difficulties, to identify the key influential factors in service innovation and integrate them into a set of indicators and guidelines. The integrated service innovation implementation guidelines aimed to assist leadership teams in the transitional management of service innovation in a changing environment. The rest of this study is structured as follows. Section 2 reviews the related literature on service innovation, resource-based theory and the key factors affecting service innovation. Our research methodology is detailed in Section 3. Simulation and results are presented in Section 4. Discussion is described in Section 5. Finally, Sections 6 and 7 contain contribution, implications and conclusions respectively.

## 2. Literature review

### 2.1. Service innovation

Service innovation is the utilization of new or improved methods to create innovative services, service processes, and service models to establish values for customers, businesses, corporate partners, and society in general [21,62]. Lyons et al. [50] described service innovation as an approach to providing new, unique products or services. Alternatively, it is an improvement of existing products or services to promote significant enhancements. Service innovation aims to create a completely new way of thinking for enterprises [1,42,71]. It seeks to increase benefits and reevaluate the current service model to determine whether there is room for improvement. It is not limited to the production of goods but also includes examining innovative high-value services. The creation of new service values boosts customer values significantly [47,84].

Avlonitis et al. [4] suggested that service innovation in the market context refers to a completely new service. For companies, this also includes new service delivery processes, appropriate service improvements, extension of service status, and the repositioning of services. Vang and Zellner [77] found that service innovation is a series of service efficiency improvements designed to customize services to meet customer needs. Lightfoot and Gebauer [47] indicated that enterprises can utilize service innovation to combine products with services and provide an integrated service method, enabling the company to do more than just product manufacturing; it also allows the company to provide the customers with a comprehensive and satisfactory solution. In addition, service innovation can be viewed as a course of action containing new concepts and specific developmental and implementation processes for new production [22,48]. Dominguez-Péry et al. [27] deduced that service innovation is a change of service system leading to a direct improvement in the development of service systems.

Many enterprises realize that service innovation is an important source of competitive strength. It is also considered a source of company potential and a key competitiveness factor [28,67,45]. Companies believe that service innovation can improve customer satisfaction and loyalty [81], as well as create market barriers for competitors [2]. It thus enables effective long-term growth in corporate performance. The application of service innovation can combine products with services to

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