

# The key success factors of introducing ERP system in Taiwan's manufacturing industry

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## Abstract

This study examines the key success factors of ERP introduction in Taiwan's manufacturing industry as a reference for enterprises to reduce the high and unforeseeable financial and time costs of ERP introduction. In the second phase, a questionnaire study was conducted using the Analytic Hierarchy Process to extract the relative weights of the distance between primary and secondary dimensions, and 5 primary dimensions were derived, including "Management/Organization", "Introduction Process", "Technical Support", "Documentation", and "Personnel", as well as 15 secondary dimensions.

*Keywords:* Manufacturing industry, Enterprise Resource Planning (ERP), Likert scale, Analytic Hierarchy Process (AHP)

## 1. Introduction

Taiwan has an island-based foreign trade economy, and its manufacturing industry is faced with energy deficiency, rising wages, and mounting environmental awareness, as well as competition from other countries, which all lead to operational difficulties; as an essential component in the transformation of enterprises, information management helps to increase productivity, improve product quality, and boost profitability.

The manufacturing sector is the mainstay of Taiwan's economy during the Covid-19 pandemic, with manufacturing output reaching NTD 3.5581 trillion in Q1 2021, which is an annual increase of 14.62%, the largest rise since Q2 2020, and positive growth for 2 consecutive quarters<sup>12</sup>.

In recent years, business management systems have realized digitalization, and its application in information systems (IT) has drawn considerable attention in research works. One of these systems, the Enterprise

Resource Planning (ERP) system, has become an important instrument for senior managers to control and conclude transactions<sup>5</sup>. Therefore, the smooth and rapid introduction of ERP systems in the manufacturing industry has developed into a key subject for the Taiwanese manufacturing industry.

This study combined the relevant literature on ERP introduction and established five primary dimensions and three items of ERP introduction for Taiwan's manufacturing industry with a total of 15 sub-dimensions. It is intended that the findings of this study will serve as an important reference for ERP introduction in Taiwan's manufacturing industry.

## 2. Literature Review

Enterprise Resource Planning (ERP) systems are often defined as a key managerial tool for planning the resources and transactions of an enterprise. The essential feature of this system is the storage, administration, and application of information to the plans and outcomes of

business operations. Weill and Ross observed that the financial performance of enterprises with excellent Information Technology Governance (ITG) are superior to those with poor IGT<sup>11</sup>, which suggests that informatization has a positive effect on the financial performance of firms, and literature review has confirmed that the introduction and operation of ERP have been a key factor in the success of enterprises<sup>3</sup>. According to statistics, nearly half (45%) of the existing ERP systems will be replaced by the new ERP systems available in the market today<sup>9</sup>. The findings of this study can provide an important basis for the initial introduction, and serve as a reference when upgrading or updating systems.

During the introduction of an ERP system, there are a number of issues that enterprises may encounter. In addition to the support and active involvement of the enterprise’s senior management<sup>6</sup>, the selection of consultants and system vendors is also required to ensure that all operators have the relevant skills to safeguard the effective and continuous operation of the system. Enterprises should continue to educate their employees<sup>1</sup> and arrange training for key personnel to acquire the

relevant knowledge<sup>2</sup>. Meanwhile, appropriate software should be selected to avoid unpredictable damage and allow room for future updates. Furthermore, managers should encourage all employees to participate in the introduction of the system, in order that all employees can contribute and be united in its application and use<sup>10</sup>.

### 3. Key Model Building for ERP Introduction

This study adopted a quantitative approach, conducted a literature review of five journal papers on ERP introduction in enterprises, constructed 5 primary and 30 secondary dimensions, and took enterprises that had successfully introduced ERP systems as the subject<sup>1,4,5,7,8</sup>. A five-point Likert scale was developed as a prediction questionnaire to extract three out of the five primary dimensions, a total of 15 secondary dimensions were obtained, and then, the weights of each dimension were calculated using AHP to obtain the key success factors for the introduction of the ERP system in Taiwan’s manufacturing industry.

Table1. Results of the Overall Assessment of Key Success Factors for the Introduction of Enterprise Resource Planning (ERP) in Taiwan’s Manufacturing Industry

Dimension	Weight	Rank	Evaluation Indication	Weight	Rank	Weight	Rank
<b>A</b> Management/ Organization	0.1961	3	A1. Commitment of Business Owners and Executives	0.3635	2	0.0672	6
			A2. Awareness of Business Owners and Executives	0.1568	3	0.0288	10
			A3. Involvement of Business Members	0.4798	1	0.1011	3
<b>B</b> Introduction Process	0.2203	2	B1. Organization of Resources	0.1649	2	0.0412	8
			B2. Completeness of Documentation	0.1318	3	0.0251	12
			B3. Appointment of Professional Consultants	0.7033	1	0.1541	2
<b>C</b> Technical Support	0.1206	4	C1. Hardware Equipment Support	0.0908	3	0.0126	14
			C2. Software Equipment Support	0.2993	2	0.0292	9
			C3. System Administration Adequacy	0.6100	1	0.0789	4
<b>D</b> Documentation	0.0413	5	D1. Primary Document	0.1084	3	0.0042	15
			D2. Completeness of Data Structure	0.3464	2	0.0135	13
			D3. Maintenance and Completeness	0.5452	1	0.0236	11
<b>E</b> Personnel	0.4207	1	E2. Training	0.6804	1	0.2849	1
			E5. Project Lead	0.1699	2	0.0712	5
			E6. Clear Objectives	0.1496	3	0.0627	7

#### 4. Empirical Analysis

With the three highest scoring sub-dimensions and primary dimensions of the questionnaire as the actual measurement samples, 10 AHP questionnaires were returned from the middle and senior level managers in charge of ERP introduction in 10 enterprises. After consistency testing, the C.I. values are all  $\leq 0.1$ , thus, the 10 AHP questionnaires are all valid. Regarding each “primary dimension” and “secondary dimension”, this study applied Microsoft Excel to calculate the relative weights. Based on the result, the connotation of each weight indicator is explained.

#### 5. Conclusion and Suggestions

##### 5.1. Conclusions and Propositions

The findings of the study “Key Success Factors for the Introduction of Enterprise Resource Planning (ERP) in Taiwan’s Manufacturing Industry” are summarized below in order of weighting:

Proposition 1: In the “Key Success Factors for ERP Introduction in Manufacturing Industry”, the “Personnel” dimension is more crucial than the “Introduction Process”, “Management/Organization”, “Technical Support”, and “Documentation” dimensions, thus, it is recommended that business owners and executives should implement various staff education and training programs to develop capable and responsible employees.

Proposition 2: In the “Management/Organization” dimension, the “Involvement of Business Members” dimension is more crucial than the “Commitment of Business Owners and Executives” and “Awareness of Business Owners and Executives” dimensions, which demonstrates that the involvement of all members of the enterprise, and their perseverance, are key issues during the introduction process, as well as critical indicators for the success of the organization.

Proposition 3: In the “Introduction Process” dimension, the “Appointment of Professional Consultants” dimension is more crucial than the “Organization of Resources” and “Completeness of Documentation” dimensions, thus, a competent professional consultant is an essential resource for planning, application, and system use experience.

Proposition 4: In the “Technical Support” dimension, the

“System Administration Adequacy” dimension is more crucial than the “Software Equipment Support” and “Hardware Equipment Support” dimensions, as a stable and fit-for-purpose system can prevent unpredictable failures during the introduction process, and a secure and stable system can also bring competitive advantage.

Proposition 5: In the “Documentation” dimension, the “Maintenance and Completeness” dimension is more crucial than the “Completeness of Data Structure” and “Primary Document” dimensions, which indicates that the maintenance of documentation has a significantly positive impact on the system’s introduction.

Proposition 6: In the “Personnel” dimension, the “Training” dimension is more crucial than the “Project Lead” and “Clear Objectives” dimensions, which corresponds to the statement that well-trained staffs are the most important asset of an enterprise, thus, routine education and conducting professional training designed for each project are also key factors in the introduction of the system.

##### 5.2. Recommendations for Subsequent

###### *Researchers*

This study examined relevant literature and employed a Likert scale as a pre-test to determine the content of the questionnaire. Then, AHP was applied to construct the evaluation method to gather the opinions of industry executives and generalize the key success factors for ERP introduction as a reference for those interested in implementing the system:

###### 5.2.1. *Identifying the subject of the study for more accurate findings*

The subject of this study was the enterprises that introduced the system in the manufacturing industry. This study outlined the respective dimensions and weights, and the subjects were mainly corporate executives; although the success of ERP introduction is very much related to the enterprise itself, it is recommended that subsequent researchers can select other subjects for study by including other related parties (e.g., MIS of the enterprise, consultants of the counseling services, or relevant academic experts).

###### 5.2.2. *Exploring the impact on business continuity with the findings of this study*

For enterprises, ERP introduction is just the inception,

meaning, it is the introduction outcome that makes the real contribution to the enterprise. In order to achieve continuity in system performance, enterprises should continue to introduce new skills through employee education and training<sup>11</sup>. Depending on the philosophy and ambition of the business owner, the scale of subsequent ERP introduction and development will vary, as will the value created for the enterprise. It is recommended that subsequent researchers should conduct follow-up studies on the effectiveness of ERP introduction on business operations. As system introduction is only the beginning, practical application reference value is expected to deliver more results.

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## Authors Introduction

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