

CHAPTER 5

The Evaluation of IT Systems in the Enterprises

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Abstract: IT systems have become essential for businesses of all sizes, providing a centralized database of customer, product, and service information that can be used to generate reports and improve efficiency. IT systems also include features such as document management, automated correspondence, data protection, and process tracking and optimization. This study aimed to investigate the relationship between corporate strategy and IT system implementation. The authors observed that IT is becoming increasingly critical to business success. The authors developed a group of variables to quantify the dimensions of various potential situational and organizational conditions that could impact the effective implementation of IT systems supported by business process management (BPM). They then derived the actual conditions that have an impact on effective IT implementation from the group of potential conditions. The results of the statistical analysis confirmed a relationship between the occurrence of changes in the company's general strategy and the implementation of IT. Companies that made changes to their general strategy in response to the challenges presented by IT were more likely to be satisfied with the accomplished objectives of the implementation. The study's findings suggest that corporate strategy is an important factor in the success of IT system implementation. Companies that align their IT strategy with their overall business strategy are more likely to achieve their desired outcomes.

Keywords: IT system, strategy, success factors, business process management, ERP

5.1. Introduction

An efficient evaluation system and method for enterprise informatization is essential for guiding the implementation and development of Enterprise Information Systems (EIS). Information technology has become an important part of businesses, helping to integrate business processes and data across various companies. Companies use EIS to collect, process, and produce valuable information.

5.2. Information Systems Success Model (ISSM)

The ISSM developed by William H. DeLone and Ephraim R. McLean is a widely used evaluation theory for EIS. It consists of six interrelated variables:

- System quality: The desired characteristics of an EIS, such as usability, reliability, and flexibility.
- Information quality: The relevance, accuracy, and completeness of the information produced by an EIS.
- Service quality: The quality of support provided to EIS users by the IT department.
- User satisfaction: The level of satisfaction of EIS users.
- System use and intention to use: The degree to which EIS users use the system and their intention to continue using it.
- Net benefits: The overall benefits that an EIS provides to the organization.

The ISSM is one of the most influential models for assessing the success of EIS. Other models include the Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DOI), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Model of PC Utilization (MPCU), and Unified Theory of Acceptance and Use of Technology (UTAUT).

The ISSM is a comprehensive and well-established model for evaluating the success of EIS. It considers a wide range of factors, including system quality, information quality, service quality, user satisfaction, system use and intention to use, and net benefits. The ISSM can be used to guide the implementation and development of EIS, as well as to measure the success of existing EIS.

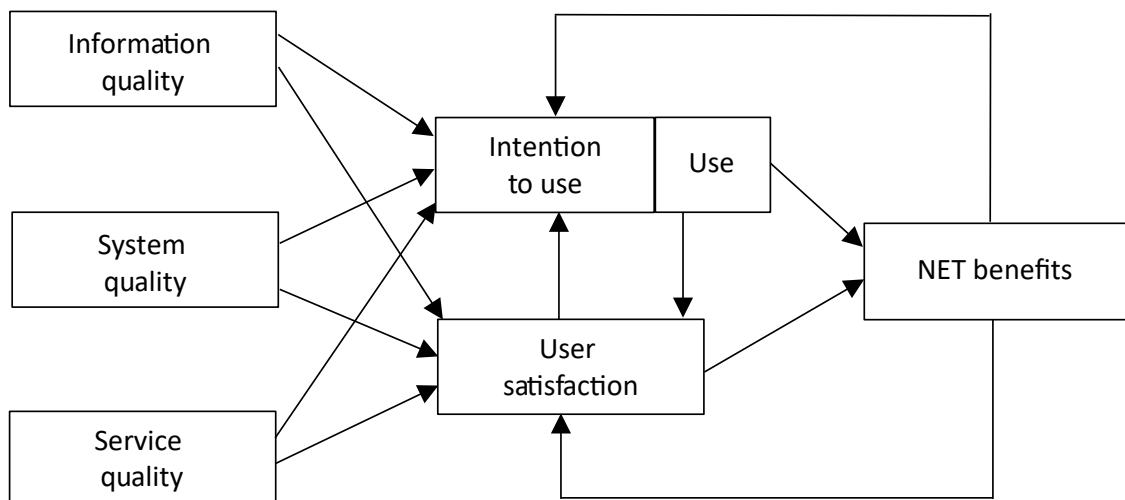


Figure 5.1. Information systems success model

Source: (William & Tjhin, 2021).

5.3. Review of the Literature

Melville et al. (2004) propose an integrative model of IT business value, which considers the organizational performance impacts of IT. This model encompasses various measures of performance, such as productivity enhancement, profitability improvement, cost reduction, competitive advantage, and inventory reduction. By using this model, enterprises can assess the value and impact of their IT systems on overall performance. Tsai (2001) discusses the effects of network position and absorptive capacity on business unit innovation and performance. This study highlights the importance of adjusting innovation and performance data to evaluate each unit, considering their specialization in different industries and strategic priorities. This approach can be applied to evaluate the performance of IT systems within different business units of an enterprise. Lu et al. (2016) propose a capacity evaluation model for enterprise technological innovation complex systems. This model can be applied to evaluate the technologically innovative ability of enterprises. By using an optimization model, the authors demonstrate the effectiveness of the evaluation model in providing accurate innovation ability values for different enterprises. This model can serve as a useful decision-making reference for optimizing the technological innovation system in enterprises. Liu (2014) focuses on the evaluation of enterprise tacit knowledge, which is crucial for IT system evaluation as it directly impacts the effectiveness and efficiency of knowledge transfer within an organization. The author builds an evaluation index system for enterprise tacit knowledge and introduces the Fuzzy AHP method to determine index weights. This provides a theoretical basis for effectively evaluating and managing enterprise tacit knowledge, which is essential for evaluating IT systems. In addition to these references, other relevant topics include performance appraisal (Lin, 2021; Peng, 2022), sustainability (Dergachova et al., 2019; Zhang et al., 2021), and low carbon development (Zhao et al., 2015). These topics provide insights into evaluating the performance and impact of IT systems in relation to employee performance, sustainability goals, and environmental considerations. By considering the insights from these references, enterprises can develop a comprehensive evaluation framework for their IT systems. This framework should consider the organizational performance impacts, network position, absorptive capacity, technological innovation ability, tacit knowledge, and other relevant factors. By using appropriate evaluation models and methods, enterprises can assess the effectiveness, efficiency, and value of their IT systems, leading to informed decision-making and continuous improvement.

The success variable of net benefits is the extent to which IS contributes to the success of individuals, groups, organizations, or various stakeholders. This variable summarizes the separate dimensions of individual impact, and organizational impact and additional IS impact measures from other researchers such as workgroup impact and social impact into a single success dimension. The choice of what impact to measure depends on the system being evaluated, the study's objectives, and the level of analysis.

5.4. Data Collection, Analysis, and Pilot Research Results

Primary data for own research was collected in the period at the end of 2019. The research concerned enterprises operating in The Kielce Technology Park and are involved in FutureHub cluster. The population was defined as people responsible for the implementation of IT systems in enterprises. The chosen method of sampling is random. The sample size is a group of 11 enterprises. The selected sample unit included the persons responsible for the IT projects, company managers, heads of IT departments or other persons appointed by managers. The applied random selection method resulted in responses from 11 entities. This result raises concerns about the representativeness of the research. The error of the lack of the representatives resulted both from the limited size of the surveyed population and from the reluctant cooperation of a large group of surveyed companies. Due to the limitations resulting from the adopted sampling method, it was not possible to apply the subjective estimation and extrapolation method. Among the available secondary sources, there were no data useful to analyse the issues constituting the essence of the described research, those related to the corporate strategy. The research was carried out in 11 companies involved in IT system implementation. Due to the nature of the research, it should be defined as exploratory. The overall goal of exploratory research is to identify the problem. In this type of research, the individual conducting it is usually guided by the initial hypothesis.

- Implementation of the ERP is depending on the company's strategy.
- The implemented ERP are used at a level, which is seen by management as unsatisfactory. One of the first questions concerned the extent, in which the management of the company implementing the IT system was involved in the implementation process.

The success of an information system (IS) can be measured using the following variables:

- System quality: The desired characteristics of an IS, such as usability, reliability, and flexibility.
- Information quality: The relevance, accuracy, and completeness of the information produced by an IS.
- Service quality: The quality of support provided to IS users by the IT department.
- User satisfaction: The level of satisfaction of IS users.
- System use and intention to use: The degree to which IS users use the system and their intention to continue using it.
- Net benefits: The overall benefits that an IS provides to the organization.

These variables are interrelated and have a dependence on measuring the success of information systems.

In addition to the above variables, the pilot research results also suggest that the following factors are important for the success of IT system implementation:

- Management involvement: Companies with greater management involvement in the implementation process reported higher levels of system quality, information quality, service quality, user satisfaction, and net benefits.
- User training: Companies with more extensive user training reported higher levels of system use and intention to use.

It is important to note that the pilot research was conducted in a small sample of companies, and further research is needed to confirm these findings and to identify other factors that may be important.

The Mann-Whitney *U* test was used to test the relationship between management commitment and satisfaction level. The results showed that companies with management involved in the ERP project had significantly higher satisfaction levels ($p < 0.01$).

Research shows that in the surveyed enterprises, responsibility for the CRM project lies with employees of the marketing and IT departments and the company’s management, with other departments of the enterprises being involved to a much lesser extent. Since management’s involvement in the project is widely considered to be one of the key success factors, it was necessary to check whether there is a relationship between this fact and the degree of satisfaction with the functioning of the CRM system. This relationship is shown in Table 5.1.

Table 5.1. Relation between commitment of the company’s management and evaluation of the process management

Management commitment \ Satisfaction level	Yes	No
	1	0
2	0	1
3	0	2
4	1	0
5	4	0
Average	4.1	2.5
Standard deviation	0.6	1.4

Source: own preparation.

Table 5.2 shows the relationship between developing a written process management strategy and satisfaction with implementation and the achieved objectives of the ERP. The measurement is qualitative and shows no significant differences between companies that developed a written ERP strategy and those that did not. However, there is a slight improvement in satisfaction with the achieved results in companies that modified their

general strategy in response to the challenges presented by the ERP. This is especially significant because organizational changes can disrupt the balance of power within an organization and lead to competency conflicts.

Table 5.2. Strategic factors and level of satisfaction with the IT project

	Written ERP strategy		Changes in the company's strategy resulting from ERP implementation	
	Yes	No	Yes	No
Satisfaction with implementation	2.9	2.7	3.5	2.4
Satisfaction with accomplished objectives	3.4	2.4	4.2	2.5

Source: own preparation.

The results of the study suggest that management commitment is an important factor in the success of ERP implementation. Companies with management involved in the implementation process are more likely to have satisfied users. However, developing a written process management strategy does not seem to have a significant impact on satisfaction levels. Companies that modify their general strategy in response to the challenges presented by the ERP are more likely to be satisfied with the results of the implementation.

It is important to note that the study was conducted with a small sample size, so further research is needed to confirm these findings. It is also important to consider the context of the study, as the results may not be generalizable to all companies.

In order to compare the obtained results, the Student *t*-test was used for significance of two means for 7 degrees of freedom and the level $\alpha = 0.05$. The obtained calculation results are presented in Table 5.3.

Table 5.3. Significance of mean differences

Satisfaction				Grade average	T statistic value	Critical value
Satisfaction with implementation	Equal variance assumption	Written strategy	Yes	2.9	0.364	2.3646
			No	2.7		
		Changes to strategy	Yes	3.5	1.350	
			No	2.4		
	Unequal variance assumption	Written strategy	Yes	2.9	0.345	2.3646
			No	2.7		
		Changes to strategy	Yes	3.5	1.354	
			No	2.4		

Satisfaction from achieved goals	Equal variance assumption	Written strategy	Yes	3.4	2.001	2.3646
			No	2.4		
		Changes to strategy	Yes	4.2	2.930	2.3646
			No	2.5		
	Unequal variance assumption	Written strategy	Yes	3.4	1.922	2.3646
			No	2.4		
		Changes to strategy	Yes	4.2	4.129	2.3646
			No	2.5		

Source: own preparation.

The *t*-test showed that the only statistically significant difference in satisfaction levels was between companies that made changes to their general strategy in response to the challenges presented by the ERP and companies that did not make such changes. Companies that made changes to their general strategy were more likely to be satisfied with the accomplished objectives of the ERP implementation.

The remaining differences in satisfaction levels between companies were not statistically significant. This includes differences between companies that developed a written ERP strategy and those that did not, and differences between companies that modified their general strategy and those that did not.

5.5. Conclusions

The results of the study suggest that the most important factor in the success of ERP implementation is making changes to the company’s general strategy in response to the challenges presented by the ERP. Companies that make these changes are more likely to be satisfied with the accomplished objectives of the ERP implementation.

Developing a written ERP strategy and modifying the company’s general strategy were not found to be statistically significant factors in the success of ERP implementation. However, it is important to note that these factors may still play a role in the success of ERP implementation, even if they are not statistically significant.

Overall, the study provides some valuable insights into the factors that contribute to the success of ERP implementation. Companies that are considering implementing an ERP should carefully consider the need to make changes to their general strategy in response to the challenges presented by the ERP.

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Ocena wdrożenia i funkcjonowania systemu IT w przedsiębiorstwach

Streszczenie: Systemy informatyczne stały się niezbędne dla firm każdej wielkości, zapewniając scentralizowaną bazę danych zawierającą informacje o klientach, produktach i usługach, które można wykorzystać do generowania raportów i poprawy wydajności. Obejmują one również takie funkcje, jak zarządzanie dokumentami, zautomatyzowana korespondencja, ochrona danych oraz śledzenie i optymalizacja procesów. Celem badania było zbadanie związku między strategią przedsiębiorstwa a wdrażaniem systemów informatycznych. Autor zaobserwował, że informatyka staje się coraz ważniejsza dla osiągnięcia sukcesu w biznesie. Opracował grupę zmiennych pozwalających ilościowo określić wymiary różnych potencjalnych warunków sytuacyjnych i organizacyjnych, które mogą mieć wpływ na efektywne wdrażanie systemów informatycznych wspieranych przez zarządzanie procesami biznesowymi (BPM). Następnie z grupy potencjalnych uwarunkowań wyprowadził warunki rzeczywiste mające wpływ na efektywne wdrożenie IT. Wyniki analizy statystycznej potwierdziły związek między występowaniem zmian w ogólnej strategii firmy a wdrażaniem IT. Firmy, które dokonały zmian w swojej ogólnej strategii w odpowiedzi na wyzwania stawiane przez IT, były bardziej usatysfakcjonowane osiągniętymi celami wdrożenia. Wyniki badania sugerują, że strategia przedsiębiorstwa jest istotnym czynnikiem powodzenia wdrożeń systemów informatycznych. Firmy, które dostosowują swoją strategię IT do ogólnej strategii biznesowej, mają większe szanse na osiągnięcie pożądaných wyników.

Słowa kluczowe: system informatyczny, strategia, czynniki sukcesu, zarządzanie procesami biznesowymi, ERP