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Development of the Readiness and Success Model for Assessing the Information System Integration

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Abstract

This study reports how to combine a technology readiness model within an information system (IS) success model in the context for assessing the readiness and success factors of an IS integration. As it is indicated by many IS studies, that most of the IS models are developed by adopting, combining, and adapting the previous ones. The researcher developed the model based on the input-process-output logic and the processional and causal model of the IS success models. The developed model was structured within nine variables and 44 indicators. The influence paths among the variables were presented by 23 links. In respect of the research implementation, the author has also broken down the model into its assessment instrument level. However, the model development study may have limited to the used assumption set and understanding of the researcher, it may contribute theoretically, in terms of a new model proposition. Besides that, the development transparency and the proposed model and its data collection instrument may be the practical consideration points for the further studies.

Keywords: Model development, IS model, Technology readiness, Success model, System integration

1. Introduction

The IS performance issues has been one of the interesting themes for researchers and practitioners in the discipline since five decades ago. The people have been discussed the subject within the efficiency and effectiveness constructs of the computer-based business during the first decade. It has then been investigating by the scholars within some different themes, e.g., the utilization, satisfaction, readiness, acceptance, and the success constructs in the next periods [1-6]. It may be clearly seen that the constructs interrelate among others and some of the constructs are combined with another one. For example, the unified theory of acceptance and use of technology (UTAUT) [5] and the technology readiness and acceptance (TRA) [7] models. It is consistent with the indications of several previous studies [5, 7-11] which indicated that many IS models are developed by referring to the previous theories rather than based on the empirical studies.

On the other side, many IS studies [1, 6, 12-14] elucidated that the IS performance studies are indispensable to be done continuously for improving the performance level, in regard to the technological risk management [15, 16] and the promised benefits of the IS implementations [17]. Accordingly, it is an interesting phenomenon how to continue the IS performance study by developing the new IS success model within the adoption, combination or adaptation of the previous IS models. The development may essential to explore the new opportunities of the IS performance improvement.

The purpose of the study was to explore the advanced influences of the technology readiness constructs towards the IS success ones and to develop an ISRS model in the context of IS integration performance. The objective was to explore the above-mentioned influences and to develop the ISRS model by adopting, combining, and adapting the technology readiness [18] and IS success [19] models. Following to the above-mentioned research programs, two research questions were then proposed in order to guide this exploratory study implementation.

Q-1. How to understand the relationship between the technology readiness constructs towards the IS success ones?

Q-2. How to combine the technology readiness model within the IS success model in the context of IS integration performance?

This paper is staked out within its five sections. The first one elucidates the research programs of the study. It is then followed by the literature review, research method, results and its discussions, and the conclusion parts in the second, third, fourth, and the fifth sections respectively.

2. Literature Review

It can be clearly seen that despite the fact that IS implementation is inevitable bring the beneficial impacts for the owners, but they have to be successful in the system implementation [6, 20]. It means that the success of the IS implementation is the first challenge for the owners before obtaining the benefits. In contrast, besides the failure of the IS implementations will bring the financial loss; the failure may also affect the business survival of the system owners [21]. The previous IS success studies [1, 6,

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10, 12, 22] indicated that the most success criteria of the IS development are related to the efficiency, effectiveness, user satisfaction, and the requirement fulfilment issues. Several IS survey [23, 24] and success [25, 26] studies revealed that one of the failure indications of IS developments is, however, the IS is successfully developed technically, but the system owners do not get its optimum benefits referring to the system requirements in the system development planning. For example, in the IS integration case. In this case, understanding the system integration and knowing the influenced factors may the early stage of the integration itself [27].

Xu et al. [21] indicated that in the context of how to support the integration of the business process and its services in an organization, the word of IS and information technology (TI) is interchangeable. Bouwman et al. [28] defined the technology is a combination of the telecommunication and computer technologies. The IS integration is inevitable to be the focus of many institutions [29], in regard to the autonomy, diversity, and distribution issues of the inter-organizational business functions [30]. Despite the fact that, many organizations ignore the internal readiness aspects of their IS development project [18].

On the other side, the IS performance issues have been one of the interesting themes for researchers and practitioners since five decades ago. They have been studied the subject within the efficiency and effectiveness constructs of the computer-based business during the first decade. Retrospectively, the subject has then been investigating by researchers and practitioners within some different themes, e.g., the utilization, satisfaction, readiness, acceptance, and the success constructs in the next periods [1-6]. In detail, the interrelationship among the constructs is indicated clearly within the used IS models. For instance, the UTAUT [5], TRA [7], IS success [19] models. Similarly, the indication is consistent with the tendencies of many IS studies [5, 7-11] which developed the research models by adopting, combining, and adapting the previous IS models.

3. Research Method

This model development study was performed throughout its four main stages (Fig. 1). First, the preliminary study (S1) was conducted by reviewing retrospectively the behavioural, organizational, and social themes of the IS studies, e.g., the usability, satisfaction, readiness, acceptance, and the success themes [2-5, 9-11, 13, 14, 18, 22, 31-33]. Besides reviewing the literature, it was also performed to formulate the research programs. The stage was then followed by the modelling works in the second stage (S2). This model development stage was started by its first sub-stage (S2.1) for developing an assumption set based on the initiated and selected theories (see Table 1).

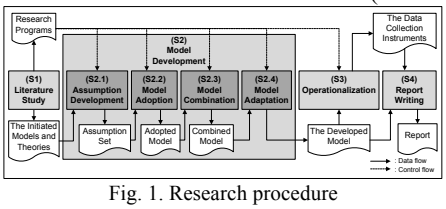

Fig. 1. Research procedure

Following to the developed set assumption, the Parasuraman and Colby's [18] technology readiness model and DeLone and McLean's [19] IS success model were then adopted, combined, and adapted in the second (S2.2), third (S2.3), and fourth (S2.4) sub-stages respectively. The developed model then was broke down into the research instrument level in the operationalization stage (S3). Lastly, the developed research model and its data collecting instrument were then proposed within the reporting stage, in terms of the research implementation

Table I List of the basic models and theories

List of the Basic Models and Theories	References
Information processing theory	[10, 34]
IS success model	[10, 19, 31, 35, 36]
Technology readiness Model	[18]
Processional and causal models of a model development	[31, 37-39]

4. Results And Discussion

Fig. 2 presents the proposed ISRS model. The development was inspired by the previous model development researches [7, 10] following to the model development tendencies of the Anfara and Mertz's [8] and Belout and Gauvreau's [40] studies, who indicated that most of the IS research models are tended to be developed practically using the previous models rather than based on the empirical studies. Generally, the model was developed by adopting, combining, and adapting the technology readiness [18] and IS success [19] models with its nine variables, i.e., Optimism (OPT), Innovativeness (INV), Discomfort (DCF), Insecurity (ISC), Information Quality (INQ), System Quality (SYQ), Service Quality (SVQ), User Satisfaction (USF), and System Integration Success (SIS). The first four variables were adopted from the Technology Readiness Model [18] and the rest ones were from the IS success model [10, 19, 31].

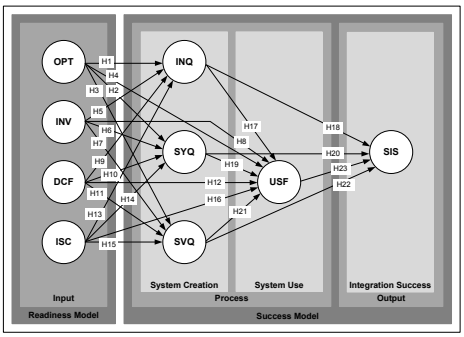

Fig. 2. The Proposed IS readiness and success model

Referring to the previous study [6, 10-12, 33] which employed the input-process-output (IPO) logic [34, 37] in the research model development, the researcher assumed that the IS integration process can also be assumed within the above-mentioned logic. In the context of the processional and causal model dimension, the scholar placed the model dimensions of the DeLone and McLean's [19] IS success model in the process and output dimensions of the IPO logic. In detail, the system creation

and system use dimensions were assumed within the process one, in terms of a product life cycle [39]. Here, the integrated system was assumed as the output of the process. In terms of the processional and causal model of the system integration, the author believed that the system readiness is also one of the input factors [18, 41, 42]. In short, the technology readiness [18] and IS success [19] constructs were then adopted, combined and adapted by the researcher in the ISRS model development for assessing the system readiness factors towards the success of the IS integration. Table 2 shows the processional and causal dimension of the model development which was used to develop the 23 hypotheses, as it is described in the next paragraph.

Table II The processional and causal dimensions of the model development

Processional and Causal Dimensions	References
Input → Process → Output	
Resources/ Input → Activities → Outputs → Outcomes → Impact	
Project Resources (Input) → Project Management → Product Use (Process) → Project Success (Output)	
System Creation → System Use → System Impact	
System Readiness (Input) → System Creation → System Use (Process) → Integration Success (Output)	

First, the previous studies [18, 41, 42] indicated that the readiness constructs may influence IS implementation. In the context of the IPO logic of an IS integration, the constructs can be assumed within the input dimension of the logic. Therefore, in regard to the adoption and combination of the technology readiness [18] and IS success [19] the author hypothesized that each variable of the input dimension affects each variable of the process output (H1-H16).

Second, the processional and causal description of the DeLone and McLean's [19] IS success study revealed that the system creation dimension influences the system use one. This assumption is consistent with the product life cycle concept [39] whereas the product (system) use stage is affected by the product (system) creation one. Accordingly, the researcher hypothesized that each variable of the system creation dimension influences each variable of the system use one (H17, H19, and H21). In the context of the study whereas it will be implemented in the compulsory use environment, the author avoided the system use variable following the previous findings [14, 43, 44].

Lastly, following to the processional and causal assumptions of the model development [10, 19, 31, 34, 37], the output dimension was revealed to be sequentially affected by the process dimension. Thus, the author has also hypothesized that each variable of the process dimension influences the output dimension variable (H18, H20, H22, and H23). Furthermore, the definitions of each variable, its broke down indicators and statements of the questionnaires can be seen in Table 3, Table 4, and Table 5 respectively.

Table III List Of The Variables [18, 19]

Var.	Definitions
OPT	The degree to believe that the IS will probably happen
INV	The degree to see that the IS is the advanced degree of the system
DCF	The degree to perceive that the IS is an uncomfortable thing
ISC	The degree to distrust that an IS integration is able to be implemented properly and concerns about its potential harmful consequences
INQ	The degree to which the produced information of the IS consistently meets the requirements and expectations of the users
SYQ	The degree to describe the quality of the content of the IS
SVQ	The degree of the excellence of the IS services to its users
USF	The degree of the satisfaction level of users during utilizing the IS
SIS	The achievement of the IS based on its implementation planning

Table IV List of the indicators [18, 19, 33]

Indicators	Definitions
Easiness (OPT1)	The degree related to the ability of a system for providing a freedom from constrains, difficulties, and troubles
Connectivity (OPT2)	The degree related to the ability of a system to connect successfully with other systems
Efficiency (OPT3)	The degree related to the system achievement to produce an output compared to the resources needed to achieve the output
Effectiveness (OPT4)	The degree related to the system capability to achieve its utilization goals
Productivity (OPT5)	The degree related to the system support for producing output compared to the resources needed to produce the output
Problem Solving (INV1)	The degree related to the system support for finding solutions to problems
Independence (INV2)	The degree related to the system ability to support its users free from the controls or influences
Challenge (INV3)	The degree related to the system support to successfully deal with or achieve something within a difficult situation or problem
Stimulation (INV4)	The degree related to the system support to encourage something to happen, develop, or improve
Competitiveness (INV5)	The degree related to the ability of a system to support the users to be more successful than their competitors
Complexity (DCF1)	The degree related to the system features that confusing or difficult to be understood
Difficulty (DCF2)	The degree related to the condition of a system which it is unable to be operated easily
Dependence (DCF3)	The degree related to the condition of a system which needs the other parties to operate it
Lack of Support (DCF4)	The degree related to a system which it does not have any, or enough, of the support in its operation
Inappropriateness (DCF5)	The degree related to the state of being inappropriate
Failure (ISC1)	The degree related to the possibility that a system unpleasant or dangerous might happen
Threat (ISC2)	The degree related to the system situation that could cause harm or danger

Table IV List Of The Indicators (*Continued*) [18, 19, 33]

Indicators	Definitions
Reducing Interaction (ISC3)	The degree related to the system implementation which makes human interactions become less in size, amount, and importance
Distraction (ISC4)	The degree related to the system utilization gets attention and prevents people from concentrating on something else
Incredulity (ISC5)	The degree related to the system hesitation of its utilization
Accuracy (INQ1)	The appropriateness degree of the produced information by the system with its real standard
Timeliness (INQ2)	The precision degree of the information processing of the IS at the planned time duration
Completeness (INQ3)	The degree of the produced information by the IS to be whole or without nothing missing part
Consistency (INQ4)	The tendency of the IS to still demonstrate the same information within operations, services, maintenances, or qualities
Relevance (INQ5)	The interrelationship degree of the produced information by the IS with its subject matters
Ease-of-use (SYQ1)	The degree of a freedom by the IS from constrains, difficulties, and troubles during its usages
Maintainability (SYQ2)	The degree related to the easiness of the IS in its maintenance
Response time (SYQ3)	The degree related to the amount of time it takes for the IS responding its user commands
Functionality (SYQ4)	The degree related to the IS can be operated appropriately to the planned requirements
Safety (SYQ5)	The invulnerability degree of the IS from the unexpected attacks, harms, or damages
Responsiveness (SVQ1)	The reaction degree of the IS to serve its users within the suitable way, time and situation
Flexibility (SVQ2)	The adaptation degree of the IS to serve its users appropriate to the required demands
Security (SVQ3)	The safety degree of an integrated system to serve safely its users from attack, harm, or damage that unexpected
Functionality (SVQ4)	The degree related to the service scope of the IS appropriate to the functional requirements
Extension (SVQ5)	The degree related to the additional service scope of the IS which exceed the functional requirements
Efficiency (USF1)	The user satisfaction degree of the IS based on the system achievement to produce an output compared to the resources needed to achieve the output
Effectiveness (USF2)	The user satisfaction degree of the IS based on the system capability to fulfil the user needs for achieving their goals
Flexibility (USF3)	The user satisfaction degree of the IS related to the adaptability of the system appropriate to the required demands.
Overall satisfaction (USF4)	The user satisfaction degree of the IS related to the adequacy of the overall aspect of the system
IS Efficiency (SIS1)	The degree related to a comparison of the output value of the IS and the resources needed to achieve the output
IS Effectiveness (SIS2)	The degree related to the capability of the system capability to fulfil the user needs for achieving their goals
User Satisfaction (SIS3)	The extent to which the IS helps users create value for their business
Productivity improvement (SIS4)	The degree related to the system support for improving output compared to the resources needed to produce the output
Competitive advantage (SIS5)	The degree related to the favourable position of the integrated IS users to be competed in the business competitions

Table V List of the questionnaire statements

Statements of the questionnaires
OPT1-System is free from constrains, difficulties, and troubles
OPT2-System can be connected easily with other systems
OPT3-System operates within the minimal resources
OPT4-System operates within the maximal output
OPT5-System is able to be operated efficiently and effectively
INV1-System is a problem-solving tool for users
INV2-System helps users to be free from the controls or influences
INV3-System supports users for achieving goals in a difficult situation or problem
INV4-System encourages users for achieving goals
INV5-System supports users to be more successful than their competitors
DCF1-System confuses users in its operation
DCF2-System cannot be operated easily
DCF3-System cannot be operated freely
DCF4-System is operated without a full support operation
DCF5-System is inappropriate to its development planning
ISC1-System is unsuccessful be operated appropriated to its development planning
ISC2-System is in situation that could cause harm or danger
ISC3-System makes users become less in interactions
ISC4-System makes users be unfocused to their importance
ISC5-The system is dubious to use
INQ1-Information are produced accurately
INQ2-Information are produced timely
INQ3-Information are produced completely
INQ4-Information are produced consistently within the system operation
INQ5-Information are produced appropriate to the user's need
SYQ1-System is easy to be used
SYQ2-System is easy to be maintained
SYQ3-System is able to respond quickly following the given commands
SYQ4-System is able to carry out all of the planned functions
SYQ5-System is safe to be used
SVQ1-System gives its services quickly
SVQ2-System gives its services flexibly appropriate to the user situation
SVQ3-System gives the safety services
SVQ4-System gives its services appropriate to the functional requirements
SVQ5-System gives its services over the required functions
USF1-Users are satisfied with the efficiency of the system
USF2-Users are satisfied with the effectiveness of the system
USF3-Users are satisfied with the flexibility of the system
USF4-Overall, Users are satisfied with the performance of the system
SIS1-Integration of the system is performed efficiently
SIS2-Integration of the system is performed effectively
SIS3-Integration of the system improves its user satisfaction
SIS4-Integration of the system improves the operational productivity of the institution
SIS5-Integration of the system is performed efficiently

In respect of the above-mentioned research questions, the following descriptions are elucidated to respond both questions.

First, the relationship between the technology readiness and IS success constructs can be illustrated sequentially across a retrospective analysis of the usability, satisfaction, readiness, acceptance, and the success constructs of the computer-based system. For example, Robey [45] in the early era described that the user psychological reactions and organizational factors contribute to the system success. In the model development points, Venkatesh and Davis [5] extended the acceptance and use theories by combining both constructs within a combination model. On the other side, Lin, Shih, and Sher [7] have also integrated the technology readiness and acceptance constructs within a

unified model. Similarly, adoptions of the system use and user satisfaction factors can also be seen in the DeLone and McLean's [19] IS success model. Clearly, the technology readiness and IS success constructs are connected within a sequential influence context. It is consistent with indications of the previous study [5, 7-11] which indicated that the adoption, combination, or adaptation of the prior models in the social studies is a common model development, in regard to explore the new model.

Second, the developed ISRS model (Fig. 2) is one of the new model developments. The adoption, combination, and the adaptation techniques of the technology readiness [18] and IS success [19] models implemented by the researcher based on the input-process-output (IPO) assumption [34, 37], as it was also presented by the previous studies [6, 10-12, 33]. In the context of IS integration assessment, the developed model has also broken down into its data collection instrument by adopting and adapting its study context.

In short, it can be clearly seen that the ISRS model development proved the new model development possibility by combining, adopting, and adapting the technology readiness [18] and IS success [19] constructs.

Despite the fact that, the exploratory model development study was performed within the author understanding himself by adopting, combining, and adapting the two previous models [18, 19] based on the selected assumptions (Table 1), the study may contribute theoretically by proposing the ISRS model. Practically, transparency of the model development and the proposed model and its data collection instrument may useful for the further studies. Besides that, transparency of the model development process and credibility of the used basic models and theories may present the trust points of the study [38].

On the other side, the basic assumption of the model development, research method, and the author understanding may be limitations of the model development study. The differences in the assumption, method, and understanding may produce the different models. Thus, it is recommended that the study limitations may be considerations of the further studies.

5. Conclusion

The IS performance issues has been one of the interesting studies for researchers and practitioners since many decades ago. The studies indicated that many IS models are developed based on the previous theories rather than the empirical studies. Accordingly, the researcher developed the ISRS by adopting, combining, and adapting the technology readiness and IS success model, in terms of the IS integration assessment. The IPO logic and the processional and causal model of an IS success model were used by the author as the model development assumption. The proposed model consisted of the nine variables with 23 indicators. The researcher has also proposed 44 question items for the next questionnaires development. Besides this exploratory study may contribute theoretically in terms of the technology readiness and IS success model combination, the transparency development process and the proposed model and its data collection instrument may be a practical consideration points for the next studies.

Despite the fact that, the used assumption of the model development, research method, and the author understanding may be the study limitations. The other studies which used the different assumption, method and understanding may present the different propositions. In addition, the limitations may helpful for the further study, especially validity of the proposed model. Moreover, transparency of the model development process and credibility of the used basic models and theories may also be a consideration point of the model trust.

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