

Evaluation of Firm Smart Business Capability: an Entire Capability Perspective

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총체적 관점에서 기업 스마트 비즈니스 능력 평가 연구

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요 약

Many firms are efficiently applying smart business technology and smart business model to their management activities in order to raise their business results in a smart business environment. Firm's smart business capability is very crucial for the efficient execution of its management activities and to improve the performance of business tasks in a global business environment. An evaluation framework is necessary for effectively evaluating a firm's smart business capability to manage and improve its smart business capability in a total smart business perspective. We generated the first 21-item based on previous literature. This research found an 11-item framework that can efficiently evaluate an enterprise smart business capability by verifying based on previous studies. This framework can be used for effectively evaluating a firm's smart business capability in a comprehensive perspective.

1. Introduction

Firms have built smart business environment to increase their task performance and to improve their competitiveness in a global management environment. They are also applying smart technology and business model to the management activities with smart business workstation, smart business mobile platform, and smart business solutions etc. Smart business technology is a crucial method to manage and improve a firm's business activities in the ever-changing business environment. The utilization of smart business technology for the business activities is indispensable to efficiently manage its smart business tasks and improve its performances. Firm smart business capability refers to the entire capability that a firm utilizes smart business technology for its management activities and for improves its business performances in a global business environment. Firm smart business capability has to be evaluated by a reasonable evaluation framework and should be improved by objective criteria based on the evaluation results of the evaluation framework. But a reasonable framework to evaluate a firm smart business capability has not been studied in previous literature. That is, we need a reasonable framework that can efficiently evaluate a firm smart business capability in an entire capability perspective.

Therefore, this paper presents a comprehensive framework that can evaluate a firm smart business capability for efficiently performing its smart business tasks and for effectively improving its smart business performances.

2. Related Research

In previous studies, they described smart business as a business process that uses the smart technology medium as a

conduit to fulfill business transactions. Smart business can be defined as an approach to raise the competitiveness of organizations by improving management activities through using smart technology such as smart devices, networks, and solutions [1][2][3][4]. Smart business can be presented as a method to efficiently perform the firm's management activities by applying the smart business plan, technology and solutions, and systems to its business tasks in a global business environment [1].

Many studies defined the concepts of IT capability from the view points of the studies' researchers [5][6][7][8]. But smart business capability has rarely researched in previous literature. IT capability is conceptualized as the extent to which a firm is knowledgeable about and effectively utilizes IT technology to manage IT data within the firm [9][10][11]. The components of IT capability represent three co-specialized resources: IT objects; IT knowledge; and IT operations [9][10][11]. IT capability is considered the culmination of the sets of hardware, software, services, management practices, and technologies and management skills related to IT departments [12]. IT capability is formed by IT system convention, IT infrastructure, human IT resources, and IT relationship assets based on these resource-based perspectives [13]. From an information system maturity system perspective, the measurement of the information system level indicates the total capability that includes information system vision, information system infrastructure, information system support, and information system application and usage [6][14][15][16].

Therefore, this study defines the firm smart business capability (FSC) as the entire smart business capabilities that a firm has to retain to efficiently perform its smart business tasks and improve its smart business performances in a

global business environment. We develop the first evaluation items for FSC based on the definition of FSC and previous studies related to a firm smart business capability.

3. Methods

Based on the previous studies, this research developed the first 21 evaluation items for FSC based on definitions and components of IT capability [9][10][11][12][13][14][15][16]. The developed evaluation items are presented in Appendix A. We analyzed the validity and reliability of the developed items to ensure that FSC is efficiently evaluated by the items. It was proved by presenting that the framework was a suitable operational definition of the construct it purported to evaluate. Many studies presented various methods to verify the validation of a model construct [14][15][16][17][18]. Generally, most studies present two methods of construct validation: (1) correlations between total scores and item scores, and (2) factor analysis [14][15][16][17][18].

In this research, the evaluation questionnaire used a five-point Likert-type scale as presented in previous studies; denoting, 1: not at all; 2: a little; 3: moderate; 4: good; and 5: very good. The survey was gathered data from a variety of industries, business departments, experience, and education. We performed two kinds of survey methods: direct collection and e-mail. The respondents either directly mailed back the completed questionnaires or research assistants collected them 2-3 weeks later. The collected questionnaires represented 37% of the respondents.

3.1 Sample Characteristics

We obtained a sample of 143 usable responses collected from a variety of industries, enterprises, business departments and positions, and experience. We excluded four incomplete or ambiguous questionnaires, leaving 139 usable questionnaires for statistical analysis. All respondents had college or university degrees in: humanities and societies (19.4%), management and economics (35.3%), engineering (23.7%), and science (21.6%). The respondents in terms of business departments were identified as strategy planning (15.1%), development and maintenance (21.6%), business application (33.8%), and administration support (29.5%). The respondents had on average 7.6 years' experience (S.D. =1.01) in their field, their average age was 35.8 years old (S.D.=5.89), and 70.5% were male. This survey was intentionally focused on various industries and persons working above the 5 years within their firms. Namely, the respondents could efficiently provide the correct responses for our questionnaire survey.

3.2 Analysis and Discussion

We extracted the various analysis results from the collected usable questionnaires. After factor analysis and reliability analysis, the first 21 measurement items were reduced to 11 items, with 10 items were deleted, with applying the criterion of previous studies [16][17][18][19]. The elimination was sufficiently considered to ensure that the retained items were adequate analysis items of FSC. Each of the 11 items had a factor loading > 0.619. The reliability coefficients (Cronbach's alpha) of four potential factors had values > 0.785 as indicated in Table 1, above the threshold recommended for exploratory research [17][18][19][20]. We

calculated the corrected item-total correlations between each variable and its corresponding factor in order to investigate the reliability and validity of the measurement items. We considered sufficiently high criteria to extract reasonable analysis items of FSC. These coefficients indicate the relative contribution of a measurement item for the construction of a scale to gauge a particular factor. Most corrected item-total correlations were greater than 0.607, showing that the measurement items are good indicators of their corresponding factors. The extracted items have validity and reliability in terms of a measurement construct based on the measurement results as indicated in Table 1.

<Table 1> Reliability, validity, and factor loadings of FSC construct

Variable	Factor Loading				Corrected Item-Total Correlation	Coefficients Alpha
	Factor 1	Factor 2	Factor 3	Factor 4		
V01	0.765				0.687	
V03	0.801				0.702	0.803
V04	0.637				0.607	
V06		0.809			0.727	
V08		0.812			0.658	0.824
V09		0.734			0.712	
V11			0.867		0.737	
V13			0.772		0.628	0.804
V16			0.729		0.611	
V18				0.731	0.713	
V20				0.619	0.619	0.785

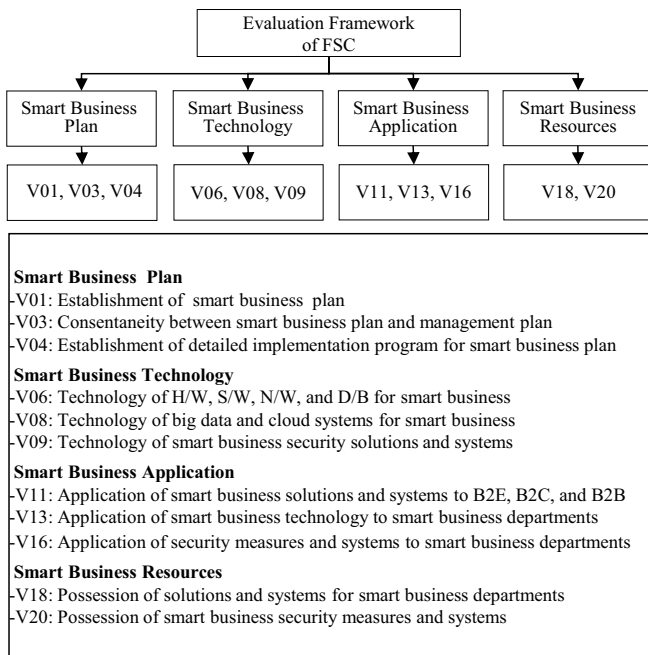
* Significant P ≤ 0.01

This research calculated the corrected item-total correlations between each variable and its corresponding factor in order to investigating the reliability and validity of the analysis items. These correlations along with alpha coefficients of each factor are presented in Table 1. It also shows the alpha coefficients for the analysis factors if an analysis item was deleted from the scale. These coefficients indicate the relative contribution of an analysis item to the construction of a scale for analyzing a particular factor. They are all in the acceptable range. Most corrected item-total correlations were greater than 0.607, showing that the analysis items are good indicators of their corresponding factors. The extracted items have a validity and reliability in terms of an analysis construct based on the analysis results as presented in Table 1. The developed evaluation framework can be become more objective and practical scale in the application of industrial fields, with reflecting the measurement results of many case studies.

4. Evaluation Framework for FSC

This research presented the reasonable 11 items for evaluating FSC. We classified four factor groups from the factor analysis. The factor groups mean the potential factors as major evaluation components to gauge FSC. With exploring the evaluation items of each factor group, we identified the following four potential factors: factor 1: smart business plan; factor 2: smart business technology; factor 3: smart business application; and factor 4: smart business resources. The potential 4 evaluation factors are used as the 4

crucial evaluation factors of our evaluation framework construct. The meanings and evaluation items of each factor are as follows. Smart business plan presents a firm's smart business plan and consistent smart business policy. It includes smart business plan and program, consentaneity between smart business plan and management plan, and detailed smart business implementation plan. Smart business technology represents the technical knowledge that a firm has to retain smart business technology such as H/W, S/W, and D/B, big data and cloud systems, smart business security solutions and systems. Smart business application indicates a firm's ability to apply smart business technology, smart business solutions and applications, and smart business systems to management activities in order to efficiently execute the firm's smart business activities. Smart business resources present smart business infrastructure, such as smart business solutions and systems, and smart business security measures and systems. That is, this refers to a structural framework that can measure FSC in terms of a whole smart business capability from smart business plan to smart business resources, including four evaluation factors and 11 items.



(Figure 1) The developed framework structure for FSC

Hence, the developed framework includes four evaluation factors such as smart business plan, smart business technology, smart business application, and smart business resources as shown in Fig. 1. As presented in Table 1 and Fig. 1, smart business plan has the evaluation items, such as V01, V03, and V04. Smart business technology comprises V06, V08, and V09. Smart business application includes V11, V13, and V16. Smart business resources contain V18 and V20. These factors affect FSC, that is, the total smart business capability of a firm. It is critical to improve and manage FSC by evaluating a firm's smart business capability with a valid and reliable framework. Evaluating FSC is a crucial method to examine the total smart business capability of a firm, based on its smart business plan, smart business technology,

smart business application, and smart business resources.

Therefore, understanding the FSC construct is essential to evaluate the success of FSC that denotes the entire smart business capability to efficiently support its management activities. This research can use the framework to evaluate FSC across different industrial fields and business departments, and perhaps even as a global measure.

Since there are the factors affecting FSC, understanding their mutual relationship is very important for efficiently improve FSC and for the effective utilization of the developed framework in industrial fields. Their mutual relationship is complex and may be affected by other variables. This research analyzed how they were correlated in order to examine the relationship between smart business plan, smart business technology, smart business application, and smart business resources, and FSC, as shown in Table 2.

<Table 2> Correlation matrix

Division	Factor Correlation Matrix				
	(2)	(3)	(4)	(5)	
FSC	(1)	0.41	0.51	0.56	0.40
Smart business plan	(2)		0.42	0.47	0.43
Smart business technology	(3)			0.46	0.47
Smart business application	(4)				0.45
Smart business resources	(5)				

5. Conclusion

This research presents a comprehensive framework that can evaluate perceived FSC from a whole smart business capability perspective. This 11-item scale is implicative, concrete, easy to use, and appropriate for practical and research purposes. The developed tool with adequate validity and reliability presents groundwork for the development of a standard framework of FSC.

Therefore, this paper provides a comprehensive framework that can efficiently evaluate FSC that a firm can obtain by applying a firm e-business capability to its management activities and business tasks in a smart business environment. These findings provide a new direction and foundation for the development and advancement of the efficient evaluation framework for FSC. In future research, we will find the practicality and availability of this evaluation framework with providing the evaluation results by applying it to a case study.

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Appendix A. Evaluation items for firm smart business capability

1. Establishment of smart business plan
2. Performance analysis between smart business investments and effects
3. Consentaneity between smart business plan and

- management plan
4. Establishment of detailed implementation program for smart business plan
 5. Establishment of smart business strategy and plan to improve smart business environment
 6. Technology of H/W, S/W, N/W, and D/B for smart business
 7. Solution technology related to ERP, SCM, CRM and KMS for smart business etc.
 8. Technology of big data and cloud systems for smart business
 9. Technology of smart business security solutions and systems
 10. Technology of smart business networks and solutions
 11. Application of smart business solutions and systems to B2E, B2C, and B2B
 12. Application of B2E, B2C, and B2B for smart business
 13. Application of smart business technology to smart business departments
 14. Application of big data and cloud technology to smart business
 15. Application of H/W, S/W, N/W and D/B to smart business systems
 16. Application of security measures and systems to smart business departments
 17. Possession of network and solutions appropriate to smart business management
 18. Possession of solutions and systems for smart business departments
 19. Possession of intellectual property related to smart business
 20. Possession of smart business security measures and systems
 21. Possession of smart business systems appropriate to smart management activities

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