

A Study of the Effect of Information Interest on Business Performance: The Construction Industry

Se-Yun Kim^a, Yen-Yoo You^b, Seok-Kee Lee^{c*}, ^aPh. D Student, Dept. Of Smart Convergence Consulting, Hansung University, 02876, Korea, ^bProfessor, Dept. Of Smart Convergence Consulting, Hansung University, 02876, Korea, ^cProfessor, Dept. Of Computer Engineering, Hansung University, 02876, Korea, Email: ^aksyun227@naver.com, ^bthreey0818@hansung.ac.kr, ^{c*}seelee@hansung.ac.kr

This study aims to gain empirical insights into the impact of work efficiency and work effectiveness on enterprise performance in terms of information interest. Recently, the Construction Business Survey Index (CBSI) hit its lowest level, making it more important to utilise the information system. Empirical data were collected and analysed exclusively for the construction industry, focusing specifically on the concepts of ERP systems and business performance. In addition, this study examines the mediating effects of work efficiency and work effectiveness on the influence of informatisation on business performance. The subjects of the study were the data of the Korea Technology and Information Promotion Agency for SMEs (TIPA), which surveyed the SMEs' information level and status every year. The data includes a survey of 3,700 SMEs stratified by industry. Among them, this study examined 336 companies classified in the construction sector surveyed in 2017. The survey items include the general status of companies, their intentions and plans for informatisation, the status of information system usage, and the effectiveness and performance of informatisation. For empirical analysis, SPSS 22.0 was used for analysis of technical statistics, exploratory factors analysis and reliability analysis, and AMOS 22.0 was used for confirmatory factor analysis, structural model analysis and mediation effects. The study's findings were as follows. First, information interest has been shown to have a significant effect on work efficiency and work effectiveness. Second, work efficiency is not significant to business performance, and work effectiveness has a significant impact on business performance. Third, multi-mediated effect testing using phantom variable showed that only work effectiveness plays a role as a mediator between information interest and business performance. The higher the level of management and staff interest in informatisation, the more significant the effect on work

efficiency and work effectiveness becomes. In addition, the higher the effectiveness of the work, the greater the impact on business performance. In-depth studies are needed to determine whether the same results would be obtained if large company data or other industry data were applied.

Key words: *ERP system; information interest; business performance; work effectiveness; work efficiency.*

Introduction

The Construction Business Survey Index (CBSI) has recently reached its lowest level, but interest in information is high. Companies are integrating and standardising their work by establishing information systems to enhance competitiveness. The higher the interest of management and staff in information services, the higher the impact on corporate performance (Lee, 2013). Lee points out that the limitations of the research were that the survey examined only two classifications of manufacturing and non-manufacturing in Busan, Ulsan and Gyeongnam Provinces. This study examined the mediating effect of work efficiency and work effectiveness on the impact of information interest on business performance in the construction industry. The mediating effect test was a multi-mediated effect analysis using phantom variables. For the empirical analysis of collected questionnaires, the test was conducted using SPSS22.0 and AMOS22.0.

Materials and Methods

Concept of ERP System

The Enterprise Resource Planning (ERP) system accurately extracts all the resources required for corporate management at Real Time and the efficient placement and evaluation of the resources required by the enterprise. From a corporate management perspective, the objective is to manage resources efficiently on an enterprise-wide basis (Jeong, 2014). The ERP system is described as a comprehensive management system that can operate all resources in the financial accounting, production operation, marketing and personnel sectors in an integrated manner. The ERP system allows an entity to manage all business processes in an integrated way. It is defined as an information system that maximises efficient decision support and work efficiency by being able to share diverse information (Lee, 2013). The ERP system is an integrated information system that enables the integrated management and sharing of various pieces of information for pure management functions and management support functions. More recently, the scope of applications has gradually been extended to expanded ERP systems to enable supply chain management, cross-enterprise e-commerce, internet business and e-business (Oh, 2017).

Informatization Interest

Top management and staff attention are very important in the introduction and diffusion of information systems. The support of top management has a great influence on the stable operation of the information system and the spread of information (Kim, 2013). Many problems can arise in the process of introducing new information technology or a new information system in the enterprise. These problems are mainly caused by interdepartmental interests, such as delays in projects and decision-making, and inefficient performance of projects. However, these problems can be prevented in advance through the attention and support of the CEO (Emmelhainz, 1988). Aggressiveness and interest in informatisation of management and employees can increase the level of informatisation utilisation.

Work Efficiency

Efficiency refers to shortening the processing time, increasing the workload that can be completed and reducing the processing cost. In particular, efficient work processes are important in terms of cost reduction and productivity improvement (Lee, 2017). That is, it is important to use the least costly and less time-consuming procedures and methods in the processing of tasks. The purpose of efficiency measures is to achieve maximum performance based on input and output analysis (Han, 2014).

Work Effectiveness

Effectiveness is a measure of goal achievement. Effectiveness means the extent to which an intended purpose, output, result or effect is produced or obtained by a cause or effect. To set and reach a goal, a given condition and capability are considered to represent a relationship of outcome or effect (Kim, 2016).

Business Performance

In a rapidly changing business environment, competition within the market activities of companies is intensifying. In this business environment, the traditional performance measurement system operated with a focus on financial performance measurement (Kim, 2013). By considering only financial measures, intangibles and non-financial measures could be ignored. In addition, considering only the results of past activities meant current or future strategic requirements were not taken into account. Fair evaluation of changes in the business environment, such as customers and competitors, was difficult. In addition, partial optimisation was prioritised rather than optimisation in the whole organisation being considered (Kim, 2011). Recognising that there is a limitation to organisational performance assessed solely on the basis

of existing financial performance, the concept of Balanced Score Card (BSC) was introduced; this measure can assess past, present and future performance and value by taking all financial and non-financial indicators into account (Kaplan & Norton, 1992). In addition to the traditional financial perspective, the BSC valuation model adds a customer perspective, a learning and growth perspective, and an internal process perspective. In this study, corporate performance measurement was assessed using the BSC evaluation model.

Research Model and Hypotheses

Research Model

The research model and hypothesis used in this study can be confirmed through previous studies – for example, Cho’s (2013) research on the effectiveness factors of smart work affecting the work efficiency of the public sector and Kim’s (2017) research on the effect of SMEs’ use of a win–win payment system for shared growth on management performance. Other research taken into account included that on the effects of organisational management systems, decentralisation, and information technology support on knowledge management activities and management performance (Jung, 2016), and the effects of win–win cooperation through information sharing on the management performance of SMEs (Jo, 2016). In this study, the research model was established using the same influential and dependent variables used in these previous studies to secure objectivity. We analysed the mediating effects of work efficiency and work effectiveness on the effects of information attention on performance. The phantom variable was used to examine the multi-mediated effects, and this study model can be differentiated because it is targeted at specific industries. In this study, information interest was defined as an independent variable, work efficiency and work effectiveness as a parameter, and business performance as a dependent variable. The research model for the study is shown in Figure 1.

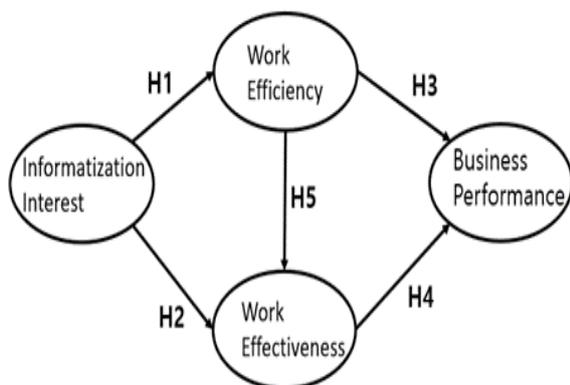


Figure 1. Research model

Research Hypotheses

- H1 Information interest will have a significant impact on work efficiency.
- H2 Information interest will have a significant impact on work effectiveness.
- H3 Work efficiency will have a significant impact on business performance.
- H4 Work effectiveness will have a significant impact on business performance.
- H5 Work efficiency will have a significant impact on work effectiveness.
- H6 Work efficiency will play a role in mediating the impact of information interest on business performance.
- H7 Work effectiveness will play a role in mediating the impact of information interest on business performance.

Operational Definition of Variables

The operational definitions of the variables are summarised in Table 1.

Table 1: Initial set of features used for the experimentation

Configuration factor	Operational definition	Reference
Information interest	Top management's interest and support, IT skills of employees and system-related knowledge about the introduction and use of the information system	(Kim, 2013)
Work efficiency	Reduction of users' working time, improvement of work-related knowledge and proficiency by the usefulness of information system, degree of work efficiency	(Han, 2014)
Work effectiveness	T Information system, information sharing and collaboration, speed decision-making, work knowledge sharing, information sharing between companies	(Kim, 2017)
Business performance	Comprehensive evaluation of corporate performance with financial performance, customer performance, internal process performance, learning and growth performance	(Kim, 2017)

Results and Discussion

Empirical Analysis Result and Frequency Analysis

The total number of samples used in this study was 336. First, frequency analysis was performed to identify the characteristics of the samples. The types of organisations included in the sample were 318 corporate corporations (94.6%), 328 firms were identified as medium and small companies, and 332 (98.8%) were unlisted company.

Descriptive Statistics Analysis

Prior to full-scale analysis, descriptive statistics analysis was conducted to analyse the normality of the measured variables. According to the criterion for the descriptive statistical analysis, individual measurement variables with standard deviation 3 or less, skew absolute 3 or less, and kurtosis 3 or less have a normal distribution. As a result of descriptive statistical analysis of all measured variables, no item exceeded the standard value.

Exploratory Factor Analysis

An exploratory factor analysis was conducted to verify the validity. As the measurement variable, principal component analysis was used to extract all components. Varimax was used to simplify factor loading. The item selection criteria in this study were based on an eigenvalue of 1.0 or more and a factor loading value of 0.4 or more. The scorecard1 and scorecard2 items that did not meet the criteria were removed. As a result of factor analysis, the results were divided into four factors.

Measurement Model Analysis: Confirmatory Factor Analysis

In order to test the goodness of fit of the data, criteria such as CMIN (<3), RMR (≤ 0.1), RMSEA (≤ 0.1), TLI (≥ 0.90) and CFI (≥ 0.90) were used. Factor analysis revealed that Interest2, effective3, effective4, scorecard3, and scorecard4 were removed. In all questions, SMC (Squared Multiple Correlation) value was over 0.4. SMC is an indicator used to determine how much a measured variable describes a latent variable. As a result of reliability analysis with the items of the measured variables shown in the confirmatory factor analysis, the Cronbach's alpha value was 0.912 ~ 0.964 value (≥ 0.6 standard) and all the reliability was secured. The results are shown in Table 2.

Table 2: Initial set of features used for the experimentation

Latent variable	Observation variable	Non-standardisation factor	Standardisation factor	SE	CR	SMC	Cronbach's α
Informatisation Interest	Interest1	1	.936			.875	.964
	Interest3	1.021	.953	.029	35.58	.908	
	Interest4	.959	.960	.026	36.523	.921	
Work efficiency	Efficiency1	1	.947			.898	.912
	Efficiency2	1.045	0.979	.023	44.582	.958	
	Efficiency3	1.054	0.964	0.026	41.149	.929	
Work Effectiveness	Effective1	1	0.931			.868	.952
	Effective2	1.083	0.951	0.037	29.652	.905	
Business Performance	Performan1	1	0.761			.579	.944
	Performan2	1.319	0.955	.037	29.652	.913	
Measurement model Fitness	(initial model) $\chi^2=621.109$, $df=84$, $p=0.000$, $CMIN/DF=7.394$ $RMR=.048$, $GFI=.772$, $AGFI=.674$, $RMSEA=.138$ $NFI=.906$, $CFI=.917$, $TLI=.897$ (final model) $\chi^2=49.668$, $df=29$, $p=0.000$, $CMIN/DF=1.713$ $RMR=.011$, $GFI=.971$, $AGFI=.944$, $RMSEA=.046$ $NFI=.988$, $CFI=.995$, $TLI=.992$						

Discriminant Feasibility Analysis

After analysing the measurement model, the validity of the model was evaluated. The validity of a specific model was divided into concentrated and discriminative. The concept reliability ($CR \geq 0.6$) was used to evaluate the concentration validity. The mean variance extraction value ($AVE \geq 0.5$) was used to evaluate the discriminant validity. As a result, construct reliability (CR) showed more than 0.8 value for all variables, and all variables over 0.7 value for AVE value. Therefore, based on construct reliability value, it can be judged that concentration validity is secured. The method proposed by Fornell and Larcker (1981) was used to examine the discriminant validity. As a result, it can be judged that the discriminant validity is secured because the square value of the correlation coefficient between all variables does not exceed the AVE value. The result is shown in Table 3.

Table 3: Discrimination validity of the measurement model

Value	Correlation between organisational concepts			
	Interest	Efficiency	Effectiveness	Performance
Interest	1.00			
Efficiency	0.290** (.034)	1.00		
Effectiveness	0.323** (.033)	0.794** (.063)	1.00	
Performance	0.293** (.029)	0.487** (.048)	0.568** (.049)	1.00
Construct reliability (CR)	0.957	0.927	0.927	0.925
A.V.E	0.985	0.974	0.962	0.961

() Is the standard error of covariance. * $p < .05$, ** $p < .01$, *** $p < .001$

Exploratory Factor Analysis

To test this hypothesis, structural model analysis was performed using AMOS 22.0. Table 4 shows the estimated results of the structural equation model. Hypothesis H3 was rejected and the rest were all adopted; the proposed model showed acceptable model fit.

Table 4: Hypothesis test results

Hypothesis	Path	Standardisation factor	CR	P – value	Result
H1	Interest -> efficiency	0.291	5.344	***	accept
H2	Interest -> Effectiveness	0.105	2.769	**	accept
H3	Efficiency -> Performance	0.091	1.1	NS	reject
H4	Effectiveness-> Performance	0.497	5.896	***	accept
H5	Efficiency -> Effectiveness	0.764	18.856	***	accept
Suitability of Structural Model		CMIN=55.116, df=30, p=.000, CMIN/DF=1.837, RMR=.002, AGFI=.939, TLI=.991, CFI=.994, NFI=.987, RMSEA=.050			

The result of verifying the hypothesis is shown in Figure 2.

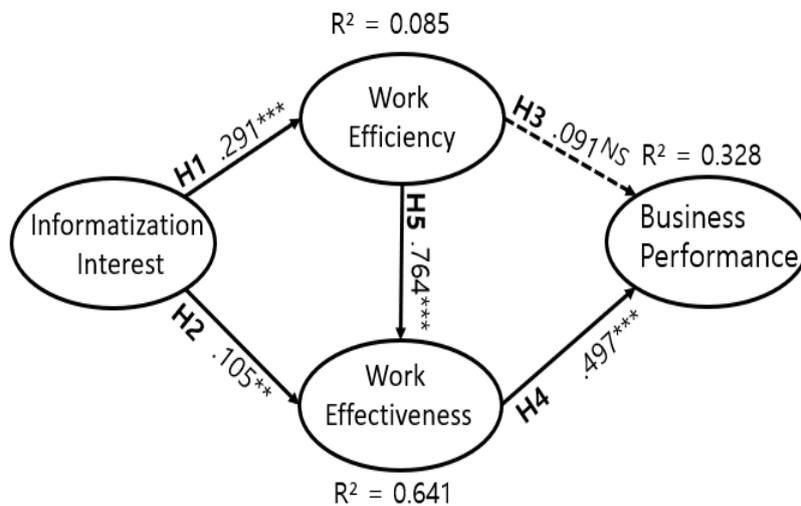


Figure 2. Hypothesis test results

Mediated Effect Analysis

The mediating effect of work efficiency and work effectiveness was verified in the relationship between information interest and business performance. To examine the multiple mediating effects, the bias-corrected Bootstrapping test was conducted using phantom variables. Thus, the median effects Estimate, S.E, and bootstrap 95% confidence interval values were analysed. The mediating effect of work efficiency was -0.03 ~ 0.105 in the 95 per cent confidence interval and the lower value, which was not statistically significant including 0, so hypothesis H6 was rejected. On the other hand, the mediating effect of the work effectiveness showed the upper and lower limits of 0.01 to 0.138 in the 95 per cent confidence interval, which did not include 0. Therefore, hypothesis H7 was adopted. The results are shown in Table 5.

Table 5: Multiple Mediation effect analysis result table

Hypothesis	Path	Bootstrap estimate		95% CI	
		Estimate	S.E	Lower	Upper
H6	Interest --> Efficiency --> Performance	0.033	0.034	-0.03	0.105
H7	Interest --> Effectiveness --> Performance	0.062	0.031	0.01	0.138



Conclusion

Some previous studies have confirmed that the high interest of managers and employees in informationalisation is a major factor affecting corporate performance. In this study, which was verified based on the relevant empirical data, interest in information was found to be an important factor. When business performance is divided into four categories from the BSC perspective, it is shown that it contributes to financial aspects such as increased sales, increased net profit and cost reduction. The mediating effect of work efficiency and work effectiveness was tested on the effect of information interest on business performance. It was found that work sharing and collaboration, which are items of work effectiveness, played a mediating role. The establishment of information system is being used as a means to achieve management purposes for companies. However, the results obtained in this study were for small and medium-sized firms and were derived based on the data of construction companies. Further research is needed to determine whether the results of this study can be applied to large corporations or other industries.

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