

Interaction of IT investment mandates and mobile savvy affecting mobile office performance in corporates: Focusing on the moderating effects of IT savvy

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ABSTRACT

This study investigates the effect of IT investment portfolios on the performance of mobile business services, as well as the moderating role of IT savvy. This study pulls the concept of IT investment mandates into the conceptual research framework of mobile investment. A survey for the IT specialists working at 123 enterprise-level companies was conducted and hierarchical regression analysis was adopted. Our results show that IT investment and organizational IT capabilities influence the performance of the mobile office and that IT savvy plays as a moderator in the relationship between investment mandates and mobile office performance. This research also may indicate that transactional assets are most helpful factors for a change by the adoption of mobile technology. This study is a rare research paper to explain the impact of IT investment portfolios on the mobile office performance in an academic methodology.

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1. INTRODUCTION

There has been a monumental change in the nature of organizations and the role of employees, a change that may be indicated by the concept of the mobile office and by the development of information technology [1, 2]. This change is mainly attributed to the spread of wireless communications and various mobile wireless gadgets, as well as to the technological backgrounds of big data, artificial intelligence, and data mining systems [1, 3]. Moreover, the advancement and enrichment of mobile operating systems have been changing the way users communicate through the web, overcoming limitations up to levels not able to be previously reached with mobile devices [4-8].

As mentioned, the release of smart devices, including the iPhone and the iPad, gave rise to a second generation of the mobile office [9] and the current version of the mobile office offers unique features related to location dependency and time criticality, which are essentials of social and organizational life, as Wiberg claims [7, 10]. Nevertheless, the inquiry of enterprise-level research into the effect of IT investment for the mobile office remains marginal to the discipline, both theoretically and empirically. This study attempts to fill this gap by adopting and extending an IT investment portfolio perspective to investigate the relationship between IT investment mandates on the mobile office, IT savvy, and mobile office performance. This study attempts to fill this gap by adopting and extending an IT investment portfolio perspective in order to

investigate the relationship between IT investment mandates on the mobile office, IT savvy, and mobile office performance [11, 12]. The main academic objective of this research is to adopt and extend the current perspective of the IT investment portfolio by conducting a comprehensive review of the relevant literature so that a sounder theoretical basis can be provided.

2. THEORETICAL BACKGROUND AND RESEARCH MODEL

2.1. Impact of information technology and IT investment at the corporate level

Four explanations of the strategic value of information technology receive the most attention in the literature: Classical, economical, complementary, and resource-based view perspectives [13]. The strategic value of IT has evolved in accordance with the level of business exploitation of IT in different major technical eras [13-20]. Ward, *et al.* suggest that the benefits of the information systems investment be considered with the concept of the changes and the differences between the current and the expected result after migration [21, 22]. Researchers can gain insights from the global chief information officer study, which drew upon face-to-face interviews with 3,018 chief information officers worldwide [23]. Furthermore, a contingency perspective has been proven to have stronger explanatory power for the strategic value of IT [10].

2.3. Research framework

This study tries to identify the effect of IT investment mandates on the productivity of the mobile office moderated by IT savvy. The terms and terminology of IT investment portfolios are virtually identical to those of the portfolios of financial investments used by investors, according to their multiple objectives. Weill conducted a research project on investment portfolios and found that business leaders have four different management objectives for investing in IT [24]. Investment in those four management objectives fully corresponds to the IT portfolio with four asset classes. Each asset class is associated with different types of business value. Weill and Aral and Weill demonstrated that firms investing more heavily in informational IT can make better decisions for the customer’s needs to accomplish quality information and larger margins [12, 24]. Investments in strategic IT are intended to obtain a competitive advantage in the market place. Investments in this asset are suitable for firms willing to accept high risk for a high return. Firms with successful strategic IT gain a two-or three-year lead on their competitors and, therefore, generate more revenues with customized and enhanced products. Investing in transactional assets aims to reduce cost and increase productivity. IT infrastructure is the base of the investment portfolio, which supports other applications. Given our earlier discussion about savvy’s degree of impact, we expect firms with a high degree of IT savvy to strengthen the relationship between IT investment mandates and respected performance indicators. In contrast, firms with a relatively low degree of savvy are expected to mitigate the relationship between IT investment mandates and performance variables. Therefore, we propose the following hypotheses as Figure 1.

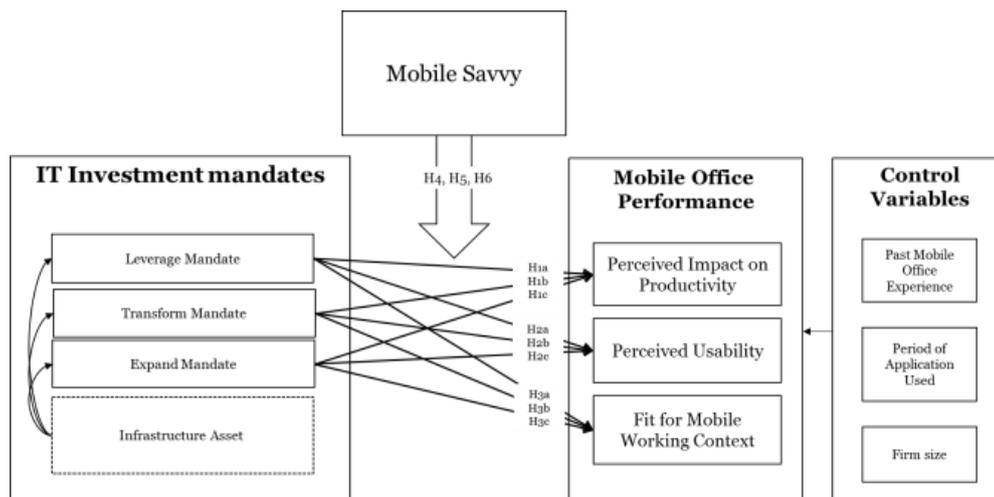


Figure 1. Conceptual research model with hypotheses

Hypothesis 1a: The perceived impact on the productivity of the mobile office will be affected by the leverage mandate of the IT investment.

- Hypothesis 1b: The perceived impact on the productivity of the mobile office will be affected by the expand mandate of the IT investment.
- Hypothesis 1c: The perceived impact on the productivity of the mobile office will be affected by the transform or pioneer mandate of the IT investment.
- Hypothesis 2a: The perceived usability of the mobile office will be affected by the leverage mandate of the IT investment.
- Hypothesis 2b: The perceived usability of the mobile office will be affected by the expand mandate of the IT investment.
- Hypothesis 2c: The perceived usability of the mobile office will be affected by the transform or pioneer mandate of the IT investment.
- Hypothesis 3a: The fit for the mobile working context of the mobile office will be affected by the leverage mandate of IT the investment.
- Hypothesis 3b: The fit for the mobile working context of the mobile office will be affected by the expand mandate of IT the investment.
- Hypothesis 3c: The fit for the mobile working context of the mobile office will be affected by the transform or pioneer mandate of the IT investment.
- Hypothesis 4: IT savvy moderates the relationship of the leverage mandate and its productivity.
- Hypothesis 5: IT savvy moderates the relationship of the expand mandate and its usability.
- Hypothesis 6: IT savvy moderates the relationship of the transform or pioneer mandate and its fit.

3. RESULTS AND DISCUSSIONS

3.1. Data collection

A survey instrument was developed to identify appropriate measurements following previous academic research [12-25]. Some existing scales were modified to make them more suitable in the context of the mobile office. Since the target organizations are companies that have adopted the mobile office application in Korea, the questionnaire was translated into Korean. The survey was administered to employees of IT departments in Korean companies that have adopted the mobile office. A total of 127 questionnaires were distributed, and 123 questionnaires were returned as shown in Tables 1 and 2.

Table 1. Demographic information of survey participants

Characteristics	Category	Number	Percentage (%)
Number of staff members	1 to 20	10	8.1
	20 to 50	15	12.2
	51 to 100	14	11.4
	101 to 150	35	28.5
	151 or more	49	39.8
Types of industry	Manufacturing	4	3.3
	Medicine	2	1.6
	IT Device Manufacturer	15	12.2
	Internet and ICT Service Provider	19	15.4
	IT S/W Development and Sales	56	45.5
	Transportation	7	5.7
	Education and Academic-related	4	3.3
	Marketing and Management-related	3	2.4
	Financial Services	4	3.3
	Holding Company	4	3.3
	Energy Industry	2	1.6
	Manufacturing and Heavy Industry	2	1.6
	Art and Pop Culture	1	0.8

Table 2. Descriptive statistics for IT investment portfolios

	N	Minimum	Maximum	Mean	S.D.
Transactional	123	0.05	0.70	0.27	0.139
Strategic	123	0.05	0.50	0.21	0.081
Informational	123	0.05	0.70	0.25	0.110
Infrastructure	123	0.10	0.70	0.25	0.121

In the context of the mobile environment, firms generally made homogeneous investment allocations, while Weill's portfolios addressed heterogeneous investment allocations [20, 25]. However, a relatively high measure of standard deviation refers to, as it actually fluctuated among our samples. For this

reason, descriptive statistics do not address any significant aspect of investment allocations at this stage. By dwelling upon previous research, all independent variables were measured in percentages of expenses to aggregate costs in terms of their asset class. Because this study focuses on investigating how firms allocate aggregate IT investments, we conducted multiple regression analysis in order to test the hypotheses; the regression model is one of the most widely used econometric methodologies for validating causality between independent variables and dependent variables. However, since our independent variables were measured in terms of the ratio of asset investment to entire cost, they are highly correlated to each other. *Tran*, *Infor*, *Infra*, and *Stra* represent transactional, informational, infrastructure, and strategic investment ratios, respectively and *Yp* represents the dependent variable which illustrates the investment result.

$$Yp(p = 1,2,3) = \alpha_0 + \beta_1 Trans + \beta_2 Infor + \beta_3 Stra + \beta_4 Infra + \varepsilon \quad (1)$$

Most empirical examinations of IT investments consider infrastructure to be the foundation of information systems [26]. Infrastructure provides the fundamental shared IT services and applications. Although IT infrastructure promises higher profitability and operational performance in the long run, infrastructure investments are basically associated with higher short-term costs [27]. Therefore, as our data set is cross-sectional, infrastructure investment does not affect any significant influences on the performances for the short time of the period. Infrastructure investment should be maintained, because it provides business initiatives by ensuring that the necessities are in place. Since $Trans + Infor + Infra + Stra = 1$, the previous equation can be substituted with the equation as $Infra = 1 - Trans + Infor + Stra$. Accordingly, we can derive another form of the linear equation, shown as,

$$Yp = (\alpha_0 + \beta_4) + (\beta_1 - \beta_4)Trans + (\beta_2 - \beta_4)Infor + (\beta_3 - \beta_4)Stra + \varepsilon \quad (2)$$

In contrast to the former equation, the coefficients of (2) describe the effect of each investment portfolio based upon infrastructure investment. Overall, as defined earlier, we modified the model specification in terms of investment mandates, as shown below in (3), to represent the significances of the differences between the coefficients of the other three IT assets and the infrastructure assets.

$$Yp = \alpha_0 + \beta_1 Leverage + \beta_2 Transform + \beta_3 Expand + \varepsilon \text{ Where } \beta_i (i = 1, 2, 3) \quad (3)$$

3.2. Analysis results

Although the performance of IT and the mobile office can be measured in several ways, we used the revised MoBiS-Q as a tool for measuring the performance of mobile business services based on previous academic research, which is able to measure the combination of user experience and enrichments in work productivity [11, 22, 27-30]. Our questionnaires for measuring the performance of the mobile office are classified under three categories as shown in Tables 3 to 5. Since our research model contains several indicators (Likert scale 1-5) according to three dependent variables and has a relatively small sample size, confirmatory factor analysis (CFA) was selected to validate the data analysis, instead of exploratory [6]. Twenty-five indicators were submitted to factor analysis, according to their latent variable, while perceived mobile work performances were measured on a five-point Likert scale following Giner's study [27]. PLS was chosen for confirmatory factor analysis. All the factor loadings of the selected items were above 0.60 and each AVE of the latent variables was above 0.60, suggesting that the measurements are reliable and that the latent construct can represent at least 60% of the variance in the item [26]. Moreover, all the Cronbach's alphas were above 0.70, and the guaranteed index of reliability associated with the variation was accounted for by the true score of the "underlying construct" [31]. We note that all the factor loadings of the selected items were above 0.60 and that each AVE of the latent variables was above 0.60, suggesting that the measurements are reliable and that the latent construct can represent at least 60% of the variance in the item [26]. Moreover, all the Cronbach's alphas were above 0.70 also guaranteed index of reliability associated with the variation accounted for by the true score of the "underlying construct" [31]. Tables 3, 4, and 5 show the brief of determined latent variables, respectively.

This study is informed by the theorizing prompted by Weill's suggestive observation of the effect of IT capability on the performance of the firm. Savvy scales were measured on a six-point scale and modified to make them more suitable in the context of the mobile office [24, 25]. When measuring the aggregate sum of the savvy index, we included an interaction term to test the influence of IT competency on the performance contributions of each mandate. We performed multiple hierarchical regression analyses in order to test the moderating effect of mobile savvy on the relationship between each mandate and performance. To avoid multicollinearity, all the variables were centered in accordance with their respective mean values. As suggested by H1a, H1b, and H1c, the main effect of the IT investment mandate on productivity was

significant as shown in Table 6. In the Tables 6 and 7, the numbers out of the parentheses explain path coefficients and the numbers in the parentheses explain the standard errors of each variable.

Table 3. Perceived impact on mobile productivity

Variable	Detail			
PROD1	Satisfaction with efficiency at work			
PROD2	Satisfaction with the quality of work task			
PROD3	User improves fluidity of work			
PROD4	Able to perform tasks in less time			
PROD5	Able to complete tasks more easily			
PROD6	Less time to go through working phases			
PROD7	Better access to information needed at work			
PROD8	Less additional traveling			
PROD9	Planning and coordinating work tasks through mobile office			
PROD10	Planning and coordinating work tasks through mobile office			
AVE	R ²	CR	Cronbach's α	Communality
0.62	0.69	0.90	0.88	0.63

Table 4. Perceived usability of the mobile office

Variable	Detail			
USAB1	Easy to learn			
USAB2	Easy to become skillful			
USAB3	Suitable for work tasks on the move			
USAB4	Fast enough			
USAB5	Functions are necessary			
USAB6	Ease of navigation			
USAB7	Functions are simple to use			
USAB8	Reliability			
AVE	R ²	CR	Cronbach's α	Communality
0.66	0.67	0.90	0.87	0.67

Table 5. Fit for mobile working context

Variable	Detail			
DEVF1	Ease of use with device			
DEVF2	Screen size is not a limit			
DEVF3	Suitability of a device for working on the move			
DEVF4	Using a device with one hand			
DEVF5	Ease of use while on the move			
DEVF6	Ease of use in a hurry			
DEVF7	Information Input			
AVE	R ²	CR	Cronbach's α	Communality
0.62	0.51	0.86	0.79	0.62

Table 6. IT investment mandates on mobile office and performance

Variables	Perceived Productivity	Perceived Usability	Fit for Mobile Context
Control variables			
Past mobile office experience	-0.230** (0.204)	-0.374*** (0.201)	-0.184* (0.215)
Length of application used	0.041 (0.063)	-0.068 (0.062)	0.027 (0.066)
Firm size	-0.004 (0.075)	-0.063 (0.073)	-0.145 (0.078)
IT class asset			
Leverage mandates 1	0.408*** (0.830)	0.255** (0.817)	0.174 (0.872)
Transform mandates 2	0.185* (1.212)	0.098 (1.194)	-0.056 (1.274)
Expand mandates 3	0.376** (1.024)	0.253** (1.009)	0.080 (1.076)
R ²	0.165	0.19	0.077
F value	3.812**	4.528***	1.621
Obs.	123	123	123

Standard errors are reported in parentheses. *P<0.10; **p<0.05; ***p<0.001

All the estimates are statistically significant. Our results illustrate that spending more on transactional, informational, and strategic assets than on infrastructure assets is positively associated with mobile office productivity. As shown in Table 6, productivity is most affected by the leverage mandate ($\beta=0.408$, $p<0.001$) and is twice as effective as the transform mandate ($\beta=0.185$, $p<0.1$) in a positive way. This result also suggests that we should spend most of the budget on transactional systems in order to maximize the productivity of the mobile office. Although the main effect of the IT investment mandate on perceived usability was significant ($F=4.528$, $p<0.001$), H2b and H2c were not supported. Nevertheless, the effect of the leverage mandate on perceived usability was significant, as predicted in H2a. At the same time, interestingly, a coefficient of the transform mandate for device fit for the mobile context is negative and significant. It is highly probable that a strategic approach may result in a lack of fit for the given context. This reading seems plausible, yet it requires further examination. The result of summing all the regression

coefficients together illustrates that transactional assets are the critical enabler in maximizing the performance of the mobile office in a given situation. We performed multiple hierarchical regression analyses to test H4, H5, and H6. In model 1, IT investment mandates and mobile savvy were entered as independent variables. In model 2, interaction terms were included. The interaction effect of IT investment mandates and IT savvy on performance turned out to be positive and significant in all three cases. This result is in the line with prior observations, in which the firms with more IT competency gain additional benefit from their investments. Device fit for the mobile work context is a clear example of the importance of IT competency within an organization. The interaction with IT savvy ($R^2=0.411$) demonstrates a higher performance variance than the investment of IT assets alone ($R^2=0.077$), as can be seen in the radically increased R values in Table 7, as compared with those in Table 6. Moreover, for fit for the mobile context, the linear estimate was insignificant ($F=1.621, p>0.1$), but the result of a later estimate was significant ($F=7.760, p<0.001$). Table 8 demonstrates the entire summary of the findings, including the main effect of IT investment and the moderating effect of IT investment.

Table 7. Hierarchical results of moderating effects

	Perceived Productivity		Perceived Usability		Fit for Mobile Context	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	IT Class Asset					
Leverage Mandates	0.421*** (0.695)		0.260** (0.606)		0.178* (0.700)	
Transform Mandates	0.318*** (1.041)		0.258** (0.907)		0.096 (1.048)	
Expand Mandates	0.360** (0.858)		0.233** (0.748)		0.061 (0.864)	
Mobile Savvy	0.565*** (0.009)		0.682*** (0.008)		0.648*** (0.010)	
Leverage * m Savvy		0.378** (0.095)		0.319** (0.082)		0.576*** (0.091)
Transform * m Savvy		0.295** (0.161)		0.035 (0.139)		0.316** (0.154)
Expand * m Savvy		0.461** (0.101)		0.330** (0.087)		0.677*** (0.097)
R ²	0.419		0.559		0.411	
ΔR		0.049		0.043		0.101
Sig. F Change		3.480**		3.986**		7.760***
Obs.		123		123		123

Note: All Control variables and IT assets are included in the regression, but not reported. *P<0.10; **p<0.05; ***p<0.001

Table 8. Result of hypotheses analysis

H	Description	Result
H1a	The perceived impact on productivity of the mobile office will be affected by the leverage mandate of IT investment	Accepted
H2b	The perceived impact on productivity of the mobile office will be affected by the expand mandate of IT investment	Accepted
H3c	The perceived impact on productivity of the mobile office will be affected by the transform mandate of IT investment	Accepted
H2a	The perceived usability of the mobile office will be affected by the leverage mandate of IT investment	Accepted
H2b	The perceived usability of the mobile office will be affected by the expand mandate of IT investment	Rejected
H2c	The perceived usability of the mobile office will be affected by the transform mandate of IT investment	Rejected
H3a	The fit for mobile working context of the mobile office will be affected by the leverage mandate of IT investment	Rejected
H3b	The fit for mobile working context of the mobile office will be affected by the expand mandate of IT investment	Rejected
H3c	The fit for mobile working context of the mobile office will be affected by the transform mandate of IT investment	Accepted
H4	IT savvy moderates the relationship of the leverage mandate and its productivity	Accepted
H5	IT savvy moderates the relationship of the expand mandate and its usability	Accepted
H6	IT savvy moderates the relationship of the transformational mandate and its fit	Accepted

3.3. Discussion and limitations

In its investigation of the effect of IT investment patterns on mobile office performance, this study reveals the following academic and practical implications. First, our research model gives a unique reading of the story of infrastructure investment. Despite the presence of loss within a short period of time, infrastructure investment serves as a catalyst for future business value. In this regard, this study pulls the

concept of IT investment mandates into the conceptual research framework of mobile investment, which might explain that mobile investment should also basically be treated as an important infrastructure investment rather than another investment type. This also might mean that a change created by the adoption of mobile technology should be treated as a structural and fundamental challenge to an organization. Second, one of the main challenges of this study is to reveal investment allocations in the mobile office. It may mean that the research results indicate that the benefits gained from investment might be different and unique in the mobile context. From a practical perspective, transactional assets are most helpful when implementing the mobile office. Third, this study also found that strategic investment can act as an obstacle to fit in the mobile context. As Lee *et al.* pointed out, citing Vuolle *et al.* From a practical viewpoint, mobile investment may be easily treated as a personal choice because of its ease of handling and of private characters. It might mean that employees will seek to maintain the current state of mobile office applications for their performance within a short period of time [32]. Fourth, according to the evidence presented in Table 8, it may be understood that IT investment should be treated as a mere supporting factor for organizational changes, rather than as a main eventer, and an organizational condition should be considered most of all when an IT investment in an organization is considered. IT competency almost always strengthens the performance of a firm. Higher than normal levels of IT intensity may cause an increased effect of the investment.

Nonetheless, while this research is one of the rare studies to consider the strategic effect of IT investment in an organization, it also has several limitations. First, our data set is cross-sectional, and therefore we cannot observe the long-term effect of the IT investment portfolio. In the future, longitudinal analysis may be considered to weaken the underestimation of its effect. Second, our assessments of organizational capability and their perceived performances were measured with ordinal self-reported data from a single respondent. These results are thus exposed to respondents' subjective bias. Third, there remain basic limitations inherent in this approach. In the practical area, there remain fundamental questions, as yet unresolved, about security issues of the mobile office. In the future, longitudinal analysis may be considered to weaken the underestimation of its effect.

4. CONCLUSION

In its investigation of the effect of IT investment patterns on mobile office performance, Previous researches including Blumenberg *et al.* in 2009 have explained the effectiveness of firms' IT investment portfolios in improving performance according to their managerial goals. Nonetheless, on the question of IT investment in the mobile office context, no meaningful progress has been made nor appears likely sooner. As one of the earlier studies to investigate the effect of IT investment patterns on mobile office performance, this study reveals the following academic and practical implications.

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