

Influence Factors on the IT Governance from ITA/EA Functions

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Abstract

In this paper, we brought some influence factors of what the function contributing by ITA/EA in organization is. Also, we verified statistically the impact relation in mutual on the base of questionnaire, extracting in investigation the factors of why the IT Governance of organization is building up, and by what the effect of building up is estimated. In result of statistical analysis based on the 223 case of organizations, it appeared that the infrastructure management, decision making enhancement, and IT process and service functions are the contributing factors on the IT Governance.

요약

본 논문에서는 ITA/EA 기능이 IT거버넌스에 미치는 영향을 분석하기 위해서, 조직에서 ITA/EA가 역할을 하고 있는 몇 가지 기능요인들을 도출하였다. 또한 이 요인들이 IT거버넌스에 미치는 영향을 실증적으로 분석하였다. 총 223개의 조직에 대한 설문조사를 통한 자료를 통계적으로 분석한 결과, 인프라 체계화, 의사결정 향상 그리고 IT 프로세스 및 지원 기능들이 IT거버넌스에 영향을 미치는 요인으로 나타났다.

▶ Keyword : ITA/EA, IT Governance, ITA/EA Function

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I. Introduction

With the rapid development of information, much investment of IT (Information Technology) in the section of public and enterprise has been made but the size of IT resource and its complication have been significantly increased. The budget department of government and company managements along with the ITA/EA is raising their demanding voices for the rightfulness on evaluation of the values that IT can have effect on business and the enormous IT costs, which results the interests for the IT Governance to increase.

Therefore, not only the enterprises, but the public offices are introducing the ITA/EA and attempt to obtain the efficiency, clarity and responsibility through IT Governance by effective control for the IT activity; and as the IT importance of IT and strategic view are increasing to orientate the systematic management to increase the strategic values of the IT properties. Eventually, the IT Governance needs to have a clear goal of what is going to be achieved by it [1].

The purpose of this research is to array the factors determining the function of ITA/EA by considering the concept with respect to ITA/EA, and also to extract the conceptual factors versus the factor determining the region of IT Governance. And we presented the hypothesis related to prove of what role the functions of ITA/EA through the relationship between factors extracted play, and verified it through questionnaire.

II. Literature review

1. IT Governance

1.1 The concept of ITA/EA components

The term ITA/EA has used since late 80's and as the concept began to be appeared on the documents of US

budget office in 1997, which includes the Enterprise Architecture(EA), Technical Reference Model(TRM) and Standards Profiles(SP) within Information Technology Architecture. However, depending on the researcher or organization, different terminologies substituted like ITA (Information Technology Architecture/Enterprise Architecture), IS(Information Architecture), EWITA (Enterprise Wide Information Technology Architecture), ISA(Information System Architecture), ISTA (Information Systems Technology Architecture), etc have been used[2, 3, 4, 5]. The ITA/EA may maximize managing the efficiency of investment, strengthening the ability coping with the variation flexibly as presenting a blue print of desirable informationization in an organization, and it does not only support to the effective management of information asset, but also to the system making fair decision effectively[1, 6].

The various basic factors of ITA/EA are that expressing a matrix classified according to the variety aspects and perspective of business, application, data, and technology infrastructure as a model of architecture, and it must contain the resource related to be possible to make the strategical decision of an organization, and must array them between each productions. Also In ITA/EA, there exists a aid tool meaning the standard, method, and instrument supporting the activity of life cycle of ITA/EA systematically and effectively, and it contains the productions with respect to the architecture of model referred, business, application, data, technology, and security[7].

1.2 Functional Factors of ITA/EA

In the organization, they introduced ITA/EA to maximize the benefit or effectiveness, resolving the problem of IT system built up in already, and under utilization. In connection with this, the US Federal Government has already introduced ITA/EA, and shown the advantages obtained through introducing it: array, inter-operation, management of change, reducing of development length(expense), and management of portfolio, and commented of improvement in support making decision, communication, complication management, integration of technology, management of investment/ danger, reconsidering quality/flexibility, cost effectiveness,

integration, obeying to law, sharing, consistency, accuracy, timing, fusibility, accessibility and others.

Also, the US Pentagon says that the benefits gaining from ITA/EA standard base and data focused Architecture are 'consistency', 'reuse', 'flexibility', 'data exchange and maintenance support', 'tool use ability improvement' and 'decision making support' in overall of Architecture [8, 9, 10].

The domestic cases show that the Ministry of Public Administration and Security takes the main goal as the "providing information resource integration management ability" through ITA/EA introduction along with suggesting 5 promotions of connection tool between business and information technology-system coping with change, information resource standard and intelligence system, foundation of information integration management and security of information planning. And the Ministry of Information and Communication has goals of promoting the integration, compatibility, safety, investment efficiency, ROI, mutual operation, and change management. Also, the Ministry of Maritime Affairs and Fisheries is trying to get Alignment(business and result focused informationization), Integration(integrated usage and mgt.), Changeability(prompt coping with changes), Convergence(securing the information standard and mutual operation) and Governance(systematic information resource management) through ITA/EA principle. Other cases in Ministry of National Defence, Seoul City, Korea Enterprise Bank and National Information Society Agency show that the 23 functions from the results of studying the introduction, constructing principle, purpose, benefit and effects of ITA/EA are organized in following <Table 2-1> [11, 12, 13, 14, 15, 16, 17].

<table 2-1> the summary of domestic ITA/EA Function Survey

Div.	MOGAHA	MOMAF	Seoul	IBK	NIA
array of work and IT	●	●	●	●	●
integration of management	●	●		●	●
managing efficiency of investment	●	●	◎	◎	
management of change (evolve)	●	●	●	●	●
management of complication	◎	●	●		●
supporting share (collaboration)	●	●	◎	◎	●
mgt. of investment (danger)	●	●	●		●
support to development (operation)		●	●	●	●
prevention of duplication		◎	●		●
support to making decision	◎	◎	◎		●
Inter-operation	●	●		●	●
quality improvement	●	◎	◎		◎
improving communication	●				
reuse		●		●	●
transplant (interchangeability, expansion)	●				◎
managing efficiency of investment		●			●
IT road map (strategical planning)	●	●			●
safety reliability			●		●
reducing the time of development					◎
timing (speedy)					◎
management of portfolio					◎
law / system compliance		●			

<note> Correspond: ●, Include: ◎

2. Concept and Key Domain of IT Governance

2.1 Concept of IT Governance

The IT Governance were initially used by Loh & Venkatraman(1992) and Henderson & Venkatraman (1993) to describe the mechanisms to achieve the IT capabilities needed for early enterprises in 1990's, but did not get much of attentions from academic research fields until late 1990's when Brown(1997), Sambamurthy and Zmud(1999) mentioned about the concept of 'IS Governance Frameworks' [6, 14, 18, 19, 20]. The definitions of IT Governance are variety with respect to each researcher, but when the existing management and control activities were focused on hardwares and softwares, the IT Governance become a generalizing even the manpower and process. Luftman and Brier(1999) say that the IT Governance is the part of IT strategy component that arranges the business and IT while

the system is the core of IT strategy component. Also, it is defined as 'the company's general process to share the decision making authority for IT and monitor the IT investment results[22]' and 'the thing organizing the decision making authority and responsibility to use IT in desirable way[21]'. Also, the Cisco Systems defines it as 'the process and culture that can maximize IT investment effect', Murcury Interactive Corporation defines it 'the process and controlling method to increase the control of IT and allowing the IT to connect with company's business goal' and in January 2006, the Federation of Korea Information Industry defined that IT Governance is a structure and process setting the authority and responsibility to promote and induce the fair using of IT for organizational object as a part of domain structure of company, and is a mechanism to manage accomplishment, and reach accomplishment [17, 21, 22].

Summarizing the above definitions of IT Governance from various agencies, it is described as 1) Achievement of organization's strategy and goal, 2) Fusion of business and IT, 3) Organization function and leadership, 4) Decision making and responsibility, 5) IT property and risk management, and 6) control process while performing with the evaluation through achievement measure as the base.

2.2 Key Domain of IT Governance

There are various opinions of researchers about the core domain of IT Governance. The US IT Governance Institute (ITGI) is suggesting the outcomes as the value delivery of IT and risk management, while drivers as the strategic alignment, resource management and performance management. And the COBIT 4.0 (Control Objectives for Information and Related Technology 4.0) announced at the end of 2005 by ITGI has suggested the 4 area process domains, 34 IT processes and 318 detail control targeted IT Governance Framework structure from previous Audit, Control Management point of views.

3. Relations of ITA/EA and IT Governance

IT Governance is being recognized as the essential

factor to secure the competitiveness through IT introduction and effective usage in organization. IT Governance becomes not improving the IT operation, but to connect the IT strategy with business strategy tool.

The IT principle, IT structure, infrastructure strategy of IT, necessary of business application, determination of IT investment and its priority, which are keys governing the Governance, contain the majority factors as itself, performing in ITA/EA.

The majority factors constituted of IT Governance consist of ERP, CRM, SCM, MIS, BPM, ITSM, BSC except the EA/ITA, and the IT Governance can be grasped as combining these factors into an integrated strategy.

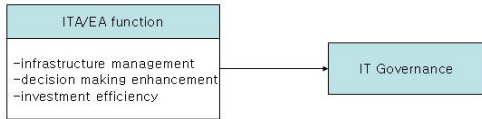
Other hand, the ITA/EA has the character evolving in continuity. To maintain and manage to let the architecture be evolved in accordance with the internal and external situation of the organization, ITA/EA Governance and the IT Governance including this are required. By saying a single word, ITA/EA is the key element of IT Governance, and accordingly, the ITA/EA must be established on the premise of IT Governance.

As ITA/EA is to design/ utilize/ manage the architecture of entire company effectively, the ITA/EA must have the organization and process in order to cope quickly with the demand of business by managing the information of ITA/EA systematically. It is desirable that introducing of IT Governance is defined in consideration of authority and leadership of ITA/EA organization on the basis of present IT organization and process, and the rapidity of decision making, and easiness of practice, and suitability of organizational culture [23].

III. Research Model and Hypothesis

1. Overview of Research Model and hypothesis

This research is to examine whether the functional factor of ITA/EA may impact to building up of IT Governance or not, shown as <figure 3-1>.



<figure 3-1> suggested research model

The hypothesis has been set as follow:

<Hypothesis 1> The infrastructure management among the functions of ITA/EA in organization impacts to building of IT Governance positively (+)

<Hypothesis 2> The decision making enhancement among the functions of ITA/EA impact to building up of IT Governance positively (+)

<Hypothesis 3> Investment efficiency among the functions of ITA/EA in organization impact to building up IT Governance(+).

2. Research variables

2.1 Function of ITA/EA

In this research, we conceptualized into the function by considering over the instruction effect, cause, and principle appeared in the example in advanced of home and oversea and brought forth it as a cause. The content arranged in the research variable is shown in <table 3-1>.

<table 3-1> Variables on Function of ITA/EA

variable	Measurement items
infrastructure management	confirmity, prevent of duplication reuse, Flexibility, Transplant(Interchangeability, expansion), Safety(reliability)
decision making enhancement	Business and array of IT, Obeying to the law/system, Supporting the decision making, Improving the communication, Timing(speedy), Road map of IT(Strategical planning)*
Investment Efficiency	Control of investment(danger, coordination), Investment(coast) effectiveness, quality improvement, investment efficiency, Control of portfolio

2.2 Region of IT Governance

We have reconstituted into the exact region for

this research through considering with respect to variety definition and regions appeared in the research related on IT Governance in the home and oversea, and conceptualized, and the factors of it has been extracted. The research variables tied into five groups have been extracted by synthesizing the region and function of IT Governance as considering in addition the definition or region presenting by an institution of home or oversea or a researcher. The content arranged with research variables and measurement points is shown in <table 3-2>.

<Table 3-2> Variables on IT Governance

variable	Measurement items
performance management	Optimizing of IT Resource, Controlling of IT budget, Controlling of IT resource, Managing of personnel resource, Monitoring and estimate, Accomplishment measurement of IT, Confirmation of basis, quantitative estimate.
management of IT process and service	Initiation and planning, executive process, Controlling process, Final process, Service mechanism, Service organization, IT Standardization, Customer satisfaction

IV. Data Analysis

1. Data collection and characters of samples

1.1 Constitution of descriptive document and data collection

To verify the hypothesis set for the research model, the questionnaire was distributed and collected from the national agencies and public institution and the responsible person in charge of civil section. The respondents are consisted of functional factor of ITA/EA and of IT Governance.

To increase the accuracy of census, the questionnaire was carried out by utilizing the response in use of not only postal questionnaire but also through e-mail or cyber space. Total responses giving answer to the questionnaire were 261 cases. However, in the questionnaire presented as scale of 5 points, the answers judged into unfaithful in the content as giving the constant answer over many

question points are excluded, and 223 cases of total data are utilized for statistical process.

1.2 Character of samples and fundamental statistics

Before verified the hypothesis set up in this research, the character of samples with respect to subject of answers first was analyzed, and the statistical fundamental analysis with respect to the character of institutions was carried out. Following table <4-1> shows of the result given by classifying into planning type, executive type, and mingling type the business pattern belonged to the subject of answerers.

<Table 4-1> respondent's institutions

Classification	Frequency	percent	accumulation percent
Planning type	33	14.8	14.8
Executive type	39	17.5	32.3
Mingling type	151	67.7	100.0
Total	223	100.0	100.0

As following <table 4-2> shows the result gave answers by classifying into five the department belonged to the organization of answerers, 86.1% of whole answerers was from information & computer department, and 7.6% of them from planning department, and a few of rest from other departments.

<Table 4-2> respondent's department

Classification	Frequency	percent	accumulation percent
Information & computer	192	86.1	86.1
planning	17	7.6	93.7
financial account	3	1.3	95.1
Material & production	1	.4	95.5
Others	10	4.5	100.0
Total	223	100.0	

2. Reliability of measurement tool and analysis of propriety

We carried out analysis of factors in order verifying of the propriety with respect to measurement tool. The methodology for analyzing the factor used the method of Varimax as one of

orthogonal rotation to prove that the variable is inter-independent, together with analyzing the main component, and analyzed in causing to be extracted only factor exceeding the 1.0 of eigen value appearing the relative significant of individual factors. Before carrying out the analysis of factors in general, the data first must be reviewed whether it is acceptable for analyzing of factors or not.

There largely three methods to decide as the method to review whether the data is proper for analyzing the factors: the method reviewing the relative matrix, and the method verifying whether the mother relative matrix is an unit matrix, and method judging by observing whether the line appearing is smooth curve (exponential distribution) or there exists a point of inflection when the eigen value obtained from the extraction stage of initial factor is displayed as a scree plot. We chose the method to verify whether the double mother relative matrix is an unit matrix or not, which is achieved through the value of KMO (Kaiser-Meyer-Olkin), and usually, where the value of KMO exceeds 0.5, the sampled data is decided into proper as the result for analyzing factors. <Table 4-3> shows of the function of ITA/EA, and <Table 4-4> of result of analysis of factors and reliability of IT Governance.

<Table 4-3> Factor analysis of functions of ITA/EA

variables	question items	Component			Eigen value	Cronbach's alpha
		1	2	3		
infra management	Infra transportability	.755	.304	.118	12.294	.9388
	Infra flexibility	.747	.254	.240		
	Infra reusability	.724	.260	.214		
	Infra redundancy prevention	.663	.353	.183		
	Integration system mgt.	.652	.443	.258		
	resource sharing	.596	.145	.423		
	Infra reliability	.590	.520	.167		
	complexity mgt.	.571	.456	.308		
	infra consistency	.555	.402	.342		
	change mgt.	.535	.527	.245		
lifecycle mgt.	.512	.339	.395			
invest risk mgt.(*)	.458	.445	.384			
decision making enhancement	business and IT alignment	.146	.815	.186	1.322	.8861
	law & policy conformance	.176	.735	.285		
	communication support	.376	.699	.160		
	timeliness/rapidness	.367	.691	.197		
	decision support	.387	.634	.228		
	IT road map	.375	.558	.304		
	T investment efficiency(*)	.348	.477	.371		
investment efficiency	investment effectiveness	.102	.324	.752	1.127	.7999
	quality enhancement	.146	.326	.712		
	interoperability	.474	.110	.633		
	cost saving	.532	.051	.612		
	portfolio mgt.(*)	.267	.336	.475		

(Note) ; (*) means removed items, KMO=0.951
 <Table 4-4> Fact analysis and reliability test of IT Governance

variables	question items	components		Eigen value	Cronbach α
		1	2		
performance management	IT performance measurement	.832	.198	11.284	.9409
	monitoring and evaluation	.823	.264		
	quantitative evaluation	.755	.308		
	compliance verification	.728	.435		
	human resource mgt.	.706	.301		
	strategic linkage	.651	.380		
	IT budget control	.628	.318		
	IT resource control	.607	.526		
	human operation	.606	.440		
	service organization	.592	.510		
	decision making guideline	.583	.535		
	IT leadership	.560	.461		
IT Process & service	completion mgt.	.285	.793	1.246	.9146
	implementation process	.354	.752		
	initiation and planning	.297	.751		
	IT standardization	.394	.686		
	control process	.425	.684		
	IT resource customization	.485	.683		
	customer satisfaction	.156	.681		
	service mechanism	.410	.603		

(Note) ; KMO=0.951

First, the value of KMO was 0.951 in the factor of ITA/EA function, and the IT Governance, 0.950, so that it was judged into acceptable to what we have done the analysis of factor since the criteria to suitability of factor analysis performance is higher than 0.5, and the loading of factor in here means, it is the extend that fact may describe of the variables. Generally, where the absolute value of loading of factor exceeds 0.4, it is regarded as a variable taking heed so that the factors extracted may be judged into what it has any meaning in the some extent because the value was more than 0.5. In other hand, to verify the reliability with respect to factor extracted, we estimated the reliability of factor by calculating the value of Cronbach’s alpha that may estimate the internal consistency according to each measurement tool. In social science, where the value of Cronbach’s alpha is more than 0.6, it may be decided as that having the reliability in some degree. According to the result of analysis, as the value of Cronbach’s alpha was appeared as more than 0.79 in the function of ITA/EA, and more than 0.91 in IT Governance, we decided that the analyzed result has reliability as appeared what exceeding the criteria, and utilized it for analysis post [24].

3. Analysis of correlation according to each factor

With respect to the content of answer to questionnaire, the mean value and standard deviation processed in statistics are shown in <Table 4-5>. When looking into the mean value among these numerals, the factor of “decision making enhancement” among the ITA/EA functions of organization belonged the answerers, and the level of “IT Process & service” in the view of IT Governance were estimated highly respectively.

<Table 4-5> Descriptive statistics

variable		N	Mean	Std. Deviation
ITA/EA function	infra management	223	3.56	.72
	decision making enhancement	223	3.61	.75
	investment efficiency	223	3.46	.72
IT Governance	performance management	223	3.16	.73
	IT Process & service	223	3.43	.67

We analyzed the correlation according to each factor on the center of factors extracted through the performance result of factor analysis until now. As showing that the analysis of correlation is a potential relation of variable, we in this research would decide potentially with respect to whether the hypothesis set up is propriety as grasping ready for the potential relation of mutual variables.

Following <Table 4-6> shows the result of analysis of correlation between factors set up in the function of ITA/EA or IT Governance, and there appeared the correlation paying heed of positive (+) in between most variables.

<Table 4-6> Correlation between variables

Name of variable	dependent variable			Independent variable	
	infra management	decision making enhancement	IT Process & service	performance management	IT Process & service
infra management	1.000	.794	.724	.593	.620
decision making enhancement	.794	1.000	.627	.599	.604
IT Process & service	.724	.627	1.000	.591	.497
performance management	.593	.599	.591	1.000	.821
IT Process & service	.620	.604	.497	.821	1.000

(Note) ** Correlation is significant at the 0.01 level (2-tailed)

4. Verification of hypothesis by regression analysis

4.1 Multi-regression analysis of the performance management

The regression analysis between three independent variables with respect to variable "performance management" is shown in <Table 4-7>.

In the analysis of multi-regression, the result estimated the VIF(Variance Inflation Factor) in the property that must exclude the multi-collinearity showed above 2.136 of VIF value, which is less than 10, and also the value of DW(Durbin-Watson) for verifying the independence of remained different was approached to 2 (1.626) so that we came to decide as acceptable.

The regression coefficient(R^2) of the model of multi-linear regression in the way entering with the method choosing in step wise three factors related ITA/EA, a dependent variable as performance management as dependent variable was 0.440, and the model was attentive in statistics(degree of freedom =219, F= 57.289, Sig =.000). The variable having attentive impact to the factor of performance management in statistics was two factors as supporting "decision making enhancement" and "investment efficiency".

<Table 4-7> Result of regression analysis of independent variable and performance mgt.(F=57.289, sig.=.000)

Accomplishment Factor	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	sig. interval about B		VIF
	B	Std. Error	Beta			lower	upper	
Constant	.561	.202		2.781	.006	.164	.959	
infra management	.131	.095	.130	1.373	.171	-.057	.319	3.504
decision making enhancement	.295	.081	.304	3.629	.000	.135	.455	2.743
investment efficiency	.309	.075	.306	4.137	.000	.162	.456	2.136

(R^2 : 0.440, adjustment R^2 : 0.432, DW: 1.626)

4.2 Multi-regression analysis of the IT process and service

<Table 4-8> shows the multi-regression analysis of three independent variable with respect to variable "IT process and service". The value of VIF(Variance Inflation Factor) related to the verification of multi-collinearity in the multi-regression analysis was above 2.136, and the value of DW related to verification of independent of remained difference also approached to 2 (1.868) so that we decided these as acceptable.

R^2 of the model of multi-linear regression in the way entering with the method choosing in step wise three factors related ITA/EA, as a dependent variable as "IT process and service" was 0.648, and the model was attentive in statistics(degree of freedom =219, F= 52.891, Sig =.000). The variable having attentive impact to the factor of "IT process and service" in statistics was two factors as "infra management" and "decision making enhancement".

<Table 4-8> Result of regression analysis of independent variable and "IT process and service"(F=52.891, sig.=.000)

Factor of accomplishment	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	sig. interval about B		VIF
	B	Std. Error	Beta			lower	upper	
Constant	1.126	.191		5.900	.000	.750	1.502	
infra management	.317	.090	.338	3.507	.001	.139	.494	3.504
decision making enhancement	.263	.077	.292	3.429	.001	.112	.415	2.743
investment efficiency	0.065	.071	.069	.920	.358	-.074	.204	2.136

(R^2 : .648, adjustment R^2 : .420, DW: 1.868)

<Table 4-9> shows the arranged result of hypothesis verification on the base of analysis result like this.

<Table 4-9> Result of verification of hypothesis

Hypothesis	Contents	Verification result
Hypothesis 1	"infra management" among function of ITA/EA impacts to building up of IT Governance positively(+)	partially supported
Hypothesis 2	"decision making enhancement" among function of ITA/EA impacts to building up of IT Governance positively(+)	partially supported
Hypothesis 3	"investment efficiency" among function of ITA/EA impacts to building up of IT Governance positively(+)	partially supported

V. Conclusion

This research can help who are concerning the effect introduced the IT governance into the organization in the view of ITA/EA function would be grasped previously, and set the hypothesis that the function of variety ITA/EA would impact to building up the IT Governance, and verified these in real example.

When looked into the contents detailed of research model considered the variable, it showed the contents that the factors of ITA/EA functions including "infra management", "decision making enhancement", and "investment efficiency". In the result of statistical verification with respect to the hypothesis, there appeared the fact that the "decision making enhancement"(B=0.295) variable and "investment efficiency"(B=0.309) variable impact attentively to the performance management, and in the same, the "infra management"(B=0.317) variable and "decision making enhancement"(B=0.263) variable also impact to the "IT process and service".

Accordingly, by raising up the level of "infra management", "decision making enhancement", and "investment efficiency" through introducing the ITA/EA into organization, it is judged that the effect of building up of IT Governance system would be increased. Also if we make an effort over the infrastructure systematization, which is asset of IT, the raising up in the level of IT service management among the regions of IT Governance would be expected.

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