The Relationship between CIO and Competitive Advantage through IT Governance

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Abstract—The objective of this research was to study the effect of CIO (Chief Information Officer) to competitive advantage through IT Governance. The attitudes rating of CIO is used as independent variables whereas the IT Governance is mediator variables. The Competitive Advantage is used as proxy of assessment firm achievement as dependent variable. The samples used in this research are 365 firms listed as medium and large manufacturing business in Thailand. The Structural Equation Model is used to analyze the model of the study. The results show that the goodness of fit and regression weight significant supported all hypotheses ($p < .05$). CIO has positive direct positive relationship to Competitive Advantage; however it also has indirect positive relationship through IT Governance equally. It indicates that, Firm should be CIO for manage IT and should give important to IT Governance. As a result firm will archive in competitive advantage, respectively.

Keywords-component; CIO; IT Governance, Competitive Advantage

I. INTRODUCTION

It is generally that business firm used Information Technology as a tool for improving productivity, quality of product or customer service, and effectiveness. Business firm can deploy IT into business operation, production, and store information that assist executive for making decision efficiently.

In 1970s, business firm emerge CIO (Chief Information Officer) on top management that responsibility for managing Information Technology. However, CIO duties are under the CEO (Chief Executive Officer). CIO needs to have IT skill and business skills[1] because they have to adopt both skills to be advantage for business operation.

IT Governance is tools for to service stakeholder for monitoring business that operation follow as impartial, faithful, accountability and comply with law.

Besides CIOs have IT skill and understanding business process, they have to be faithful and accountability, which called IT Governance. There are many research study IT Governance and found that it impact to firm performance, However, there have no research that study CIO and Competitive Advantage in the context of IT Governance.

II. RESEARCH OBJECTIVE

1. To study the competitive advantage which is result from CIO.
2. To confirm that, if CIO has to give important to IT Governance, it will improve competitive advantage.

III. RESEARCH FRAMEWORK AND HYPOTHESIS

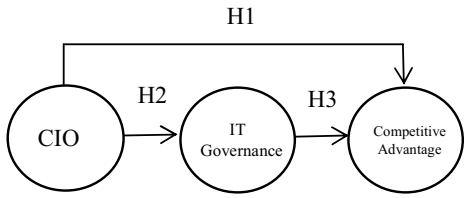

Figure 1. Research Framework

H1: CIO has positive effect to Competitive Advantage
H2: CIO has positive effect to IT Governance
H3: IT Governance has positive effect to Competitive Advantage

IV. THEORY

A. *CHIEF INFORMATION OFFICER (CIO)*

CIO is a firm's executive that direct to CEO. The responsible of CIO are managing IT of organization such as information systems, hardware, software, and Information Technology staff. However, before CIO was emerged in to business, the responsible of IT generally look care by Chief Financial Officer (CFO). The roles of CIO are important, because the organizations commonly concern about the management of IT spending to archive an outcome.

B. *IT GOVERNANCE*

The IT governance is a subset of corporate governance. IT governance is an operation process for ensures that an organization are impartial, faithful, accountability management and law compliance. The processes of IT Governance are on internal control and reporting. Bowen,

Cheung and Rohde[2] divided IT governance into two groups, IT governance as structure and IT governance as process. The IT governance as structure involves functions for making decision responsible both business and IT executive, whereas IT governance involves the process of IT implementing.

C. COMPETITIVE ADVANTAGE

Competitive Advantage is the firm's ability to perform in one or more ways that competitor cannot. They success to deliver high customer value and satisfaction achieve a high profitability as customer value and satisfaction lead to high repeat purchases[3].

V. RESEARCH METHODOLOGY

A. Population and Sample

The research sample are medium and large business firm list on the Department of Business Development Ministry of Commerce of Thailand. Sample size is processed as subset of population to study, which follows a formula of Yamene with 95 confidence level.

$$n = N/(1+N*(e)2$$

Where "n" is the sample size, "N" is the population, and "e" is error value.

The 4,092 firm population applied into Yamane formula with 95% confidence level is 365 firms.

B. Research Tools

The questionnaire is a tool for gathering data from search sample. The questionnaire was constructed from review of the literature and designs for meet the research object. The questionnaire comprise of three parts: CIO, IT Governance, and Competitive Advantage. The question use Likert 5 scales to receive the attitude from respondents. The level of give important

1 = Very unimportant
2 = Unimportant
3 = Moderately Important
4 = Important
5 = Very Important

The level of competitive advantage

1 = very dissatisfied
2 = Dissatisfied
3 = Moderately Satisfied
4 = Satisfied
5 = Very Satisfied

C. Validity and Reliability

- Content Validity Testing

The content validity use for assess the questionnaire covers the theory. The questionnaire will be assessed by the five expertise in Information Technology and then adjust the term from expertise suggestion. The discriminate validity will test by the factor analysis. Usually, there are many questions representing each factor or variable. If the questions represent different variable, it should summarize into different groups by factor analysis. Then, the convergent validity will test by the correlation statistic. If the questions represent the same variable, it must have correlation among them.

- Reliability Testing

This research will test the internal consistency of reliability by the cronbach's alpha after designing the questionnaire. The score ranges from 0 to 1 and the acceptant of the score of this research are more than 0.7[4]. This research is designed to test reliability two times. First before sampling, the 40 questionnaires try out to test and then adjust the term if the score is less than 0.7. The second, reliability testing will treat again when all sampling data complete collecting.

- Structure Equation Model Analysis

1. Construct the model that related with variable in search framework
2. Define Latent Variable
3. Define observe variable to latent variable
4. Assessment the model fit
   4.1 Chi-Square/ Degree of Freedom should less than 2.00
   4.2 Root Mean Square Error of Approximation should less than 0.05
   4.3 Good of fit index approach to 1
   4.4 Comparative fit index approach to 1
   4.5 Root Mean Square Residual should less than 0.05
5. Consider the Standardized Regression Weights that accept model if it has significant and Square Multiple Correlation for confident of prediction of model.

After model accepted, the result of regression weight will consider for hypothesis testing. If regression weight are significant, it will indicate that the variable at the beginning arrow affect to the end arrow.

VI. RESEARCH RESULT

A. Convergent Validity

This researchers measured Convergent Validity with Confirm Factor Analysis. If the research model is converge, the value of factor loading should be greater than 0.6[5]. The Figure 2 shows the construct model for Convergent Validity testing.

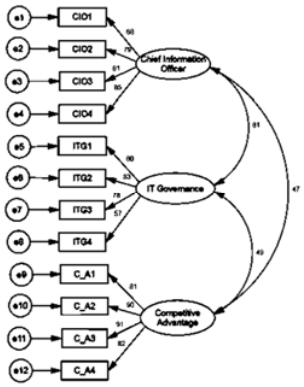

Figure 2. Factor Loading

Table 1 Factor Loading of all latent variables

Variable	Factor Loading
CIO	
CIO1	0.68
CIO2	0.79
CIO3	0.81
CIO4	0.85
ITG	
ITG1	0.80
ITG2	0.83
ITG3	0.78
ITG4	0.57
Competitive Advantage	
Com1	0.81
Com2	0.90
Com3	0.91
Com4	0.82

When considering the table1, ITG4 are not convergent. It was dropped in this step.

B. Discriminate Validity

This step will measure correlation between variable. If model is discriminate validity, the coefficient of correlation should be less than .85. The table 2 shows the coefficient of correlation among variable.

Table 2 . The coefficient correlation among variable.

	CIO1	CIO2	CIO3	CIO4	ITG1	ITG2	ITG3	ITG4	C_A1	C_A2	C_A3	C_A4
CIO1	1											
CIO2	**.606****	1										
CIO3	**.504****	**.644****	1									
CIO4	**.571****	**.648****	**.702****	1								
ITG1	.442**	.512**	.509**	.571**	1							
ITG2	.378**	.495**	.574**	.582**	**.687****	1						
ITG3	.425**	.495**	.513**	.554**	**.616****	**.654****	1					
ITG4	.223**	.427**	.442**	.342**	**.443****	**.474****	**.454****	1				
C_A1	.307**	.351**	.295**	.348**	.319**	.338**	.369**	.348**	1			
C_A2	.340**	.349**	.318**	.348**	.345**	.323**	.394**	.340**	**.763****	1		
C_A3	.342**	.359**	.302**	.352**	.312**	.364**	.383**	.345**	**.739****	**.804****	1	.
C_A4	.346**	.321**	.267**	.325**	.303**	.270**	.319**	.300**	**.609****	**.733****	**.779****	1

C. Mullticollinearity Testing

Due to the structural equation model is the base on regression analysis, thus this research must go through Multicollinearity testing. The assumption of regression analysis has a limitation that each variable should not highly correlate with other. The Tolerance and Variance Inflation Factor (VIF) measurement used for testing. The Tolerance should more than 0.1 or VIF should less than 10 (VIF = 1 / Tolerance) for to accept that they have no multicollinearity problems[6]. The result of multicollinearity of IT_Prod1 testing with other has shown in table 3.

Table 3 Multicollinearity Testing

Variable	Mullticollinearity	
	Tolerance	VIF
CIO2	.472	2.119
CIO3	.405	2.468
CIO4	.382	2.619
ITG1	.434	2.303
ITG2	.385	2.595
ITG3	.468	2.139
ITG4	.657	1.523
C_A1	.365	2.743
C_A2	.260	3.840
C_A3	.239	4.187
C_A4	.352	2.837

D. The Construct Model

This model was constructed to measure that the CIO positive effect to Competitive Advantage and then to measure that CIO positive effect to Competitive Advantage through IT Governance. The finding shows that CIO effect to Competitive Advantage though IT Governance.

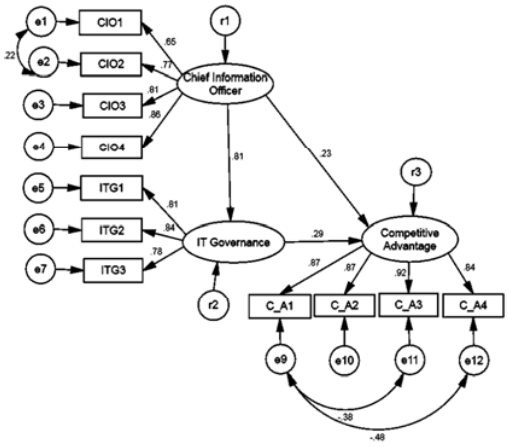

Figure 3. Construct Model

The goodness of fit shown as follows: Chi-Square=46.129, df=37, p-value=0.142, GFI=0.978, AGFI=0.960, NFI=0.983, CFI=0.997, RMSR=0.023, RMSE=0.026(PCLOSE=0.971), and Hoelter=483(0.01).

- *Direct and Indirect Effect*

The standard indirect, direct, and total effect of model shows on table 4.

Table 4. The standard indirect, direct, and total effect

	Direct effect		Indirect effect		Total direct effect	
	CIO	ITG	CIO	ITG	CIO	ITG
CIO						
ITG	0.806				0.806	
C_A	0.226	0.290	0.234		0.461	0.290

E. Hypothesis Testing

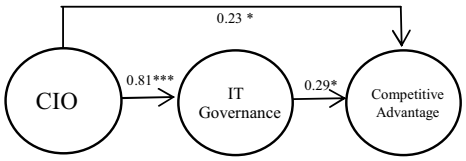

Figure 4. Hypothesis Testing

Considering figuring 3, the result of hypothesis testing show as follows:

H1:CIO has positive effect to Competitive Advantage. This hypothesis was supported with standard regression weight is 0.23($p< .05$).

H2:CIO has positive effect to IT Governance. This hypothesis was supported with standard regression weight is 0.81($p<.001$).

H3:IT Governance has positive effect to Competitive Advantage. This hypothesis was supported with standard regression weight is 0.29($p<.001$).

VII. CONCLUSION

According to hypothesis testing on figure 4 and effect on table4, CIO which has IT skill, understand both business and IT, and strategic management will achieve competitive advantage. However, if they give important to IT Governance, the competitive advantage will increase twice. It mean that firm has IT Governance in their strategy will gain return competitive advantage higher than same business that without IT Governance.

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