IT Investment and Organizational Support Influence on the IT Project Success and Go Live through IT Infrastructure Capabilities and Teamwork Quality

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บทคัดย่อ—การเปลี่ยนแปลงอย่างรวดเร็ว ทางด้านเทคโนโลยี การเมือง สังคม และเศรษฐกิจ มีส่วนในการนำ IT และ Telecommunication กลายมาเป็นตัวขับเคลื่อนในการแข่งขัน การให้บริการ เพื่อให้บริษัทสามารถดำรงอยู่ได้ แต่ละบริษัทจึง มีการลงทุนทางด้าน โครงการ IT กันอย่างมากมาย ภายใต้ความ เสี่ยงของการดำเนินงานที่โครงการจะสำเร็จเพียง 30% . ใน งานวิจัยนี้ต้องการศึกษาว่าความสัมพันธ์โครงสร้างระหว่าง IT Investment , Organization Support , IT Infrastructure capabilities , Teamwork Quality , IT Project Success และ Go Live.ในการทำวิจัยครั้งนี้ได้มีการนำทฤษฎี คุณลักษณะ ที่ น่าสนใจของ Organization Support ซึ่งเป็นทฤษฎีทางด้าน จิตวิทยา (Psychology) มาเป็นส่วนผลักดันให้ Teamwork Quality ที่จะดำเนินงานโครงการ ให้เกิดความองค์ความรู้ และ แรงจูงใจในการดำเนินงาน . ในการศึกษานี้นักวิจัยได้เน้น การศึกษาไปที่ธุรกิจการอุตสหกรรมการผลิต ในประเทศไทย โดยเลือกขนาดของบริษัทเป็นแบบขนาดกลาง และขนาดใหญ่ ของ SME โดยใช้แหล่งข้อมูลรายชื่อบริษัทจาก กรมพัฒนา ธุรกิจการค้า กระทรวงพาณิชย์. เครื่องมือที่ใช้สำหรับงานวิจัยนี้ ได้ใช้แบบสอบถาม เป็นเครื่องมือในการ สำรวจกลุ่มตัวอย่าง เพื่อที่จะเก็บข้อมูล . นักวิจัยได้ทำการแจกแบบสอบถามออกไป 1,500 บริษัท และ ได้รับการตอบกลับมา 394 บริษัท คิดเป็น 26.67% โดยที่แบบสอบถาม ถามไปยัง CIO หรือ IT Team leader .เครื่องมือสถิตินักวิจัยได้ทำการวิเคราะห์โดยใช้ Structural Equation Modeling (SEM) ในการทดสอบ Validity และ Reliability. ผลการทดสอบการ Construct model ที่ตัวแปร แฝง (latent variable) จากการทำ Confirmatory Factor Analysis (CFA) เพื่อยืนยันความสัมพันธ์กับตัวแปรสังเกต (Observed variable) ได้ตามทฤษฎี และ สมมติฐานที่ตั้งไว้ (Hypothesis) ซึ่งผลการทดสอบได้ยืนยันว่าค่า Goodness of fit และ Regression weight มีนัยสำคัญเป็นไปตาม สมมติฐานที่ตั้ง ไว้ จึงสามารถสรุปความสัมพันธ์ได้ว่า IT Investment และ Organization Support มีอิทธิพลต่อ IT Project Success โดยที่ ทางบริษัทจะต้องให้ความสำคัญปัจจัยการจัดซื้อ , ความสามารถ ของอุปกรณ์ และ การสนับสนุนจากบริษัท จะเป็นส่วนผลักดัน ให้ IT Infrastructure และ Teamwork Quality มีประสิทธิภาพ จากผลการวิจัยยังแสดงให้เห็นว่า บริษัทควรจะต้องดำเนินการ ในด้าน Go Live เพื่อให้เกิดการใช้งานจริงของ IT Project ที่ได้ ดำเนินการส่งมอบติดตั้งเสร็จเรียบร้อยแล้ว ซึ่งจะส่งผลให้ บริษัทเกิดความคุ้มค่าในการลงทุน.

คำสำคัญ: IT investment, Organizational support , IT infrastructure capabilities , Teamwork quality , IT project success , Go live

Abstract— Fast changing in technologies, politics, social and economic were partly leading IT and Telecommunication to be the driven for service competitiveness. For the survival of the firms, many of them had invested on so many IT projects under the risks

that the projects processing would be success for only 30%. This study aimed to study on the relationship between the structures of IT Investment, Organization Support, IT Infrastructure capabilities, Teamwork Quality, IT Project Success and Go Live. This research had brought the theories and interesting characteristics of the Organization Support which was the Psychology theory to push toward the Teamwork Quality to process the project that would give the body of knowledge and work motivation. In this study, the author stressed on the stud on the businesses in production industry of Thailand by selected the medium and large size of SME companies from the firms listed source of Department of Business Development, Ministry of Commerce. The instrument used in this research was the questionnaire that applied to examine on the sample group to collect the data. The author distributed the questionnaires to CIO or IT Team leaders in 1,500 firms where 394 had been returned in which accounted for 26.67%. The statistical tool used by the author was the Structural Equation Modeling (SEM) for Validity and Reliability testing. The testing result of Construct model on the latent variable from the Confirmatory Factor Analysis (CFA) was to confirm its relationship with the observed variable according to the proposed theory and hypothesis. The testing result confirmed that the Goodness of fit and Regression weight values had significantly be accordance to the proposed hypothesis. Thus, the relationship can be concluded as IT Investment and Organization Support had influenced on IT Project Success by the firms must pay attention to the factors of purchasing, equipment capacity, and supporting from the firms would push toward the effectiveness of IT Infrastructure and Teamwork Quality. The study results also showed that the firm shall process on Go Live for the real use within the completely submitted and installed IT Project in which would result on the worth of investment.

Keywords - IT investment; Organizational support; IT infrastructure capabilities; Teamwork quality;IT project success; Go live

I.   INTRODUCTION

"IT" or Information Technology has, played an important role in our daily lives. All aspects of our daily lives has been rapidly transformed by this pervasive computing IT, particularly in the business sector.In 1995, Standish group conducted a survey on IT executive managers in each company. Samples of the selected companies for the survey were large, medium and small scale firms covering a wide range of businesses, such as banking, securities, manufacturing, retailing, wholesaling, healthcare, insurance, services and local representatives. From 8,380 applications, 365 respondents were received[1].   The report has concluded that there are 5 causes of IT project failure[2].

1. Lack of user input & involvement. Insufficient information from the user or lack of user involvement results in the project team using excessive time to understand what the user needs and determine the needs of the project [3].

2. Lack of executive support. Companies that conduct research as well as educational agencies have focused on the major problem that corporate executives do not support the projects. That is because the project manager who is responsible for the project would be a coordinator between the business and technology [4].

3. Unclear goals and objectives. Users are not clear in defining the scope of work requirements. They often change their needs or their goals [5].

4. Poor planning. For IT project, the time frame is often a problem for the management team. Planning poorly or improperly can cause difficulties during the implementation[6].

5. Unrealistic expectations on the project team. The project team must have realistic expectations about the project implementation [7].

II.   RESEARCH OBJECTIVES

1.To examine the effect IT Investment on Project Success through IT Infrastructure Capabilities.

2. To examine the effect the Organizational Support on Project Success through Teamwork Quality.

3.To examine the effect IT investment on Project Success through IT Infrastructure Capabilities and Teamwork Quality.

4.To examine the effect of IT infrastructure capabilities on Teamwork Quality.
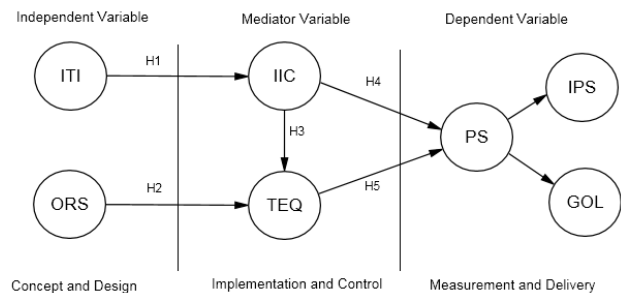
III.   RESEARCH FRAMEWORK AND HYPOTHESIS

Figure 1. Research Framework

This research is divided into 3 phases as follows:

1) Concept and Design. In this part, it is the beginning in conceptual design and condition of IT Project for the implementation. It consists of IT investment and Organizational Support. IT investment means the IT Infrastructure investment to build the IT Infrastructure Capabilities to support the implementation of IT Project.

This consists Hardware, Computer Network, Software, and IT Staff employment in which will support and influence on the IT Infrastructure Capabilities. Another part is the organizational Support to form the motivation, perception, encouragement, support and influence over Teamwork Quality in IT Project implementation. This research sets for the hypotheses in this phase as follows:

H1: IT investment has positive effect on IT infrastructure capabilities.

H2: Organizational support has positive effect on teamwork quality.

2) Implementation and Control. This part receives the influence from IT investment and Organizational Support which is the part of control and operation over the IT Project that consists of IT Infrastructure Capabilities and Teamwork Quality. The research then sets the hypotheses in this as follows:

H3: IT infrastructure capabilities have positive effect on teamwork quality.

3) Measurement and Delivery. In this phase, it is the last phase to submit and use after submission. It consists of IT Project success and Go live. IT Project success is to measure the success from three factors of: on time, meet the budget and, function according to the project scope that will support and influence over Go live. Another part is Go live which is the use after submission for the IT Project to work well and actually work and worth with the investment. It is to adjust and take care for the effective use that consists of Transference, Preparation, Training, and Maintenance and Support. The research then sets the hypotheses in this as follows:

H4: IT infrastructure capabilities have positive effect on project success.

H5: Teamwork quality has positive effect on project success.

IV. THEORY

A. IT investment

Investment in IT infrastructure requires complex investment management which result in less-tangible future benefits. In practice, many businesses are unwilling to take risks investing in IT infrastructure because of the amount of the budget allocation[8]. Instead, they chose for investments in the production or service section which gives immediate returns, or other investments perceived more necessary than IT infrastructure investment. This is because IT infrastructure investments give less tangible future benefits than other types of investments. However, businesses rely heavily on IT infrastructure which will become a key strategy to competition in the business sector. Businesses capable of fully utilizing their IT infrastructure will be able to achieve good firm performance. IT investments consists of 4 components which are IT infrastructure, transactional IT, informational IT and strategic IT[9].

B. Organizational support

In the past decade, researchers have studied project team's perspectives. Such team use technology at various levels to drive the project to success [10, 11]. Teams are typically temporary teams set up for a particular project, or may be formed by all employees within the organization [12]. By using POS to positively motivate both parties, the organization believes that POS affects the organizational rewards and job condition such as, recognition, pay[13], promotion, job security, autonomy and training [14]. In a recent study, it was revealed that organizational support with standardized process and fair rewards payment according to individual performances has a positive effect on team building. The researchers focused on means to support teamwork to enable efficient, knowledgeable and capable team that can perform tasks successfully, means to foster potential of each individual team member with emphasis on reliability throughout the project lifetime, positive attitude as well as receiving support from the organization or executive management in carrying out the project [15]. The focus of the study is on 4 factors of the antecedents of received organizational support, namely, strategic staffing, training and tools, team autonomy and top management monitoring. The consequences of perceived organizational support was teamwork quality [16]. The motivation of using antecedents is the evolution to project management which considers factors that support team work, i.e., improved process, methods and tools as input for teamwork building process. Researchers have conducted studies in firms abroad which applied advanced technology and organizational support to enforce teamwork. Their antecedents included human resources, human resource allocation which included employees, training, knowledge development, resource allocation, in order to ensure team skills, knowledge and specialized expertise to execute the project to completion. From the aforementioned statement, it can be concluded that organizational support fosters project team by enabling effective team work through perception from both the organization and employees [16].

C. IT Infrastructure capabilities

The IT infrastructure is the investment in computer and communication technology which comprises hardware, software, telecommunication as well as other peripheral services which the system requires for its operation such as stored data, hard disks, data display and IT service staff [17, 18]. IT infrastructure is the foundation for IT portfolio which consists of 2 components, including, the techno ware and human ware [19]. Both components are vital assets to business development within an organization. IT infrastructure is imperative for each organization to make use of their

resources in an efficient manner [20, 21]. IT projects for their businesses are thus developed based on IT infrastructure capabilities. In this research, IT infrastructure capabilities resource management is deployed. A model is then developed to verify its use leading to project success through teamwork quality and organization support [14, 22]. The literatures related to IT infrastructure capabilities are presented as follows [23]. IT infrastructure is the basic principle of IT portfolio that is used reliably by the entire organization. The structure of the organization infrastructure capabilities consists of technical and human aspects. From the aforementioned literature, these two aspects are integrated to create a complete Organization IT infrastructure capabilities. The objective is to create efficient and stable IT services to enable Business Process Redesign (BPR) and changes towards desirable business process [24].

D. Teamwork Quality

The definition of teamwork is a group of employees within an organization who interact, collaborate and assist one another [25]. Each individual has a unique capability or expertise and uses his individual skill to achieve a common goal of the team efficiently, attaining satisfaction among members of the team. It is therefore a challenge for management or team leaders to manage the teamwork to achieve the goal of the IT project [26]. To develop teamwork that would affect project success and to measure the project success as a function of teamwork, each of the 6 faces of teamwork quality, i.e., 1. Communication 2.Coordination 3.Balance of member contribution 4.Mutual support 5.Effort 6.Cohesion is explained as follows [27]

E. Project Success

Project refers to the temporary activity to produce the products, services or results with the special and unique characteristics. Project has the characteristics as follows: the objective, uniqueness, time frame, budget, job owner or supporter and uncertainty since there are projects in different characteristic. Project management is the applying of knowledge, skills and tools to meet the requirements. Project management knowledge consists of 9 aspects: Project Integration, Scope, Time, Budget, Human Resource, Communication, Risk, Procurement, Stakeholder and Quality[28]. Project success has three limitations to complete with the budget, time frame and result within the setting scope. In this research, it consists of two main characteristics which are IT Project success and Go Live.

- **IT Project success**
  Literatures have pointed out that the most significant field is time and budget [29]. Another factor that affects the IT project success is the project manager [30, 31]. There are questions pertinent to whether an inefficient project

management is caused by an incompetent project manager or other causes. From successful IT projects, it was found that the project manager capability is necessary with qualities such as experience, training, the ability to make full use of the team member's capability, technology integration, and inducing a good working environment [32]. Further studies on the function of a project manager revealed that a project manager not only relies in a single individual, but also applies his abilities to fit the skills of the team to achieve project success. Therefore, leadership training, decision making, innovation and creativity are also required[33].

- **Go Live**
  In the literature survey, the go-live operation is carried out in the fourth phase of an IT project. The four phases include transference, preparation, training, maintenance and support.

  1) Transference refers to the transfer or move from the existing system to the new one. The data must be securely maintained prior to its removal from the system within an appropriate timeframe.

  2) Preparation refers to employee preparation in order to become more accustomed and cooperative in using the new IT system for the benefit of the organization[34].

  3)Training refers to the training of the employees to begin using the system and enable operations that increase production and achieve the goals of the organization[35].

  4) Maintenance and support refers to the problem solving and assistance provided to the employees during the roll out of the new system.

V. RESEARCH METHODOLOGY

A. Population and Sample

Sample size suggested two assumptions for a research sample size[36]. These are guided by conceptual and practical considerations that suggest an adequate sample size can be obtained for the number of variable to be examined. As a general rule, the minimum sample size should be at least five time that of the number of observed variable to be analyzed, and the more acceptable sample size would be a 10:1 ratio. According this theory, the study initially targeted the population with approximately 320 of manufacturing industry in Thailand.

B. Research Tools

The questionnaire is a tool for gathering data from research samples. The questionnaire was constructed from reviews of the literature. The questionnaires were designed to meet the research objectives. The questionnaire comprises six parts : IT investment , organizational support, IT infrastructure capabilities , Teamwork quality, and Project success. This research used the Likert 7 scale to quantify the attitude from survey questionnaire. The level of give important.

C.   Validity and Reliability

- Content Validity Testing

The content validity was used for assessing the accuracy of the questionnaire. The questionnaire was assessed by five experts in the field of information technology by applying the IOC (Index of item objective congruence) method. The results from the assessment were used to adjust and improve the accuracy of a question .The discriminate validity 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 test by the correlation statistic. If the questions represent the same variable, it must have correlation among them.

- Reliability Testing

The questionnaire was sent 30 firms from the research sample. The reliability test analyzes and selects only those with the Cronbach's alpha score above .7, If the score was lower than .7, it would be dropped out.

The reliability test would be tested again after receiving questionnaire back from business firms. This testing is one of the requirements of the SEM analysis.

VI. RESEARCH RESULT

A.   Construct Validity

The next testing before create model for Structural Equation Model Analysis are Convergent Validity Testing and Discriminant Validity Testing. The Convergent Validity Testing will verify that the indicators can represent into latent variable whereas Discriminant Validity testing was performed to show that observe variable represent on the same latent variable and not associated with observe variable of the other latent variables.

The researchers measured Convergent Validity with Confirm Factor Analysis. If observe variable is the best represent of latent variable, Factor Loading should above .6. Convergent Validity was evaluated with an average variance extracted (AVE) and composite reliability (CR) per factor. Convergent Validity was accepted when AVE is greater or equal to 0.5 and CR is greater or equal to 0.7[37]. The result of independent variable testing was presented as Figure 2 and table 1
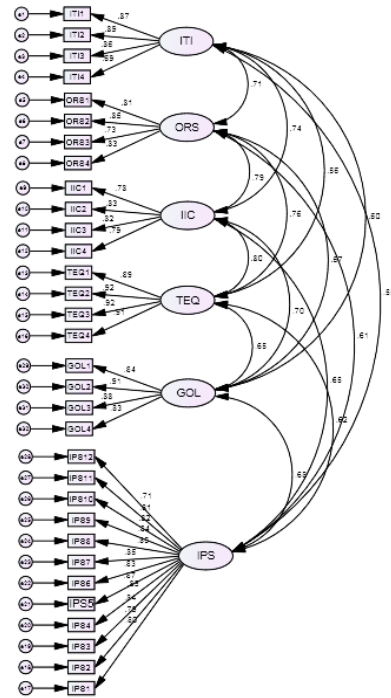

Figure 2. Factor Loading

Table 1 Factor Loading of all latent variables

Variable	Factor Loading	AVE	CR	Variable	Factor Loading	AVE	CR
IT Investment		0.69	0.89	IT Project success		0.66	0.88
ITI 1	0.87			IPS 1	0.8		
ITI 2	0.89			IPS 2	0.79		
ITI 3	0.86			IPS 3	0.84		
ITI 4	0.69			IPS 4	0.83		
Organizational support		0.65	0.88	IPS 5	0.87		
ORS 1	0.81			IPS 6	0.83		
ORS 2	0.85			IPS 7	0.85		
ORS 3	0.73			IPS 8	0.85		
ORS 4	0.83			IPS 9	0.84		
IT infrastructure capabilities		0.64	0.88	IPS 10	0.82		
IIC 1	0.78			IPS 11	0.81		
IIC 2	0.83			IPS 12	0.71		
IIC 3	0.82			Go live		0.74	0.92
IIC 4	0.79			GOL 1	0.84		
Teamwork quality		0.82	0.95	GOL 2	0.91		
TEQ 1	0.89			GOL 3	0.88		
TEQ 2	0.92			GOL 4	0.83		
TEQ 3	0.92						
TEQ 4	0.91						

B.   Discriminate Validity

This process is the testing of the directness on the aspect of discriminant to confirm for the right membership of the observed variables and latent variable by using two testing methods of the observing on covariance value between the latent variables from CFA model and testable on the coefficient between the observed variable. By considering the Covariance values between the latent variables in CFA model that should not

more than .85 The table 1 shows the coefficient of correlation among variable.

C. Multicollinearity 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 limit 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 problem. The result of multicollinearity of ITI testing with other has shown in table 2

Table 2 Multicollinearity Testing

Variable	Multicollinearity		Variable	Multicollinearity	
	Tolerance	VIF		Tolerance	VIF
ITI 2	.299	3.346	IPS 1	.225	4.436
ITI 3	.312	3.202	IPS 2	.212	4.718
ITI 4	.414	2.415	IPS 3	.190	5.254
ORS 1	.346	2.889	IPS 4	.210	4.767
ORS 2	.330	3.027	IPS 5	.228	4.391
ORS 3	.462	2.166	IPS 6	.231	4.322
ORS 4	.343	2.915	IPS 7	.217	4.614
IIC 1	.355	2.814	IPS 8	.242	4.133
IIC 2	.344	2.909	IPS 9	.210	4.768
IIC 3	.327	3.062	IPS 10	.223	4.494
IIC 4	.344	2.905	IPS 11	.257	3.892
TEQ 1	.191	5.243	IPS 12	.407	2.455
TEQ 2	.170	5.872	GOL 1	.291	3.439
TEQ 3	.164	6.100	GOL 2	.199	5.032
TEQ 4	.184	5.434	GOL 3	.251	3.984
			GOL 4	.312	3.200

D. The Construct Model

This model was constructed to measure that IT investment and Organizational support have positive effect on project success then to measure that. IT investment and Organizational support have positive effect Direct and Indirect Effect quality affect project success through IT infrastructure capabilities and Teamwork quality.
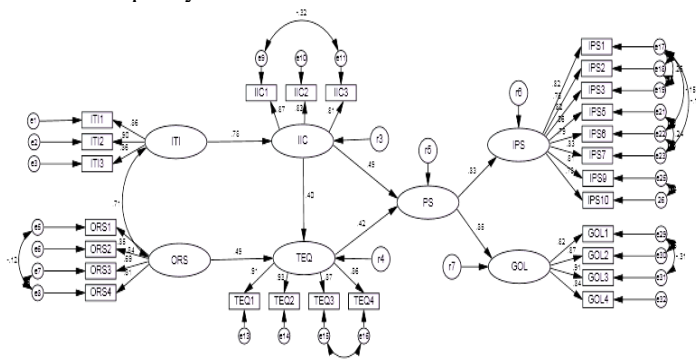

Figure 3. Construct Model

Figure 3 presents the results of the construct model tested. The measurement model for the three latent constructs

was assessed by confirmatory factor analysis , In this research , the goodness of fit shown as follows : Chi-Square = 542.210 , df = 276 , CMIN /DF = 1.965 , GFI = 0.904 , AGFI =0.877 , NFI = 0.945 , CFI = 0.972 , RMR = 0.095 , RMSEA = 0.50 (PCLOSE = 0.540) , and Hoelter = 242 (0.01)

- Direct and Indirect Effect

The standard indirect , direct , and total effect of model shows on table 3.

Table 3. The standard indirect, direct , and total effect

	Direct					Indirect				
	ITI	IIC	ORS	TEQ	PS	ITI	IIC	ORS	TEQ	PS
ITI										
IIC	0.783									
ORS										
TEQ		0.402	0.49			0.315				
PS		0.488		0.423		0.516	0.17	0.207		

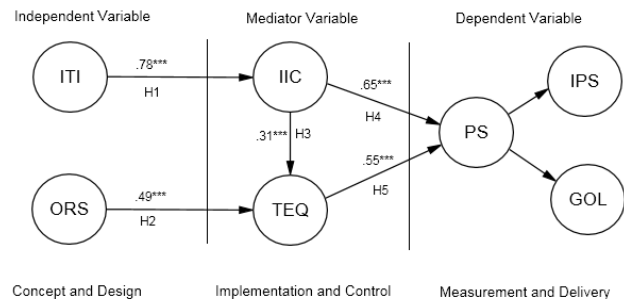|		Tota		
ITI	IIC	ORS	TEQ	PS
0.783				
0.315	0.402	0.490		
0.516	0.658	0.207	0.423	

E. Hypothesis Testing

Figure 4. Model Analysis

Considering figuring 4, the result of hypothesis testing show as follows:

H1:IT investment has positive effect on IT infrastructure capabilities. This hypothesis was supported with standard regression weight is 0.78 (p < .001)

H2:Organizational support has positive effect on teamwork quality. This hypothesis was supported with standard regression weight is 0.49 (p < .001)

H3:IT infrastructure capabilities has positive effect on teamwork quality. This hypothesis was supported with standard regression weight is 0.31 (p < .001)

H4:IT infrastructure capabilities has positive effect on project success. This hypothesis was supported with standard regression weight is 0.65 (p < 0.001)

H5:Teamwork quality has positive effect IT project success. This hypothesis was supported with standard regression weight is 0.55 (p < .001)

VII CONCLUSION

In this study, it was found that each theory as used in testing and set as the hypothesis for this model researching was significant according to the hypotheses as set into H1, H2, H3, H4 and H5. IT Investment was assigned as the Independent variable with the influence on IT Infrastructure and required for the firm to pay attention in the processing to purchase the Computing and Communication technology in which consisting of hardware , software and Network providing devices. The purchasing should be appropriate and effective since it would lead to the IT Infrastructure that can support for the IT Project. This is conformed to the research by Broadbent (1998), Weill and Vital (2002) [8, 17, 18]but the firm still has to pay importance to the Organization Support as an Independent variable as well since it was the essential part to driving toward the forming of body of knowledge and motivation. According to the study by Drouin and Bougault (2013)[16], the author pushed Teamwork Quality as the Mediator variable for the IT staff within the teamwork to work effectively and this required to pay attention on the aspect of Organization Support regarding personnel recruitment into Team. By staff needed to have the IT knowledge to support for any tools and for the Teamwork to be fluent in working on IT project with the independent in work processes and the closeness for job follow up. This would result toward more successful of IT project. This had conformed with the research by Hoegl and Gemuenden (2001)[27] who studied to develop on the concept for the best teamwork cooperation or the skills that required for team building that would result on the project success. IT Infrastructure capabilities were the Mediator variable that influenced on teamwork quality. This had conformed with the study by Xia , Zhang et. al. (2010)[22] and it had the influence on the project success by it required the firm to pay attention on 2 parts which were the technical and IT Staff in which can lead toward the project success. Pinto (1990)[38] found that the basic norms to measure on the IT project success were the cost , time and quality in which popularly used to measure the project successfulness on the aspect on effective budget and resources management as well as effective time management. The IT project must be submitted within time frame and the users were satisfied with the working conditions as placed in the IT project requirements.

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