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Factors Affecting IT Project Implementation Success in the Manufacturing Industry in Malaysia

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ABSTRACT

Globally billions of dollars are spent on information technology projects by both public and private sectors annually. Unfortunately, more than half of these projects fail to deliver the intended objectives. Thus, millions of dollars are wasted on failed projects. This research intends to investigate the factors that influence the success of Information Technology (IT) project implementations in Malaysia. In this study, five factors that influence the success of the project such as project management, requirements and risk management, organizational culture, management support and communication were selected through literature review. The scope of the research was limited to three industries only namely manufacturing, IT service providers and banking. The primary research methodology deployed for this research was a questionnaire survey. Based on the regression analysis, management support, project management and communication were found to have significant positive influence on the success of IT projects. Meanwhile, organizational culture, requirements, and risk management did not have any significant relationship with the outcome of the IT projects' success. The survey also revealed that quality procedures, project implementation approaches and system ownership by end-users could be the other potential barriers to a successful IT project implementation. The findings of this research could help organizations embarking on IT projects to address the potential deficiency and pitfalls in their IT projects in order to ensure the success of its implementation.

Keywords: Information technology, Project and project success

BACKGROUND AND OBJECTIVE

In a competitive global business environment, business strategy not only determines success, it also dictates business survival. Now more than ever, effective business strategy is built upon effective and efficient use of Information

Technology (IT). Billions of dollars are spent globally on IT projects by both public and private sectors annually but unfortunately, more than half of these projects fail to deliver the intended objectives resulting in millions of dollars being wasted on failed projects. The 2004 Standish Group survey report shows that only 29% of all projects carried out worldwide success while 53% were challenged, and 18% failed. Undeterred by the poor statistics, companies continued to spend in IT indicating that companies believe in the business value of IT even though the relationship between IT spending and business value is highly complex. Recent studies and empirical evidences on the positive influence of IT investment towards both productivity and economic growth are accumulating and encouraging. A study conducted by Massachusetts Institute of Technology (M.I.T) economist Erik Brynjolfsson on the productivity impact of IT investments at the firm level concluded that IT has made a substantial and statistically significant contribution to the output of the firms (Brynjolfsson, 1996; Brynjolfsson & Hitt, 1996; Brynjolfsson & Hitt, 1993; Brynjolfsson, 1993). These findings are further supported by the research conducted by Senn and Gefen (1998) which indicated that the business values returned from IT spending can be observed in the areas of productivity improvements, performance improvements, customer surplus and derived demand; and perception of business value.

According to the new study released by World Information Technology and Services Alliance (WITSA) the estimated global expenditure for IT will top US \$3 trillion this year and reach almost US \$4 trillion by 2009. IT spending also has tremendous impact on the global economy, both directly and indirectly. IT spending volumes represent 6.8 percent of global Gross Domestic Product between 2001 and 2005 (WITSA, 2006). In Asia Pacific, Gartner (2005) found that IT spending by organizations will grow at a compounded annual rate of 7.1 percent from 2003 through 2008 to reach US \$284 billion with China as the largest market followed by India and Australia respectively. Under the Ninth Malaysia plan, the Malaysian government has earmarked Multimedia Super Corridor (MSC) as one of national economic drivers. This new engine of growth is expected to build on the established reputation of Malaysia as the third best location in the world for IT shared services and outsourcing industry (EPU, 2006). It is targeted to create an additional 100,000 high value added jobs to the existing 20,000 in the MSC. This research was conducted with the objective of enhancing the success rates of Malaysia's MSC projects through the use of lessons learned and provides deeper understanding of the best practices used in successful IT projects.

The intent of this paper is to investigate the factors that influence the success of IT project implementation.

LITERATURE REVIEW

According to the Royal Academy of Engineering and the British Computer Society (2004), there are numerous inherent challenges in IT projects. First of all, IT projects do not have well defined constraints compared to projects in other disciplines such as civil engineering. This lack of constraints or the difficulties of communicating those constraints are likely to influence customers' and suppliers' expectations of the project. Secondly, the visualization of problem surrounding software development might lead to problems which may surface later during the project such as during requirements specification phase. Such challenges limit the ability of stakeholders to fully comprehend the impact and how it would affect the project deliverables. The other challenge is the lack of information and process leading to the business' inability to select appropriate IT application initiatives that reap the best Return On Investment (ROI), which only serves to weaken the ability of even the most effective organization to efficiently manage the trade-offs related to the constraint of time, budget, quality and scope in dynamic, change sensitive and distributed business environment (Borland, 2005).

The increased focus on the IT software projects to drive business values, should not come as a surprise. According to Borland International (2005), the challenges of modern day IT projects are centered on four common factors such as organizational chasms, gaps between roles, technical complexity of the project and distributed work environment. Builder (2002) believes that the success of IT projects is closely tied to the idea of tolerance. This means all the critical factors used to measure the project should have its own tolerance identified prior to the start of the project. There were several researches undertaken to understand the magnitude of the IT project failures, probable contributing factors and solutions to avoid such failures. One concise literature study by Jiang et al. (1996) produced a list of 13 success factors. The 13 success factors include clearly defined goals, competent project manager, top management support, competent project team members, sufficient resource allocation, adequate communication channels, project control and planning, feedback capabilities, responsiveness to clients, client consultation, technical tasks, client acceptance and trouble shooting. The scope of this research examines the influence of five independent factors namely; project management, requirements and risk management, organizational culture, management support and communication on the success of the IT project implementation.

Project Management

A survey conducted in 2003 by META Group Inc. indicated that 77% of respondents believed that lack of project and program management skills is a major information technology issue (Bigelow, 2004). The field of project management has only been recognized in the last thirty years as a science which could be defined, learnt and widely applied (Barnes, 2002). Project Management Institute (PMI, 2000) defines project management as the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the use of the processes such as: initiating, planning, executing, controlling and closing. According to Johnson (1999), project management is a process that spans the full life cycle of a project from inception to completion. Its cornerstone tenets are planning, execution, and control of all resources, tasks, and activities necessary to complete a project. The project manager should be able to inspire a shared vision, communicate with people at all levels in the project, demonstrate integrity by embracing ethical practices, lead with enthusiasm, display empathy towards the people of the project, display competence, delegate tasks, be cool under pressure, possess team building skills and have excellent problem solving skills (Barry, 2000).

Requirements and Risk Management

The planning and control of project scope is important to avoid higher costs and late delivery (Buttrick, 2000). Scope can be viewed as a boundary on what the project is responsible for achieving (Thomsett & Thomsett, 2000) and can be affected by a poorly controlled input of "good ideas" or "good intentions" (Buttrick, 2000). Requirements may be the most critical aspect of the IT project's development lifecycle. Studies point to a more than 60% failure rate for software projects in the United States, with poor requirements as one of the top five reasons (Martin, 2005). Studies also show a high percentage of project schedule overrun, with 80% due to creeping requirements (Martin, 2005). Risk management is a systematic way of identifying and analyzing or measuring potential risks within a project and then developing strategies to manage these risks. Staying on top of project risks will keep the project on track. As part of risk management, successful projects need to identify "concrete actions" that will avoid risks becoming problems (Kulik, 1997).

Organizational Culture

An organization with the culture of shared values and strong corporate identity is essential for an effective change paradigm (Rosario, 2000). Managing change is often more difficult and challenging in organizations with high stress environments, lack of education or training and high turnover. Cultural change involves understanding the entire paradigm shift of the organization and often, failure occurs most of the time in IT implementation projects when the management does not understand that they must change the business to work with the software or change the software to work like the business.

Management Support

Executive sponsorship of a project is vital for project success. Active sponsor participation has historically increased the probability of a project being on time, within budget, and meeting the business goals. According to Sommer (2003), there are three areas of sponsorship an IT project should have before moving forward - Technical Sponsorship, Business Sponsorship and Financial Sponsorship. Based on another research conducted by Lockett (2003) at thirty projects with a range of technologies in a large multinational company, he discovered that one of the major factors behind successful IT projects was the appointment of a project champion in a business function, combined with appropriate sponsorship. Thus a business champion, combined with a sponsor where appropriate, is the single most important factor for success (Lockett, 2003).

Communication

According to Elenbaas (2000), "projects are about communication, communication, communication". Kirksey (1990) found that one predictor of project success is when communications are kept honest and open between customer and vendor. The major indicator of project failure is when an IT project manager fails to correctly read warning signs that communication is breaking down. Essentially, effective communication within the team and with the project's internal and external stakeholders is crucial to the success of the project. Wixom (2001) argues that user participation and team skills are two of seven imperative implementation factors that determine project success or failure and these two are essentially communication skills.

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

To understand the factors influencing the success of IT project implementation, five independent variables namely; project management, requirements and risk management, organizational culture, management support and communication were selected for the purpose of this study. A theoretical framework was developed based on the literature reviews and is shown in Figure 1.

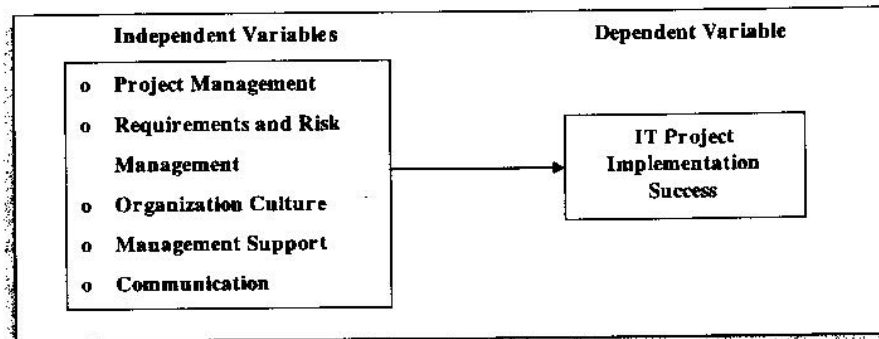


Figure - 1: Theoretical Framework

Based on the theoretical framework, the following five hypotheses were generated for this study which examines the influence of the project management, requirements and risk management, organizational culture, management support and communication on the success of IT project implementation.

Hypothesis I: Companies that use a well run project management program will achieve a higher level of success in their IT project implementation.

Hypothesis II: Companies that manage requirements and risk will have a higher probability of success in their IT project implementation.

Hypothesis III: Company culture that encourages or rewards learning will have a higher probability of success in their IT project implementation.

Hypothesis IV: Companies that have management level support will achieve a higher success rate in their IT project implementation.

Hypothesis V: Companies that emphasize effective communication methods and practices have higher level of success in their IT project implementation.

The survey questionnaire was administered to managerial and non-managerial staff of various organizations located in the Northern and Central part of West Malaysia. Primarily, the questionnaire was distributed through email. The sampling population was limited to three industries only namely manufacturing, banking and IT services companies. The questionnaire was developed from an earlier work by Tan (2004). The questionnaire was divided into four sections and the scoring method deployed was Likert's method. The collected data were then processed and analyzed by using SPSS software to test the relevance and validity of the data relating to the five hypotheses formulated. A small pilot test was conducted to examine the reliability of the questionnaire and also to validate if participants understood the questions in order to avoid errors thus improving the legitimacy of the data. A total of 10 responses were obtained and it was deemed sufficient to proceed (Saunders, Lewis, & Thornhill, 2000). Respondents' feedback were recorded and used to modify two questions. The final survey involved the administration of 140 questionnaires. These were distributed and collected electronically over a two weeks period. A total of 120 responses were received with a response rate of 86%.

SURVEY RESULTS

After the distribution of a total of 140 questionnaires via email and hardcopy handouts, 120 responses were received back. However, two out of these 120 responses were rejected because they were received from respondents outside the three industries covered by the survey. The remaining 118 sets were entered and analyzed using the Statistical Package for Social Sciences (SPSS) software. The survey respondents profile is shown in Table I, which indicates that most of survey respondents were almost evenly distributed between two industries namely Manufacturing companies (47.5%) and IT Services and Consulting firms (44.9%), followed by a small percentage from the banking or financial institutions (7.6%). The profile analysis also indicates that most of the participants were from the executive level (60.2%) followed by management (38.1%) and general workers (1.7%).

Table I. Respondents Profile Summary

| Variables | Categories | Frequency | Percentage |
|--------------------------------------|--|------------|-------------|
| Industry | Manufacturing | 56 | 47.5 |
| | Banking | 9 | 7.6 |
| | IT Services & Consulting | 53 | 44.9 |
| | Total | 118 | 100% |
| Position in the organization | Managerial Level (CEO, MD, Dept. Mgr., Asst. Mgr.) | 45 | 38.1 |
| | Staff (Executive, Officer, Supervisor, Technician) | 71 | 60.2 |
| | Workers (Data Entry Clerk, General Worker, Operator) | 2 | 1.7 |
| | Total | 118 | 100% |
| Role played in the last IT Project | Project Sponsor | 7 | 5.9 |
| | Project Manager | 23 | 19.5 |
| | Project Team | 64 | 54.3 |
| | System User | 19 | 16.1 |
| | Observer (Not involved in the project) | 5 | 4.2 |
| | Total | 118 | 100% |
| Project success measurement criteria | Only one of the four measurement criteria | 8 | 6.8 |
| | <i>Two of the four measurement criteria</i> | 18 | 15.3 |
| | <i>Three of the four measurement criteria</i> | 25 | 21.2 |
| | <i>All four of the measurement criteria</i> | 66 | 55.9 |
| | <i>None of the four measurement criteria</i> | 1 | 0.8 |
| | Total | 118 | 100% |
| Was the IT project successful | Yes | 97 | 82.2 |
| | No | 3 | 2.5 |
| | Not Sure | 18 | 15.3 |
| | Total | 118 | 100% |

More than half of the respondents have been part of the project team (54.3%). This was followed by respondents who held the position of project manager (19.5%), system users (16.1%), project sponsor (5.9%) and observers (4.2%) who were not involved in the project. The survey response indicates that more than half of the organizations used all the four project measurement criteria (55.9%), 21.2% of the organization's used at least three of the measurements, 15.3% used two of the measurement criteria, 6.8% used one of the measurement criteria and 0.8% indicated that none of the measurements were used to gauge the projects success. In terms of the success of IT project implementations, an overwhelming 82.2% of the respondents claim that the IT projects they were involved in were successful, 2.5% claim that the projects failed and 15.3% of the respondents were not sure whether the projects were successful. The number of respondents who felt that the IT project in their organization failed was not sure whether it was successful or not. These respondents were 17% of the sampled population.

The reliability analysis was used to test the stability and consistency for the research instrument to measure the concept as stated in the theoretical framework. The summary of the Cronbach's Alpha reliability coefficients readings and number of items for each dependent and independent variables is shown in Table II.

Table II. Summary of Reliability Analysis

| Variables | Number of Items | Cronbach's Alpha |
|----------------------------------|------------------------|-------------------------|
| Success of IT Projects | 7 | 0.639 |
| Management Support | 4 | 0.762 |
| Requirements and Risk Management | 4 | 0.792 |
| Organizational Culture | 4 | 0.811 |
| Project Management | 4 | 0.778 |
| Communication | 4 | 0.845 |

The results of Cronbach's Alpha value range from 0.639 to 0.845. All the five independent variables recorded Cronbach's Alpha of more than 0.75 which indicates that the internal consistency reliability coefficient for all the independent measures of the study were statistically consistent, valid and reliable. Although the dependent variable recorded the lowest Cronbach's Alpha value of 0.639, it is still considered to be reliable as it is above the 0.5 benchmark value that has been set for this research. It should be noted that none of the items were deleted to improve the Cronbach's coefficient. Thus, it can be concluded that the measures for both dependent and independent variables are statistically reliable.

Multiple Regression Analysis was used to examine the relationship between the independent and dependent variables. The five independent variables in this study are Management Support, Requirements and Risk Management, Project Management, Organizational Culture and Communication. Meanwhile, the dependent variable in this study was Success of IT Project Implementations. Durbin-Watson reading was used to check for evidence of existence of a first-order auto-correlation. The acceptable range for Durbin-Watson reading is 1.5 to 2.5. In the model developed for this study, the Durbin-Watson reading was 1.932 which is within the acceptable limits. Therefore, there were no autocorrelation problems in the data which indicated that the data were keyed in as per the received survey questionnaire.

Table III. Summary of Multiple Regression

| Variables | Beta | t-value | Sig |
|----------------------------------|--------------|----------------|------------|
| Management Support | 0.346 | 4.384 | 0.000 |
| Requirements and Risk Management | 0.144 | 1.658 | 0.100 |
| Organizational Culture | 0.012 | 0.159 | 0.874 |
| Project Management | 0.207 | 2.468 | 0.015 |
| Communication | 0.219 | 2.418 | 0.017 |
| Durbin Watson | 1.932 | | |

The multiple Regression tabulation shows that the management support is highly significant with respect to the success of IT projects at significance level of 0.000. This supports the fourth hypothesis that states "Companies that have management level support will achieve a higher success rate in the IT project implementations". Meanwhile, project management and communication are found to have a significance level of 0.015 and 0.017 respectively. This indicates that the first and fifth hypotheses are also accepted since the significance level is below 0.05. However, the test also shows that the organization culture and requirements and risk management are not significant to the success of the IT projects with a level of 0.874 and 0.1 respectively.

IMPLICATIONS OF THE FINDINGS

The findings of this research confirm that all five hypotheses have positive correlation. The study further proves that three of the five hypotheses namely Management Support, Project Management and Communication significantly influence the success of the IT projects; while the other two hypotheses – Organization Culture and Requirements and Risk Management have no influence of the success of the IT projects in Malaysia. The research has shown that the research model underpinning the theoretical framework has been found to be adequate and valid.

The research survey shows that management support has significant effect on the success of IT projects resulting in the Hypothesis IV being accepted. This finding is supported by the literature reviews such as international survey conducted by Standish Group and Jiang's research (1996). Additionally, authors such as Thomsett (2000), Lockett (2003), and Keever (2005) stress the importance of the role played by the management team in enhancing the success rate of IT projects. This factor plays an equally important role in Malaysian industry as the general tendency for the employees to seek guidance and directions from the management.

One of the surprises from the survey findings is that 'Requirements and Risk Management' does not have any relations to the success of IT project implementation, thus leading to the rejection of the Hypothesis II. This contradicts the studies by various authors such as Kulik (1997), Thomsett (2000), Buttrick (2000), and Martin (2005). Literature review indicates that this is one of the critical factors that determine the success of the project and almost 60% of the projects in the US fail owing to lack of proper requirements and risk management. This is a significant finding and the probable reason for such findings could be attributed to two reasons. The first reason could be due to the lack of thorough understanding of the risk factor and its practice in organizations. 'Risk planning and mitigation' has been gaining popularity in the US and Europe only in the later half of the last decade and is not widely practiced in IT projects executed in Malaysia. The second reason could be attributed to the questionnaire itself. The results could have been different if the single influencing factor were to be broken into two separate factors namely 'Requirements Management' and 'Risk Management'. This finding could likely become a controversial finding of this study and could certainly be an area that needs to be investigated further. The relationship between Project Management and success of IT projects has been proven by the study to be in line with the findings of the literature reviews leading to the acceptance of Hypothesis I. The survey findings support the previous international survey findings such as the Standish Report and Jiang's research among others. This means that the project manager plays a significant role and project management is one of the critical factors in determining the success of IT projects.

It is found that there is no relationship between the organizational culture and success of the IT projects leading to the rejection of Hypothesis III. These findings contradict the work done by previous authors in this field such as Thomsett (2000), Buttrick (2000), and Sommer (2003). The findings could probably be related to the learning organization culture which is still not widely practiced in Malaysia. An organization that is open to continuous learning and challenges is defined as a "learning organization" (Senge, 1994). However, this culture is still far fetched in Malaysian context primarily because employee empowerment itself has a long way to go in Malaysian based companies. Much of the decision making still resides in the realm of middle and senior management and there are no signs of letting up. As such, this factor may not be reflective of the literature findings based on western culture. The significant relationship between communication and successful IT implementations was demonstrated through this study leading to the acceptance of Hypothesis V. It also further supports the literatures authored by Kirksey (1990), Allen (1997), Elanbaas (2000), and Wixom (2001). In fact, there are studies that claim that the job of project manager is 90% communication and only 10% management. This research conclusively shows that communication is a key contributor to the success of IT projects in Malaysia.

The implication of this study sheds light in a number of areas that need to be focused on while pursuing IT projects especially with the extensive MSC initiatives undertaken by Malaysian government under the ninth Malaysia plan. The result of this study stressed the importance of strong management support, effective project management and communication as the fundamental building blocks to successful IT project implementations. In order to improve the success rate of IT project implementations, senior management needs to actively participate in the project not only at the beginning but also throughout the project lifecycle. Project Managers have played a pivotal role in the success of IT projects. An effective Project Manager is said to be not only a good planner and executioner but also an excellent communicator since their role involves primarily as the interface between the project stakeholders, besides handling the schedules and day to day project operational issues.

There were several limitations experienced while conducting the research. This research was mainly conducted based on the challenges and success factors reported by the IT projects in the West with the knowledge that these problems will trickle down to Asia. Similar effects have been observed in other high technology knowledge transfers to the East from Western world. The main resource used to support this research was through online research articles, journals and PMI recommended texts. However, the study can be improved as demonstrated by the R square value of 0.597 which indicates that there are other important factors that influence the success of IT project implementations. These other factors have not been considered in this study. Future researchers interested in pursuing research in this area may incorporate the quality aspect of the project such as quality measurement matrix, quality acceptance standards for software development and software bugs or defects and the relevant measurement matrix. The various project implementation methodology available such as phased or waterfall implementation versus big bang approach could have varying implications depending on the industry type, risk tolerance and size of the organization and not to mention the type of IT implementation.

CONCLUSION

This research provided the unique opportunity to learn from other successful IT project implementations and use it to improve the success of the IT projects to be undertaken under the MSC initiative. It is hoped that this study will pave the way for the creation of best practices for the IT project implementation in the Malaysian context. The results of the research reveal that Management Support, Project Management and Communication are factors that have significant influence on the success of the IT project implementations. Thus, organization should ensure that senior management team is an integral part of the implementation project throughout the project lifecycle. Care should also be taken in the appointment of Project Manager as it can influence the success of the project. Appointing a Project Manager who has similar project experience along with the necessary soft skills is

an essential component to an effective project leadership. It can be concluded that successful IT projects are strongly influenced by the involvement of the management team and the appointment of a capable and experienced Project Manager. Ensuring open and clear communication of the project objective and its significance to the organization is essential in bringing everyone together to support the project initiative. Improved success rate of IT projects will help organization in realizing better returns on their IT project investments. Recognizing that employees, management and communication form an integral part of the IT project's success besides the process, tools and methodology is essential for ensuring a successful project execution.

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