

# Critical Success Factors for IS Project Implementation in Malaysian Institutions of Higher Learning

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**Abstract**— What do Information System (IS) project managers consider as critical success factors (CSFs) in IS project implementation? Project implementation is a complex process which requires simultaneous attention to a variety of factors – people, technology and processes. To determine whether a project is a success or a failure, one needs to know what are the important criteria of a project implementation in the eyes of the stakeholders. For this study, we are identifying the CSFs from a project manager's view. This study tries to identify which processes, people, tools and environment factors do experienced project managers regard as CSFs for IS projects implementation. Lessons learnt from these experienced project managers provide an important framework for establishing a sense of IS project implementation success, so that others can learn and take the necessary steps. This study is far from being exhaustive, but it can contribute to project managers by identifying and establishing the CSFs for IS project implementation, as there are not many studies concerning this being carried out for Malaysian Institution of Higher Learning (IHL).

**Keywords**— Critical Success Factors, CSFs, IS, Information System Project Implementation, CMMI, Project Manager, Project Management, IHL, Malaysia

## I. INTRODUCTION

In [1], a project is defined as a complex, non-routine, one-time effort limited by time, budget, resources, and performance specifications design to meet customer needs.

Project implementation is a complex process, requiring simultaneous attention to a variety of human, technical and other factors such as project processes and environment. A typical project manager is often made responsible for projects outcomes, success or failure, without the right or required authority, budget, people, or/and tools. If knowledge and experience, in the form of lesson learnt, can be identified and documented as critical success factors (CSFs) and best practices by experienced project managers, other project managers can learn and be guided to do the right things and then to do them right. Organizations that are implementing IS projects must pay early attention to each of these CSFs and take necessary steps to ensure IS project implementation are successful. However, the CSFs and best practices are often listed in very general terms.

For this study, we have come out with suggestions on CSFs for project management processes such as: all project deliverables must get management approval before proceeding to the next phase; business and user requirements are developed together with customers; project scope and product change need management approval; project goals and objectives are aligned to organizational goals/objectives; the design of the system is thoroughly discussed, documented and approved by key stakeholders.

For the people-related CSFs, we have come out with a few suggestions include: the good characteristics of project manager; commitment, active participation and support from top management, customers, stakeholders and vendors/partners; and competency of project team members.

Project managers can make use of different tools in order to manage their projects effectively and efficiently. Without the needed tools, it is a challenge for project managers to focus on important areas, and to set different priorities across different project elements. These tools include standard office tools, development tools and project management tools. The use of these tools may lead to better chance of project success.

For project environment, we have come out with some CSFs which cover the physical, organizational and social environment issues. Examples are: organizational policies; sufficient project office workspace; early establishment and communication on project team charter, commitment in team values throughout project life cycle, resolution and tolerance for conflict, interpersonal relationships among stakeholders and project team members.

In evaluating CSFs for IS implementation success, we have adopted an IS success model used in [2]. Figure i contain the list of categories in the form of a fishbone diagram. The organization of the fishbone diagram, however, does not imply any ordered importance of the success factors.

In this paper, we aim to know what are the factors identified as critical for a successful IS project implementation from the experienced IS project managers' perspective, so that others can learn and be guided to do the right things and then to do them right. The research questionnaire was designed to have a view of the IS project implementation in the Malaysian Institution of Higher Learning (IHL) involving project processes, people, tools and environment.

The rest of the paper is organized as follows; next, we will look at the Literature Review and our research model, followed by our research objectives. This is then followed by the research section, with the research methodology and analysis and findings, and lastly, the conclusion section.

#### A. Literature Review

There are many ways to measure success or failure, but there is no clear dividing line identifying the two. It is almost impossible to find agreement about whether a project succeeded or failed [3]. It may be useful to view them as being subjective judgments when trying to make sense of the ambiguity of notions of success and failure [3].

Anyway, before we attempt to discuss the critical factors of a successful project, it is important to describe just what is meant by a “successful” project. This is in line with what is proposed in [3], if project managers want to succeed, they first should find out how stakeholders define success.

Project implementation success has been defined in many ways and to include a large variety of criteria. For example, in the 1960s, project success was measured entirely in technical terms: either the product worked or it did not [4]. According to this article, in the late 1980s, that was after the introduction of Total Quality Management (TQM), a project was considered to be a success by not only meeting the internal performance measures of time, cost and technical specifications but also making sure that the project: is accepted by the customer; and resulted in customers allowing the contractor to use them as a reference [4]. This version of definition of project success is more complete and embraces a quality dimension in it, but it is also harder to achieve for many project managers. However, it is interesting to note that many articles and books on project success written by practitioners claim that when projects are completed, only one or a few of these five objectives are met and the objective that the project manager focuses on the most is the one that he/she usually meets[4].

Based on [5], in its simplest terms, project success can be thought of as incorporating four basic facets. A project is generally considered as a successful implementation if it:

- Comes in on-schedule
- Comes in on-budget
- Achieves basically all the goals originally set for it
- Is accepted and used by the clients for whom the project is intended

According to [3], many factors have contributed to the dismal of IT project track record, but none is more to blame than a lack of leadership. Accordingly, the author argued that an aspiring project manager will not succeed without leadership ability. This leadership ability, according to him includes but not limited to: the ability to communicate with people, deal with people, create and sustain relationships and have ability to organize.

The 2006 CHAOS study cited that top management support is the one most common success factors when implementing IS projects [11]. In relation to this, in [3], it was suggested that project managers must prepare a political game plan for

managing important sponsors, stakeholders and constituents to mitigate project derailment. When difficulties arise, top management is in the best position to help the project team deal with them effectively [6]. Top management support is normally in the form of providing sufficient resources for the success of the project, sharing responsibilities with project team, communicating with project team authorities and responsibilities and supporting the project team in times of crisis or at unexpected situations.[7]

In [8], top-management support and full user involvement has been found to be the top identified critical success factors. Full involvement of the end-users right through the project is critical for a successful project [11]. In [8], the author suggested that a project manager should be customer focused throughout the implementation of the project.

Personnel for the project team are often chosen with less-than-full regard for their skills necessary to actively contribute to project implementation success. In [5], the Technical Tasks which were defined are the necessity of not only having the necessary personnel for the implementation team, but ensuring that they possess the necessary technical skills and have adequate technology to perform their tasks.

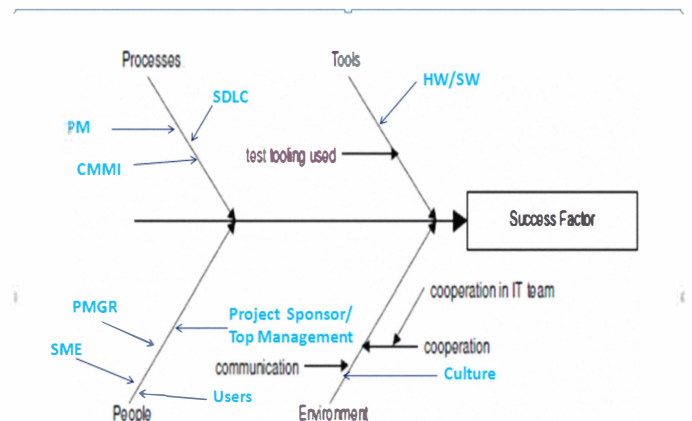
In [6], many project managers of successful projects stressed the importance of investigating the underlying processes, apart from proper and detailed planning and allocating appropriate human and financial resources.

According to [9], external environment is one of the groups, together with project, project manager, project team and organization which were identified as critical success factors.

If the CSFs of processes, people, tools and environment for IS project implementation can be identified, we believe that a project manager will be able to effectively deal with the many demands required by his/her job, thus channeling his/her energy more efficiently in his/her attempt to successfully implement the project under development [5].

#### B. Research Model

##### Fishbone diagram containing project characteristics



**Figure i:** Fishbone diagram containing project factors critical for project implementation success.

## II. OBJECTIVES

The objectives of this case study are as follows:

- To obtain a better understanding of critical success factors of Information System (IS) project implementation in Malaysian IHL.
- To establish the knowledge and experience, in the form of lesson learnt, critical success factors (CSFs) and best practices, which enable project managers to learn and be guided to do the right things and then to do them right in IS project implementation.

## III. THE RESEARCH

This study is part of a bigger study being conducted by the MIT students of KICT, IIUM. It focuses on the IHL in Malaysia. A research has been initiated with the following methodology, data analysis and findings:

### C. Methodology

The nature of this research is exploratory because, while there is plenty of literature on critical success factors of IS/IT implementation, little work has been done on Malaysian IHL scenario. Following a review of critical success factors in IS/IT implementation in literatures, a questionnaire was developed to further probe on these. This evolved into a number of questions about the processes, people, tools and environments deployed in projects, together with questions about the project management methodology used and demographic questions regarding the experience of the respondents. In obtaining perceptions of the Malaysian IHL community, 40 questionnaires were distributed to the IS project managers of institutions of higher learning in Malaysia by hand and through e-mails. The questionnaire mostly consists of closed-ended questions; with a few open ended ones.

#### 1) Sampling & Data Collection

This study utilized questionnaire-based survey for data collection using both close-ended questions and open-ended questions. The population of this sample consists of 22 IT project managers from different higher learning institutions in Malaysia. This population was chosen because of the vicinity of their experience in IS project management. 40 questionnaires were distributed to the selected correspondents. 32 valid and usable questionnaires were returned with the response rate of 80 percent.

#### 2) Instruments & Data Measurement

The instruments were constructed into two sections with demographic and project success criteria consisting of processes, people, tools and environment, with multiple types of scales. All the items in the instruments were developed and adapted based on several literature reviews on critical success factors on IS/IT implementation domain. Table I summarized the project success criteria constructs' definitions and the scale used.

TABLE I  
Summary of Constructs and Definitions

| Construct          | Definition   | Scale                                    | References |
|--------------------|--|--|------------|
| Critical processes | Indicate the critical processes factors in IS implementation as perceived by the project managers in Malaysian institutions of higher learning   | 14 items with Yes, No and Not Sure scale |            |
| People             | Indicate the critical people factors in IS implementation as perceived by the project managers in Malaysian institutions of higher learning      | 6 items with Yes, No and Not Sure scale  |            |
| Tools              | Indicate the critical tools factors in IS implementation as perceived by the project managers in Malaysian institutions of higher learning       | 3 items with Yes, No and Not Sure scale  |            |
| Environment        | Indicate the critical environment factors in IS implementation as perceived by the project managers in Malaysian institutions of higher learning | 6 items with Yes, No and Not Sure scale  |            |

#### 3) Statistical Analysis

As for data analysis, the questionnaires are being analyzed by using frequency method. The quantitative calculation is simple, the results will only show the value and the percentage.

### D. Analysis & Findings

#### 1) Demographic Characteristics

Table II refers to the demographic information on the respondents. The questionnaires were distributed to IS project managers in education sectors, covering universities and colleges in Malaysia by hands and via e-mails.

TABLE II  
Demographic Information

| Measure  | Item       | Results (%)         |
|--|------------|---------------------|
| Length of service in ICT industry                            | 3 years    | 13                  |
|  | 5 years    | 21                  |
|  | 7 years    | 30                  |
|  | > 7 years  | 36                  |
| Experience as Project Managers                               | < 3 years  | 80                  |
|  | > 3 years  | 20                  |
| Number of successful projects handled?                       | Open-ended | Least: 1<br>Most: 7 |
| Were you formally trained in Project Management methodology? | N          | 40                  |
|  | Y          | 60                  |

## CMMI Declared Organizations

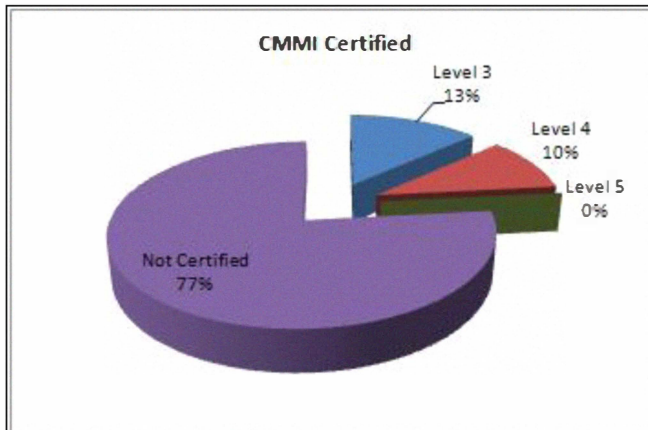


Figure 1: CMMI Declared Organizations

Figure 1 above shows the organizations involved are CMMI-declared or not. Based on the pie chart, the 77% of the institutions whose respondents were involved in this survey is not CMMI-declared organization. and no level 5 certification. There are 13% of CMMI-Level 3 organizations, 10 % of CMMI-Level 4 and none at CMMI-Level 5.

## Project Management Methodology

The most popular project methodology used, which is 52%, is based on a combination of in-house/custom plus a combination of different methodology. However, further investigation should be carried out to find out whether these in-house/custom methodologies were based, in whole or in part, on one or the other of the mainstream methodologies.

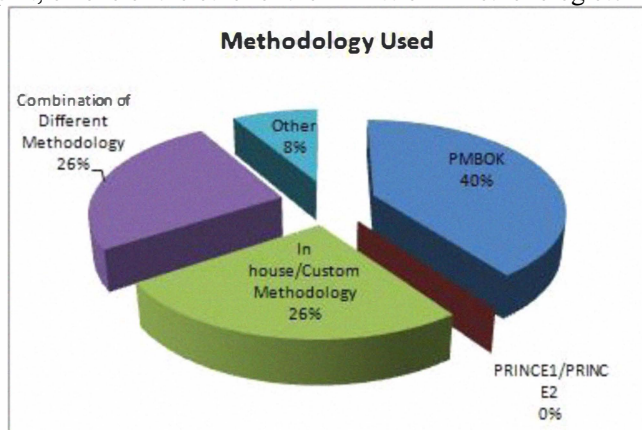


Figure 2: Methodology Used

40% of the respondents used PMBOK methodology with 40 percent, 26% used a combination of different methodology, 26% used in house/custom methodology, 8% used other methodology and none is using PRINCE.

## Project Development Methodology Software

Figure 3 shows the breakdown of the software development methodology used. Waterfall model is the highest with 31%, RAD 29%, Prototyping 25%, Agile 11% and other methodologies with 4%. None of the respondent uses Extreme, Spiral, Cleanroom or Incremental software development methodology.

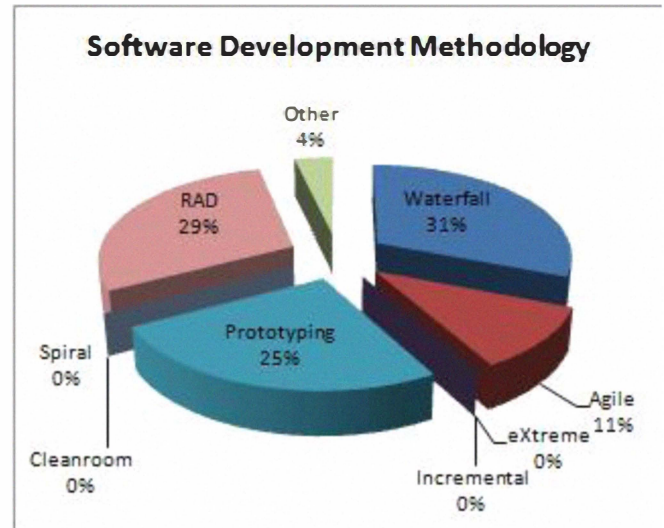


Figure 3: Software Development Methodology

## Knowledge Area Project Management

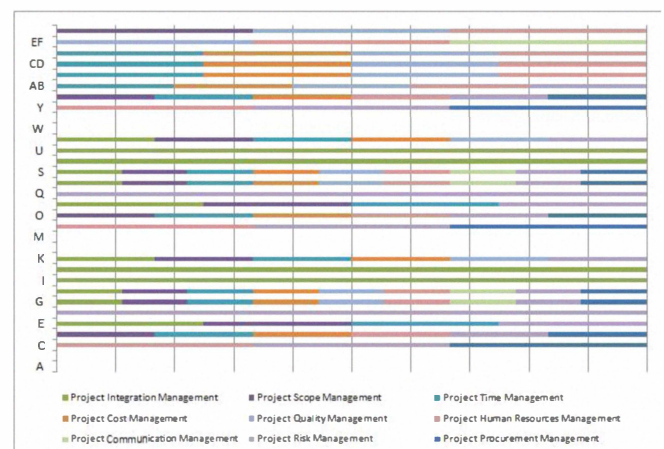


Figure 4: Knowledge Area of Project Management

16% of respondents did not specify any knowledge areas, 11% uses all of the knowledge areas, and the rest, uses at least 1 area of PMBOK. We can observed from the responses that project managers with more experience in project management, tend to use more of these knowledge areas of project management.

## 2) Critical Success Factors

In the second section of the survey, the respondents were asked 14 questions which relate to their perception towards



the processes which they perceived as critical in the IS implementation success. The questionnaire asked the project managers to indicate whether they consider the processes listed as critical to the success of a project.

In Table III, the percentage of the respondents who think that the listed process is critical to the project implementation success is shown.

TABLE III  
Processes perceived as critical

| Processes   | Yes % | No % | Not Sure % |
|---|-------|------|------------|
| All stages must get approval before going to the next stage   | 100   |      |            |
| The project plan included all the required phases of conceptualize and initialize project, develop project plan and charter, execute and control project, close project, and evaluate project   | 100   |      |            |
| The project team has an established project plan  | 93.75 |      | 6.25       |
| The project plan was followed and any deviations documented, including extensions of the schedule   | 81.25 |      | 15.62      |
| The business case for the system was documented   | 78.12 |      | 9.37       |
| A business justification has been generated and approved by the client management   | 90.62 | 6.25 | 3.12       |
| SLDC include all planning, analysis, design, coding, testing and implementation   | 93.75 |      | 6.25       |
| Detail user requirements have been developed and documented   | 90.62 | 6.25 | 3.12       |
| The design of the system is thoroughly documented   | 100   |      |            |
| Change management including training plan was developed and documented  | 75    | 6.25 |            |
| A test plan focus on <ul style="list-style-type: none"> <li>Unit testing (e.g functionality, and/ or structure)</li> <li>Integration testing (e.g functions, module, programs, objects, etc)</li> <li>System testing (e.g verify usability, performance, stress, compatibility, and documentation)</li> <li>Acceptant testing (e.g align to organization and project objectives)</li> </ul> | 18.75 |      |            |
| There is a post implementation support including  | 96.87 |      | 3.12       |

|   |       |      |      |
|---|-------|------|------|
| problem resolution scheme in place  |       |      |      |
| All software required for the successful implementation has been documented and baselined | 90.62 | 6.25 | 3.12 |
| There is a backup /contingency plan documented  | 81.25 | 6.25 | 12.5 |

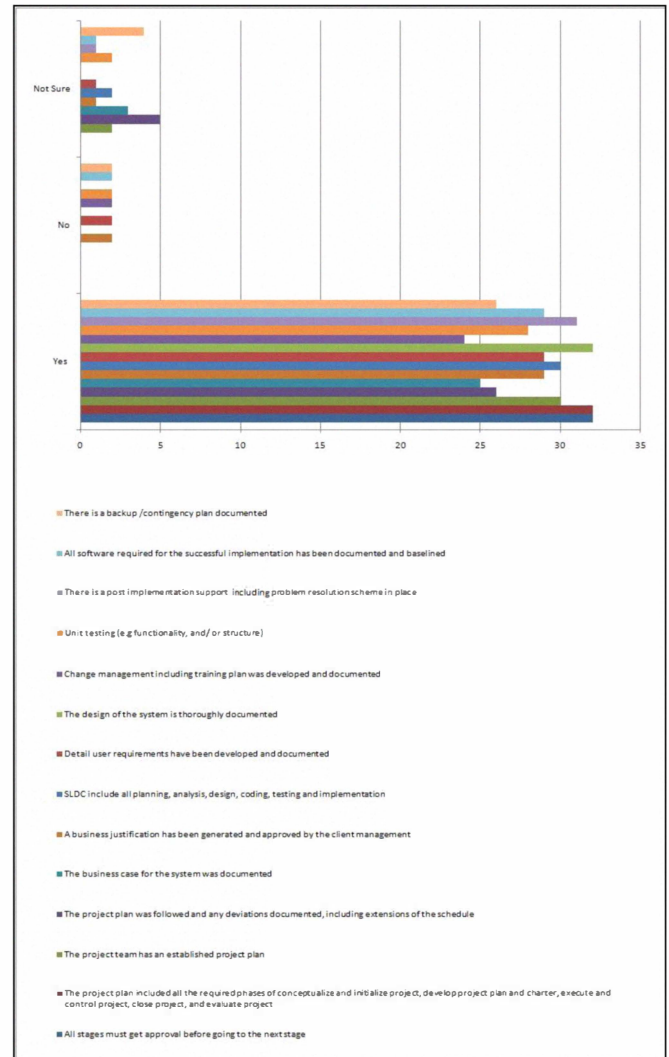


Figure 5: Processes

Most of the respondents believe that, all major project stages must get approval before going to the next stage. The project plan included all the required phases covering conceptualize and initialize project, develop project plan and charter, execute and control project, close project, and evaluate project and the development of the system is thoroughly documented.

Next, the project managers are asked to indicate whether they consider the five (5) listed factors related to people are critical to the success of a project.

TABLE IV  
People perceived as critical

| People   | Yes % | No % | Not Sure % |
|--|-------|------|------------|
| Project Manager has good characteristic (communicate with people, deal with people, create and sustain relationships and have ability to organize) | 100   |      |            |
| Project has Top Management support & commitment  | 93.75 |      | 6.25       |
| Customers (internal / external) fully involve in the project   | 68.75 | 12.5 | 18.75      |
| Stakeholders understand and committed with their roles and responsibilities towards achieving projects goals and objectives.                       | 78.12 |      | 21.87      |
| Project team members must be technically competent   | 96.87 |      | 3.12       |

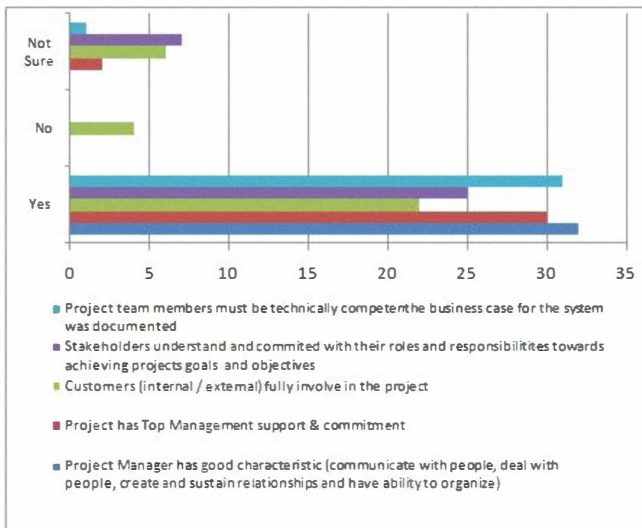


Figure 6: People

100% respondents agree that a Project Manager must have good characteristic (communicate with people, deal with people, create and sustain relationships and have ability to organize). 97% of the respondents agree that project team members must be technically competent. 94% agree that project must have Top Management support and

commitment. 78% agree that stakeholders must understand and committed with their roles and responsibilities towards achieving projects goals and objectives. Finally, 69% agree that customers (internal / external) must be involved fully in the project.

There are 3 questions asked about the project tools. The respondents are asked to indicate whether they consider the project tools listed are critical to the success of a project or not.

TABLE V  
Project Tools perceived as critical

| Project Tools (Hardware and Software)               | Yes % | No %  | Not Sure % |
|---|-------|-------|------------|
| Common / standard office tools are used             | 81.25 | 6.25  | 12.5       |
| Common / standard development tools are used        | 81.25 | 6.25  | 12.5       |
| Common / standard project management tools are used | 68.75 | 18.75 | 12.5       |

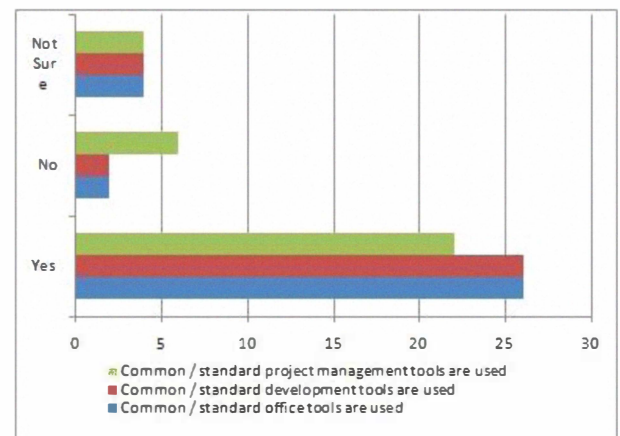


Figure 7: Tools

In Project Tools, 81% of the respondents used common/standard office tools as well development tools. 69.% of the respondents used common/standard project management tool.

The last section is on the project environment. There are six (6) questions in this section. The respondents are asked to indicate whether they consider the project environments factors listed are critical to the success of a project.

TABLE VI  
Project Environment factors perceived as critical

| Project Environment  | Yes % | No %  | Not Sure % |
|--|-------|-------|------------|
| Management provides sufficient project office for the project  | 93.75 | 6.25  |            |
| Organizational policies and practices facilitate project delivery  | 87.5  |       | 12.5       |
| Sound interpersonal relationships among stakeholders   | 81.25 | 3.12  | 15.62      |
| Stakeholders' commitment in team values throughout the project life cycle (trust, work hard, team comitment, result oriented, add values to customers) | 87.5  | 6.25  | 6.25       |
| Tolerance for conflict among stakeholders  | 50    | 28.12 | 21.87      |
| Project team members must have sound interpersonal skills  | 93.75 | 6.25  |            |

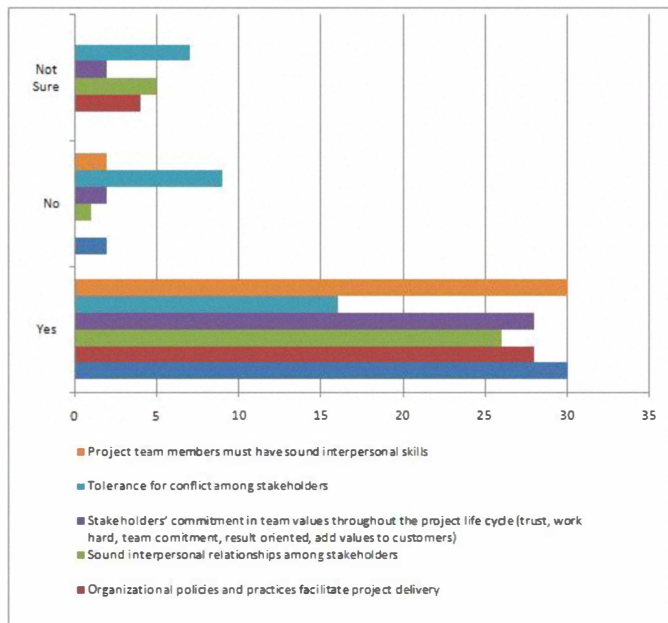


Figure 8: Project Environment

94% of the respondents agree that the “Management must provide sufficient project office for the project” as well as “Project team members must have sound interpersonal skills”. 88% agree that “Organizational policies and practices facilitate project delivery” and “Stakeholders’ commitment in team values throughout the project life cycle (trust, work hard,

team commitment, result oriented, add values to customers)”. 81% agree that “Project team members must have sound interpersonal skills”. 50% agree on “Tolerance for conflict among stakeholders”

In general, we observe that the more experienced project managers having managing several successful projects, they are more prone to think that the factors that we have listed are critical for project implementation success. The “Not Sure” answers were generally given by project managers with less experience and having managed 1 or 2 successful projects.

#### IV. CONCLUSIONS

The IS project implementation process is complex, usually requiring simultaneous attention to a wide variety of factors – technical and non-technical. This kind of study is significant as there are not many studies being carried out in the Malaysian IHL context. Although this study is far from being exhaustive, we hope this study provides the CSFs of Information System (IS) project implementation in Malaysian IHL. This study helps establishing the knowledge and experience, in the form of lesson learnt, critical success factors (CSFs) and best practices, which enable project managers to learn and be guided to do the right things and then to do them right in IS project implementation.

However, there are some limitations in this study as the population of the respondents was only 30. In order to get more accurate result, the questionnaires should be distributed to a bigger population of respondents who are experienced IS project managers. Also, about half of the questionnaires were distributed via e-mails to respondents. Some of the “Not Sure” answers might be due to respondents not understanding the meaning of the term used.

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