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# SUCCESS FACTORS TO SYSTEMS INTEGRATION IMPLEMENTATION: MORE TECHNICALLY ORIENTED THAN HUMAN RELATED

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***ABSTRACT***

*This paper is written based on the findings of a survey conducted in the Malaysian public sector IT community. The paper starts with a definition of systems integration and then briefly describes how the study was conducted. This is followed with an explanation of the research questions and a thorough examination on the findings of the survey. The data gathered were used to determine the most critical success factors of systems integration implementation. We conclude the paper by saying that non-technical factors have a stronger influence on the success of systems integration implementation.*

***Keywords:*** ***Systems integration, Success factors and IT in the public sector***

## 1.0 INTRODUCTION

To those who are involved in IT, systems integration has been one of the hottest buzzwords in the past years. Researchers and practitioners differ in their definition of systems integration; but everyone agrees that systems integration is difficult and complicated, yet, **not** impossible. Integration is simply defined in a dictionary as *make whole or complete by bringing together parts* [1]. Systems integration means different things to different category of people. Khun [2] defines systems integration as the practice of joining the functions of a set of subsystems, software or hardware, to result in a single unified system that supports the requirements of an organisation. Another definition of systems integration is given as:

> *Systems integration is the assembling of various hardware (such as computers and telecommunication systems), software (such as accounting, desktop publishing and personnel management) and human interfaces to accomplish a specific goal. Often some unique software bridge is developed to bring together diverse hardware/software elements in order to allow the entire configuration in question to accomplish its intended task* [3].

## 2.0 THE SURVEY

Data gathering through a survey was chosen because it is a quick way to gather data from a large number of organisations. Pervan and Klasss [4] recommended that surveys could provide a rich base of numerical data and are often used in association with other research approaches. Furthermore, surveys act as a standalone research methodology to test hypotheses via the information gathered in the questionnaire. In addition to the survey, telephone interviews were also conducted to seek clarification on the answers given by the respondents.

### 2.1 Participating Organisations

Questionnaires were sent out to EDP managers of all the 69 government agencies within the Klang valley. This exercise was closely monitored. 40 government agencies responded and thus a response rate of 57.9% was achieved. Supporting data was obtained from the Manpower Administrative Modernization Planning Unit (MAMPU), which they have gathered through a survey, conducted during the conceptualisation of the electronic government project.

### 2.2 Methodology

The organisations selected are situated in the Klang valley and are utilising computers in their daily operations. The respondents were ensured of the confidentiality of the information given. The questionnaires were posted to all the 69 government agencies and after a grace period of three weeks, the answers started to come in. The results obtained were summarised using the statistical software package SPSS Version 8. Some of the data was collected using a Likert scale, and the mean, standard deviation and variance were computed. The Likert scale used was from 1 (weakest) to 5 (Strongest), and therefore, factors with mean value above 3 are considered important.

Given the fact that most information systems have been developed and maintained in-house, the IT personnel in the public sector are technically prepared to undertake the responsibility of implementing systems integration. The National Registration Information Systems, Cops-online, Immigration System, and the Election Registration Information System, are among a few of the testimonies supporting this claim. Whatever the technical challenges posed by systems integration at the actual development level can be dealt with by the IT personnel in the public sector. The next question is: what are the critical success factors? Are they more technical or non-technical factors? Hence, the following hypothesis was formulated:

> H1. *Success factors to systems integration implementation are more technically oriented than human related.*

## 3.0 FACTORS THAT WILL CONTRIBUTE TOWARDS THE SUCCESS OF SYSTEMS INTEGRATION IMPLEMENTATION

The respondents were asked what are the factors that will contribute towards the success of systems integration implementation. Their answers are summarised in Table 1.

The respondents gave 21 factors that will contribute towards the success of systems integration implementation. All these factors have a mean value of above 3. We have chosen to elaborate only the top five most important factors given in the order of significance. These factors are:

1. *Support from top management*
2. *Directive from top leadership*
3. *Appointment of a team that can manage inter-departmental projects*
4. *Establish inter-departmental coordination*
5. *Complete change in work culture*

The above result is compared with that derived by the CTG's study [5]. Critical success factors for the public sector integrated information systems are well known but are not easily achieved. The study showed that the most important success factors for inter-governmental systems are:

1. Top management support
2. Clear purpose
3. Committed stakeholders
4. Realistic cost and benefit measures

We shall now examine the five most significant success factors chosen by our respondents. A follow up telephone interview reveals the following explanations.

Table 1: Factors that will contribute to the success of systems integration implementation

| Factors | Mean | Std. Dev. | Median |
|---|---|---|---|
| **1.** Support from top management | 4.703 | .702 | 5 |
| **2.** Directive from top leadership | 4.378 | .828 | 5 |
| **3.** Appointment of a team that can manage inter-departmental projects | 4.368 | .913 | 5 |
| **4.** Establish inter-departmental coordination | 4.342 | .878 | 5 |
| **5.** Complete change in work culture | 3.889 | 1.063 | 4 |
| **6.** Ensure sufficient measures are taken on data confidentiality and security | 3.842 | 1.053 | 4 |
| **7.** Outsourcing to overcome the problem of insufficient IT personnel | 3.816 | 1.036 | 4 |
| **8.** Implementation of electronic government | 3.757 | .983 | 4 |
| **9.** Setting up of an infrastructure such as the multimedia supercorridor | 3.750 | 1.052 | 4 |
| **10.** Achieve agreement on priorities amongst participating organisation | 3.684 | .962 | 4 |
| **11.** Achieve agreement on data ownership and access | 3.676 | .973 | 4 |
| **12.** Open system concept | 3.639 | 1.099 | 4 |
| **13.** Formation of a neutral body that will act as a mediator amongst participating organisations | 3.611 | 1.248 | 4 |
| **14.** The availability of appropriate tools to assist in development activities | 3.595 | 1.142 | 4 |
| **15.** Paperless environment | 3.389 | 1.178 | 4 |
| **16.** Utilising new system development methodology - such as Object oriented approach | 3.351 | 1.086 | 4 |
| **17.** Vendors' efforts to introduce new hardware and software relevant to systems integration | 3.270 | 1.045 | 3 |
| **18.** Electronic Data Interchange | 3.265 | .864 | 3 |
| **19.** Agreement on project cost sharing amongst participating organisations | 3.162 | 1.068 | 3 |
| **20.** Complete change in leadership trend | 3.139 | 1.073 | 3 |
| **21.** Corporatisation | 2.735 | 1.214 | 3 |

*1. Support from top management support*

In the Malaysian public sector, new innovations to improve business processes are implemented in a top-down manner. Top executives make strategic decisions and lower-level executives carry out implementations of these ideas when directives are given. For an innovation that originates from the bottom of the hierarchy to be fully implemented, will require a lot of explanations, campaigning and convincing efforts from the proposer or the originator.

As an example, in the case of systems integration, the EDP manager of a department will have to propose the idea to the head of the department. He will then have to campaign and convince the other divisional managers and win their support. Once approval and support are given at the departmental level, it will then be taken up to the ministerial level. Here, the same process is repeated but it gets more complicated because the co-operations of other departments that will participate in the integration exercise are essential. When an agreement has been achieved at the ministry level, the proposal will then be tabled at the weekly cabinet meeting.

*2. Directive from top leadership*

As has been elaborated above, any innovations introduced by the top executives in the form of directives will be implemented immediately without hesitation. Some of these directives may be agreeable to one department/ ministry and unfavorable to others. An example to this predicament is when the National Registration obtained the green light to the identification card number (IC No.) from 8 to 14 digits. The IC No. is a unique identification number given to all Malaysian citizens above the age of twelve. It is used for all official purposes from schools to hospitals, banking and financial, services and employment. In almost all information systems in the country, the IC No. is the primary key for database records. This alteration has generated a ripple of changes in most organisations,

private and public, across the nation. It has caused a lot of inconveniences to organisations that used the IC No. as a key to their database record but since it was a directive from the top leadership, everyone complied despite all the displeasure.

The respondents believe that if there is a directive from the top leadership to implement systems integration among related organisations in the public sector, then the chance for it to be successful will be greater. For this reason, it has been chosen as the second most critical factor for the implementation of systems integration.

*3. Appointment of a team that can manage inter-departmental projects*

The current trend of project implementations in the public sector is very individualistic and this is mainly due to the nature of the projects themselves. There are not that many projects in the history of the Malaysian public sector that involves inter-departmental collaborations. However, there were few such projects that were launched and amongst them is *The Civil Service Link* project [6]. The *Civil Service Link* project launched in 1992 was abandoned due to low enthusiasm from several related organisations. This project was introduced to enable members of the public to access information regarding the services that are available for them. The databases and information systems of related organisations are to be linked up seamlessly to one another and appear to function as a mega system to end-users. The project failure is blamed upon the lack of good leadership. If there were a team of project leaders and implementors to monitor the progress of this project, perhaps the project would have achieved its objectives.

Similarly is the argument for a project like systems integration. Its implementation requires the cooperation and commitment of all participating organisations. There must be a team of project managers to manage the project. They can help ensure the smooth coordination of all development work. CTG [5] stressed that positive leadership will set the stage for a project and ensure timely and meaningful completion. The Office of Inter-governmental Solutions (OIS) [7], has conducted three case studies on inter-agency systems integration projects. They concluded that project managers faced with managing inter-governmental initiatives must understand the potential challenges and create an environment that can minimise risks. Public managers must also develop mechanisms to work through each challenge as they arise. The areas of risks being specified include decision making, communication, responsibility, accountability and competing objectives.

*4. Establish inter-departmental coordination*

There are many departments in the public sector that rely on the output of other departments. For example, the Public Services Department receives data of newly appointed government employees from the Public Services Commission. Before the Public Services can start its recruitment process, it requires information on the number of job vacancies from all the government departments. The Election Commission maintains data on electorates and receives input from the Royal Malaysian Police Department and the Army. At the same time, the Election Commission provides electoral information to the Prime Ministers Department as and when they are requested.

Surprisingly, no one has ever tried to fully investigate the inter-dependency of all the departments in the public sector. For a full-scale implementation of systems integration in the public sector, it is sensible to first establish links between organisations. This will then pave the way for an effective integration of information systems. Once the inter-relationships have been established, development works will progress precisely. This will contribute towards the success of systems integration implementation.

Coordination among the staff and objectives of different government departments presents special challenges because it is not 'business as usual'. For a coordination effort to be successful, it has to deal with a range of hierarchical team and matrix of management styles. Kumar [8] emphasised that the boundary spanning an inter-governmental information system implies a high degree of coordination and mutual respect among managers, planning teams and implementation efforts.

*5. Complete change in work culture*

The respondents have quoted that a complete change in work culture is also a critical success factor. Many civil servants who want to introduce positive changes realise that there is a need to transform the way the Malaysian civil service operates. The respondents share a common view that there must be a change in the work culture. Presently, government employees are oriented to focus only on accomplishing the objectives of the departments that they have been assigned to within the guidelines and procedures that have been laid out by their predecessors.

In the past, employees work hard to solve problems in isolation and are confined to within their own organisations only. They did not venture beyond the stage where they could get the cooperation of other departments with complimentary functions. If this tradition is changed, each organisation will work towards solving problems within its jurisdiction and extends its cooperation and support to other departments that are in need of their assistance. Systems integration relies heavily on this attitude and in fact it is one of the success factors. The whole civil service should be looked upon as a team and not as islands of service providing bodies.

The OIS [7], has noted that there is already a shift in the public sector management. Instead of working in isolation, the trend is moving towards inter-governmental management. The number of inter-agency collaborations is increasing and it is anticipated that this emerging trend in management approach is a long-term transition that will occur over the next decade.

## 4.0 DISCUSSION AND CONCLUSION

From Table 1, the results of the survey showed that there are 21 factors considered important enough to contribute to the success of systems integration implementation in the public sector. To test the hypothesis H1, the success factors were classified into *technical* and *non-technical* groups. SPSS was then used to compute the mean for each group and later perform the t-test for paired samples. The results computed are summarised in Table 2.

Table 2: Paired sample test between technical and non-technical success factors of systems integration implementation

| **Pair** | **Total Mean** | **Mean of Group** | **Mean Difference** Technical - (Non-Technical) | ***T*** | **Sig. (2-tailed)** |
|---|---|---|---|---|---|
| Technical | 32.0303 | 3.5589 | 0.9839 | 1.105 | 0.277 |
| Non-Technical | 30.9091 | 2.575 | | | |

The technical factors are:

1. *Ensure sufficient measures are taken on data confidentiality and security*
2. *Implementation of electronic government*
3. *Setting up of an infrastructure such as the multimedia supercorridor*
4. *Achieve agreement on data ownership and access*
5. *Open systems concept*
6. *The availability of appropriate tools to assist in development activities*
7. *Paperless environment*
8. *Utilising new system development methodology such as the object-oriented approach*
9. *Electronic Data Interchange*

The Non-Technical Factors are:

1. *Support from top management*
2. *Directive from top leadership*
3. *Appointment of a team that can manage inter-departmental projects*
4. *Establish inter-departmental coordination*
5. *Complete change in work culture*
6. *Outsourcing to overcome the problem of insufficient IT personnel*
7. *Achieve an agreement on priorities amongst participating organisations*
8. *Formation of a neutral body that will act as a mediator amongst participating organisations*
9. *Vendors efforts to introduce new hardware and software relevant to systems integration*
10. *Agreement on project cost sharing amongst participating organisations*
11. *Complete change in work culture*
12. *Corporatisation*

On the average, technical factors received higher rankings than the non-technical factors group. However, it is not statistically proven by the t-test that success factors to systems integration implementation are more technical-oriented than human related factors.

Greeves [9] reported that the Council of Excellence, USA, did a study of 27 inter-governmental projects. The study concluded that, where systems integration is concerned, human-related factors overshadow the technical-oriented factors. This is similar to the findings of the study in the Malaysian public sector suggesting that the problem for systems integration implementation in a developed country is the same as that for a developing country.

As for the success factors, the US study reported that the influencing factors are more non-technical than technically related. Surprisingly, this study derived at a different conclusion. However, the degree of confidence is very low.

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**BIOGRAPHY**

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