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# Establishing Important Criteria and Factors for Successful Integrated Information System

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**Abstract**

The assessment of Integrated Information Systems (IIS) is seen as an important exercise in organisation to enable the IS managers, as well as top management, to understand their return on investment in IS integration. Study has found out that very few organisations have proper assessment tool, and while other organisations have never done proper assessment to their IS integration works. Current tools on the market, however, are lack of comprehensive measures to really assess the success of IS integration in the organisation. The purpose of the paper is to provide an insight on the process of establishing important factors and criteria for successful Integrated Information System. These criteria and factors are then grouped into Integrated Information System domains which will be used as an instrument to comprehensively assess Integrated Information System in organisation. The survey process and its result are discussed and the finding shows that the survey supports the literature findings.

Keywords:Integrated Information System domains, IIS Success Criteria, IIS Critical Success Factor;

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## 1. Introduction

Integrated Information System (IIS) is important to maintain organization's competitiveness in business, as well as servicing its customers and stakeholders (Perrey et al., 2004; Markus & Cornelius, 2000; McAdam & Galloway, 2005). Few studies have been made on IS integration assessment

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(Mendoza et al., 2006; Wendt, T., Brigl, B., Winter A. 2005., Chien & Tsau, 2007) that contributes to understanding IIS assessment issues, but not comprehensive enough to cover technical, organizational and strategic domain of IS integration (DeLone & McLean, 2003). Success factors and criteria are important elements to be used in assessing the IIS success in organization (Yusuf et al., 2004; Guclu & Bilgen, 2011). This paper focus on discussing the approach used to search, identify and establish relevant critical success factors and success criteria for IIS.

The rest of this paper is organised as follows. Section 2 discusses on the review of important factors and criteria for IIS from previous researches. Section 3 discusses the methodology which covers the survey distribution and process. Section 4 analyzes the survey and Section 5 concludes with discussion of the findings for further research.

## 2. Review Method

The review purpose is to establish an exhausted view on criteria and factors that are important to the success of Integrated Information System. The following steps have been taken to realise the objective:

- Review papers that discuss on IIS success factors.
- Review papers that discuss on criteria used to measure IIS success.
- Review relevant practices that assess IIS.
- Review papers on failure factors to IIS.
- Consolidate findings to produce IIS success factors and criteria.
- Group the IIS factors and criteria into relevant IS integration domains.

### *2.1. Success Factors of IS integration*

The purpose of having the success factors to assessing IIS is to acknowledge factors that cause the project at the current state of success. Nah et al. (2001) proposes 11 factors critical to packaged IIS success. There are 247 papers cited Nah et al., where some papers (McAdam& Galloway, 2005; 24, Amoako-Gyampah & Salam, 2004; Shore, 2006; Voordijk et al., 2003; Somers & Nelson, 2004) are mentioning partial or several factors similar to Nah et al. findings. Other studies (Mendoza et al., 2006; Schmidt, 2000) that didn't refer to Nah et al., have come out with similar findings.

### *2.2. Criteria used to measure Information Systems Integration success*

DeLone and McLean's Information Systems Success Model (DeLone & McLean, 1992 & 2003) consists of six categories of IS success (DeLone & McLean, 1992). These categories are reviewed (DeLone & McLean, 2003) to become revised six categories: Systems quality, Information quality, Service Quality, Intention to Use/Use, User satisfaction and Net Benefits. This success criteria are selected as the basis of IS integration criteria, since major papers on IS integration criteria for success (Alaranta, 2005; Bernroider, 2008; Chien & Tsau, 2007; Sedera & Gable, 2004) are also referring to the same model.

### *2.1. Relevant practice that assess Integrated Information System*

These are some findings on professional best practice in IS integration that indicates certain factors (Lam & Shankararaman, 2004; Yusuf et al., 2004) and criteria (BEA Flyer, 2003; IBM, 2006; Patni

Computer System, 2009) which are considered important in successful IS integration work. Their criteria have some similarities with the previous reviewed papers, thus has strengthened the findings of the previous papers.

### *2.4. Failure Factors to IS Integration*

Kim & Iijima (2005) have made a study on IS integration's failure factors in some large companies in Japan. Analysis done has found out that all the failure factors can be associated with Nah et al.'s 11 critical success factors proposal. It is concluded that these failure factors have complement and strengthen Nah et al.'s proposal.

### *2.5. Critical success factors and criteria for IS integration – consolidated view*

IIS success factors are factors that is important to the success of IS integration work either at analysis, design or implementation stage. IIS success criteria are criteria that indicate and measure the effectiveness, success or failure of IIS. Findings from previous papers have to be consolidated to produce a proposed IIS success factors and criteria.

Once the IIS success factors and criteria are proposed, the next task is to determine which domains these factors/criteria closely affiliated to. Wainwright & Warring (2004) have established IS Integration strategic model, which consist of three (3) main domains namely, technical, organizational and strategic domain. These domains and its definition are used in the grouping exercise. The grouping decision is based on weighting which issues are the most influencing the criteria/factors. Table 1 shows the results which list all the proposed factors and criteria grouped into proposed domains.

Table 1: IIS Success Factors and Criteria grouped into IS Integration domains

| IIS Success Criteria | Authors | Domains |
|---|---|---|
| Systems Quality | DeLone & McLean, 1992 & 2003 | Technical |
| Information Quality | DeLone & McLean, 1992 & 2003 | Technical |
| Integrated Systems | Kumar et al., 2002 | Technical |
| Integrated Business Process | Kumar et al., 2002 | Technical |
| Service Quality | DeLone & McLean, 2003 | Organisational |
| Use | DeLone & McLean, 1992 | Organisational |
| User satisfaction | DeLone & McLean, 1992 & 2003 | Organisational |
| Net benefits | DeLone & McLean, 2003 | Organisational |
| Teamwork and composition | Nah *et al.,* (2001) | Strategic |
| Change management program and culture | Nah *et al.,* (2001) | Strategic |
| Top management support | Nah *et al.,* (2001) | Strategic |
| Supporting business plan and vision | Nah *et al.,* (2001) | Strategic |
| Business process reengineering | Nah *et al.,* (2001) | Strategic |
| Project management | Nah *et al.,* (2001) | Strategic |
| Effective communication | Nah *et al.,* (2001) | Strategic |
| Software development, testing and troubleshooting | Nah *et al.,* (2001) | Strategic |
| Project champion | Nah *et al.,* (2001) | Strategic |

### 2.6. Putting measures into Integrated Information System Success Criteria and Factors

The next process after having a proposed IS Integration criteria and factors which has been grouped into domains is to breakdown further into meaningful measure of success criteria and factors. Using the literature once again, the detailed measures associated with these criteria/factors are collected

and analysed which produced 60 proposed items of detail criteria/factors for IS integration assessment (Table 2).

## 3. Method

### *3.1. Using Survey to get Experienced Practitioners Opinion*

The result from the breakdown of the proposed criteria is validated by getting experienced practitioners opinion from selected organisations. Thus, a survey is chosen to be an instrument to gather opinions from the targeted practitioners. The detailed criteria/factors for IS integration are used to develop the main theme of the survey, which is to determine the important criteria and factors to the success of IIS and to identify the appropriate IIS domain for these criteria and factors.

### *3.2. Survey distribution*

The survey has been done at three selected public higher learning institutions in Malaysia where all these institutions have experience in Information Systems integration works. The target respondents are selected amongst senior non-IT administrator/managers, senior IT managers & systems analysts, and IT support staff (5). There are a total of 59 valid respondents that have experiences in either developing or using IIS. With near to equal distribution of age group in the survey together with one third female respondents, the survey sampling for gender and age group is considered sufficient and valid. Majority of the respondents are IT personnel. The distribution of work experience from the respondents is also quite balance ranging from a year to 10 year experience.

## 4. Results and Discussion

Result from respondents (Table 2) on importance level of each criterion (using Scale level 1 to 5) shows that there are 5 criteria having mean more than 4.5 (Criteria No. 1, 2, 3, 6, 46) which is considered as very important criteria, while there are 6 criteria that have mean less than 4.1 (Criteria No. 29, 33, 42, 47, 54, 60). The other 51 criteria fall between 4.1 and 4.5. 4 out of 5 top criteria are from technical domain, and only one from organizational domain.

Although there are some differences in the value of mode and median to some Criteria/Factors, the main agreement from the result shows that not even one criterion has average value below than 3, which indicates that all these proposed criteria/factors are very important in Information System integration. The difference between scale 4 and 5 does become significant when these criteria are intended to be used as indicators and measures instrument in the assessment of IS integration. The higher scale will be given more weight compare to the lower scale, which in the end will give higher value to the percentage of achievement to the IS integration work.

Table 2: Survey result on IS Integration Criteria/Factors level of importance

| Criteria / Factors | Level of Importance | | | | | Total | Mode | Mean |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | | |
| 1. Fast response time | | | 1 | 18 | **39** | 58 | 5 | 4.66 |
| 2. Fast turnaround time | | | 1 | 21 | **36** | 58 | 5 | 4.6 |
| 3. System reliability | | | 3 | 15 | **40** | 58 | 5 | 4.64 |
| 4. System completeness | | | 7 | 20 | **31** | 58 | 5 | 4.41 |
| 5. System flexibility | | | 8 | 21 | **27** | 56 | 5 | 4.34 |
| 6. Systems functionality | | | 4 | 18 | **32** | 54 | 5 | 4.52 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. The information format | | | 4 | 23 | **27** | 54 | 5 | 4.43 |
| 8. System documentation quality | 1 | 1 | 7 | **23** | 22 | 54 | 4 | 4.19 |
| 9. Data quality | | | 5 | 20 | **32** | 57 | 5 | 4.47 |
| 10. Integrates all information required | | | 8 | 19 | **28** | 55 | 5 | 4.36 |
| 11. User interface consistency | | 1 | 8 | 21 | **27** | 57 | 5 | 4.3 |
| 12. Integrates all business (work) process | | | 5 | 23 | **29** | 57 | 5 | 4.42 |
| 13. Project team shares all information | | | 7 | **24** | **24** | 55 | 4,5 | 4.31 |
| 14. Project team consists of a mix | | | 6 | 21 | **29** | 56 | 5 | 4.41 |
| 15. Project team is highly skill technically | | | 9 | 22 | **25** | 56 | 5 | 4.29 |
| 16. Project team members have business and technical knowledge | | | 12 | **26** | 20 | 58 | 4 | 4.14 |
| 17. The project as top priority to project member | | | 8 | 24 | **27** | 59 | 5 | 4.32 |
| 18. Manageable culture and structural change | | 1 | 13 | **24** | 21 | 59 | 4 | 4.1 |
| 19. Develop strong commitment to integration effort | | | 9 | **25** | **25** | 59 | 4,5 | 4.27 |
| 20. Provide training and re-skilling of staff | | 2 | 8 | 22 | **26** | 58 | 5 | 4.24 |
| 21. Top management's project approval | | 1 | 5 | 20 | **33** | 59 | 5 | 4.44 |
| 22. Top management's top priority project | | | 3 | 26 | **30** | 59 | 5 | 4.46 |
| 23. The project aligned with business plan | | 1 | 6 | 25 | **26** | 58 | 5 | 4.31 |
| 24. Top management commitment | | 4 | 10 | 21 | **24** | 58 | 5 | 4.1 |
| 25. Clear business plan | | 1 | 8 | 22 | **25** | 56 | 5 | 4.27 |
| 26. Clear operational model | | 1 | 9 | 23 | **26** | 59 | 5 | 4.25 |
| 27. Tied directly to business direction | | 1 | 9 | 22 | **27** | 59 | 5 | 4.27 |
| 28. Established and controlled scope | | 2 | 8 | **26** | 23 | 59 | 4 | 4.19 |
| 29. Clear and limited agreed scope | | 2 | 13 | **23** | 20 | 58 | 4 | **4.05** |
| 30. Project management w a coordinated training | | 2 | 9 | **24** | 23 | 58 | 4 | 4.17 |
| 31. Effective communication ( the projject known to all) | | 3 | 8 | 21 | **25** | 57 | 5 | 4.19 |
| 32. Effective communication (comm channel at every level) | | | 9 | 24 | **25** | 58 | 5 | 4.28 |
| 33. Effective communication (project promotion and announcement) | | 2 | 13 | **23** | 20 | 58 | 4 | **4.05** |
| 34. Problem solving capability | | | 6 | 20 | **32** | 58 | 5 | 4.45 |
| 35. Proper tools and techniques | | | 10 | 20 | **28** | 58 | 5 | 4.31 |
| 36. Project leader is project “champion'' | | 1 | 13 | **22** | **22** | 58 | 4,5 | 4.12 |
| 37. Project champion strive (resolving conflict & resistance) | | | 10 | 21 | **26** | 57 | 5 | 4.28 |
| 38. Quality of business process | | 1 | 10 | 22 | **24** | 57 | 5 | 4.21 |
| 39. Service quality (availability) | | | 11 | 17 | **30** | 58 | 5 | 4.33 |
| 40. Service quality (reliability of service) | | | 9 | 18 | **31** | 58 | 5 | 4.38 |
| 41. Positive system use (user’s nature of use) | | | 13 | **26** | 19 | 58 | 4 | 4.1 |
| 42. Positive system use (visit/hit per day) | | 4 | 14 | **24** | 15 | 57 | 4 | 3.88 |
| 43. Number of transactions increased | | 1 | 11 | **24** | 23 | 59 | 4 | 4.17 |
| 44. User satisfaction (project satisfaction) | | 1 | 10 | 17 | **29** | 57 | 5 | 4.28 |
| 45. User satisfaction (information satisfaction) | | | 9 | 19 | **29** | 57 | 5 | 4.35 |
| 46. Users satisfaction (confidence in the system) | | | 2 | 19 | **36** | 57 | 5 | 4.6 |
| 47. User satisfaction (repeat usage) | | 2 | 13 | 20 | **22** | 57 | 5 | **4.09** |
| 48. Organisation benefit (overall profitability) | | | 10 | **25** | 23 | 58 | 4 | 4.22 |
| 49. Organisation benefit (productivity improvement) | | | 8 | 21 | **29** | 58 | 5 | 4.36 |
| 50. Organisation benefit (cost effective) | | 1 | 8 | 22 | **27** | 58 | 5 | 4.29 |
| 51. Organisation benefit ( improved customer service) | | | 5 | 20 | **33** | 58 | 5 | 4.48 |
| 52. Organisation benefit (innovation capabilities) | | | 11 | **23** | **23** | 57 | 4,5 | 4.21 |
| 53. Organisation benefit (organisational flexibility) | | 1 | 10 | **24** | 23 | 58 | 4 | 4.19 |
| 54. Organisation benefit (culture conflict) | 1 | 1 | 17 | 13 | **26** | 58 | 5 | **4.07** |
| 55. Organisation benefit (desired business process) | | | 14 | 21 | **23** | 58 | 5 | 4.16 |
| 56. Organisation benefit (improved business process) | | | 10 | 22 | **26** | 58 | 5 | 4.28 |
| 57. Organisation benefit (optimised system cost) | 1 | | 7 | 23 | **27** | 58 | 5 | 4.29 |
| 58. Organisation benefit (reduced cycle time) | | 1 | 9 | 17 | **31** | 58 | 5 | 4.34 |
| 59. Organisation benefit (enhanced decision making) | | | 7 | 18 | **33** | 58 | 5 | 4.45 |
| 60. Minimizing undesired political behaviour and power game | 2 | 4 | 10 | 13 | **27** | 56 | 5 | **4.05** |

A factor analysis to the survey result will be another quantitative analysis that can be done to analyse if there are any significant difference of important value from one criteria/factor to another criteria/factor that can determine its ranking in term of importance. This exercise will be the next steps taken in order to group and categorise the criteria and factors into manageable constructs which becomes the main elements in the Integrated Information Systems assessment framework.

## 5. Conclusion and Future work

This paper has demonstrated that the process of deriving success criteria and critical success factors for IIS requires step-by-step approach and careful analysis on various literatures of IIS, its success, and factors/criteria associated with successful IIS. The use of expert opinions based on the proposed survey is an instrument that provides validation to the proposed success criteria and factors of IIS. We have successfully determined level of importance for the established criteria/factors through survey. Factor analysis will be used to seek better grouping results for the three domains proposed. The empirical survey provides a clearer picture on proposed success factors/criteria for IIS. Further works is to formulate a framework of assessment for IIS based on the selected criteria/factors from the survey. Once the relevant criteria/factors have been selected, a measurement detail has to be formulated. Furthermore, the assessment approach, detail instrument and tools need to be constructed in order the proposed framework can be operationalized via sample case test.

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