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VALIDATING THE IS-IMPACT  
MODEL: TWO EXPLORATORY CASE  
STUDIES IN CHINA AND MALAYSIA

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# VALIDATING THE IS-IMPACT MODEL: TWO EXPLORATORY CASE STUDIES IN CHINA AND MALAYSIA

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## Abstract

*For over a decade, IT expenditure in China and Malaysia has shown a significant increase, as organisations in these countries are increasingly dependent on information systems (IS) for achieving strategic advantages and business benefits. However, there have been numerous reports of dissatisfaction with IS, and in some cases the effectiveness of the information systems have yet to be reviewed. Two exploratory case studies reported in this paper are the first phase of an overall research in validating the IS-Impact model introduced by Gable, Sedera and Chan in two countries: China and Malaysia. This validation research aims to produce a standard measuring model across different contexts. The purpose of this paper is to present preliminary findings from two exploratory case studies, attempt to test the feasibility of the research design and to investigate applicability of the IS-Impact model in Chinese and Malaysian organisations. Twenty-nine respondents from a Chinese private company and seventeen respondents from a state government in Malaysia were involved in these studies. Findings indicated that most of existing IS-Impact measures are applicable in the study contexts, however, there are some new measures informed by the respondents. Feedback from the case studies also suggested necessary modifications to the Mandarin instrument.*

**Keywords:** IS-Impact, IS Success model, China, Malaysia, Model validation, Pilot study, Exploratory case study, Context extension

# 1. INTRODUCTION

For over a decade, IT expenditure in China and Malaysia, has shown a significant increase as organisations in these countries are increasingly dependent on information systems (IS) for achieving strategic advantages and business benefits. According to the China Centre for Information Industry Development (2007), in 2006, China's management software market was worth 7,136 million Yuan (1 USD\$ ≈ 7.1Yuan), up 19.5% from 2005 (CCID, 2007). In Malaysia, Business Monitor International (BMI, 2007) has projected that the IT market will increase from US\$2.9bn in 2005 to around US\$4.8bn in 2010. The Malaysian government in particular has spent around US\$413.3 million in 2007, which is 11.9% of the country's IT spending (IDC, 2004). This large spending was to replace traditional information systems in government agencies with more sophisticated information systems (Hussein, Karim, Mohamed, & Ahlan, 2007; Hussein, Selamat, & Karim, 2005).

However, there have been numerous reports on dissatisfaction with IS, such as IS implementation projects not being completed on time or within budget, and many fail to meet requirements and realise promised benefits (He, 2004; M. G. Martinsons, 2004; Yajiong Xue, Huigang Liang, William R Boulton, & Snyder, 2005; Zhang, Lee, Zhang, & Banerjee, 2002). Furthermore, in some cases the effectiveness of the information systems has yet to be reviewed (Hussein et al., 2007). Thus, it is important that organisations in China and Malaysia monitor the success (or not) of their growing investment in IS.

Recently, Gable, Sedera and Chan (2008) have introduced a comprehensive and validated measurement model, called IS-Impact model. The model can be used to measure the impact of contemporary IS such as enterprise systems. This model was developed and validated in Queensland's public and semi-public organisations. Therefore, in an effort to extend the use of this model to other countries, two researches are currently being conducted to revalidate the IS-Impact model in China and Malaysia.

There are three key objectives of the overall research. Firstly, these researches will identify relevant new measures when extending the IS-Impact model in new contexts (i.e. Chinese and Malaysian organisations). Secondly, by using new sets of data, we will statistically revalidate the IS-Impact model, and at the same time derive a measurement model with two measuring instruments in the national language of the country (where our ultimate aim is to arrive at a standard model that can be used across different context). Lastly, this research will quantitatively evaluate the impact of the information systems under study using the revalidated model. Figure 1 demonstrates the overall research design of the research.

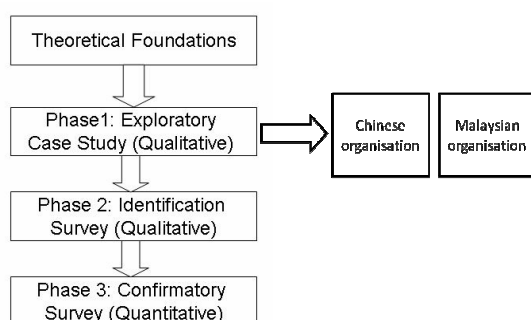


Figure 1. The overall research design

The purpose of this paper is to present preliminary findings from *Phase 1: Exploratory case study* conducted independently by two researchers at two organisations. These case studies attempt to test the feasibility of the research design and to provide preliminary observations on the applicability of the IS-Impact model in Chinese and Malaysian organisations. At the same time, we pilot tested the survey instrument that will be used in subsequent identification survey which mainly focus on identifying any relevance new measures for the study context. The following section briefly discusses the theoretical background of these studies. Then the research methods and the profile of the companies involved in these studies are presented in the next section. This is followed by the results

from both case studies. The paper concluded with a discussion of the findings and the conclusion of these exploratory case studies.

## 2. THEORETICAL BACKGROUND

The research starts by identifying a theoretical framework to serve as a basis for identifying relevant IS evaluating measures for Chinese and Malaysian organisations. In the literature, it is notice that a myriad of measures and dimensions for IS Success/Impact exist. However, structured and robust models, that capture the whole IS Success/Impact scenario are scarce (DeLone & McLean, 1992; Petter, DeLone, & McLean, 2008). Gable, Sedera and Chan (2008), in reference to Gregor's (2006) analytic theory, suggest a reference model or a theoretical framework should have the characteristics of a strong analytic theory, that meets the criteria in terms of utility, intuitiveness, mutual exclusivity, completeness, and where relevant, appropriate hierarchy. Gable et al. (2008) also suggested that, beyond those quality of analytic theory, a framework of IS Success/Impact should maximally reflect the full range of IS impact and accommodate the views of the multiple internal stakeholder group.

We have identified several salient models, surpassing other models in light of the relevance of measures and completeness, as well as appropriate model structure. These models include DeLone and McLean IS Success Model, Shang and Seddon (2000) ES Benefit framework, Kaplan and Norton (1992; 1996) Balanced Scorecard and Gable, Sedera and Chan's IS-Impact Model (2008).

The IS Success Model is the most cited and referred to by researchers involved in evaluating or measuring the success of IS (Myers, Kappelman, & Prybutok, 1997; Sedera & Gable, 2004). This model consists of six dimensions of success that are proposed to be interrelated and interdependent. These dimensions are 'System Quality', 'Information Quality', 'Use', 'User Satisfaction', 'Individual Impact' and 'Organizational Impact'. This model has contributed to the success of IS research by summarizing commonalities observed across prior measures of IS success studies (Gable et al., 2008). Before DeLone and Mclean's work, IS success has been measured idiosyncratically, and their work provides a basis for better understanding the research domain. However, the IS Success model received criticism from several researchers, for example for confusing the combination of the process model and the causal in the model and inappropriately conceptualizing dimension of 'Use'(Peter B. Seddon, 1997; Peter B Seddon & Kiew, 1996).

In 2000, Shang and Seddon introduced an ES Benefit framework which provides a detail list of benefits that may achieved from an Enterprise System. The framework consolidated benefits into five dimensions: operational, managerial, strategic, IT infrastructure and organizational. Though this is an ES-specific success model and accommodated multidimensionality and relevant ES success measures, it focuses on the organisation's perspective rather than the system itself. In addition, some of the measures are perceived as overlapping across dimensions (Gable et al., 2008). Last but not least, the framework is far from a model and the suggested measures have never been operationalized into an instrument.

The Balanced Scorecard (BSC) is another relevant framework for assessing the performance of IS, yet it is not directly related to IS Success/Impact field. Realizing the insufficiency of traditional financial accounting measures, the researcher proposed a comprehensive approach to gauging business performance, namely four interrelated dimensions including customer satisfaction, the internal business process and innovation and learning. As many IS researches recognize the inappropriateness and infeasibility of only using a financial index in measuring IS Success/Impact (DeLone & McLean, 1992; G. G. Gable, Sedera, & Chan, 2003; Murphy & Simon, 2002), the BSC provides useful implications to the IS evaluation field. Several attempts were made to extend BSC into the IS evaluation area, for example, Martinsons, David & Tse (1999) introduce a BSC-for-IS framework, consolidating four perspectives coming from traditional BSC, to assess the performance of the IS department, the IS project and IS applications.

From a review of the literature, the latest IS success model identified is the IS-Impact model, which is also the most comprehensive and validated measurement model for IS evaluation. The IS-Impact measurement model (Gable et al., 2008, 2003), comprises 27 measures along four distinct and individually important dimensions – '**System Quality**' (SQ), '**Information Quality**' (IQ),

**‘Individual Impact’ (II) and ‘Organization Impact’ (OI).** The model developer commented that *“The IS-Impact Model is a holistic index representing the stream of net benefits; the ‘impact’ half measuring net benefits to date, while the ‘quality’ half, forms our” best” proxy measure of probable future impacts, with ‘impacts’ being the common denominator”* (Gable et al., 2008:381).

We have adopted the IS-Impact model as the theoretical foundation in our research. The IS-Impact model, by design, is intended to be robust and simple yet generalisable, yielding results that are highly comparable across time, stakeholders, different type of systems and system contexts. The model and approach employs perceptual measures, aiming to offer a common instrument answerable by all relevant stakeholder groups, thereby enabling the combining or comparison of stakeholder perspectives. Note that the current research, in attention to revalidate the model in new contexts, will employ 37 IS impact measures based on the *a-priori* model developed by Gable et al. (2008).

### **3. METHODOLOGY**

Both studies used an exploratory case study method to investigate the applicability of the IS-Impact model in new contexts. The case study method is normally used to study contemporary phenomena within a real world context. According to Yin (2003), a case study is an appropriate research method to apply in exploratory research. As these studies explore any relevant new measures for evaluating IS success in China and Malaysia, we regard the exploratory case study is most suitable for this project

Two case studies are reported in this paper. These studies were conducted at a private Chinese company and at a Malaysian government agency. Both studies used a survey to explore whether there are relevant new measures or dimensions for the IS-Impact model when extending it into new contexts. Considering the difference between the two research contexts and to better reach out to the respective respondents, the research team have devised a different approach for data gathering and instrument design for each case study. The respondents of these studies are users who have direct involvement with the systems and/or are receiving the output from the systems.

#### **3.1. The standard survey instrument**

One of the contributions of this research is to produce an instrument using the national language of the context. However, there is an issue in verifying the research design and method when collecting data, therefore at first we constructed a Standard English version instrument, and then this standard instrument is translated into respective national language. The standard instrument was designed based on the Sedera (2006) identification survey instrument. The original instrument was devised in an Australian research context, to canvass a broad list of potential IS-Impact measures. The instrument includes two sections, querying (1) respondent demographics (e.g., name, position, years with organisation and a brief description of their involvement with the Enterprise; (2) an open-ended question to query respondents’ observations on the impact of IS. The intention to use one general open-ended research question is not to lead and limit respondent’s thinking, but rather to let them reflect on the question intensively and brainstorm the answer. Previous research results suggest that this questionnaire design was adequate to elicit citations that relate to both impact and quality of the IS.

Although both Mandarin and Malay instruments are translated from standard English survey instrument, each version is modified to accommodate local respondents and the specific study context. In addition, the research team ensure the equivalency of the instrument based on key-words and the main questions in both versions of the instruments. The equivalency of both instruments is the basis of the research comparison.

#### **3.2 The Chinese Company Profile**

The Chinese case study was conducted in PETRO, a Chinese joint-venture firm in the petrochemical industry. PETRO was founded by the largest Chinese petrochemical producer and is a world-class petrochemical giant company with an investment of about \$ 2.7 billion in a 50%, 50% proportion. It is by far one of the largest joint-venture petrochemical projects in China. PETRO have used SAP since their establishment in 2003, and now have 10 modules fully installed, including FI, CO, PM, MM, HR, PP, SD, PS, QM and WMS.

### 3.2.1 *The survey instrument modification*

As mentioned earlier, though these two case studies attempt to answer the same research question and seek further validation of IS-Impact model, given the difference in cultural background and practical research settings, the two researchers have adopted a different case study design to accommodate specific issues in each context. The Chinese case study consists of a pilot test using a survey instrument (designed for the following identification survey) and a series of face-to-face interviews. The purpose of the Chinese case study are threefold: (1) to test whether the original instrument design, where a questionnaire only containing one open-ended IS impact question, make sense to Chinese respondents, (2) to check translation equivalence, as the research will be conducted in Mandarin, (3) to identify any new issues and potential missing measures informing the Mandarin version of the IS-Impact model development.

Instrument design workshops with leading academics and research team members helped to devise an English version instrument for the Chinese context. Based on the standard survey instrument (discussed in section 3.1), the workshop rephrased the single open-ended question, revisited demographic questions and checked the equivalence of key-words and concepts in the instrument, such as 'SAP', 'impact' etc. Then the researcher adopted a direct-translation method to translate the English version instrument into Mandarin. Two certified translators were invited to check for translation equivalency. Some minor revisions were made in relation to grammar, inappropriate wording, but there were no changes to key concepts and the single open-ended question. A group of Chinese students were then asked to check for the face validity on the Mandarin instrument.

The pilot test indicated good translation equivalence between the English and Mandarin versions instruments, as there was no misunderstanding related to language issues. All respondents clearly understood the research question and gave appropriate answers. However, based on the pilot test, it was found that the original open-ended impact question did not seem to elicit responses pertaining to each quadrant of the model. The reason for this problem is probably due to the psychological profile of Chinese respondents when faced with an instrument containing only open-ended questions. The Chinese seem to prefer specific questions to general questions. Additionally, they need trigger sentences to encourage their reflection and help them to deliver quality responses. The researcher then decomposed the single open-ended impact question into a set of detailed questions and put them into structured guidelines for the subsequent interview. The detailed research design for the Chinese case is given in Table 1.

29 PETRO SAP users were randomly selected for the Chinese case study. When selecting respondents, the researcher intended to cover each level of stakeholders in PETRO's organisational hierarchy for canvassing multiple perspectives of the impact of IS in China enterprise. Finally, 23 valid responses have been gathered.

### **3.3 The Malaysian organisation profile**

In Malaysia, 11 state governments are currently using a standard financial system named 'The State Government's Standard Computerised Accounting System (SPEKS). It was developed by KJSB, a local software developer with 18 years experience in the ICT industry. The system's copyright is owned by The Accountant General (AG) of Malaysia, a department under Ministry of Finance. SPEKS contains 11 integrated modules and was first implemented at two of the eleven state governments in 2001. By 2005, SPEKS had been successfully installed in all 11 state governments.

Data was collected from one state government in Malaysia that has been using SPEKS since 2003. The system is used across 18 departments with over 800 users. In this preliminary study, 17 SPEKS users were randomly selected from one department. Before distributing the survey question, the researcher gave a brief description of the study, the purpose of the questionnaire, the objective of the pilot test and how to complete the questionnaire.

The aim of the pilot test was to determine the feasibility of all the questions in the survey instrument. What concerns the researcher is whether the question that seeks to identify potential measures in Malaysian organisation can elicit measures for both the 'impact' and 'quality' halves of the IS-Impact

model. Furthermore, through the pilot test, the researcher will be able to identify IS stakeholders in the Malaysian organisation.

### 3.3.1 *The survey instrument modification*

Similar to the Chinese case study, the standard survey instrument discussed in section 3.1 was then modified and translated into Bahasa Malaysia (Malaysia national language) using the back translation technique. According to McGorry (2000), at least two bilingual individuals will separately involve in the translation process. Therefore, the researcher has asked two colleagues who are conversant in English and Bahasa Malaysia to help in the translation process. In general, the technique requires four steps (Behling & Law, 2000; McGorry, 2000). Firstly, the first translator translated the standard survey instrument (see section 3.1) to Bahasa Malaysia. Then, the second translator translated the Bahasa Malaysia instrument done by the first translator, back to English. This English version is called the ‘back translated version’. Next, the researcher compared the back translated version with the standard survey instrument for any inconsistencies, mistranslation or lost words or phrases. Lastly, the researcher discussed with both translators to come to a conclusion of the inconsistencies and modify the instrument if necessary.

A similar single question (that was used in the Chinese context) was employed in the instrument to capture the impact of SPEKS. However, prior to the translation process, a modification was made to the question by including some synonyms for the word ‘impact’ in order to give a broader definition of the word impact and to help the respondents to think more broadly. These synonyms are effect, influence, outcome, result and consequence. The respondents were given 15 minutes to complete the questionnaire. Table 1 gives a summary of the research context for both cases.

|                      | Chinese Case   | Malaysian Case   |
|----------------------|--|--|
| Research method      | A qualitative survey distributed by email and face-to-face interview with a structural interview guideline   | A qualitative survey distributed through a workshop  |
| Type of organisation | Private organisation   | Public organisation  |
| Type of system       | SAP system modules: FI, CO, PM, MM, HR, PP, SD, PS, QM and WMS   | A customised and integrated financial system   |
| Type of question     | <p><b>Open-ended Question in survey instrument:</b><br/>The SAP system has been installed in the participant company for four years. What do you consider have been the impacts of SAP in your company, since the SAP system implementation?</p> <p><b>Interview guideline:</b><br/>1. SAP has been installed in your agency for years, What do you consider have been the impacts of SAP in your company and yourself, since its implementation?<br/>2. What is the quality of the SAP system today? (System and information quality)<br/>3. According to your observation, what are the changes happened to your company due to SAP implementation and usage?<br/>4. What issues and problems they have with the system?</p> | <p>“SPEKS has been installed in your department/organisation for some time. What do you consider have been the impact* of SPEKS to you and your organisation, since its implementation?”</p> <p>*the word impact herein is similar to effect, influence, outcome, result or consequence.</p> |
| Sample selection     | Randomly choose 29 SAP users in overall company  | Randomly selected 17 SPEKS users from financial department   |
| Sample size          | 29   | 17   |
| Valid participants   | 23   | 17   |

Table 1. *Summary of research context for both case studies*

## 4. RESULTS

Table 2 summarises the demography of the respondents from both case studies. Based on Anthony's (1965) framework and Gable et al.'s (2008) classification of IS key-user group, we have classified the respondents into four employment cohorts (Strategic, management, technical and operational) according to the respondents' job title as well as their job role and involvement with the information systems under study.

|  | Chinese Case   | Malaysian Case  |
|--|--|---|
| Classification of stakeholder          | Strategic level: 3, 13%<br>Management level: 10, 43%<br>Technical level: 5, 22%<br>Operational level: 5, 22% | Strategic level: 0<br>Management level: 0<br>Operational: 16, 94%<br>Technical: 1, 6% |
| Duration working with the organisation | <1 year: 0<br>1-3 years: 3<br>3-5 years: 8<br>>5 years: 12   | <1 year : 2<br>1-3 years: 4<br>3-5 years: 8<br>>5 years: 3                            |
| Functionality                          | Production, Finance, HR, Sales, Commercial   | Finance   |

Table 2. Respondents' demography

These case studies generate textual responses from the respondents reflecting their observation of the impact of IS on their organisation and their individual work. We have isolated these textual data into short sentences that we refer to as 'impact citation'. These impact citations were then group or mapped into relevant IS-Impact measure. Each citation must explicitly carry a single piece of information about the impact of IS. The citation isolation and mapping process was done using NVivo, a qualitative data analysis tool. Table 3 summarises the counts and distributions of citations according to the dimension of the IS-Impact model. Table 4 presents the counts and distributions of citations according to the measure of the IS-Impact model. 141 citations were isolated from respondents' responses, namely each respondent provides an average of six (6) citations in the Chinese case study. From the Malaysian case study, 74 citations were collected from the survey, which is an average of four (4) citations per respondent.

|                            | Chinese case study | Malaysian case study |
|----------------------------|--------------------|----------------------|
| System Quality (SQ)        | 53 (38%)           | 30 (41%)             |
| Information Quality (IQ)   | 15 (11%)           | 4 (5%)               |
| Individual Impact (II)     | 11 (8%)            | 14 (19%)             |
| Organizational Impact (OI) | 38 (27%)           | 25 (31%)             |
| Unknown (U)                | 24 (17%)           | 1 (4%)               |
| Summary                    | 141                | 74                   |

Table 3. The summary of citations distribution in both case study

In the Chinese case study, a large portion of citations pertain to '**Organizational Impact**' (OI), that is 38 (27%) of the 141 citations are mapped into existing IS-Impact measures straight away. However, there are 18 (13%) citations are also recognized as OI could not readily mapped into the IS-Impact measures. The researchers put these unmapped measures into the *Unknown (U)* category temporarily. Another large portion of citations, 53 (38%) were mapped into the '**System Quality**' (SQ) dimension. Very few comments about the '**Individual Impact**' (11, 8%) and the '**Information Quality**' (15, 11%) were made by respondents. However, the Chinese respondents also raised new issues about the impact of IS beyond the existing IS-Impact measures, which takes up 16% (23) of the total citations. These new issues were group under the *Unknown (U)* category.

Meanwhile, Malaysian respondents have cited '**System Quality**' frequently, and 30 (41%) citations are mapped into the dimension. This is followed by 25 (31%) citations mentioning '**Organizational Impact**'. Only four (4) citations can be related to the '**Information Quality**' dimension. Additionally, there is one (1) citation that could not be mapped into any of the dimensions of the IS-Impact model.

Next, we focused on the distributions of citations in relation to measures of the IS-Impact model. In the Chinese case study, in the ‘**Individual Impact**’ dimension, respondents emphasised *Individual productivity* (45% of total Individual Impact citations), and followed by *Learning* (27%). For the ‘**Organizational Impact**’ dimension, more than half of citations (62%) are related to *Business process change*, and 23% related to *Overall productivity*. It is also noted that very few respondents regards *Cost reduction* as a crucial benefit of IS in this sample of Chinese respondents. For the ‘**System Quality**’ dimension, Chinese respondents commented that *System features* (25%) and *Ease of use* (19%) are critical characteristics of a good system. Meanwhile, for ‘**Information Quality**’ dimension, Chinese respondent cited *Content accuracy* (53%) and *Timeliness* (20%) of reports frequently.

In the Malaysian case study, 40% of the citations group under ‘**System Quality**’ are related to *System features* (40%). Besides the quality of the system feature, the respondents also emphasised the quality of *Accessing* (20%) the IS and the *Reliability* (13%) of the system. Respondents were then interested in the ‘**Organizational Impact**’, 31% of the citations mapped into this dimension. In contrast to the Chinese case study, Malaysian respondents show there is a significant impact of the system on *Cost reduction* (24%) and *Overall productivity* (24%). For the ‘**Individual Impact**’ dimension, the respondents strongly comment on job effectiveness and this relates to *Individual productivity* (100%). Moreover, they mostly cited the *Format* (50%) of the report in the ‘**Information Quality**’.

|  |                       |                           | Chinese case study  |            | Malaysian case study |             |
|--|-----------------------|---------------------------|---------------------|------------|----------------------|-------------|
|  | Dimension             | Measures                  | Numbers of citation | %          | Numbers of citation  | %           |
| Original IS-Impact measures and dimensions | Individual Impact     | Learning                  | <b>3</b>            | <b>27%</b> | 0                    | 0%          |
|  |                       | Awareness/ Recall         | 2                   | 18%        | 0                    | 0%          |
|  |                       | Decision effectiveness    | 1                   | 10%        | 0                    | 0%          |
|  |                       | Individual productivity   | <b>5</b>            | <b>45%</b> | <b>14</b>            | <b>100%</b> |
|  |                       | Total                     | 11                  | 100%       | 14                   | 100%        |
|  | Organizational Impact | Organizational cost       | 0                   | 0%         | 5                    | 20%         |
|  |                       | Staff requirements        | 2                   | 5%         | 0                    | 0%          |
|  |                       | Cost reduction            | 1                   | 2.5%       | <b>6</b>             | <b>24%</b>  |
|  |                       | Overall productivity      | <b>8</b>            | <b>23%</b> | <b>6</b>             | <b>24%</b>  |
|  |                       | Improved outcomes/outputs | 2                   | 5%         | 4                    | 16%         |
|  |                       | Increased capacity        | 1                   | 2.5%       | 0                    | 0%          |
|  |                       | E-government/ E-business  | 0                   | 0%         | 0                    | 0%          |
|  |                       | Business process change   | <b>24</b>           | <b>62%</b> | 4                    | 16%         |
|  |                       | Total                     | 38                  | 100%       | 25                   | 100%        |
| Original IS-Impact measures and dimensions | System Quality        | Data accuracy             | 0                   | 0%         | 0                    | 0%          |
|  |                       | Data currency             | 0                   | 0%         | 0                    | 0%          |
|  |                       | Database contents         | 1                   | 2%         | 1                    | 3%          |
|  |                       | Ease of use               | <b>10</b>           | <b>19%</b> | 2                    | 7%          |
|  |                       | Easy of learning          | 1                   | 2%         | 0                    | 0%          |
|  |                       | Access                    | 3                   | 6%         | 6                    | 20%         |
|  |                       | User requirement          | 5                   | 11%        | 1                    | 3%          |
|  |                       | System features           | <b>13</b>           | <b>25%</b> | <b>12</b>            | <b>40%</b>  |
|  |                       | System accuracy           | 3                   | 6%         | 0                    | 0%          |
| Flexibility                                | 1                     | 2%                        | 0                   | 0%         |                      |             |

Table 4. The distribution of the citations from both case studies to all measures in IS-Impact model.

|                                |                     |  | Chinese case study         |            | Malaysian case study |            |    |
|--------------------------------|---------------------|--|----------------------------|------------|----------------------|------------|----|
|                                | Dimension           | Measures                                   | Numbers of citation        | %          | Numbers of citation  | %          |    |
|                                |                     | Reliability                                | 4                          | 8%         | 4                    | 13%        |    |
|                                |                     | Efficiency                                 | 3                          | 6%         | 1                    | 3%         |    |
|                                |                     | Sophistication                             | 2                          | 4%         | 1                    | 3%         |    |
|                                |                     | Integration                                | 3                          | 6%         | 1                    | 3%         |    |
|                                |                     | Customisation                              | 4                          | 8%         | 1                    | 3%         |    |
|                                |                     | Total                                      | 53                         | 100%       | 30                   | 100%       |    |
|                                | Information Quality | Importance                                 | 0                          | 0%         | 0                    | 0%         |    |
|                                |                     | Availability                               | 1                          | 7%         | 1                    | 25%        |    |
|                                |                     | Usability                                  | 0                          | 0%         | 1                    | 25%        |    |
|                                |                     | Understandability                          | 0                          | 0%         | 0                    | 0%         |    |
|                                |                     | Relevance                                  | 2                          | 14%        | 0                    | 0%         |    |
|                                |                     | Format                                     | 0                          | 0%         | <b>2</b>             | <b>50%</b> |    |
|                                |                     | Content accuracy                           | <b>8</b>                   | <b>53%</b> | 0                    | 0%         |    |
|                                |                     | Conciseness                                | 0                          | 0%         | 0                    | 0%         |    |
|                                |                     | Timeliness                                 | <b>3</b>                   | <b>20%</b> | 0                    | 0%         |    |
|                                |                     | Uniqueness                                 | 1                          | 7%         | 0                    | 0%         |    |
|                                |                     | Total                                      | 15                         | 100%       | 4                    | 100%       |    |
|                                |                     | Unknown (U)<br>(Temporary classifications) | Usage                      | 4          | 17%                  | 0          | 0% |
|                                |                     |  | Better resource management | 7          | 30%                  | 0          | 0% |
| Overall management improvement | 12                  |  | 48%                        | 0          | 0%                   |            |    |
| Training                       | 1                   |  | 4%                         | 0          | 0%                   |            |    |
| Security                       | 0                   |  | 0%                         | 1          | 100%                 |            |    |
| Total                          | 24                  |  | 100%                       | 1          | 100%                 |            |    |
| <b>Total</b>                   |                     |  | <b>141</b>                 |            | <b>74</b>            |            |    |

Table 4. The distribution of the citations from both case studies to all measures in IS-Impact model (continue).

|       | Chinese case study |                 |                 |                 | Malaysia Case   |                |
|-------|--------------------|-----------------|-----------------|-----------------|-----------------|----------------|
|       | S Level            | M Level         | T Level         | O Level         | O Level         | T Level        |
| SQ    | <b>4 (29%)</b>     | <b>26 (33%)</b> | <b>11 (50%)</b> | <b>12 (44%)</b> | <b>29 (41%)</b> | 1 (25%)        |
| IQ    | 0 (0%)             | 10 (13%)        | 1 (5%)          | 4 (15%)         | 4 (6%)          | 0 (0%)         |
| II    | 1 (7%)             | 5 (6%)          | 1 (5%)          | 4 (15%)         | 14 (20%)        | 0 (0%)         |
| OI    | 3 (21%)            | <b>24 (31%)</b> | <b>5 (23%)</b>  | <b>6 (22%)</b>  | <b>23 (33%)</b> | <b>2 (50%)</b> |
| U     | <b>6 (43%)</b>     | 13 (17%)        | 4 (17%)         | 1 (4%)          | 0 (0%)          | 1 (25%)        |
| Total | 14                 | 78              | 22              | 27              | 70              | 4              |

Table 5. The distribution of the citations according to stakeholders

Table 5 demonstrates the instantiation of dimensions of the original IS-Impact model in relation to four employment cohorts in Chinese and Malaysian studies. In the Chinese case study, the data shows ‘System Quality’ and ‘Organizational Impact’ are closely related to four employment cohorts. The Strategic (S) level respondent also raised lots of issues beyond existing IS-Impact framework. The table also show that more than half of the citations (78) come from Chinese Management (M) level respondents and their concerns about the impact of IS are distributed more evenly compared with other employment cohorts. In both Chinese and Malaysian studies, the respondents from the Operational (O) level were inclined to give impacts that relate to the ‘System Quality’. While the Technical (T) level respondents in the Chinese study expressed concern about ‘System Quality’ more than other impact dimension. The only Technical (T) respondent in the Malaysian case study placed more emphasis on ‘Organizational Impact’ than any other impact dimension. In addition, no cohorts group show substantial attentions to ‘Information Quality’ and ‘Individual Impact’.

## 5. DISCUSSION

In this section, we will discuss the preliminary findings from the two case studies. A number of observations were made based on the findings. We have found that the results from both case studies provide some implication to the research methodology. Furthermore, the textual data may suggest some new measures for the IS-Impact model. We have also discovered an issues about the IS key-user group and lastly, the type of organisation and application that were used in these case studies may lead some differences between these two contexts. These implications will be discussed in detail in the following sub sections.

### 5.1 Implication for research methodology

The researchers have received important feedback on the survey instruments that will be used in subsequent research phase. Overall, the Malaysian respondents agreed on the credibility of the survey instrument, however, the Chinese respondents require more focus information and questions to help them in completing the survey.

Based on the Chinese case study, it was observed that a set of more detailed questions (from interview) can generate more SQ citations (36) than a single general open-ended question (the pilot test (17)). In the interview, most of the citations related to SQ came from Research Question No.2 and No. 4: 'What is the quality of the SAP system today?' and 'What issues and problems do you have with the system?' The findings indicated that: (1) the single general IS impact identification question is valid to explore '**Organizational Impact**' in the Chinese research context, (2) the single general IS impact identification question is probably sufficient to explore '**System Quality**' in the Chinese research context, and (3) the single general IS-Impact identification question may not be adequate to explore '**Individual Impact**' and '**Information Quality**' of the IS in the research context. Other questions are needed to investigate these two dimensions when conducting an Identification Survey at subsequent stages of the research. In this case, open-ended research question accompanied by some trigger questions are recommended for identification surveys in the Chinese context.

Meanwhile, feedback given by respondents in the Malaysian case study indicates that the survey instrument is clear and understandable. Additional words describing the word 'impact' have given them a better understanding of the purpose of the single question and also help respondents to elaborate more about the impact of the system that they have received so far. However, because the respondents are from Operational and Technical employment cohorts, we have observed that the respondents placed an emphasis on certain dimensions, therefore for the following Identification Survey, it is important to cover the entire employment cohort, in order to obtain more representative measures.

### 5.2 Implication for model extension

Preliminary findings related to the IS-Impact model validation and extension are worth investigating in the next research phase. From the Chinese case study we have found more than 60% of citations within OI mapped into Business Process Change (BPC). According to the key-words given by Chinese respondents, the researcher classifies BPC citations into four categories: (1) *Business process standardization* (10 citations), (2) *Integrated process across departments and functionality* (7 citations), (3) *high level automation* (3 citations), and (4) *effective risk management* (4 citations). BPC can thus be probably expanded into four sub measures, however this requires further evidence from the following Identification Survey and empirical validation of these possible sub measures in the Confirmatory survey.

A great many citations containing unique information are also given by Chinese respondents. Some people pointed out that the Enterprise System has enhanced their system usage; however, '**Usage**' is a dimension being removed from IS-Impact model in the previous research owing to its insufficient instantiation and low level of measuring power (Gable et al., 2008). Two other issues, 'Better Resource Management' and 'Overall Management Improvement', while not appearing in the existing IS-Impact model, are cited by Chinese respondents frequently in the study as well. There is also one citation from the Malaysian case study that could not be mapped into the IS-Impact model. This single

citation came from a Technical employee who mentioned the security of the system. This might suggest a new measure for SQ.

Although the sample of respondents was limited and the study is at the exploratory stages, the preliminary findings are valuable for the research, as they provide the possible missing aspects of IS-Impact for Chinese and Malaysian organisations. They partly support the existing IS-Impact model's credibility. Those model adjustments will be further tested and justified in the Identification survey and Confirmatory survey.

### **5.3 IS key-user group**

These case studies have indicated some patterns between the IS-Impact dimensions with key user groups. In the Chinese case study, regardless of which employment cohorts the respondent is located in, they all place emphasis on '**Organizational Impact**' and '**System Quality**', while prior study suggested, based on the weighting, that Strategic users gave high correlation to the '**Organizational Impact**' dimension. Meanwhile, prior study also suggested that Technical and Operational users highly correlated to '**System Quality**' (Gable et al. 2003; Gable et al. 2008). In addition, Chinese management level respondents tends to be better informed about the impact of IS than other stakeholder groups. A previous study suggested that if an IS evaluation is limited in terms of time and resource and is not able to canvass multiple stakeholder groups, the 'user group (management level and operational level)' (Sedera, 2006) or middle level management group (Shari Shang & Seddon, 2002) is the ideal respondents group to be investigated. The Chinese case study provides evidence for those arguments.

### **5.4 Application and organisation type**

We observed that applications and organisational type chosen in each case study could result in different findings. As the Chinese case study looked at multiple SAP modules rather than only financials, a great deal of operational impacts, such as better resource management, improved productivity on manufacturing and inventory management, have been highly commented by the respondents. Meanwhile, as the Chinese case study is carried out in a profit-driven organisation rather than public organisation, a number of managerial impacts, such as business process standardisation/integration, and improved overall enterprise management have been identified. In relation to the Malaysian case study, all citations (except one) have mapped into the dimensions and measures of IS-Impact model. This suggests with the same type of IS system (as the prior work) all measures and dimensions may be relevant to the Malaysian context.

Comparing the Chinese case study with the previous Australian as well as Malaysian case study, the Chinese respondents demonstrated substantial concerns with enterprise management and business process change due to the IS. The expectation for Enterprise systems from Chinese enterprise could be one of reasons for this issue. The Chinese enterprise is eager to learn the advantages of enterprise management theory and learn to survive in an increasingly fierce competitive business environment. Enterprise Systems, especially ERP, that was claimed as the 'best business practices', and are regarded as a drive for more advanced business process and can remove deficiency exist in the traditional Chinese business practice. Therefore, realizing improvements in terms of business process and enterprise management have become critical impacts from IS.

## **6. CONCLUSIONS**

The overall research seeks to validate one of the most rigorous and comprehensive IS Success measurement model – IS-Impact model in the Chinese and Malaysian research context. We have adopted a context extension strategy (Berthon, Pitt, Michael, & Carr, 2002) by altering the research setting while the research methodology and theory remain generally the same. However, as the study context changed, part of the research design may require adjustment, as some issues associated with specific context emerged during the course of study.

This paper has discussed a preliminary observations of measures of the impact of IS in Chinese and Malaysian organisations. All findings from these case studies are regarded as a starting point in validating and extending the IS-Impact model in new contexts. Although we are at an early stage of

the re-exploratory model, these preliminary findings are valuable for the research, as they provide some insights for organisations as well as some implications for the model in new contexts.

In conclusion, the outcomes of the pilot tests have helped us in constructing a better survey instrument for the following phase in the research. In addition, we have found that it is important to canvass the right stakeholder in order to get representative citations to measure IS success in the research context.

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