Association for Information Systems
AIS Electronic Library (AISeL)

PACIS 2008 Proceedings

Pacific Asia Conference on Information Systems (PACIS)

July 2008

The Measurement of Information Systems Success in China: Re-validating IS-Impact in the Chinese Organizational Context

Lan Cao
IT Professional Services Research Program, l.cao@student.qut.edu.au

THE MEASUREMENT OF INFORMATION SYSTEMS SUCCESS IN CHINA

: RE-VALIDATING IS-IMPACT IN THE CHINESE ORGANIZATIONAL CONTEXT

Lan, Cao, Queensland University of Technology, Level 3, Margaret Street 126, 4001, Brisbane, Australia, l.cao@student.qut.edu.au

Abstract

Information system (IS) investments are under increasing scrutiny and pressure to justify their contribution to the productivity and competitiveness of organizations. The impacts from contemporary IS, Enterprise Systems being the quintessence, are arguably difficult to measure. In response (Gable, Sedera, & Chan, 2008) introduced the IS-Impact measurement model 'a measure at a point in time, of the stream of net benefits from the IS, to date and anticipated, as perceived by all key-user-groups.' IS-Impact, though extensively validated with enterprise system (ES) in both public and private sectors in Australia, has yet to be tested in other countries. This paper proposes a study to operationalise a Mandarin version of the IS-Impact model, and to validate the model, instrument and approach in the Chinese organisational context, thereby further validating and generalizing the IS-Impact approach. A context study, in combination with IS-Impact survey results, will also yield valuable insights into the state of ES in China.

Keywords: IS-Impact, IS-success, China, Model validation

1 RESEARCH OVERVIEW

China's management information systems software market is experiencing a period of rapid growth. According to the China Centre for Information Industry Development (CCID, 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). Though Chinese organisations are increasingly dependent on their installed base of IS, much dissatisfaction with IS has been reported; many IS implementation projects are not completed on time or within budget, and many fail to meet requirements and realise promised benefits (He, 2004; Martinsons, 2004; Xue, Liang, Boulton, & Snyder, 2005; Zhang, Lee, Zhang, & Banerjee, 2002). In these circumstances, it is important that Chinese organisations monitor the success (or not) of their increasingly large investment in IS.

The study addresses the main question "How can IS Success be measured economically in Chinese organisations?" Several models and approaches have been developed for measuring IS Success, the most widely cited being the (DeLone & McLean, 1992) IS Success model (ISS). Though widely cited in the academic literature, there has been little known take-up of ISS in practice. More recently, (Gable et al., 2008) have proposed the IS-Impact model, which, while based in ISS, offers a validated, operationalised, economical and generalisable model, instrument and approach, designed both for research and for benchmarking IS in practice. This study adopts the IS-Impact model as the commencing theory-base.

In attention to the main research question, the study has the primary objective - to translate, adapt, extend as necessary and re-validate the IS-impact model, instrument and approach for Chinese organisations. The study has the further aims of qualitatively and quantitatively evaluating and identifying relevant key-user-groups[1] (Gable et al., 2008) in Chinese organisations, and describing the state of Financial applications in China.

An IS-Impact model validated in China may serve as a validated dependent variable in ongoing research into the drivers of IS-Impact in China. As independent variable, IS-Impact may aid in understanding the relationship between IT and Chinese organizational performance. Across systems in an organization, IS-Impact may yield a measure of performance of the applications portfolio. With further research, IS-Impact may ultimately yield valuable cross –organizational comparisons of IS performance between application areas, system sourcing scenarios, sectors, geography, cultures, organization size and between other demographic groupings. More broadly, an extensively validated and widely-adopted IS-Impact model would facilitate cumulative research on IS-Impact, while providing a benchmark for Chinese organisations to track their IT performance.

Ultimately, the IS-Impact approach may be of interest to Chinese organisations seeking to: (1) Evaluate the goodness of contemporary IS using an 'easy-to-understand', perceptual survey instrument; (2) Assess the level of IS-Impact from multiple stakeholder perspectives (e.g. Strategic-users, Operational-users, and Technical-users); (3) Measure IS-Impact using tangible as well as less tangible indicators; (4) Identify and understand trends in system performance over time; (5) Establish an IS-Impact benchmark for comparison across versions/upgrades, organisations, departments, system-types, system-modules or across other demographic groupings; (6) Further justify the IS subsequent to implementation; and (7) Focus scarce resources and attention on those aspects of the IS and the organization most in need.

[1] Prior research on IS-Impact has been constrained to intra-organisational systems (mainly Financials) for which key-user-groups are: Strategic-users, Operational-users and Technical-users, consistent with (Anthony, 1965).

2 RESEARCH QUESTION

(Cooper & Emory, 1995) suggest a four-level research question hierarchy, consisting of (1) a management question; (2) research question(s); (3) investigative questions, and (4) measurement questions (questions in instrument). This study's research question hierarchy is presented in Table 1.

Management Question	
How can IS Success be measured economically in Chinese organisations?	
Research Question	
Does the IS-Impact model work in Chinese organisations?	
Investigative Questions	
Investigative Q1 Are the IS-Impact dimensions and measures appropriate for Chinese organisations?	
Investigative Q1.1	Are all existing IS-Impact dimensions and measures applicable?
Investigative Q1.2	Are any new dimensions or measures required?
Investigative Q1.3	Can necessary dimensions and measures be addressed by all key-user-groups?
Investigative Q2 Can the dimensions and measures be combined into an overarching IS-Impact model?	
Investigative Q2.1	Are the dimensions and measures complete?
Investigative Q2.2	Are the dimensions and measures additive?
Investigative Q2.3	Are the dimensions and measures mutually exclusive?

Table 1: Research Question Hierarchy

3 LITERATURE REVIEW

The candidate reviewed related literatures attempting to realise: (1) the prevalent evaluation framework and models of IS Success and issues in IS Success research, (2) the current state of IS Success research in China and valid IS Success measures conforming to Chinese IS use that have been proposed by Chinese academic. It ultimately helps the candidate to identify the theoretical basis, research model and research gaps of the proposed study. Here below is a short summary of the literatures reviewd.

3.1 IS Success research

A great deal of literature on Information Systems Success evaluation focuses on the implementation issues, rather than on the investment or benefits from the IS to the organisation after the systems have been deployed. Especially when it comes to evaluating Enterprise Systems success, this problem becomes more severe (Cheng, Deng, & Li, 2006; Soh, Kien, & Tay-Yap, 2000). Additionally, the question of how IS are considered to be a success or failure remains the big issue by researchers. For this reason, most of the studies on IS Success reflect only on cost or benefits analysis and paying more attention in finding factors that contributed to the success of ERP implementation. (DeLone & McLean, 1992) summarized the features of early stage as: (1) a very broad list of individual dependent variables to measure IS Success and the research results are very difficult to be compared, (2) insufficient MIS field study research has attempted to measure the influence of the MIS effort on

organisational performance, and (3) most of studies measured IS Success in only one or possibly two success measures. In their 1992 work, (DeLone and McLean 1992) also called on the academics to spend effort on reducing the number of measures of IS Success and bring more structure into this area.

IS Success is rather difficult to measure, especially when it comes to gauging comprehensive modern information system, such as Enterprise Systems (known as ERP systems). It is might due to ERP's complex nature of handling large amounts of transactions across many business functions and involving a variety of stakeholders. When evaluating the IS Success or effectiveness, different studies might adopt perspective from different stakeholders, employ different time framework, or may be diverse in level of analysis. The idiosyncrasy of IS Success studies contribute to the mixed results observed. For example, (Shang & Seddon, 2002) proposed to classify potential ERP benefits from strategic perspective; however (Sedera, Gable, & Chan, 2004)argued that a holistic perspective from all stakeholders will be more beneficial.

(DeLone & McLean, 1992, 2003) proposed a taxonomy and an interactive model as frameworks for conceptualizing and operationalizing IS Success. It is the most accepted model which have been cited and referenced by many later studies in this area. The DeLone and McLean IS model is multidimensional framework integrating six categories of measurements, including System Quality (SQ), Information Quality (IQ), User Satisfaction, Use, Individual Impact (II), and Organizational Impact (OI). They revealed the very nature of the IS phenomena, namely the dimensions of ISS cannot be isolated, because they are independent and integrated to constitute the comprehensive dependent variable – IS Success. In the proposed study, the candidate will apply the DeLone and McLean IS Success model as the theoretical basis, as it is the major source and the most referenced model in IS evaluation/ IS Success area. Besides the strength of DoLone and McLean model, some researcher argued that it is flawed in combination of process model and variance model, and misconcepulizaion of IS Use (Seddon, 1997).

3.2 IS Success Research in China

The candidate reviewed the IS Success studies or IS evaluation studies from the middle of 1990's to most recent to identify any valid IS Success theoretical frameworks or models proposed by Chinese academics and practitioners. The major objective of reviewing Chinese IS Success works is to help the candidate to get any important insights from Chinese academic with reference in assessing IS Success in China. Additionally, the candidate anticipates discovering any validated measures which can be assisted in further IS-Impact model re-validation. This section summarises highlights of a recent analysis of 53 studies across 15 Chinese journals[2] that have discussed IS Success / IS evaluation topic. Among those Chinese IS Success / IS evaluation research, 16 IS assessing model have been identified. However, one model developed by (Min, Chen, & Zhang, 2000), a group of academics from Beijing Jiaotong University, is comparatively prevalent, since Min's model have been cited frequently by other studies. Chinese academics also regarded the IS Success as a comprehensive variable as their western counterparts did, so they construct multidimensional models to describe the dependent variable. Taking Min's study as an example, five dimensions constitute his IS evaluation model, which are System Quality, Benefit, Technical Investment, Performance and Operation. Another important feature of Chinese IS Success frameworks and models is that they remain a certain degree of consistency in the measuring dimensions but varies greatly in the measuring items. The most commonly used dimensions are System Quality, Organization Fit (including technical competence, IS implementation success and cost of IT), Benefits, and IS Use. However, the Chinese IS Success studies are flawed in terms of the insufficient theory support and demonstration. The last but not lest, none of the models have been further validated and empirical examined. As no evidence show the

[2]Information Systems as a discipline in China is relatively young with only two decades of history, thus there is still no academic journal dedicated to the IS field in China. IS research is often published in academic journals in related disciplines, such as management science, forecasting, enterprise management, and accounting. (Ji, Min, & Han, 2007) used to study on the state of the art of the Chinese IS discipline and summarized a list of the journals that influence the IS research mostly. Most of the Chinese reference that candidate have reviewed come from academic journals listed in Ji's ranking.

credibility of those Chinese IS Success models, the candidate decide to employ IS-Impact models as the research model.

4 RESEARCH MODEL

The IS-Impact model (Figure 1) will be employed as the research model in this study. The IS-Impact measurement model comprises 27 measures along four distinct and individually important dimensions – "System Quality" (SQ), "Information Quality" (IQ), "Individual Impact" (II) and "Organization Impact" (OI) (Gable, Sedera, & Chan, 2003; Gable et al., 2008).

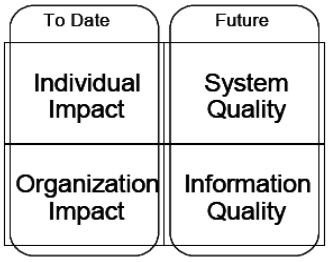

Figure 1: The IS-Impact Measurement Model

The IS-Impact model deviates from (DeLone & McLean, 1992) in five main ways (Gable et al., 2008; Sedera, 2005). Firstly, it does not purport a causal or process model of success. Secondly, it excludes Use as a success dimension. Thirdly, Satisfaction is conceptualised as an overarching measure of ES success rather than as a dimension. Fourthly, new measures were added for evaluating contemporary IS. Finally, it includes additional measures to explore a more holistic organisational impact dimension.

5 RESEARCH DESIGN

5.1 Research Strategy

According to (Berthon, Pitt, Ewing, & Carr, 2002), replication is regarded as an important approach in verifying knowledge. This approach is widely accepted by researchers in revisiting previously proposed theory to compare findings (Berthon et al., 2002; Samaddar & Kadiyala, 2006). Furthermore when determining the applicability of findings of one study to another context, replication is the appropriate approach (Samaddar & Kadiyala, 2006). The study proposed herein conforms to the replication strategy introduced by (Berthon et al., 2002), referred to as 'context extension'. This strategy applies the existing theory and method to a different context in order to further explain the results. The proposed study will thus discover whether the IS-impact measurement model, while valid in one setting, yields the same result in another.

Studies that extend a model/framework by altering the context often are associated with validating an instrument within the new setting. Increasingly researchers in the IS field attempt to construct models to interpret IT phenomenon. They extract constructs from the real setting and attempt to build interrelationship among the constructs. The constructs serve as surrogates of the real world phenomenon and the relationship among those constructs convey how a part of the world works. The set of constructs in a model then are operationalized into an instrument, whereby the causal relationships or the correlations among each variable can be tested. However, when the research context has been changed and new data have been gathered, it should be questioned whether the construct extraction, model construction and instrument operationalization of previous studies are still credible. Academics can answer the above question by re-validating the instrument associated with this model. In this particular research, the candidate will test the translated IS-Impact measurement instrument in terms of content validity, construct validity and reliability to justify the IS-Impact model's applicability in the new setting - "Chinese organisations".

5.2 Methodology

The design will combine qualitative and quantitative research evidence, a main objective being a richer, contextual basis for interpreting and validating results (Gable, 1994; Hunter, 2005). The proposed study will involve three types of research methods: context report, translation and survey. As the overall research strategy is context extension of the IS-Impact model, the research commences with a qualitative context report, drawing on academic and commercial press in both English and Mandarin (e.g. newspaper clippings, government reports, commercial reports, mainstream web-pages) to explore and describe the new study setting "the Chinese enterprise which implements Financials (or ERP Financial module)".

Two round surveys will be conducted in order to validate the IS-Impact model. In the development of the IS-Impact measurement model, researchers will come up with two survey instruments. The first survey "identification survey" actually is more interpretative and attempts to probe all possibly applicable IS-Impact dimensions and measures for Chinese enterprises and the data gathering are qualitative. The second survey "main survey" is then developed to verify the credibility of dimensions and measures identified in last survey by using quantitative data. In this study the related model, theoretical framework and instruments will be translated into Mandarin. As all Mandarin is the official language in China and the participants are local owned companies, it is logical to carry out surveys in China national language. This program of study is divided into three phases and figure 2 present the research design of the study in details.

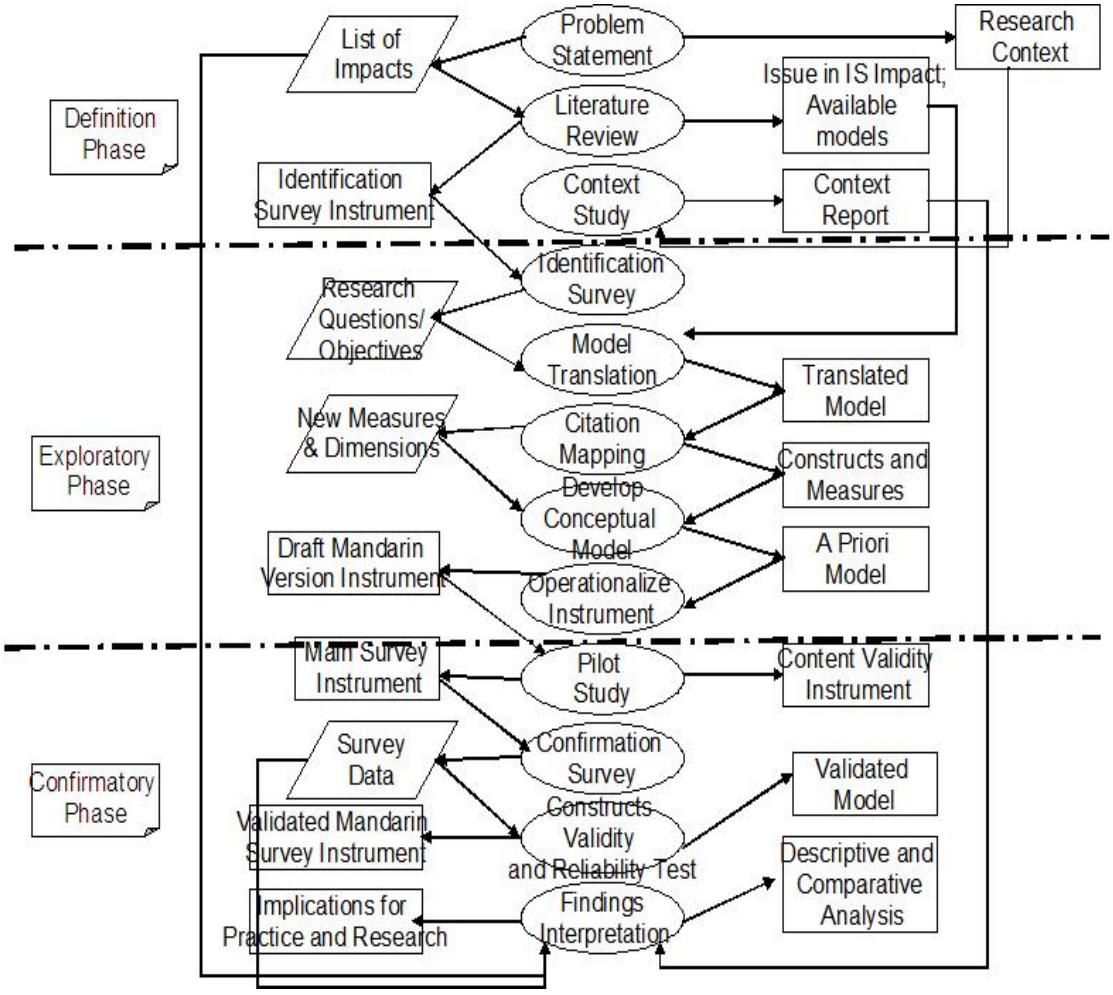

Figure 2: The Research Design

6 RESEARCH OUTLOOK

The Candidate commenced the PhD study in November 2006 and finalized Confirmation of PhD Candidature in December 2007. By the time of submission of this document, the candidate finished "the definition phase" study and achieved the milestone set for this research phase, namely research problem and research question identification, a phrasal literature review, a preliminary context report, a research design, confirmation document, and confirmation defence.

The candidate is proceeding to the exploratory phase research and plans to begin the first round survey "identification survey" in July and August 2008 then conduct the main survey by the end of 2008. It is supposed that the candidate would finish the PhD study by the end of 2009.

References

Berthon, P., Pitt, L., Ewing, M., & Carr, L. C. (2002). Potential research space in MIS: A framework for envisioning and evaluating research replication, extension, and generation. *Information Systems Research, 13*(4), 416.

CCID. (2007). *China Management Software Market Report, 2005*. Beijing: China Centre of Information Industry Development.

Cheng, D., Deng, F., & Li, H. (2006). *Critical factors for successful implementation of ERP in China.* Paper presented at the International Conference on e-Business Engineering, Shanghai, China.

Cooper, D. R., & Emory, C. W. (1995). *Business Research Methods* (the fifth edition ed.). Homewood, Illinois: R.D. Irwin.

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60-95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9-30.

Gable. (1994). Integrating case study and survey research methods: An example in information systems. *European Journal of Information Systems, 3*(2), 112.

Gable, Sedera, & Chan. (2003). *Enterprise systems success: a measurement model.* Paper presented at the Proceedings Twenty-Fourth International Conference on Information Systems, Seattle, USA.

Gable, Sedera, & Chan. (2008). Measuring Enterprise Systems Success: The ES-Success Model. *Journal of the Association for Information Systems 8*(This article has already been accepted and will be put in print in May in 2008)

He, X. J. (2004). The ERP challenge in China: a resource-based perspective. *Information Systems Journal, 14*(2), 153.

Hunter, M. G. (2005). Editorial Preface: In Support of Qualitative Information Systems Research. *Journal of Global Information Management, 13*(4), I.

Ji, S., Min, Q., & Han, W. (2007). Information Systems Research in China: An Empirical Study. *Journal of Global Information Management, 15*(1), 1.

Martinsons, M. G. (2004). ERP in China: ONE PACKAGE, TWO PROFILES. *Association for Computing Machinery. Communications of the ACM, 47*(7), 65.

Min, W., Chen, J., & Zhang, Z. (2000). Study on the Evaluation Index System and Methods for Information Systems. *Journal of the China Railway Society, 22*(5), 37-41.

Samaddar, S., & Kadiyala, S. (2006). **Information systems outsourcing: Replicating an existing framework in a different cultural context**. *Journal of Operations Management, 24*(6), 910.

Seddon, P. B. (1997). A Respecification and Extension of the DeLone and McLean Model of IS Success. *Information Systems Research*

Information Systems Research J1 - Information Systems Research, 8(3), 240-253.

Sedera, D. (2005). *Enterprise System Success: A Measurement Model.* Queensland University of Technology Brisbane.

Sedera, D., Gable, G. G., & Chan, T. (2004). *Measuring enterprise systems success: the importance of a multiple stakeholder perspective.* Paper presented at the Proceedings 12th European Conference on Information Systems, Turku, Finland.

Shang, S., & Seddon, P. (2002). Assessing and Managing the Benefits of Enterprise Systems: the Business Manager's Perspective. *Information Systems Journal, 12*(2), 271-299.

Soh, C., Kien, S. S., & Tay-Yap, J. (2000). Cultural fits and misfits: Is ERP a universal solution? *Association for Computing Machinery. Communications of the ACM, 43*(4), 47.

Xue, Y., Liang, H., Boulton, R. W., & Snyder, A. C. (2005). ERP implementation failures in China: Case studies with implications for ERP vendors. *International Journal of Production Economics, 97*(3), 279-295.

Zhang, L., Lee, M. K. O., Zhang, Z., & Banerjee, P. (2002). *Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China.* Paper presented at the Proceedings of the 36th Hawaii International Conference on System Sciences, Hawaii.