Research Proposal

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INTRODUCTION

RESEARCH SIGNIFICANCE

ACADEMIC SIGNIFICANCE

PRACTICAL SIGNIFICANCE

RESEARCH QUESTIONS

BRIEF LITERATURE REVIEW

THEORETICAL BASIS AND A TENTATIVE RESEARCH MODEL

RESEARCH DESIGN

RESEARCH RESULTS TO-DATE

CONCLUSION

REFERENCE

APPENDIX A: NOMINATION INFORMATION FORM

APPENDIX B: NOMINATION LETTER
**Introduction**

IT synergy is emerging as an important information systems (IS) research topic (Tanriverdi 2005; 2006; Zhu 2004) that is considered pertinent to the enduring research on the business value of IT (Melville et al. 2004; Tanriverdi 2005; 2006; Wade and Hulland 2004; Zhu 2004). While synergies in other fields, such as biology, chemistry, and medical science, have been extensively studied, synergies in the field of information systems have received scant research attention (Brown and Magill 1994). In particular, most studies on IT business value to date have attempted to relate IT directly to firm performance. Such reductionism not only ignores the synergistic benefits enabled by IT (Bharadwaj 2000) but also overlooks potential intermediate variables between IT and firm performance that business value may be contingent upon.

It has been acknowledged that synergy arisen from the combinatorial use of IT and other organizational resources were largely ignored by the extant IT business value literature (Barua and Mukhopadhyay 2000). Brown and Magill (1994, p.191) urged researchers to take heed and awareness to the measurement of cross-unit IT synergies because they were “unaware of any instruments that purport to capture IT-related cross-unit synergies”. Information systems researchers have also noted that synergies arisen from the combinatorial usage of IT and business resources were inadequately recognized in the IT business value literature and such underestimation tends to understate the business value of IT (Barua and Mukhopadhyay 2000; Rai et al. 1997; Zhu 2004).

Recognizing this research gap, emerging IS studies have attempted to examine how IT synergies can affect the performance of firms and have shown that, from a
resource-based view’s (RBV) perspective, the synergistic combination of IT and other organizational resources can enhance firm performance (Tanriverdi 2005; 2006). For example, Tanriverdi (2006, p.75) attested that IT synergy accounted for “two percent of the variance in corporate performance…[that] represents significant economic value”. Likewise, Zhu (2004, p.195) showed that synergy among IT and other organizational resources “indeed delivers a value proposition reflected upon firm’s performance”.

Because IT synergy is indispensable in determining the business value of IT, because IT synergy is emerging as an important research topic, and because IT synergy is yet to be conceptualized and operationalized, it is imperative to conduct research on the topic. This will allow the incorporation of a potential IT synergy construct into the IT business value research framework as an intermediate element and help explaining more variances in firm performance that are due to IT-related factors. This echoes the call for research efforts into the “missing link” between IT investment and firm performance (Devaraj and Kohli 2003) and it is also in accordance with Barua et al.’s (1995) intermediate variable proposition.

**Research Significance**

**Academic Significance**
The incorporation of the IT synergy construct into the IT business value research framework is one of the academic contributions of the proposed study. Although the research attention of quantitative IT business value research has shifted away from examining the productivity paradox (Melville et al. 2004), the fallibility of relating IT directly to firm performance is still being criticized because such reductionism ignores any synergy that may also contribute to firm performance (Bharadwaj 2000). In fact, the benefits of IT synergy have been largely ignored by the extant IT business
value literature (Barua and Mukhopadhyay 2000; Rai et al. 1997; Zhu 2004). Such paucity of consideration for IT synergy while evaluating the business value of IT not only underestimates the contribution of IT synergy to firm performance but also overlooks potential intermediate variables between IT and performance outcomes upon which business value may contingent.

Therefore, by incorporating the IT synergy construct into the IT business value research framework as an intermediate element, the proposed study can help painting a more comprehensive picture in terms of IT payoff and augmenting the research framework. Indeed, this echoes the call for research efforts into the “missing link” between IT investment and firm performance (Devaraj and Kohli 2003) and it is also in accordance with Barua et al.’s (1995) intermediate variable proposition. Hence, the proposed study aims to reduce the amount of underestimation of the business value of IT and help explaining more variances in firm performance that are due to IT-related factors by taking IT synergy into account.

Incorporating the IT synergy construct into the IT business value research framework requires that the construct be operationalized, and the operationalization is dependent on a valid conceptualization of IT synergy. As a result, the proposed study aims to contribute academically by conceptualizing IT synergy. To date, while emerging studies have started to formally examine the synergistic effects between IT and other organizational resources (e.g. Tanriverdi 2005; 2006), they lack a received definition of IT synergy, especially in the context of IT business value research. In fact, the term synergy in the IS literature has been so commonly used at each researcher’s own convenience that its connotation varies under different contexts. Such lack of a
received definition of IT synergy necessarily leads to difficulties in producing cumulative knowledge (Churchill 1979; Osigweh 1989).

Thus, it is very helpful that IT synergy be firstly conceptualized if the information systems literature were to proceed any further on the track of investigating the concept because precise conceptualizations are “the building blocks of science upon which propositions are based” (Osigweh 1989, p.579). It is only after IT synergy has been properly conceptualized that information systems researchers are able to account for the much-neglected element in assessing the performance impact of IT on firms and allow the accrual of comparable studies that rest on the same theoretical base.

Furthermore, an appropriate conceptualization of IT synergy offers sound concept extension and connotation that can be instrumental in drawing research boundaries, identifying potential antecedents and moderators, and building a framework and/or a nomological network for systematic research (Osigweh 1989). The nomological network that contains potential antecedents and moderators of IT synergy enables empirical examination of IT synergy itself and other associating factors, provides insights into the underpinning resource configuration on which strategies for achieving competitive advantage can be built, and complements the current IT business value research framework. Therefore, the conceptualization of IT synergy can lay the theoretical foundation for synergy-related information systems research.

The instrument for measuring IT synergy, which is a result of and is built on the conceptualization of IT synergy, is also one of the academic contributions of the proposed study. Developing an instrument for measuring IT synergy is a natural extension of the conceptualization of the term because the definition of IT synergy clearly specifies concept extension and connotation (Osigweh 1989). This
specification of concept extension and connotation not only stipulates all properties that anything must possess to be denoted by IT synergy but also specifies the class of objects to which IT synergy applies or identifies (Osigweh 1989). Although Brown and Magill (1998, p.191) have urged researchers to take heed and bear awareness to the measurement of cross-unit IT synergies because they were “unaware of any instruments that purport to capture IT-related cross-unit synergies”, such instrument is yet to be seen. Hence, an instrument for measuring IT synergy not only answers previous calls and fills the research gap but also enables future studies to capture IT synergy in a more formal and systematic way.

In summary, the incorporation of the IT synergy construct into the current IT business research framework to remedy the missing intermediate element requires that IT synergy be firstly conceptualized and then operationalized. The conceptualization of IT synergy, the development of an IT synergy measurement that can be linked to firm performance, together with the incorporation of the IT synergy construct into the IT business value research framework can shed light on how organizational factors affect IT synergy and how IT synergy in turn links and contributes to firm performance. The research results also provide a foundation for further research into firm or corporate strategies that allow efficient resource allocation that generates maximum synergistic benefits.

**Practical Significance**
The instrument developed by the proposed study for measuring IT synergy and the associating moderators and antecedents can serve as a basis for the development of a balanced-scorecard-like tool using which firms are able to measure the degree of synergy between their IT and other organizational resources. Measuring IT synergy has practical significance for firms because “[if] you can’t measure it, you can’t
manage it” (Kaplan and Norton 1996, p.21). Although IT synergy may not be systematically managed (Barney 1991; 2001), the ability of measuring it can nevertheless empowers firms to gain valuable insights into the effectiveness of its resource combination and uncover the transforming power of complementary assets (Hughes and Morton 2006).

Moreover, the balanced-scorecard-like instrument can act as a self-diagnostic tool the employment of which allows firms to investigate key aspects of their organization that are crucial in effectively generating and capturing synergy. For example, using the balanced-scorecard-like instrument, firms can evaluate the adequacy of their IS capabilities that are necessary for exploiting IT synergy. In fact, capturing synergies is the prime goal of a multi-business firm and is “at the heart of corporate strategy” (Eisenhardt and Galunic 2000, p.91).

Furthermore, the proposed study provides firms with insights for understanding why some of them are unable to generate, capture, or further exploit IT synergy arisen from the combinatorial use of IT and other organizational resources. In particular, the IT synergy construct and its antecedents can reveal factors that must be considered if firms want to capture IT synergy, and moderators of IT synergy can shed lights on factors that are likely to hinder IT synergy from contributing to firm performance.

Finally, because the proposed study reveals that synergistic benefits can occur when IT and other organizational resources are used in effective combination, firms can be more certain when acquiring resources that bear sufficient traits. For example, firms traditionally identify feasible investments by looking into financial indicators such as the net present value (NPV) and/or return on investment (ROI). However, when potential synergistic effects are considered, investment that bears negative NPV or
ROI can still be acquired because they may be complementary to other resources that have already been obtained by the firm and such investment can effectively generates benefits that overwhelm any financial justification.

**Research Questions**

Therefore, the research questions that this proposed study seeks to answer are,

- What is IT synergy?
- What are the antecedents and moderators associated with the generation, capture, and exploitation of IT synergy?
- How much variance of firm performance does IT synergy account for?

**Brief Literature Review**

Through literature review, it is found that IT synergy encompasses synergies occur at the asset and process level as well as the ones arisen from intra-organizational and inter-organizational interactions. First, synergy could occur among IT resources (Bharadwaj 2000; Tanriverdi 2005; 2006; Zhu 2004), which include assets and capabilities (Wade and Hulland 2004). For example, Meredith and Camm (1989) illustrate that synergies are generated when various advanced manufacturing technologies can be used in combination by being linked together and operating off common data sources. Moreover, El-Najdawi and Stylianou (1993) contend that because a decision support system (DSS) and an expert system (ES) share so many similarities, significant synergies that will lead to improved efficiency and quality can be achieved when the two systems are integrated. In addition, Jih et al. (2005) maintain that the capability of managing knowledge effectively and the capability of conducting electronic commerce efficiently can produce synergistic outcomes. Finally, Zhu (2004, p.193) argues that “mutually enhancing synergies exist between legacy IT systems and Internet-based ecommerce capabilities”. At this level, synergies are
commonly referred to or supposedly to be manifested as decreased costs, improved value \(^1\), and/or enhanced operating efficiency. Such cost savings and efficiency improvements are due to the relatedness or the complementarity among IT assets (e.g. El-Najdawi and Stylianou 1993; Meredith and Camm 1989) as well as IT and other organizational assets (e.g. Tanriverdi 2005; 2006; Zhu 2004).

Second, when properly managed, IT can enable the integration of processes across various physical and organizational boundaries by removing physical, spatial, and temporal communication restrictions (Basu and Blanning 2003; Brown and Duguid 1998; Melville et al. 2004). As a result, IT facilitates the sharing and accessibility of organizational resources among disparate business processes and allows these processes be synergistically put together to produce additional positive outcomes with little extra costs (Bharadwaj 2000).

Third, probably the most apparent and easily observable synergies are the ones occur within an organization. For example, cost-saving synergies can be observed when IT artefacts operate off common resources and databases (Bharadwaj 2000; Meredith and Camm 1989) as well as when business units of a multi-business firm employ a common IT infrastructure (Tanriverdi 2006). Intra-organizational synergy can be further divided into intra-functional and inter-functional synergies. Intra-functional synergy refers to synergies that occur within a specific business function. Synergies occurred within a business function generally arises from proper coordination and combinatorial utilization of organizational assets and processes. Inter-functional synergy refers to synergies that occur among two or more business functions. For example, Tanriverdi (2005; 2006) describes the performance effects of IT synergy

\(^1\) Meredith and Camm (1989) considered cost saving is essentially the same as revenue generation.
across business units in multi-business firms and Nelson and Cooprider (1996) depict synergy between the IS function and line organizations. In addition, Richardson et al. (1990) explain how effectively managed and coordinated IT architecture, which is comprised of IT organization, application, data, and infrastructure, can help the corporation achieving cross-unit synergy.

Fourth, synergy can also occur among disparate organizations. Barua et al. (2004) suggest that through the integration of system, corporate level suppliers and customers can attain synergy that will lead to greater cost efficiency and more effective business operations. Similarly, Ash and Burn (2003) show that the business-to-business (B2B) integration of enterprise resources planning (ERP) systems between two organizations enables synergistic benefits that result in performance gains.

However, none of the previous studies has empirically examined why and how synergy occurs, how it can be achieved, and how it can be captured. In other words, extant studies have not yet investigated the antecedents of synergy and they do not use a received definition of synergy. Thus, there is a potential gap in the current information systems literature about the synergy concept.

**Theoretical Basis and a Tentative Research Model**

The proposed study attempts to answer the research questions by adopting the resource-based view (Barney 1991; Penrose 1995) and the relational view (Dyer and Singh 1998; Lavie 2006) of the firm. This is because the resource-based view offers rich tools for examining synergies at the resource level and the relational view enables the clear specification of relationships among resources.

The following is a tentative research model for the proposed study.
Research Design
The proposed study seeks to obtain desirable research outcomes by adopting a mixed method approach that employs both quantitative and qualitative research methodologies. Overall, there are three main stages in the proposed study each producing different yet connected outcomes. The first stage involves the conceptualization of IT synergy using which the IT synergy construct can be developed in the second stage, while the third stage consists of the empirical and quantitative testing of the IT synergy as a missing link between IT investment and firm performance.

The first two stages largely follow the construct development approach suggested by Churchill (1979), who made extensive references to Nunnally’s (1978) study of psychometric theory, and the one suggested by Lewis et al. (2005), whose work was built on Churchill (1979), that was specially designed for use in information systems studies. However, the proposed study has made minor changes to these approaches to fit its specific research context. This is mainly because the term IT synergy does not have a received definition and a concise conceptualization. As a result, extra steps need to be taken to ensure that the conceptualization of IT synergy is valid, reliable, and rigourous, which in turn guarantees domain and content validity (Bohrnstedt 1970; Churchill 1979).
Research Results To-Date

By adopting a validated literature review method (David and Han 2004; Newbert 2007), the applicant’s preliminary study of IT synergy has offered a tentative definition of IT synergy and a description of the term’s connotation and extension (Zheng 2008). The tentative definition, concept connotation and concept extension of IT synergy provides the applicant with a foundation for developing the IT synergy construct.

Moreover, the applicant has conducted a case study to substantiate the research model and the underlying theoretical logic (paper forthcoming). With these research results, the applicant is able to improve the research model and gain deeper understanding of the term IT synergy.
Currently, the applicant is working on the operationalization of the IT synergy construct and preparing survey questions (Stage II).

**Conclusion**
The proposed research studies the concept of IT synergy by developing a clear definition that describes concept connotation and extension, examining the antecedents of IT synergy, and empirically examining IT synergy’s contribution to firm performance.
Reference


### Appendix A: Nomination Information Form

**PACIS 2009 Doctoral Consortium**  
**Nomination Information Form**

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<tr>
<td><strong>Name</strong></td>
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With this nomination, I, as the nominating faculty, certify that the candidate

____ Zhong Zheng ____ is the sole nominee for PACIS 2009 Doctoral Consortium from

the ____Australian National____ University.
Appendix B: Nomination Letter

This is the Nomination Letter filled by the applicant’s supervisor.

<table>
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**Candidate Information**

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