

Sanjeev Kumar: Research Statement

This document discusses my two main research interests and introduces key research papers in each research streams. The document also provides details of my dissertation research and my future research plans.

Research Interests

My research interests stem from my academic background and work experience. As a business consultant advising clients on technology issues, I observed first hand how firms struggle to derive tangible business benefits from their technology investments. The nature of IT has evolved from transaction oriented systems to more communication and collaboration focus, my primary research interest follows the trend and explores business value of IT with special emphasis on business value of information sharing and the role of emerging technologies in moderating the relationship between information sharing and business performance.

My secondary research interest in Open Source Software (OSS) leverages my engineering background and work experience as a software developer. Scope of my research on the OSS phenomenon includes the entire OSS lifecycle from OSS development through OSS distribution and OSS adoption and use.

I use empirical analysis as the main methodological tool. I have used archival data, primary data collected using survey instruments and also web based data collected through automated spiders in my research. Other methodological approaches that I have used in my research include social network analysis and agent based modeling.

Dissertation Research: Business Value of IT

The fundamental research question I am interested in exploring is - *How can firms use IT systems to significantly improve business performance?* The role of IT systems has evolved from automation and decision support to the current primary role of communication and collaboration platforms. I study the process and technology aspects of causal mechanisms through which such IT systems affect business performance.

- **Dissertation Research Focus: Business Value of Information Sharing and the Role of Emerging Technologies**

The defining characteristics of today's IT is information mobility. IT has generally improved the flow of information and firm's ability to share information. Firms constantly share information with suppliers, partners, customers, employees, regulators, potential customers or even competitors. IT platforms like electronic markets leverage the information handling capabilities of IT to provide real time, transparent, synchronized and instantaneous information flows. Emerging technologies are allowing firms to find novel ways to connect to customers (e.g. social networking), suppliers (e.g. SOA) or partners. Information sharing is expected to lead to improvement in business performance. While extant research has studied the relationship between information sharing and business performance, it has considered information sharing as a black box and ignored the process and technology characteristics that moderate the relationship. In this dissertation I focus on these process and technology characteristics and

their interaction as drivers of business performance. As information sharing is enabled by emerging technologies, I further explore the impact of emerging technologies on the relationship between information sharing and business performance. Hence, the fundamental research questions for the dissertation are:

- What is the relationship between information sharing and business performance?
- How do emerging technologies moderate the relationship between information sharing by firms and their business performance?

The dissertation comprises three related research papers that explore the above research questions in three different contexts. The first paper looks at information sharing between a firm and its suppliers and explores how complexity and transparency of the information sharing process and the use of service oriented architecture affect the performance benefit of information sharing. The second paper looks at information sharing between a peer to peer financial market platform and users of the platform and studies the impact of a sudden change in information sharing with platform users on decision making of users and the efficiency of the platform. The third paper explores the role of information sharing between business process outsourcing vendors and clients and studies the role of such information sharing on vendor led innovations and the success of the outsourcing engagements. The dissertation is scheduled to be completed by July 2008.

The dissertation proposal was presented at the AMCIS Doctoral Consortium 2007 and is scheduled for presentation at the ICIS Doctoral Consortium 2007.

- **SOA and Information Sharing in Supply Chain: “How” Information is Shared Matters!**

We empirically analyze impact of Service Oriented Architecture (SOA) adoption on performance benefits of information sharing in supply chain using a cross sectional dataset of large US firms. We show that complexity and transparency of information sharing process significantly impact supply chain performance. Information sharing complexity has a negative effect while transparency has a positive effect. We also demonstrate that SOA adoption is successful in mitigating the negative effects of process complexity. Interestingly, SOA adoption also leads to reduction in performance benefits of information sharing transparency. We contribute to business value of IT research by providing empirical evidence of business value of SOA and the mechanisms by which SOA leads to business value. We show that both “what” information is shared and “how” it is shared affect performance and they interact differently with SOA adoption. Our results emphasize the interaction between process characteristics and technology architecture and provide directions for managers to orchestrate information sharing processes in supply chains and leverage SOA for optimal performance.

Previous versions of this paper have been presented at INFORMS-CIST 2007 and scheduled to be presented at ICIS 2007. The paper received the Best Doctoral Student Paper Award at CIST 2007. A preliminary version of the paper was nominated for the best paper award at HICSS 2007.

- **Bank of One: Empirical Analysis of Peer-to-Peer Financial Marketplaces**

Peer-to-peer financial marketplaces provide a platform for individual lenders and borrowers to interact and transact. These marketplaces dis-intermediate the traditional financial services business models. In this exploratory paper we study the operation and effectiveness of one such marketplace: Prosper.com. We analyze six months of lender, borrower and loan repayment data to answer preliminary research questions about lender behavior, market effectiveness and antecedents of loan default. We show that lenders mostly behave rationally and charge appropriate risk premiums for antecedents of loan default. We also show that there are mismatches between risk premiums charged and relative importance of factors that drive loan default. We then explore the dynamic process of lenders adjusting their lending strategies to reduce these mismatches. We analyze the effectiveness of the group reputation used in the marketplace and show that it is not effective in promoting good borrower behavior. Our analysis provides a base for future research in this exciting and evolving context. Our results provide directions for practice applications as well as future research in design of financial marketplaces, investing and risk mitigation strategies and improving the effectiveness of peer-to-peer financial marketplaces.

A preliminary research in progress version of the paper was presented at the AMCIS 2007 conference.

Other Research: Open Source Software

Open source software (OSS) represents a fundamental shift in how software is developed, distributed and used. My research on OSS spans the entire value chain of OSS from development to adoption. The three papers below represent ongoing research in each of the three stages of OSS value chain.

- **Empirical Analysis of Effect of Collaboration Network Structure on Productivity in Open Source Software Development**

In this study, we view open source development teams as social collaboration networks of developers. By integrating theories and methods from social network, software engineering and organizational behavior studies, we empirically examine the impact of collaboration network structure of open source projects on developer productivity. We find that the collaboration network structure significantly affects developer productivity. Further, the specific impact of network structure depends on the complexity of the software being developed. Our data analysis indicates that for less complex software projects, a highly collaborative and loosely structured development approach works better. However, when developing more complex software, smaller teams that collaborate in a more centralized manner with division of labor to clusters of developers achieve higher productivity. This study extends our understanding of the open source development process and provides directions for open source practitioners to better organize their projects for higher productivity.

This paper is under review at IEEE Transactions on Software Engineering (IEEE-TSE). A practice oriented version of our findings titled “Using Social Network Analysis to

Inform Management of Open Source Software Development” is under review at IEEE-Software.

- **Impact of Open Source Software Adoption on Firm IT Expenditure**

Open Source Software has attracted a lot of research interest but focus has primarily been on the development process and not on the ”demand-side” of OSS. Further, there is limited empirical investigation of the impact of OSS adoption. In this study we have attempted to fill the gap and empirically analyzed impact of OSS adoption on IT expenditure in firms. We find that OSS adoption is positively associated with overall firm IT expenditure. OSS adoption was found to have a significant positive impact on IT Labor Expenditure while no significant impact was found on IT Application Expenditure and IT Services Expenditure. We believe our findings inform both user firms and the OSS community to understand the potential cost impact of OSS adoption. Our results give a real context to the current debate on benefits of OSS vis-a-vis commercial software and provide managers with insights needed for making informed OSS adoption decisions.

A work in progress version of the paper was presented at the Workshop on Information Systems and Economics (WISE) 2005.

- **A Model of Competition between Open Source and Close Source Software**

Open-source software has grown to be significant component of many software product markets. OSS products, which are available free of charge and often have quality comparable to competing close-source software (CSS) products, have forced incumbent CSS sellers to adopt novel product and pricing strategies. Although OSS have attracted significant research interest, research has focused on the development of OSS rather than on its market impact. In this paper, we fill the gap in the literature and analyze the impact of OSS introduction on product and pricing strategy of an incumbent CSS provider. We develop a two period model of a vertically differentiated market to capture the impact of OSS introduction on a CSS monopoly. We demonstrate when CSS and OSS coexist in the market, and when only one of the products can be viable. We show that OSS entry can increase social welfare even when no one adopts the OSS, and find the lower bounds for OSS quality to increase social welfare, be adopted by end-users, and attract first-period users of CSS.

Conclusion

I intend to continue my research efforts in both business value of IT and open source software research streams. I am continuing to develop the papers mentioned in this document and other work in progress research papers for publication to premier research journals. I expect to have additional three papers under review in premier journals in next one year.

I am passionate about pursuing interesting research topics that contribute to extant research and are also relevant to managerial practice. I have developed my research skills to be able to use a variety of data sources and research methodologies. I believe I will be able to further extend my research streams and build a substantive research portfolio.