

EXPLORING THE INTELLECTUAL STRUCTURE OF THE ROLE OF TRUST IN INFORMATION SYSTEMS RESEARCH

Aakash Taneja

Richard Stockton College of New Jersey
aakash.taneja@stockton.edu
Ph: 609-652-4948

George Mangalaraj

Western Illinois University
G-Mangalaraj@wiu.edu
Ph: 309-298-1027

Anil Singh

University of Texas at Brownsville
anil.singh@utb.edu
Ph: 956-882-5831

ABSTRACT

Over the years, researchers have examined various facets of trust and its impact on IS research. The advent of e-commerce along with interpersonal, enterprise-wide, and inter-organizational systems has made trust the cornerstone in a large number of IT-related research fronts. Using author co-citation analysis (ACA), this study examines various trust-related articles published in top-tier IS journals to map the intellectual structure of trust and its applicability in IS research. Results of our analysis reveal two distinct streams: inter-personal and inter-organizational trust. It also reveals frontiers of trust related IS research and brings out the inter-relationships between the fields.

Keywords: trust, author co-citation analysis, IS research, reference discipline

INTRODUCTION

IS researchers have increasingly focused their attention on the concept of trust, rigorously examining it from both conceptual and empirical perspectives. Beginning with borrowing from the wealth of “trust research” in our traditional reference disciplines such as psychology, strategic management, and organizational behavior, IS researchers are now also utilizing the IS discipline’s cumulative research on trust to enhance our understanding of the use of information systems involving trust. In recent times, we have seen special calls for trust-related issues in top-tier IS journals such as *MIS Quarterly* and *Journal of Management Information Systems*. The importance of the phenomenon and its applicability and value to our research discipline has necessitated to systematically analyze the domain of trust as it is applied in IS literature.

Researchers can adopt different strategies to examine published work in a particular research stream. For example, a review of the literature by experts can help synthesize the intellectual development of a field [1]. On the other hand, bibliometric techniques such as citation analysis can quantitatively and objectively unravel the intellectual patterns in a discipline [2]. For this research, we have adopted author co-citation analysis (ACA) to explore and map the conceptual foundations and the intellectual structure of trust in IS literature.

The objective of this research is to delineate the subfields constituting the intellectual structure of trust-related research in the IS discipline and to explore the linkages between them. It will help us to: 1) understand the nature of trust-related IS research, 2) explore and assess various streams pertaining to the trust-related IS research, 3) identify the knowledge sources for trust-

related research in IS, and 4) find gaps and under-researched areas for trust research, thereby opening up new avenues for future research.

The organization of this research paper is as follows. First, we review trust-related research in IS. We then explain the research methodology followed by a discussion of the results. Finally, we spell out the limitations and conclude with directions for future research.

TRUST

Researchers in various disciplines have utilized trust concepts to further their understanding of various facets of trust as applicable to their domain (e.g., marriage relations between partners, organizational relations between manager and subordinates, vendor-supplier relationships) [3-7]. This versatility also is reflected by the different ways trust is defined in such studies. At a basic level, a very simple definition of trust that encompasses the phenomenon's essence is as follows: trust is one party's confidence that the other party in the exchange relationship will not exploit its vulnerabilities [8]. Various concepts related to trust have been expounded in the past, including trust propensity, trusting beliefs, distrust, trust repair, benevolence-based trust, and competence-based trust. From the methodological perspective, trust is studied at different levels of analysis such as individual, networks, and organizations. In recent past, trust research is almost synonymous with e-commerce environments. E-commerce has engendered the need to create trustworthy environments for online marketplaces. IS researchers have spent considerable effort examining the trust-building mechanisms for e-commerce. However, the issues related to trust are not limited to just e-commerce environments. IS artifacts are immensely helpful in fostering trust under a variety of situations, such as in open-source projects, project development teams, and supply management systems. It is, therefore, germane to explore different streams of trust-related research in IS and its reference areas.

RESEARCH METHODOLOGY

This study uses author co-citation analysis (ACA) on trust-related articles published in top-tier IS journals. This research adopts the methodology described below.

Selection of Authors

The first step in the ACA is to find authors who have worked on trust-related research in IS. For this task, we included all trust-related research papers published in top-tier IS journals, namely *MIS Quarterly*, *ISR*, *JMIS*, *Management Science*, and *Decision Sciences*. In total, our search on trust yielded 109 articles published from 1993 to 2009 (present). In the next step, we scanned through the bibliography of these papers to collect the sources of citations, which amounted to 7,530 references. Subsequently, we identified seminal authors whose works were more often referred to in the trust-related IS research. Some authors use publication as the unit of analysis [e.g., 9], while some consider authors to be the unit [e.g., 2]. We follow the latter technique because the scholarly contributions of co-cited authors are likely to reflect similar concepts [2]. Our analysis included articles that appeared in a 15-year period. Hence, we decided to include in our list authors whose works were cited at least 15 times in this period. Based on this criterion, we arrived at a list of 49 authors who have contributed to trust-related research in IS. Table 1 presents the list of these authors. As can be seen from the table, a large number of these authors are IS researchers, thereby reflecting the self-reliance of the field.

Table 1. Contributing authors in trust-related research in IS

Author Name (citation counts)	Research Area	Author Name (citation counts)	Research Area	Author Name (citation counts)	Research Area
Gefen D (164)	IS	Bagozzi R (25)	Marketing	Benbasat I (19)	IS
Mcknight D (100)	Management	Hofstede G (24)	Social Psychology	Anderson E (18)	Marketing
Pavlou P (93)	IS	Resnick P (24)	IS	Heide J (18)	Marketing
Jarvenpaa S (70)	IS	Gulati R (23)	Strategy	Luhmann N (17)	Sociology
Williamson O (53)	Economics	Bhattacharjee A (23)	IS	Kirsch L (17)	IS
Mayer R (49)	Management	Ajzen I (23)	Psychology	Nonaka I (16)	Management
Chin W (45)	Methodology	Nunnally J (23)	Methodology	Lewis J (16)	Sociology
Fornell C (39)	Methodology	Dellarocas C (22)	IS	Eisenhardt K (16)	Management
Davis F (38)	IS	Orlikowski W (22)	IS	Kumar N (16)	Marketing
Ba S (38)	IS	Lewicki R (22)	Management	Clemons E (16)	IS
Anderson J (35)	Mktg./Mgmt.	Zaheer A (22)	Strategy	Kim D (16)	Marketing
Doney P (33)	Marketing	Podsakoff P (22)	Methodology	Baron R (15)	Marketing
Rousseau D (33)	Org. Behav.	Wang W (21)	IS	Deutsch M (15)	Sociology
Venkatesh V (31)	IS	Ring P (20)	Strategy	Granovetter M (15)	IS
Zucker L (30)	Sociology	Stewart K (20)	IS	Dyer J (15)	Management
Straub D (29)	IS	Agarwal R (19)	IS		
Culnan M (26)	IS	Hoffman D (19)	IS		

Factor and Cluster Analysis

ACA researchers conduct multivariate analyses such as factor analysis and cluster analysis to analyze the data and identify the underlying subfields of a research stream. The correlation matrix was used as the input for this analysis. Extracted factors from the factor analysis correspond to the conceptual sub-domains of a given research stream. The results also identify the authors with substantial and/or pervasive influence on the field. Cluster analysis not only helps us unravel different research subfields in a research stream, but also aids in finding the inter-relationships between different subfields. In this research, results of the factor and cluster analysis provided a glimpse of the intellectual structure of trust-related IS research.

RESULTS AND DISCUSSION

Factor Analysis

Factor analysis with varimax rotation was conducted using SYSTAT. The results of the factor analysis yielded five factors (Table 2). Looking at the various factors, it is apparent that each of the factors represents a distinct area of trust research in information systems.

Factor 1 - Interpersonal Relationship: The central authors in the first factor primarily focus on the interpersonal relationships. Research in this area tends to be focused on the individual level of analysis. IS researchers have borrowed from the seminal works in fields of management, organizational behavior, and psychology, as is evident from the principal role played by Ajzen, Mayer, McKnight, Rousseau, and Zucker in shaping trust research in IS. Development of

cohesive trust research in IS is also evident. The maturity of any discipline relies on the cohesive body of knowledge it has created, and over time trust research in IS has accomplished it. For instance, some of the influential authors in this factor, such as Pavlou and Gefen, have done extensive research on trust in the online environment. Research on interpersonal relationships tends to utilize more quantitative research methodologies, such as field surveys and experiments. This is evident from the influential role played by Chin, Fornell, Gefen, Nunnally, Podsakoff, and Straub. The above analysis also suggests that the interpersonal relationship-based trust can be examined with alternative research methods, such as case studies and action research.

Table 2. Emergent Structure of Factors in IS Trust Research

Interpersonal Relationship		Inter-Organizational Trust	Knowledge Management	Reputation Systems	Conflict Resolution
<i>Agarwal</i>	<i>Kim D</i>	<i>Anderson E</i>	<i>Benbasat</i>	<i>Ba</i>	<i>Anderson</i>
<i>Ajzen</i>	<i>Kumar</i>	<i>Anderson J</i>	<i>Eisenhardt</i>	<i>Dellarocas</i>	<i>Deutsch</i>
<i>Anderson</i>	<i>Lewicki</i>	<i>Clemons</i>	<i>Granovetter</i>	<i>Granovetter</i>	<i>Kumar</i>
<i>Ba</i>	<i>Lewis</i>	<i>Deutsch</i>	<i>Nonaka</i>	<i>Resnick</i>	<i>Lewis</i>
<i>Bagozzi</i>	<i>Luhmann</i>	<i>Dyer</i>	<i>Orlikowski</i>		<i>Luhmann</i>
<i>Baron</i>	<i>Mayer</i>	<i>Fornell</i>			<i>Rousseau</i>
<i>Benbasat</i>	<i>McKnight</i>	<i>Granovetter</i>			<i>Zucker</i>
<i>Bhattacharjee</i>	<i>Nunnally</i>	<i>Gulati</i>			
<i>Chin</i>	<i>Orlikowski</i>	<i>Heide</i>			
<i>Culnan</i>	<i>Pavlou</i>	<i>Kirsch</i>			
<i>Davis</i>	<i>Podsakoff</i>	<i>Kumar</i>			
<i>Doney</i>	<i>Rousseau</i>	<i>Nunnally</i>			
<i>Fornell</i>	<i>Stewart</i>	<i>Podsakoff</i>			
<i>Gefen</i>	<i>Straub</i>	<i>Ring</i>			
<i>Hoffman</i>	<i>Venkatesh</i>	<i>Williamson</i>			
<i>Hofstede</i>	<i>Wang</i>	<i>Zaheer</i>			
<i>Jarvenpaa</i>	<i>Zucker</i>				

Authors with loading $\geq \pm 0.7$ are shown in italics.

Factor 2 - Inter-organizational Relationship: Trust-related issues are also evident in inter-organizational relationships. Supply chain management and open information sharing between different partners in the supply chain requires a trusting environment. Research in the inter-organizational area of IS is informed by theories from economics, strategic management, marketing, and sociology. Some of the influential authors in this area of IS research are Anderson, Dyer, Gulati, Heide, Ring, Williamson, and Zaheer.

Factor 3 - Knowledge Management and Decision Support: Knowledge management and decision support have also focused on issues related to trust. Knowledge transfer/reuse relies on the person's trust of the knowledge source's credibility. IS researchers in this area rely on the works of influential authors such as Nonaka, Eisenhardt, and Orlikowski to develop theoretical underpinnings for their research.

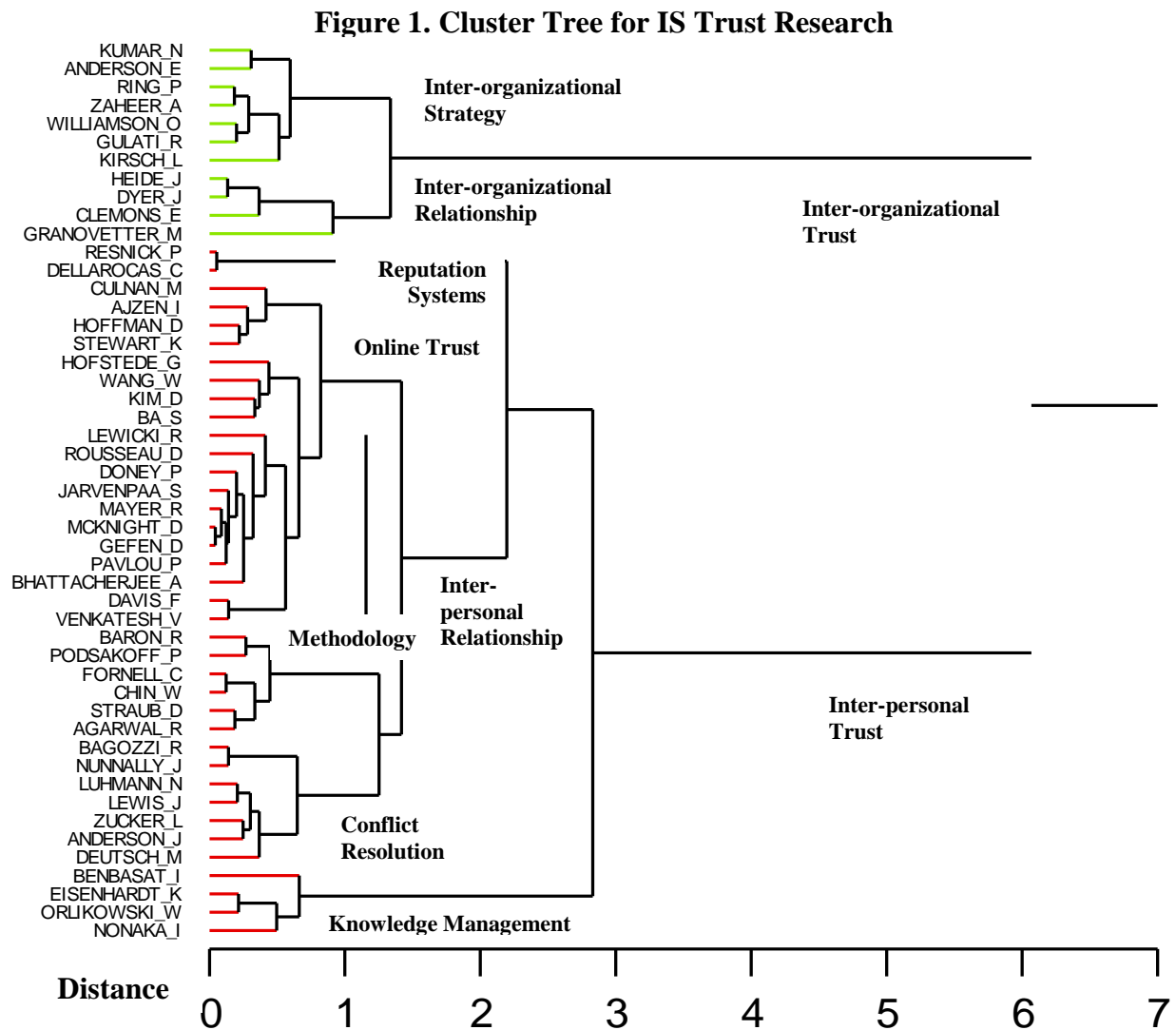
Factor 4 - Reputation Systems: IS artifacts are used to create reputations among parties involved in both interpersonal and inter-organizational levels. Reputation is found to directly influence the trusting beliefs in a relationship. One such prominent mechanism is the feedback system used in various online marketplaces. The trust developed with the help of such systems can be used as a differentiator in e-commerce [10]. The intellectual structure of research in this area shows the

unique contribution made by IS researchers to the body of knowledge on trust. Influential authors in this area are prominent IS researchers such as Resnick and Dellarocas.

Factor 5 - Conflict Resolution: The last factor in our analysis pertained to conflict resolution. Trust creates a mutually friendly environment, but the absence of trust can create conflict. IS researchers have also focused their attention on conflict and its resolution. Deutsch is an influential author in this area.

Cluster Analysis

Next, cluster analysis with Ward linkage and Pearson's distance as the analysis option was conducted using SYSTAT. The derived dendrogram (Figure 1) shows the clear division in IS research between the inter-personal and inter-organizational areas of trust.



Inter-organizational Trust: In order to get the best of both market and hierarchies, organizations engage in various levels of relationships with other organizations [11]. Trust is an important ingredient in such relationships. Two broad streams of research as evident in this area

concentrate on strategy and relationships. Research on the inter-organizational area seems to have gotten lesser attention in IS. IS researchers have examined the implications of technologies (e.g., Electronic Data Interchange, supply chain management systems) on inter-organizational trust. IS researchers have mainly relied on reference disciplines such as strategic management, marketing, and sociology. Two prominent IS researchers in this area are Kirsch and Clemons, who have explored concepts related to IS governance and electronic linkages.

Inter-personal Trust: Trust in inter-personal relationships has received wider attention in IS research. Cluster analysis reveals many subfields in this sphere of research. Unlike inter-organizational research in trust, the area of inter-personal trust has been influenced by many prominent IS researchers. IS researchers have used trust-related research in areas such as management, psychology, and social psychology to better understand the phenomenon in the IS context. Though IS researchers have largely relied on theories from reference disciplines, they have still created unique knowledge in areas such as reputation systems and trust in online environments. Concepts related to trust also influenced research in the area of knowledge management. Trust is a vital ingredient in the sharing and use of knowledge. Research related to trust in IS also benefited from the extant knowledge on rigorous research methods available in reference disciplines such as PLS (Chin W), SEM (Fornell C), construct measurement (Nunnally J), mediators (Baron R), and common method bias (Podsakoff P).

CONCLUSION

The central role of trust in many cognitive studies, along with the exponential growth of e-commerce where trust plays a major role, has brought about the need to understand and analyze the role of trust in IS research. To achieve the objectives of the study, we have conducted author co-citation analysis and used two important multivariate techniques, factor analysis and cluster analysis, to identify the subfields. While the results of this study shed light on the way the concept of trust is associated with IS research, the ACA technique has some limitations. For example, the subjectivity in deciding the number of authors, inclusion of only the first author in the analysis, and consideration of co-citation as a measure of similarity (though two authors having totally different views may also be co-cited together) are some of the limitations inherent in the citation methodologies. However, this limitation does not pose a serious threat to the findings, as the widespread use of ACA in similar studies across various disciplines lends confidence to the results of this study. It is pertinent to mention that ACA is an effective methodology that objectively uses quantitative data to detect patterns in any research field [2].

This study contribute to IS research in various ways: 1) the results indicate the preponderance of inter-personal trust research in IS, 2) there exists clear delineation in the various subfields of IS trust research, 3) IS researchers have made unique strides in the areas of reputation systems and trust in the online environment, and 4) there is a need to explore interpersonal relationship-based trust with other alternative research paradigms such as case studies and action research. We believe these findings will help in furthering the role of trust in IS research.

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