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Discovering the Fundamentals of IS Discipline through AIS Basket Journal Citations (2008-2012)

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Abstract

Discovering the fundamentals of Information Systems (IS) research is of benefit to both the IS community and the prospective IS practitioners. The purpose of this thesis was to explore the fundamentals of IS research by means of citation and Social Network Analysis (SNA) of all the articles published in the AIS basket of 8 journals between 2008-2012. Based on the systematic search from Scopus, we obtained a total of 1,205 articles containing 80,906 references. We then analysed this data in two units. In unit one, the references obtained from the articles were analysed with regard to discovering the research topics that IS researchers have addressed. We went ahead to discover the theoretical foundations of IS and the most influential IS papers. By means of citation analysis of the data obtained, we identified the top 10 influential IS papers. Using SNA techniques we identified 6 topics in combination with their theoretical foundations and models. The topics include Technology acceptance, Business value of IT investment, E-market strategy for competitive advantage, research methods, IS theory building and organizational structuring and finally quantitative methods.

In unit two of this research we also analysed papers that cited one another only from among the 1,205 basket of 8 articles during the 5 year period on the basis of discovering topics in the current IS research. The results revealed research developments of new topics compared to those uncovered from the reference analysis. The findings of this study are relevant in providing a roadmap for IS future research in the IS community and prospective practitioners.

Key words: IS Basket of 8 Journals, Citation Analysis, Social Network Analysis

1 Introduction

It is necessary to identify, examine and trace the intellectual linkage to each other in a given academic field as a basis of assessing the current state of its field to guide future developments (Eom, 2009). Since the last decade, there has been a rapid growth in IS research and this has resulted to a fascinating growth in IS publications (Willcocks, Whitley & Avgerou, 2008; Barnes, 2005). In 2007, the AIS declared 8 journals as the top quality journals also called the basket of 8 (AIS, 2007). Despite the continuing developments in the field little has been known as regards to what constitutes the body of knowledge in the IS domain and what research areas the field has addressed in the recent past and what new developments the IS community is currently addressing. Knowing this core knowledge will guide the IS community and the prospective practitioners in predicting a roadmap for the future of the field. This however cannot be achieved by looking at the number of publications alone but rather exploring through the research developments that have occurred in the recent past by means of citation analysis. There is however evidence of research findings that have made progress in investigating the research developments in the AIS and IS as a whole, such as Bernroider, Pilkington & Córdoba (2013). Nevertheless these findings do not cover periods specified in this research hence, found the cause to investigate the current state of developments in IS field and what literature constitute the main body of knowledge in the IS domain.

This thesis presents a citation analysis of the publications that appeared in the AIS top 8 journals in the period 2008-2012. There is a large body of related research that has previously been undertaken to address the research developments in the discipline. We believe that the findings of this study in comparison with previous studies might predict a roadmap for research interests within the discipline. Various studies revolve around what can be aggregated as finding the fundamentals of the IS discipline. One of the dimensions of IS research in the recent history is studies on trends in IS research topics and methods that most researchers use to collect, analyze and interpret research findings in the discipline (Vessey, Ramesh & Glass, 2002; Chen & Hirschheim, 2004). Of the IS journals that have systematically been successful in following up the research trends in its field is the journal of Management Information Systems (MIS) which holds a systematic analysis of research trends in regard to what subject areas and research methods have been used by the researchers within its field across periods of time of which include the findings of (Culnan *et al.*, 1986; Alavi & Carlson, 1992); Palvia *et al.*, 2004) and their analysis revealed changing trends in regard to research

methods and research topics. Other IS journals that undertook investigations to follow up its trends include Information Systems research (Orlikowski & Baroudi, 1991; Chen & Hirschheim, 2004) and of recent an extension of the update of the journal's profile (Palvia, Pinjani & Sibley, 2007). Other studies that have labored to study the fundamentals of the discipline through profile studies such as (Dwivedi & Kuljis, 2008; Galliers & Whitley, 2007) have in some way addressed the core of IS research. Therefore with regard to previous studies discussed, this thesis focused on the AIS basket of 8 journals as a basis for understanding the IS discipline as a whole and therefore addressed the following research questions;

1.1 Research question

What are the cornerstones of the IS discipline?
Sub questions

1. Who/what are the most influential papers/countries/journals in the discipline?
2. What topics do IS researchers address?
3. What are the most influential theoretical foundations of IS?
4. What are the differences in the trend of research topics within the basket papers compared to those discovered from its references?

To answer the research questions, a review of the 1,205 source articles published within the AIS basket of 8 journals in the period 2008-2012 was conducted in two units. In unit one, the references contained in the source articles were analyzed to answer questions 1-4. In unit 2 all the source articles within the basket journals that cited each other in the given period were also analyzed and the findings were compared to those of its predecessors in unit 1.

1.2 Scientific relevance

To the IS community the findings of this study could help to track progress and inform the community on what research subjects have been addressed frequently in past and on the other hand where little research has been undertaken and therefore channel their research resources to those subject areas that have not been addressed sufficiently. This for instance could be seen from the network structure and distribution of the clusters in the network.
Furthermore it makes the IS community and prospective practitioners aware of the most contributing journals evidenced by the citation distributions to those journals there by giving researchers options to choose which journals to target for future research publishing. The inter journal citations also give a richer

understanding of the relationships of research ideas in the literature published in those journals.

For the prospective IS researchers the finding can guide them in positioning their research not only in terms of extending research in the identified hot topics that are in trend, but also identifying the appropriate IS core theories to ground their research, identifying suitable research methods and target publishing their articles with the most contributing journals.

The results from SNA analysis reveal which papers are most influential and therefore respect is attributed to the authors of those papers that contribute knowledge to the discipline.

1.3 Definition of the basic concepts

The following basic concepts provide an overview of the most used terminologies applied in this research. These terminologies provide an understanding of subject under investigation and are defined below:

Citation

It is the action of citing or quoting any words or written passage or quotations from prior research sources (De Bellis, 2009; Gorraiz & Wien, 2010). Citations also include the hyperlinks that point to the source documents (Hersh, 2008). Yet Leydesdorff (1998) adds that citations are references to other textual elements from the perspective of the citing article. Leydesdorff further explains that in order to have citations there must be a cited-citing pair and from a formal perspective, cited-citing pair are the relations.

Reference

Is a more technical indication of a source document's bibliographic data which includes (author, year, title, source title, volume, issue, etc.) from the perspective of the citing document, (De Bellis, 2009; Gorraiz & Wien, 2010; Moed, 2005) clarify that a reference list is generally unique in the sense that hardly any papers with references have identical lists. In addition Vessey, Ramesh & Glass (2002) report that the one way to understand the intellectual developments and structure of the IS field is by examining its reference discipline.

Citation index

A citation index is an ordered list of cited articles, each accompanied by a list of citing articles. The citing article is identified as a source and the cited article as

a reference. Garfield (1970) and Eom (2009) defines it as a listing of all referenced or cited source items published in a given time span associated with a citing article.

Citation frequencies

It is the total number of times each journal or article is cited in a given period of time (Garfield, 1972)

Citation analysis

It is the principal method for bibliometrics through counting and analysing the citation frequencies (Eom, 2009). Moed (2005) adds that citation analysis involves the construction and application of a series of indicators of impact, influence or quality of scholarly work derived from citation data.

Citation network

A citation network of related journals occurs when an article references another, for instance when an article "A" references another article "B" article A is called the "citing" article also called the source while article B is called the "cited" also known as the target, the directionality of the citation network starts at article "A" pointing towards article "B". Therefore article "B" has a relative influence on article "A" (Nerur *et al.*, 2005)

Figure 1 is a snapshot of a citation index from Scopus describing the above concepts. The figure1 shows a citation index containing list of articles and their references as seen in the drop down menu selected. The last Colum on the right showing the citation frequencies of each of the articles in the list. The number of times each of the articles has been cited indicates its importance or impact as seen in the last Colum from the right and is the basis for citation analysis.

Figure 1: Screen shot of citation index from Scopus

Journal impact factor

The impact factor was introduced by Garfield (1972) as a measure of a journal's importance. Garfield defined it as "the average citations per published item" while Moed (2005) explained it further as a measure based on the citations to items published in two previous years divided by the number of items the journal has published in those two years and adds this measure is a direct reflection of a journal's prestige or quality.

Social network analysis

Social network analysis is a method broadly used for graphing relationships among friends, objects or acquaintances with the nodes representing objects and the links representing the relationships between objects (Easley & Kleinberg, 2010). Ma *et al.* (2007) in the INK model explains that network analysis allows us to visualize the invisible network of knowledge production. In another description, Crane, (1972) similarly explained that network visualization helps us to discover the invisible colleges of knowledge diffusion in scientific communities.

The structure of this research was as follows: Chapter 2 discusses the research approach and techniques that were used to obtain and analyze the findings of the published literature in the AIS basket in the given period, this follows the discussion on the research design that was used to structure the phases of this study. Chapter 3 discusses the literature on the bibliometric tools that were applied to analyze the data and provide answers to the questions identified. Chapter 4 describes the data collection process and data preparation activities

undertaken to prepare the data for analysis, these include data cleaning among others. Chapter 5 discusses data analysis and the findings of the analysis that provided answers the research questions. Chapter 6 contains discussions of the findings and finally in chapter 7 Conclusion, discussions on the limitations of the study and close with recommendations for future research.

2 Research design

In this section the researcher described the adopted research design that showed how the different phases of the research activities were planed and fulfilled. The design for this research was based on the research process described by Blumberg Cooper & Schindler (2011). This framework is described in figure 2.

2.1 Desk research

The approach for this study was desk research also known as secondary research. This involved gathering data from already existing known source also called secondary data. Blumberg *et al.* (2011) explain that secondary data is information or data that has already been collected and recorded by someone else usually for other purposes. In addition Kamins (1993) earlier explained that secondary information consists of data and other information collected by others and archived in some form which could be archival data sets, books, reports, journals found in libraries and information services. Kamins further adds that using secondary data however requires that researcher has knowledge of its existence and the means of accessing it as well as the time and effort needed to acquire the data. The advantages of this approach is that it saves time and money since the data is readily available therefore the researcher can already start to analyse the data to answer the research problem provided that the researcher is able to identify the right data source, moreover Blumberg *et al.* (2011) report that secondary data depending on the source, often contain data of high quality. In addition Polites & Watson (2009) confirm that most citation based studies rely on bibliographic information which is readily available electronically. It is along this reasoning that the current study justified the reasons for the choice of this approach.

2.2 Data Analysis techniques

To identify the most influential and top cited IS papers and the intellectual structure of their citation network, we applied the two bibliometric techniques discussed in the following section.

2.2.1 Citation analysis

Citation analysis is the bibliometric method for counting and analysing citation frequencies (EOM, 2009). EOM adds that in order to apply citation analysis there must be a citation index which is a listing of all referenced or cited source items published in a given time span associated with the citing article, as previously illustrated in figure 1. After accumulating the total number of articles and their citation data, we applied computer based data manipulation on the citation data then we generated the total citation counts for all the references contained in the articles. Citation analysis was used to identify and rank the highly valued IS papers evidenced by their total citation counts. This list of selected papers was presented in a table form in descending order according to the papers with most citation counts. Citation analysis is based on the notion that the papers that are highly cited are considered relevant to the developments of the research in the discipline (Chappin & Ligtvoet, 2012; EOM, 2009; Ramos-Rodríguez & Ruíz-Navarro, 2004). The generated citation data was the primary input for social network analysis.

2.2.2 Social Network Analysis

The AIS citation network was visualized using SNA. In a recent study Bernroider *et al.* (2013) report that citation analysis alone does not show the structure of ideas in a field neither does it show how knowledge distinctions are connected. Furthermore Polites & Watson (2009) affirm that SNA is one of the newest approaches used to obtain citation based measures of journal prestige and influence as it allows for examination of relationships among journals where by the role that a journal plays can be identified in the network. Therefore to discover the intellectual structure of the AIS citation network, we applied SNA technique used for graphing relationships among objects. After capturing the citation based data, a citation network was constructed in which the nodes are the citing papers (from the basket of 8) and the links are the cited references. The citing-cited pairs are the relationships, two or more nodes point to the same link if they both cite the same reference. In-degree centrality as a ranking parameter was applied to identify and rank the most influential IS papers in accordance with the total number of citations received by those papers. We also applied SNA tools such as cluster analysis to identify

subgroupings of articles in the network based on the strength of their relationships. This provided more insights into discovering the research topics in the subgroups by critically reviewing the papers contained in each subgroup. The insights from the network analysis were the basis for answering the research questions.

2.3 Research framework

 Figure 2 shows the framework adopted from Blumberg *et al.* (2011) and how the different phases of the project activities were embedded into the framework. Although the process steps in the design were sequentially arranged, Blumberg *et al.* (2011) report that it does not necessarily require each step to be completed before proceeding to the next because some steps can be executed concurrently while others can be skipped. Furthermore Miller & Salkind (2002) adds that a research design is not a highly specific plan to be followed without deviations but rather a series of guide posts to keep one headed in the right direction although not all designs fit perfectly to the needs of every research. Upon these justifications the researcher therefore aligned the stages in the framework to the research activities fulfilled in the various chapters of the research.

The following description of the research framework in figure 2 shows the different process steps fulfilled in various chapters of the thesis. Some of the process activities in the framework were fulfilled in more than one chapter as described.

Figure 2: Research framework
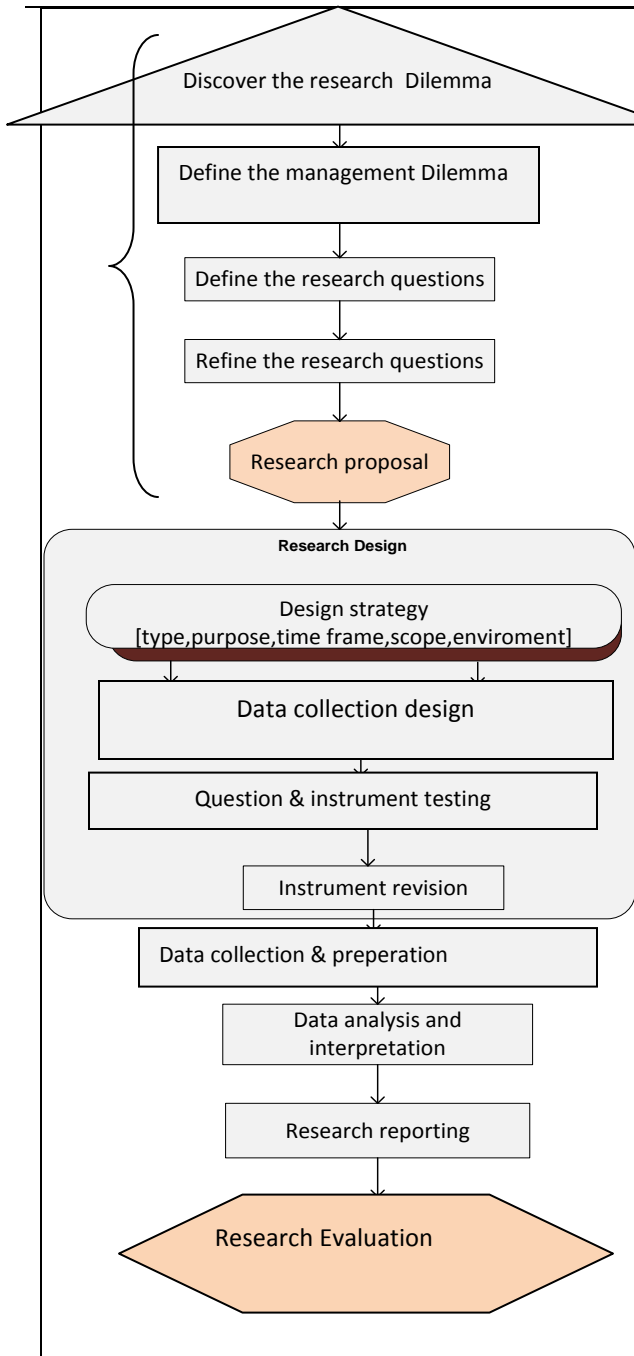
Description of the process steps

Discovering the research dilemma…

Chapter 1 and 3 of the thesis covered the first five activities in the framework which include: discover the research dilemma, define the management dilemma, the research questions, and refine the research questions. As an essential part of a research (Blumberg *et al.*, 2011; Miller & Salkind, 2002) report that discovering the research dilemma is the most important part of the start of any research project. The research dilemma for this study was partly discovered as a result of the literature reviewed in chapter 3 in which an existing gap in the IS that needed to be investigated triggered the need for the research. The first four activities lead to a research proposal document which was submitted at the early stage of the thesis.

The research design strategy

This contained a series of sub activities which include: Type of research approach chosen, the purpose of the chosen approach, the time frame for data collection, scope of study population, data collection environment. This followed with brief description of the data collection design, question and instrument testing and instrument revision.

Type of research approach and the purpose for which it was selected

Desk research was applied in this study in combination with citation analysis and SNA techniques. This section is described in detail in sections 2.1 and 2.2 of this report.

The time frame and Scope of journals

The journals under study consist of the top 8 leading IS journals in the ranking, also called the Association of Information Systems (AIS) basket of 8 journals. The study focused on the articles published within these journals in the period 2008-2012. The table 1 below shows the list of the basket of 8 journals according to AIS (2007).

Table 1: AIS basket of 8 Journals

1. European Journal of Information Systems
2. Information Systems Journal
3. Information Systems Research
4. Journal of AIS
5. Journal of Information Technology
6. Journal of MIS
7. Journal of Strategic Information Systems
8. MIS Quarterly

Data collection environment/source

Before considering which data source to select for gathering secondary data Blumberg et al. (2011) outline 5 requirements the selected source should exhibit; (1) Purpose of the existing source should be in line with the needs of the current study (2) the scope of information available at data source should be sufficient to cover the needs of current study (3) the credentials of the institution sponsoring the information should be authoritative (4) The audience to whom the information source is intended should fit in the researcher's needs so as to avoid bias and finally (5) the format with which the information is displayed should be easy to use by the current researcher. It is upon these guidelines that this research therefore considered the following data source

Scopus online database

Data for analysis was extracted from Scopus the largest abstract and citation database of research literature. The reason for choosing Scopus citation database was that apart from being the world's largest citation-based and citation enhanced database, it also offers a simple query based approach for citation search services. Scopus includes journals and the citation indexes that have been published since the early 70s making it a powerful tool for bibliographic browsing. Apart from journals it also covers books and conference proceedings (Meho & Yang, 2007). Although it is a commercial database it was freely accessible via Utrecht university library student subscription.

Data collection design

In this step we outlined the data collection process as well as how the 8 journals were identified from Scopus. The data collection was conducted in multiple steps including the manual identification of each journal and the collection of data per journal per each year. This process was described in chapter 4 of the thesis

Question, instrument testing and revision

Before the actual data gathering a pilot test was conducted in which the researcher queried the selected database for sample data to test whether the procedures followed would evoke the database to produce accurate data needed for the study. There were a number of variations on pilot testing which included for instance browsing the database to make sure all the 8 AIS journals were contained and that the data covered the period under study. Using a variety of difference IS key words to see if the database produced the same results, testing different data export formats and to see which format was appropriate for data to be exported with all the required attributes and finally the data analysis instruments were also tested using the sample data. These procedures were later simulated during the actual data collection and analysis of the findings.

Data collection and preparation

Chapter 4 of the thesis described this activity. In Scopus data was collected from the 8 selected sample journals and included all source articles published within these journals in the period 2008-2012, data was searched using search keywords in the subject area of information systems. Keywords such as "Information systems" "information technology" were queried and specified

journals were sorted from the large list in the database. The database contains an organized list of all articles published in each journal per each year.

Data preparation

Data cleaning was done to remove inconsistencies in the data. Blumberg et al. (2011) explained that the main problem of using secondary data is that they were not collected with your specific research problem in mind. Also in a recent study involving secondary data Young & Chi (2013) report that bibliometric records retrieved from online database often contain inconsistency problems especially in the fields of author names, journal titles and source titles. In the current study further sorting from selected journals was done to exclude documents which did not contain original research or did not follow scientific research procedures; these include Editorial, Erratum and Review notes so that only articles within the journals were selected for analysis. Other inconsistencies encountered were majorly found in some of the references of the articles with missing source title, volume, issue and author names and duplicates. These inconsistences were fixed manually which rather was tedious and time consuming.

Data analysis and interpretation

Chapter 5, 6, 7 and 8 of the thesis discussed this process. In chapter 5 and 6 the researcher discussed how the SNA technique was applied in the analysis of the data to discover the most referenced literature in IS research. Furthermore the researcher discussed the research topics discovered as a result of interpretation of the data from the cluster analysis from both the references and the AIS basket articles. Chapter 7 covered the discussion of the findings whereby the results from the current analysis were also compared to the results from other researchers that previously conducted related studies in the same domain. Chapter 8 covered the conclusions, limitation of the study and finally recommendations for future research.

Research reporting

In this section a research report was compiled in form of a thesis report and submitted to the supervisor/academic department concerned for the purpose of decision making. Furthermore the finding from the research were presented inform of thesis defense whereby the results of the study which addressed the research dilemma were reported and presented.

Finally after the final presentation of the research to the supervisor/academic department concerned, value assessment of the research report was done to judge whether the results matched the objective of the study and upon which a grade for the researcher was decided.

3 Literature review

This chapter discussed relevant literature related to the topic under study, particularly the chapter discusses the two bibliometric techniques applied in the current study in relation to their prior application on various IS studies these include citation analysis and social network analysis.

3.1 Citation analysis

Citation analysis is one of the principle methods and technique for analysing bibliometric data. In scholarly research, each individual contributes to a body of knowledge by building on what others have already accomplished, in this process referencing and citations tools are important in linking scholarly contributions (EOM, 2009). The idea behind citations is that papers refer to other papers to provide an intellectual or methodological basis to motivate or support their current research, forming a network of citations (Chappin & Ligtvoet, 2012). In the field of research and academic publishing citation counts are one of the legitimate yardsticks for measuring scientific performance (Bornmann & Daniel, 2008; Garfield, 1972, 1979).

 Citation analysis is one of the techniques that have been used in information systems research to examine the field.   There are various contexts where citation analysis has been applied in evaluating the productivity of IS research, of those include author analysis where citation counts is used to measure the impact and contribution of IS researchers by counting the number of publications of an author, and also number of citations to the works published (Dwivedi & Kuljis, 2008). In other areas, citation analysis has been used in the context of assessing journal quality through journal citation reports which looks at the total number of citations a journal has received in a given period of time measured as impact factor of a journal used in ranking IS journals (Lewis *et al.*, 2007; Willcocks *et al.*, 2008; Barnes, 2005) or in other words measuring the influence of a journal through citations accumulated over time (Podsakoff,

et al., 2005). Of recent citation analysis has been used to understand the nature of diversity of IS research through its reference discipline. Furthermore (Vessey *et al.* 2002; Chappin & Ligtvoet 2012) add that Citation counts alone do not account for diversity but rather guide in understanding the dependencies on prior research ideas that motivate researchers basing on the idea that researchers cite prior literature that is deemed relevant to motivate their current studies. As a result citation analysis has been used as a point of understanding the intellectual trends of research that have been addressed in the field by examining the references within published literature. Through citation analysis IS journals have engaged in tracing its research developments in terms finding what research methods of investigation have been used in the field either by focusing on examining these trends within a specific journal or a bundle of selected journals. Examples include trends on research methods in MIS journals (Palvia *et al.*, 2004) and IS as a whole (Chen & Hirschheim, 2004). More IS studies have engaged in studying a combination of different aspects that address the field in terms of what research topics, research approaches, methods and techniques of analysing and reporting research findings among the leading journals or in the discipline as a whole through citation analysis for instance Córdoba *et al.* (2012) in a recent study compared research trends using citation data between EJIS and MISQ IS leading journals to understand the dynamics there including the most cited literature in the two journals. Other studies have engaged in investigating these trends across the entire field or a subset influential IS journals to predict the future roadmap of the field, among others includes studies on the diversity of IS research (Vessey *et al.*, (2002) and the profile of IS research (Dwivedi & Kuljis, 2008; Palvia *et al.,* 2007; Galliers & Whitley, 2007) based on citation data to addressed a wide range of questions including most influential authors, papers, methods, topics, theories, geographical distribution of publications and many others   to understand the patterns of research trends through the manner of its referencing patterns. However citation analysis alone does not reveal enough insights as regards to the structure of ideas in the field, many IS studies therefore have engaged in studying the intellectual structure of the field not only using citation analysis but in combination with social network analysis to examine the intellectual relations in the citation network of (Córdoba *et al.*, 2012). In the next section we discuss social network analysis technique applied in this study.

3.2 Social network analysis

Social network analysis (SNA) is the principle technique used for graphing relationships among objects. It is one of bibliometric techniques used to obtain

citation based measures to understand the structure and the patterns of interactions among objects under study. In IS research SNA has provided a richer alternative to analysing research aspects of the field. For instance it has been used to examine relationships among IS journals and to reveal how information flows from journal to journal showing which journals play an important role in disseminating information in the field by examining which journals are most cited in the network as such, SNA has been applied in ranking IS journals by mapping the citation structure (Polites & Watson, 2009). SNA has also been applied in examining the co-authorship network to reveal which authors are central in research collaborations and publishing of IS literature by examining their degree centrality (Cheong & Corbitt, 2009; Vidgen *et al.*, 2007). Studies in the IS discipline have progressed in examining the status of the discipline as a body of knowledge engaged in addressing various research subjects using various methods, techniques, frameworks and theories to address research issues. As such various IS studies have engaged in examining these aspects by mapping citation data to discover insights surrounding the discipline for instance regarding what range of research topics is the discipline addressing as a whole or a mong specified journals and what research methods the field commonly applies in research investigations. Of those studies that have applied SNA to examine its field include Shiau & Dwivedi (2013) that engaged SNA in studying intellectual developments of its field addressing issues such as what research topics the field is engaged in. In another related study Pratt, Hauser & Sugimoto (2012) applied SNA to examine the contribution of IS research to other related disciplines through the citation network. Furthermore SNA has been applied in IS studies to compare fields and examine what research issues specific IS journals address and what constitutes the main body of knowledge in the journals compared, in this regard Córdoba *et al.* (2012) examined the IS discipline through comparing the EJIS and MISQ one of the IS top quality journals in an endeavour to understand the fundaments of IS as a whole. In yet another recent study Bernroider *et al.* (2013) applied SNA to examined the diversity IS field through the AIS basket of 8 top quality journals in which the study investigated a wide range of topics the field has addressed since 1995-2011 my mapping the citation data obtained from the articles published in those journals during the period, this helped to understand the developments in the field as regards to what research topics have been addressed and what research methods IS researchers apply in in field among others. These findings helped to predict a roadmap of IS research interests. The current study contributes to the body of this knowledge by examining the AIS basket of 8 publications for the period

2008-2012 to understand the fundamentals of the IS discipline through its top quality journals.

The following SNA measures commonly applied in measuring different aspects of the network were also adopted in the current study.

Centrality

It is the extent to which a given individual/ object is connected to others in a network (Sparrowe *et al.*, 2001) this is also seen as a perceived measure of the importance and popularity of a node in the network. Easley & Kleinberg (2010) puts it that it's a symbol of power and authority.

Degree centrality

Is the number of links a node has or number of links adjacent to the node. Otte & Rousseau (2002) explain further that Degree centrality is a simple absolute indicator of size that is, the node with most relations is the most central in the network. Degree centrality can further be measured in two ways: (i) if the type of network is un directed thus where the relations or connection are treated equally and are reciprocal in nature for example in the co-authorship network, centrality is measured in size or in terms of simply total number of connections a node has is what matters, but for the case of a directed graph where it is not necessarily reciprocal in nature like the case of citation networks, such that when an article is citing a particle article, the cited article does not necessarily cite back. In that case the in- degree centrality is considered as a measure of influence and importance of the nodes.

In-degree centrality

In a directed network such as the citation network it refers to the number of incoming nodes or number of nodes pointing to a particular link. Papers with a highest in-degree are the most cited (Chappin & Ligtvoet, 2012). This can also be seen as a measure of influence, prestige, interest in a particular subject etc. In this project our main focus will be centered on the in-degree centrality to measure journal influence in which we will identify the key papers that are mostly cited by other papers and also discover what subject areas around which the majority of the citations are attracted to.

Strongly connected component

It is the maximum connected subset of a network thus the path between all nodes in the sub set are reachable and that there is no path between a node in the component and any other node not in the component (Vidgen *et al.*, 2007). While Easley & Kleinberg (2010) define it as a group of actors with strong ties whereby every other node is directly reachable in the network. Easley & Kleinberg further add that the graph is strongly connected if every pair of nodes is linked by a path.

Giant component

Is a single component containing a significant fraction of all the nodes in the network, It involves classifying nodes by their ability to reach and be reached by other nodes in the network. (Easley & Kleinberg, 2010)

Strong and weak ties

When nodes have a direct link to all other nodes within a subset it's said to have a strong ties but when nodes connect via other nodes it's said to have weak tie, Granovetter (1973) however argues that weak ties act as bridges between components and are vital channels for information flow between 2 components in the network.

Small worlds

This is in relation to the interconnectedness of components within the network. The idea that the world looks so small when you think of how short a path of friends it takes to get from you to almost anyone else also famously known as the "six degrees of separation" that everybody in the planet is separated by a maximum of only six others. This is explained further with Milgram's experiment (Newman, 2001; Vidgen, *et al.*, 2007; Easley & Kleinberg, 2010)

Cliques

Cliques are groups of objects with strong ties. In the current analysis, papers that are closely related either in subject matter or by method of investigation are closely tied together.

Bridges

Bridges connect otherwise disconnected network components in the network, Granovetter (1973) explains that bridges are important part of the network as they act as information brokers in the network and connect different groups of network components in the network

4 Data collection and preparation

In this chapter we described the data collection process and the data obtained and analyzed to answer the research questions of the study. Scopus database was used to collect the citation data for each of the 8 journals. The time period for analysis was 2008-2012. The articles and their references published within the 8 journals in the given period were retrieved. This data was then prepared manually to remove any inconsistences before the final analysis. The data collection process is described in detail in Appendix A.

4.1 Total articles obtained

Table 2 shows the total number of articles published by the AIS basket journals between the period 2008-2012 which were obtained from Scopus.

Table 2: Total papers obtained from the basket journals

Items	Journal title	Total articles
1	Information Systems Research	221
2	MIS Quarterly: Management Information Systems	179
3	European Journal of Information Systems	185
4	Journal of Management Information Systems	164
5	Journal of the Association of Information Systems	155
6	Information Systems Journal	105
7	Journal of Information Technology	100
8	Journal of Strategic Information Systems	97
	Grand Total	**1206**

The following table 3 is a summary of total number of articles and total references obtained from the articles. This data set was then prepared to remove any inconsistences before it was used for further analysis

Table 3: Total articles plus total references obtained

Total articles from basket	1,206
Total references of the articles	81,461

4.2 Data cleaning

The citation data set obtained was edited and checked to eliminate any data inconsistencies before the data set was used for analysis. The following section described the anomalies identified and corrected.

Data Inconsistences from the basket journals

In the basket of 8 journals, there were not many data inconsistencies identified however one article was found published twice in two different years by the same journal. Table 4 shows a summary of the identified article discovered to have been published twice by the same journal.

Table 4: Paper from the basket published twice

Author	year	Title	source
Liu, L. & Yetton, P.	2009	Sponsorship and IT vendor management of projects	*Journal of Information Technology, 24*(1), 46-54.
Liu, L. & Yetton, P.	2010	Sponsorship and IT vendor management of projects	*Journal of Information Technology, 25*(1), 56-64.

Data cleaning from the references

Total number of references from all the articles collected as raw data before data cleaning was 81,461 of which only 43,228 were unique references. After data cleaning process in Microsoft excel 555 records were eliminated due to (1) Missing information such as no author name, no title name, no source. This was mainly with references to either a website, a news article or quoted speeches, of which majority did not bear Meta data about their existence. (2) A reference with multiple versions cited more than once by an article. Many

previous studies have also encountered the dilemma of multiple citations especially from references of books. Authors often reproduce the updated versions of the same books in different years. For instance while conducting citation analysis Galliers & Whitley (2007) found multiple versions of Yin (1994, 2003) cited in the same article. In this regard the reference was counted only once during the analysis. After the data cleaning process, a total of 80,906 valid references (Including of the unique references) remained and were the basis for the further analysis of the study

The following section shows references with multiple versions that were merged and treated as one

Example reference 1: Yin, R. K: Case study research: Design and methods

Yin, R. K. (Ed.). (2003). *Case study research: Design and methods* (Vol. 5). Sage, also appears in multiple versions (1989:1994: 2002: 2003)

Example of articles from the basket 8 citing the above reference more than once in a single article

   a) Ngosi, T., & Braganza, A. (2009). Toward a component-based design framework of the international information technology standardization process. *Journal of Information Technology, 24*(1), 103-125
   b) Dong, L., Neufeld, D., & Higgins, C. (2009). Top management support of enterprise systems implementations. *Journal of Information Technology, 24*(1), 55-80
   c) Seddon, P. B., & Scheepers, R. (2012). Towards the improved treatment of generalization of knowledge claims in IS research: Drawing general conclusions from samples. *European Journal of Information Systems, 21*(1), 6-21
   d) Dudezert, A., & Leidner, D. E. (2011). Illusions of control and social domination strategies in knowledge mapping system use. *European Journal of Information Systems, 20*(5), 574-588
   e) D'MacRedie, R. D., & Mijinyawa, K. (2011). A theory-grounded framework of open source software adoption in SMEs. *European Journal of Information Systems, 20*(2), 237-250

Example reference 2: Nunnally, J.C: Psychometric Theory

Nunnally, J.C (1978: 1994) *Psychometric Theory*), New York: McGraw Hill

Sources citing both versions from the basket articles

a) Kock, N. (2009). Information systems theorizing based on evolutionary psychology: An interdisciplinary review and theory integration framework. *MIS Quarterly: Management Information Systems, 33*(2), 395-418.
b) Mithas, S., Jones, J. L., & Mitchell, W. (2008). Buyer intention to use internet-enabled reverse auctions: The role of asset specificity, product specialization, and non-contractibility. *MIS Quarterly: Management Information Systems, 32*(4), 705-724.
c) Liu, L., Li, C., & Zhu, D. (2012). A new approach to testing nomological validity and its application to a second-order measurement model of trust. *Journal of the Association of Information Systems, 13*(12), 950-975

Example reference 3 Rogers, E. M.: Diffusion of innovations

Rogers, E. M. (1983: 1995: 2003) Diffusion of innovations. Free Press, Vol. 65, p. 519.

Sources citing both versions

Liang, H., & Xue, Y. (2009). Avoidance of information technology threats: A theoretical perspective. MIS Quarterly: Management Information Systems, 33(1), 71-90.

Bouwman, H., & Van De Wijngaert, L. (2009). Coppers context, and conjoints: A reassessment of TAM. Journal of Information Technology, 24(2), 186-201

Dong, L., Neufeld, D., & Higgins, C. (2009). Top management support of enterprise systems implementations. Journal of Information Technology, 24(1), 55-80.

Li, X., Troutt, M. D., Brandyberry, A., & Wang, T. (2011). Decision Factors for the Adoption and Continued Use of Online Direct Sales Channels among SMEs. Journal of the Association for Information Systems, 12(1), 1-31

D Macredie, R., & Mijinyawa, K. (2011). A theory-grounded framework of Open Source Software adoption in SMEs. European Journal of Information Systems, 20(2), 237-250

Walsh, I., Kefi, H., & Baskerville, R. (2010). Managing culture creep: Toward a strategic model of user IT culture. The Journal of Strategic Information Systems, 19(4), 257-280.

Li, X., Hess, T. J., & Valacich, J. S. (2008). Why do we trust new technology? A study of initial trust formation with organizational information systems. The Journal of Strategic Information Systems, 17(1), 39-71.

Datta, P. (2011). A preliminary study of ecommerce adoption in developing countries. Information Systems Journal, 21(1), 3-32.

However, it should be noted that the examples of duplicated references shown above were only obtained from papers that were highly cited, other eliminated duplicates with very minimal citation counts were not included in the above examples.

Table 5 shows a summary of the data after data cleaning. The columns represent total data before and after cleaning for both the basket of 8 papers and the total references presented vertically. However it should be noted that the 80,906 total references included both repeated references across all the papers. For further description of how the data set was prepared for the SNA analysis is described in chapter 5.

Table 5: Total data after data cleaning

Total records	From the basket of 8	References	
Before cleaning	1,206	81,461	
Number of records removed	1	551	
Total records after cleaning	1,205	80,906	Of which unique references 43,228

The total number of records that remained after data cleaning as shown in table 5 was compiled and was the primary input for the social network analysis.

5 Data analysis and interpretation

This chapter presents citation network generated from the data set obtained together with insights derived from the network structure. The findings in this chapter provide answers to the research questions of this study. All the findings were based on the interpretations from the citation network. Data was analysed and interpreted using social network analysis tools. Network analysis was conducted in two units. Unit one entailed only the network analysis of the references obtained from articles published during the given period while in unit two network analyses was conducted entailing only the published basket papers that also cited each other during the given period. The results of both units of analysis were compared and discussed.

5.1 Basket of 8 general overview

In the following section we briefly discussed a general overview of the articles published in the AIS basket in regard to countries where the articles were published from and the subject overview.

5.2 Distribution of Journal publication by country

Figure 3 shows the distribution of the number of articles published in the basket journals per country during the 5 year period. According to the record on Scopus database the top 15 leading countries that published IS literature in the basket of 8 journals basing on first author are listed in figure 3. Ranked from the country with highest number of publications, the figure reveals that United States of America (USA) is leading in publishing IS literature followed by Canada and United Kingdom.

	Country	Documents
✓	United States	781
✓	Canada	127
✓	United Kingdom	116
✓	Australia	74
✓	Hong Kong	68
✓	Singapore	56
✓	Germany	47
✓	South Korea	43
✓	China	40
✓	Netherlands	40
✓	France	31
✓	Sweden	31
✓	Denmark	28
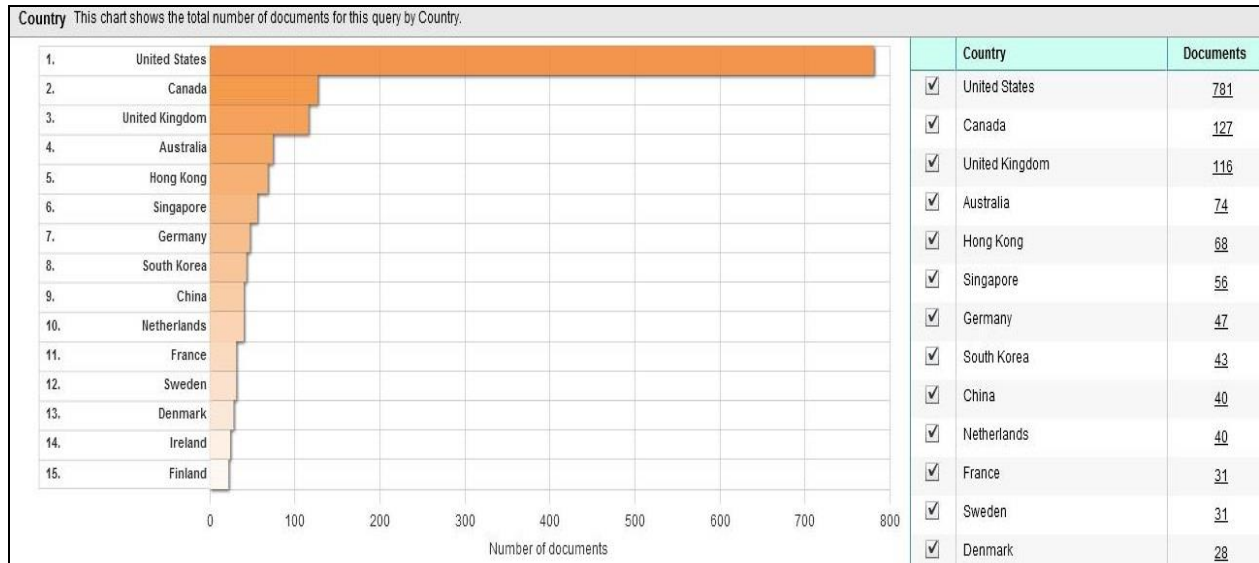
Figure 3: Journal publications per country in the 5 year period

5.3 Classification of the basket articles by research discipline

The categories in figure 4 represent a broad aggregation of IS research by subject area. This categorization was extracted from Scopus. As reported by Vessey *et al.* 2002) IS research is a multidisciplinary field that branches from a number of other disciplines. The figure reveals that IS draws most of its research from computer science studies followed by decision sciences, business management studies and social sciences.

Subject Areas This chart shows the total number of documents for this query by Subject Area.

- Computer Science: 40.8%
- Decision Sciences: 21.4%
- Business, Managem...: 18.8%
- Social Sciences: 19.0%
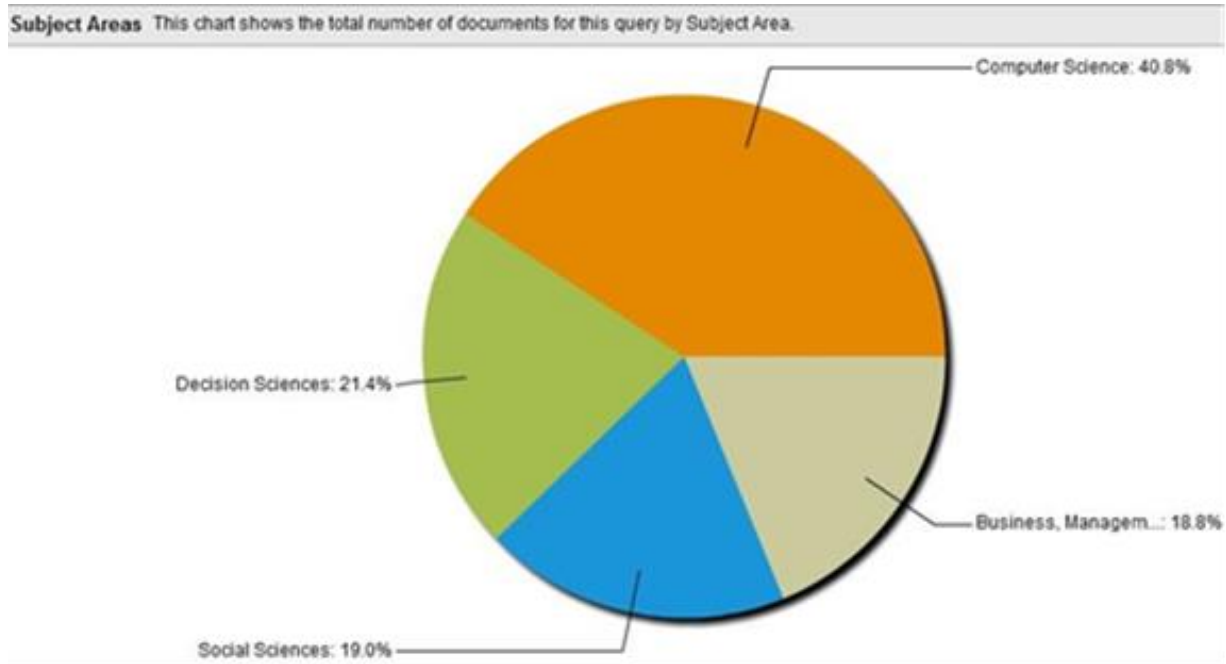
Figure 4: Distribution of articles by subject area

5.4 Unit 1: Analysis for the references in the basket articles

This section covered analysis for all the references obtained from the articles of the basket of 8 journals during the period 2008-2012.

5.5 Social network analysis

After capturing the citation data SNA technique was used to map the connections between the source articles obtained and their references whereby the nodes are the citing papers (from the basket of 8 articles) and the links are the references by each article. For SNA visualization Gephi version 0.82 beta, an open source visualization tool was used (Bastian, Heymann & Jacomy (2009). This tool visualized the network structure based on two tables thus the nodes table and the links table. In this analysis the two tables that were created in Ms excel were:

1. The nodes table which contained the list of all 1,205 citing papers plus all the unique references and the title of each paper was used as its unique Identification (Id). Together a total of 1,205 unique articles from the basket plus 43,228 unique references formed the nodes table.

2. A links table which contained the marched pairs of citing papers and their-cited references which summed up to 80,906.

Table 6 shows the summary of the variables that formed the two tables constructed for the network analysis.

Table 6 shows a summary of the nodes table and links table

Nodes table		Links table	
Basket of 8 articles	1,205	Total matched pairs	
Total Unique references	43,228		
Total nodes table	44,433	80,906	

The two tables created in excel were then saved into CSV file format and imported to Gephi platform in which a directed network structure was generated whereby two or more nodes point to the same link if they shared the same reference. Yifan Hu layout algorithm (Hu, 2005) recommended in Gephi for large directed networks was applied for displaying the network layout.

5.6 Cluster analysis

The network that formed the citing–cited relationships among the basket papers was generated. The research questions were answered basing on the observations and interpretations from the network.

This network defined the IS intellectual structure, their relationships as well as the strength of their relationships. The modularity community detection algorithm (Blondel *et al.* 2008) in Gephi was applied to identify clusters for analysis. The algorithm intelligently groups the related papers into clusters of densely connected sub groups on the basis of the strength of their relationships such that papers with strong ties were placed closely together and the sub groups that are far from each other are connected by a bridging paper (Hu, 2011). Furthermore Blondel *et al.* (2008) report that the identification of these communities in the network is of crucial importance as they may help to uncover unknown functional network segments such as research topics in

information networks. In this regard therefore a more in-depth literature review was undertaken to examine the papers within each cluster and this was the basis for discovering the research topics, theories and models.

5.7 The network topology

Figure 5 shows the entire structure of the citation network generated. As observed the main two network components at the centre have a clearly defined network structure while the majority of the nodes surrounding the main components did not have clear structure of relationships and therefore were automatically repulsed away by the layout algorithm as explained in Hu, (2005). The area where the main activity is thus the two network components at the centre were selected for further analysis. However in order to get a better view of the network structure. The degree range for this network was 20-148. This means that the references for analysis were papers which were cited at least 20 times. The objective of selecting this in-degree range was to improve the visibility of the network by eliminating the small relations that otherwise cluttered the network. (Pratt *et al.*, 2012; Polites & Watson, 2009) report that there is no clear guideline for selecting an acceptable citation threshold but rather the researcher should apply a reasonable threshold to avoid distorting the network visibility. Some of the characteristics observed in the network depicting the intellectual structure of the IS for instance included size of the links in the network which was done by assigning weight to the links such that larger links represented papers that are highly cited which indicates their influence or importance measured in terms of their in-degree centrality. The flow of information represented by the arrows begin at the citing papers (source) and point towards the cited references (target) as was initially pre-determined by the researcher at the time of creating the nodes table and the links table in Gephi. Other characteristics observed in the network include cliques and bridges. Bridges in this network are the papers which connect otherwise the disconnected network components together or act as brokers in the network while a clique on the other hand represents a group of papers with strong ties closely placed together.

Although the entire network in figure 5 is hardly visible due its large size and inability to clearly display in an MS. Word environment the network showed a clear citation structure which was zoomed in for further analysis in the proceeding sections.
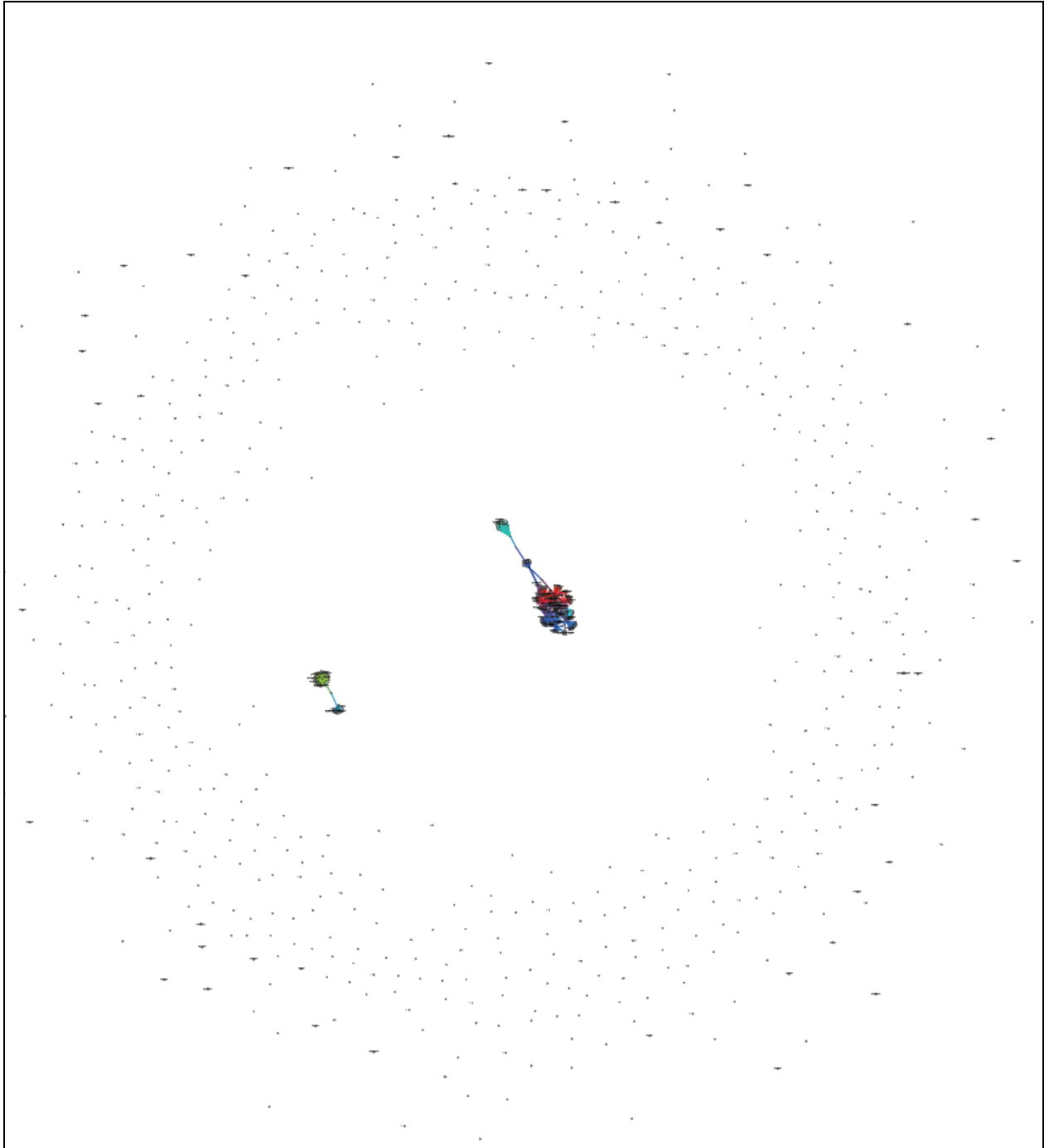
Figure 5: The entire citation network structure

In figure 6 the two main network components with visible clusters were selected and examined for further analysis.

Figure 6: The two main Citation network components
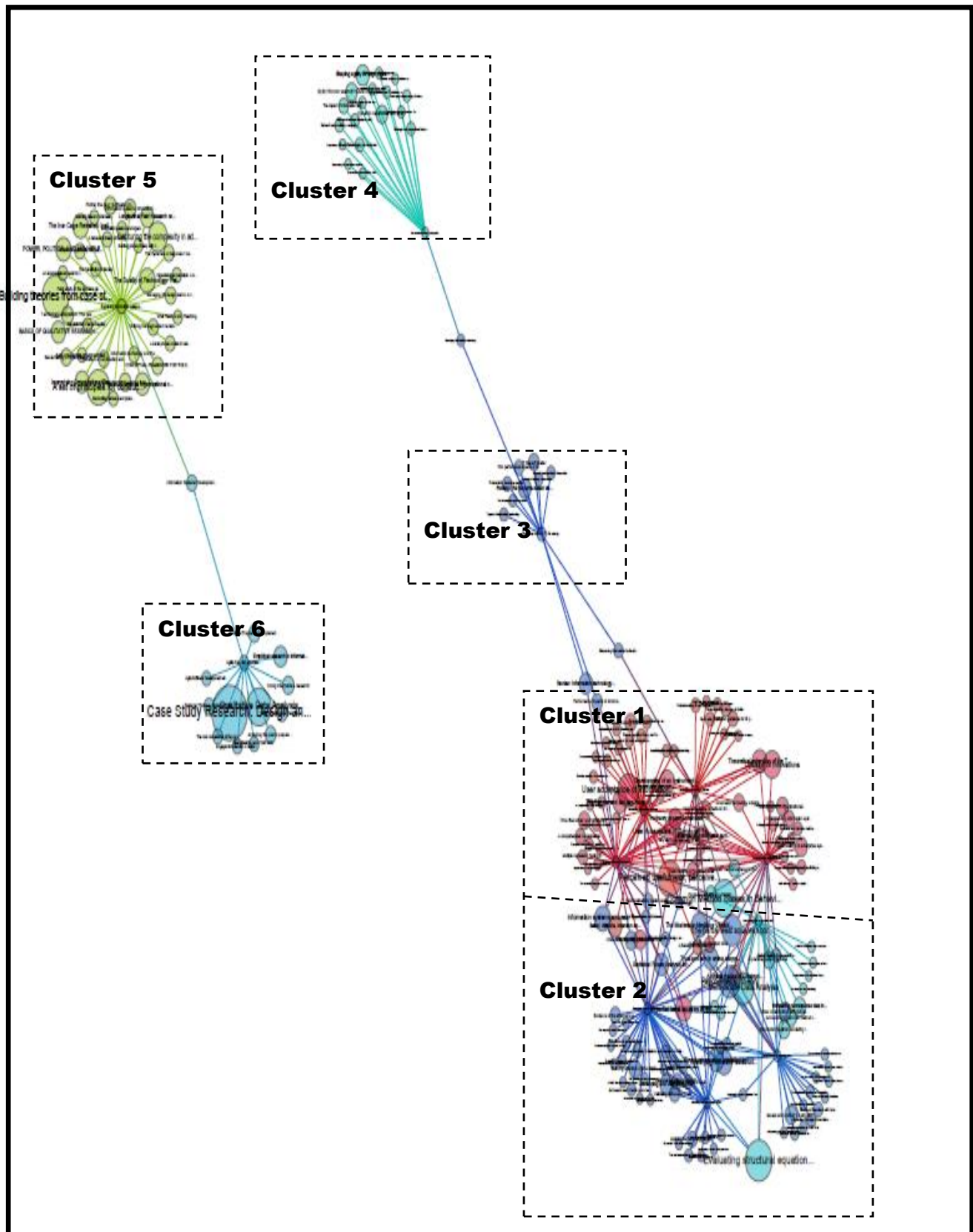
5.8 Discussion of the findings

The identified clusters enabled the researcher to address the research questions based on the observations from the citation network. As observed in figure 6 the clustering algorithm groups the papers based on their strong ties and a more in-depth literature review was undertaken on all articles within each cluster to discover the research topics common among all the identified articles. Various items were also recorded for each article in the cluster including citation counts of those articles. Although the algorithm detected 231 communities only 6 were the major point of discussion while majority of the detected communities/clusters were so small and invisible which were mostly repulsed outside the main component. The area where the network was concentrated was perceived to be the main research areas of interest and was the basis for this analysis as already shown in the figure 6 above. The analysis of the findings proceed as follows;-

5.9 Findings for most influential papers in the IS research

This analysis started by finding the most influential papers contributing to the IS discipline identified and ranked by their in-degree centrality arranged in the order of most cited.

This addresses Research sub question 1: Who/what are the most influential papers, authors/countries/journals in the IS discipline?

Gephi displayed a list of most cited references in the descending order ranking them from the most cited. Table 7 displays the top 10 most influential papers/ references cited by the top 8 IS basket journals during the 5 year period. The rest of the list is displayed in Appendix B.

In accordance of rank, table 7 shows that Yin R.K. (1994): Case Study Research: Design and Methods, Sage Publications is the most influential and most cited literature by the top journals during the 5 years followed by Fornell & Larcker (1981): Evaluating structural equation models with unobservable variables and measurement error, Journal of Marketing Research, (39-50) and the list continues as displayed in table 7 below. From the list it is observed that at least six of the references in the top 10 are journal articles of which two are published by journal of MIS Quarterly and 1 by Information Systems Research. Four of the top cited are books and at least two of those are from Sage

publication. Another observation from the top 10 list is that at least 6 of the top cited papers involve references containing methodological approaches where by case study research method and design is leading followed by quantitative methods by means of structural equation modelling techniques. Next to this is citations to references that provide theoretical foundations of IS disciple. Among the theoretical papers include the papers that provide theoretical models for technology acceptance (Davis, 1989; Venkatesh *et al.*, 2003). The table below shows the list of the 10 most cited papers arranged in the order of most cited.

5.10 Top 10 cited references in IS research

Table 7 Top 10 cited references in IS research

Rank	Citations	Author	Year	Title	Source title
1	148	Yin R.K.	1994	Case Study Research: Design and Methods	Sage Publications
2	147	Fornell & Larcker	1981	Evaluating structural equation models with unobservable variables and measurement error	Journal of Marketing Research,(39-50)
3	129	Podsakoff *et al*	2003	Common Method Biases in Behavioural Research: A Critical Review of the Literature and Recommended Remedies	Journal of Applied Psychology,88(5), 879-903.
4	123	Davis F.D.	1989	Perceived usefulness, perceived ease of use, and user acceptance of information technology	MIS Quarterly,13(3), 319-340
5	108	Venkatesh *et al*	2003	User acceptance of information technology: Toward a unified view	MIS Quarterly: 27(3), 425-478
6	105	Hair *et al*	1995	Multivariate Data Analysis	Prentice Hall, Englewood Cliffs, NJ, 178-256
7	103	Nunnally	1978	Psychometric	McGraw Hill

		J.C.		Theory	
8	102	Eisenhardt K.M.	1989	Building theories from case study research	Academy of Management Review, 14(4), 532-550.
9	99	Chin W.W.	1998	The partial least squares approach to structural equation modelling	Lawrence Erlbaum Associates Publishers, pp. 295-336
10	89	Miles & Huberman	1994	Qualitative Data Analysis	Sage Publications, Thousand Oaks, CA

5.11 Findings for IS research topics, models and theories

This addresses the research sub questions 2 and 3:
Question 2: What are the main research topics that IS researchers address?

Question 3: What are the most influential theoretical foundations of IS research? The theoretical foundations in this study will include the influential IS theories and models.

After reviewing the literature in each cluster the following identified topics were identified and discussed as following:

5.11.1 Cluster 1: Technology acceptance/ IS success

In the following discussion, cluster1 is zoomed in and discussed as shown in figure 7. In Cluster 1 the researcher discovered that Technology acceptance/ IS success studies dominated IS research during the 5 year period. The question on what determines IS success in society, organizations as well as in an E-commerce environment contain the main body of the literature in this cluster. IS acceptance as a dependent variable is determined by various independent and moderating variables. Various IS studies have addressed those factors that contribute to IS success. These IS success factors have been measured, explained and put together into descriptive models by various IS studies to predict technology acceptance by end users. The most contributing studies in this category are the literature on Technology Acceptance described in the Model (TAM 1 & 2) by (Davis, 1989; Davis *et al.*, 1989; & Venkatesh *et al.*, 2003). For IS success (Davis, 1989; Davis *et al.*, 1989) proposed a TAM model

based on the notion that a potential IT user will only accept adopting to IT usage based on these independent variables which include; perceived usefulness, perceived ease of use by potential user and intention of use of technology by end user. Ever since the TAM was introduced by Davis (1989), other papers have complemented the model by suggesting other variables to the TAM model including the contribution of Chin *et al.* (2003) which argues that emotion and enjoyment could also increase the user's intention to adopt to IT use. A number of IS theories have contributed to the study of technology acceptance, the most contributing and technology enabled theory identified by its high citation count in the cluster include the diffusion of innovation theory (Rogers, 1995) that predicts the level of acceptance and implementation of IT by potential end users based on state of art and IT innovation, this includes system quality design features. Other contributing theories identified in the cluster argue that technology acceptance is not only based on state of art and innovation but also based on human behaviour, attitude and intention of use of technology which could contribute to its acceptance; these theories include theory of planned behaviour (Ajzen, 1991) and theory of reasoned action (Fishbein & Ajzen, 1975).

The second observed technology acceptance studies is expressed in the D& M IS success model (DeLone & McLean, 2003) for E-commerce success which explains that IS success as a dependent variable is determined by 6 related independent variables which include system quality, information quality, use, user satisfaction, individual impact, organization impact.

Figure 7 shows cluster1 with the technology acceptance and the contributing literature as observed in the cluster. The literature contributing to this topic is listed in table 8 and includes all the papers that formed this cluster. This cluster includes all referenced papers denoted with the red colouring, the larger links for which formed the main body of the topic identified were the main points of discussion (papers with high in-degree within the cluster) then followed by other small but contributing literature to the subject (papers with low in-degree in the cluster) which include theory of planned behaviour and theory of reasoned action. The coloured dotted border marks the boundaries of this cluster, however as observed some of the red coloured links mix into other clusters which shows the close relationships among cluster1 and 2 as will be discussed in the next chapter. In conclusion to this cluster Technology acceptance studies explained by the two theoretical models and the most cited being the TAM model of Davis (1989) followed by the D& M model (DeLone & McLean, 2003). Technology acceptance studies are backed by theory of diffusion of innovation (Rogers, 1995), theory of planned behaviour (Ajzen, 1991) and theory of reasoned action (Fishbein & Ajzen, 1975).
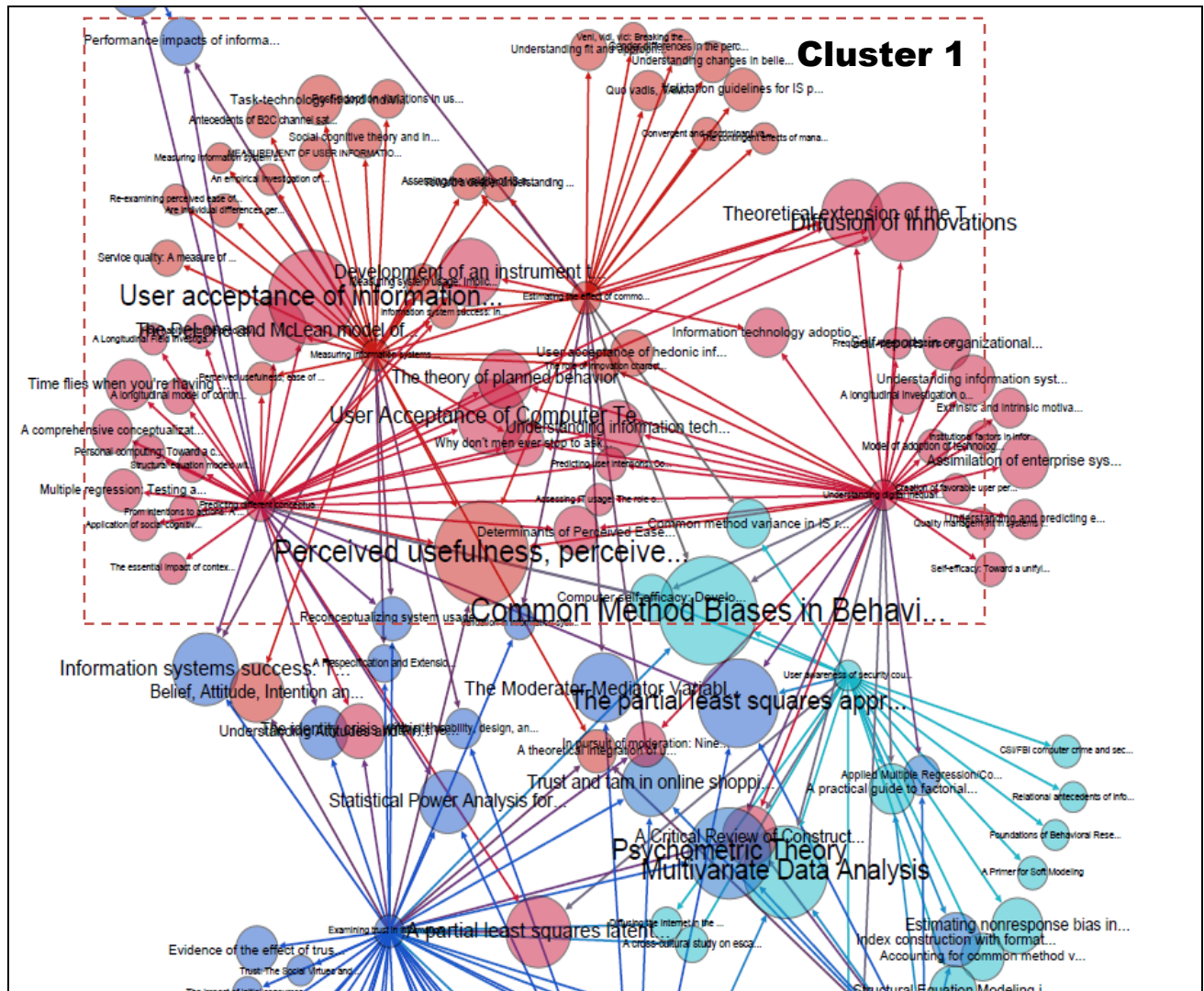
Figure 7- Cluster 1. Technology acceptance

The following table 8 shows the top 5 most contributing papers to the research topic of technology acceptance in cluster 1 of figure 7 ranked according to their in-degree centrality. This included all papers coloured with red. The full list of all the papers in cluster 1 is listed in appendix C.

Table 8-Cluster 1: Technology Acceptance

Rank	Citations	author	Year	Paper	Source title
1	123	Davis, F. D	1989	Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.	*MIS Quarterly*, *13*(3), 319-340
2	108	Venkatesh, *et al*	2003	User acceptance of information technology: Toward a unified view.	*MIS Quarterly*, *27*(3), 425-478.
3	84	Rogers, E.	1995	*Diffusion of innovations.*	Free Press, Vol. 65, p. 519.
4	78	Davis *et al*	1989	User Acceptance of Computer Technology: A Comparison of Two Theoretical Models	Management Science, 35(8), 982-1003
5	73	Chin *et al*	2003	A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study	Information systems research, 14(2), 189-217.

5.11.2 Cluster 3: Business value of IT

After the acceptance and adoption of technology as discovered in cluster 1 the business value of IT is yet another area of research discovered from the cluster analysis in this study. It is based on the argument that although organizations have adopted to and have invested in IT, realizing its business value in terms of its performance is yet another concern area in IS research. Research shows that realizing the business value of IT is so much dependent on the internal and external factors surrounding the enterprise including the type of IT, management practices and organizational structure as well as the competitive and macro environment. The most contributing studies to the study of value realization of IT investments in organizations in cluster 3 include Melville, Kraemer & Gurbaxani, (2004). Melville *et al.* (2004) define IT business value as the extent to which the application of IT within firms lead to improved

organizational performance impacts that includes productivity enhancement, profitability improvement, cost reduction, competitive advantage, inventory reduction and other measures of performance. The authors described these variables in an integrative model of IT business value based on the resource based view theory (RBV) (Wade & Hulland, 2004) which states that the success of a firm is dependent upon the resources it owns. The IT business value model described the IT value generation process in organizations. The model asserts that realizing IT business value as a dependent variable is determined by several independent variables sounding the organization these variables include;- the focal firm its self, competitive environment, and macro environment. Other contributing literature to this topic in 3 cluster include (Devaraj & Kohli, 2003; Rai, Patnayakuni & Seth, 2006) which argue that the driver of IT impact in organizations is not the investment in the technology it's self but rather in the actual usage of technology. Witnessing the value of IT today Carr (2003) confirms that nowadays "hardly a dollar or a euro changes hands anymore without the aid of a computer system". Carr adds that IT usage in organizations today has changed and shifted the attitudes of managers who in the past down looked at computers as *proletarian"* tools used by floor staffs such as secretaries, analysts and technicians but today executives heavily use IT and this is evidenced by its inclusion in the organization's strategic plan in most organizations nowadays. Figure 8 shows the cluster 3: IT Business value and table 9 shows the contributing studies to the topic. A detailed list of the articles in this cluster is found in appendix D
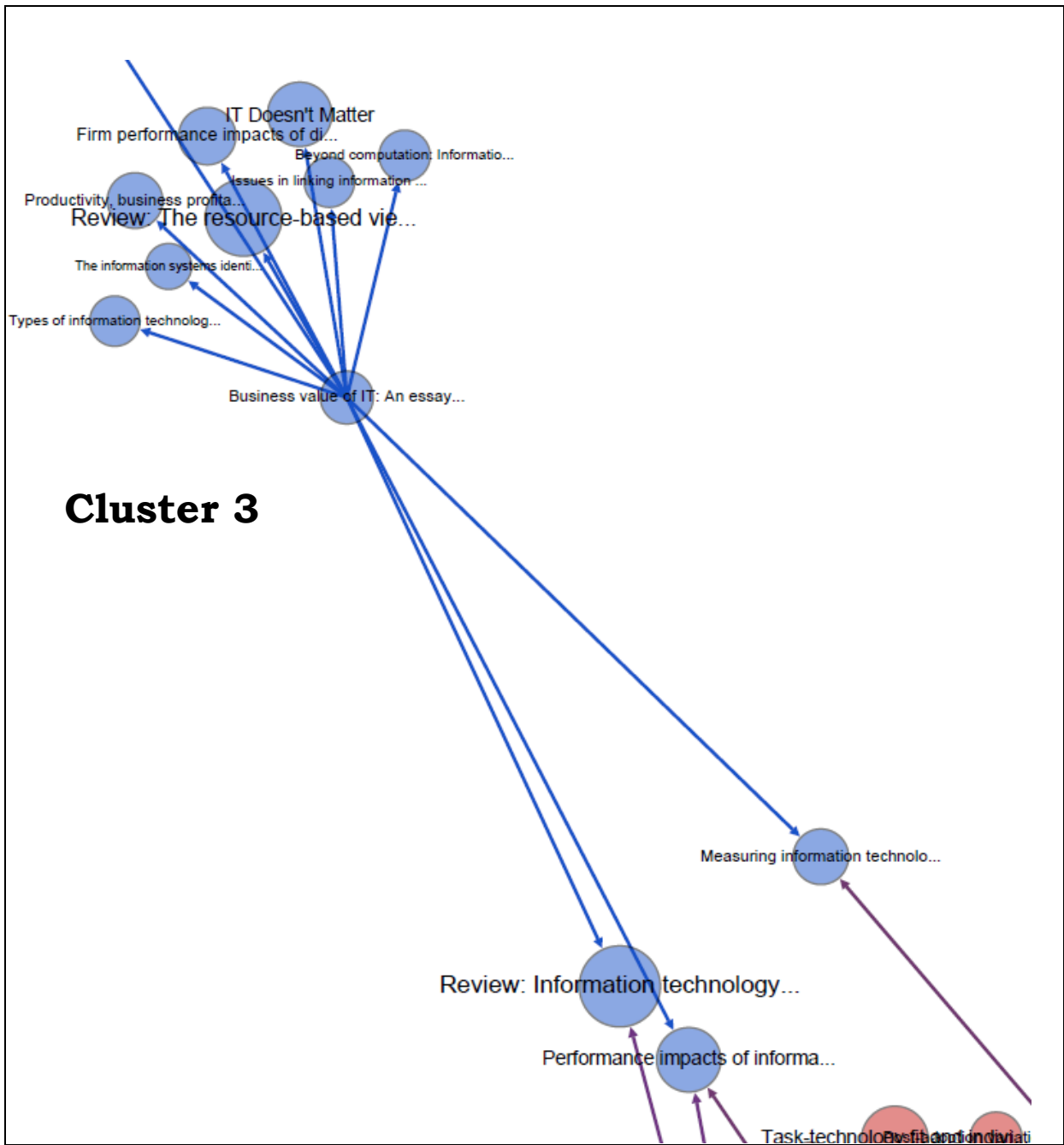
Figure 8- cluster 3: IT Business value

Table 9: Cluster 3: IT Business value

Rank	Citations	Author	Year	Title	Source
1	55	Melville *et al*	2004	Review: Information technology and organizational performance: An integrative model of IT business value	*MIS quarterly*, *28*(2), 283-322
2	50	Wade & Hulland	2004	Review: The resource-based view and information systems research: Review, extension, and suggestions for future research	*MIS quarterly*, *28*(1), 107-142.
3	36	Devaraj & Kohli,	2003	Performance impacts of information technology: is actual usage the missing link?	*Management science*, *49*(3), 273-289
4	36	Carr, N.	2003	IT doesn't matter	*Educause Review*, *38*, 24-38
5	28	Rai, *et al*	2006	Firm performance impacts of digitally enabled supply chain integration capabilities	*MIS Quarterly*, *30*(2), 225-246.

5.11.3 Cluster 4: Electronic markets for competitive advantage

After realising the business value of IT as discussed in cluster 3, in cluster 4 the topic's concern is on further laying strategy as regards to how organizations can make use of electronic markets to gain competitive advantage over other contemporary firms in the presence of technology by digitizing its trading process, as explained in the IT competence model (Sambamurthy, Bharadwaj & Grover, 2003). The model explains that firms should take advantage of the digital option and combine it with its entrepreneurial alertness to seize market opportunities by digitizing their enterprise work processes and knowledge systems. Furthermore the model explains that a firm's ability to take advantage of the strategic role of IT for agility will lead to reduced costs of production, cutting coordination costs of intermediaries and expanding the customer base

through their networked environment hence increase a firm's returns. Other contributing studies to this topic include Malone, Yates & Benjamin (1987) and argue that the presence of IT has enabled a paradigm shift towards electronic markets which has heavily reduced on transaction costs, giving an example to the airline industry where the brokerage role of airline agents has diminished cutting down on costs and time to market. More to this Teece, Pisano & Shuen (1997) also report on how a firm can gain competitive advantage basing on its capabilities. Again the main contributing theory to this topic is the resource based view theory (Wernerfelt, 1984) Teece *et al.* (1997) argues that a firm's full utilization of its own resources coupled with its IT capabilities can lead to wealth creation. Figure 9 shows cluster 4 followed by contributing literature on table 10
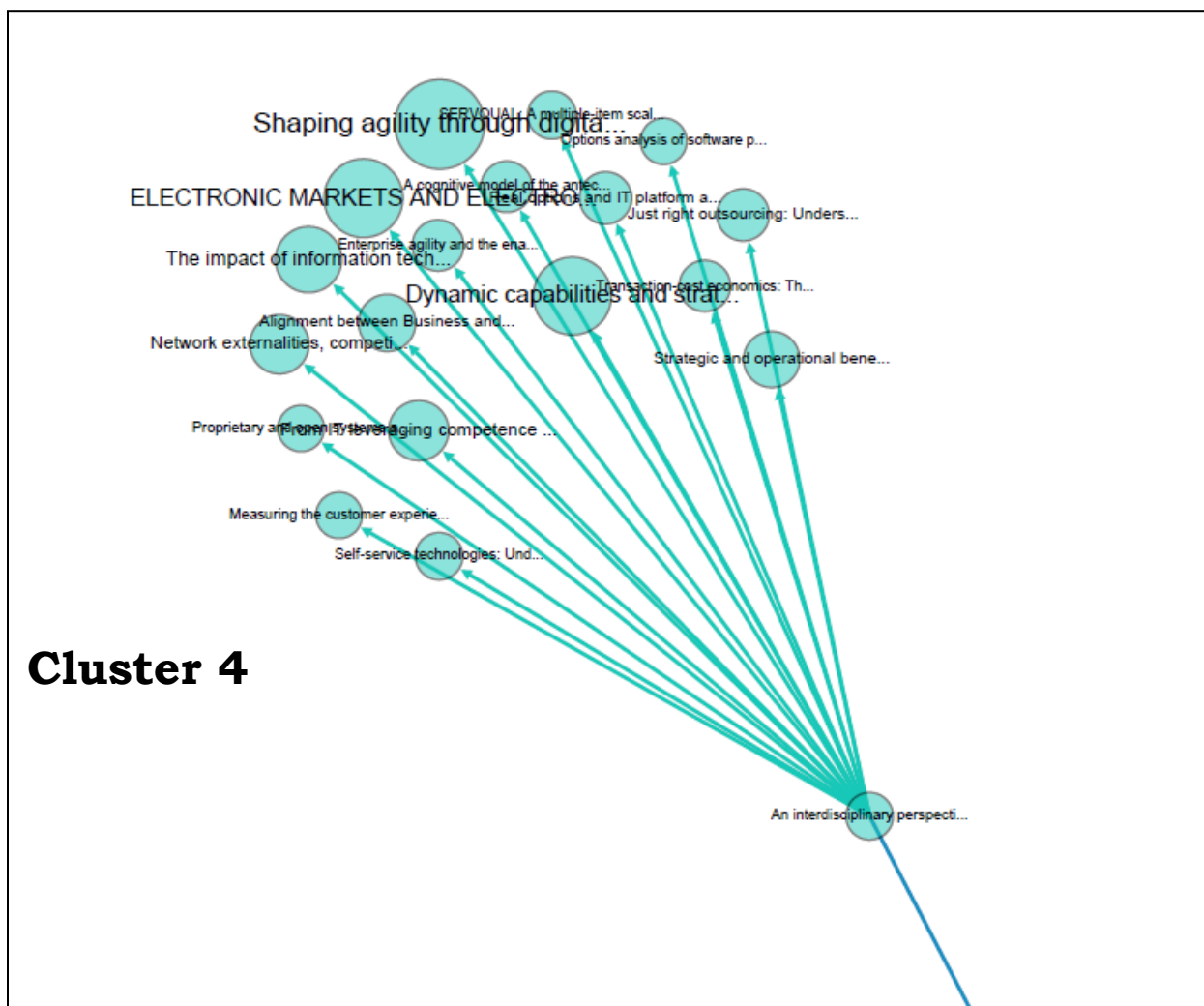
Figure 9- cluster 4: Electronic markets for competitive advantage

Table 10- Cluster 4 Electronics markets for competitive advantage

Rank	Citations	Author	Year	Title	Source
1	54	Sambamurt *et al*	2003	Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms	*MIS quarterly*, 237-263.
2	43	Malone, *et al*	1987	Electronic markets and electronic hierarchies	*Communications of the ACM*, *30*(6), 484-497
3	42	Teece *et al*	1997	Dynamic capabilities and strategic management	*Strategic Management Journal*, *18*(7), 509-533.
4	30	Clemon *et al*	1993	The Impact of Information Technology on the Organization of Economic Activity: The" Move to the Middle55 Hypothesis	*Journal of management information systems*, *10*(2), 9-35.
5	23	Katz, & Shapiro,	1985	Network externalities, competition, and compatibility	*The American economic review*, *75*(3), 424-440.

5.11.4 Cluster 5: IS theory building and organizational studies

The analysis of this cluster reveals how IS theories and standardized principles as regards to classification and structuring of organizations are derived from IS qualitative studies. The most contributing literature by Eisenhardt (1989) begins with giving guideline on how to build theories from case studies step by step beginning from selecting the research question, Other contributing literature is Klein & Myers (1999) which gives a set of principles for evaluating

and interpreting results from case studies in IS research and confirms that one of the key contributions in IS research methods which is consistent with IS principles is the case study research by (Yin, 1994; Benbasat & Zmud, 1999). In another dimension of theory building from organization studies, DiMaggio & Powell (1991) used the term "isomorphism" to describe those organizations that in the aggregate, constitute a recognized area of institutional life such as key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products defined on the basis of empirical investigations. The isomorphism tries to understand the similarities and differences in culture, operations, decision making in these organizations to identify patterns in the nature of operations in these organizations over time. Figure 10 shows the cluster 5 and the contributing papers that form this cluster is presented in table 11.
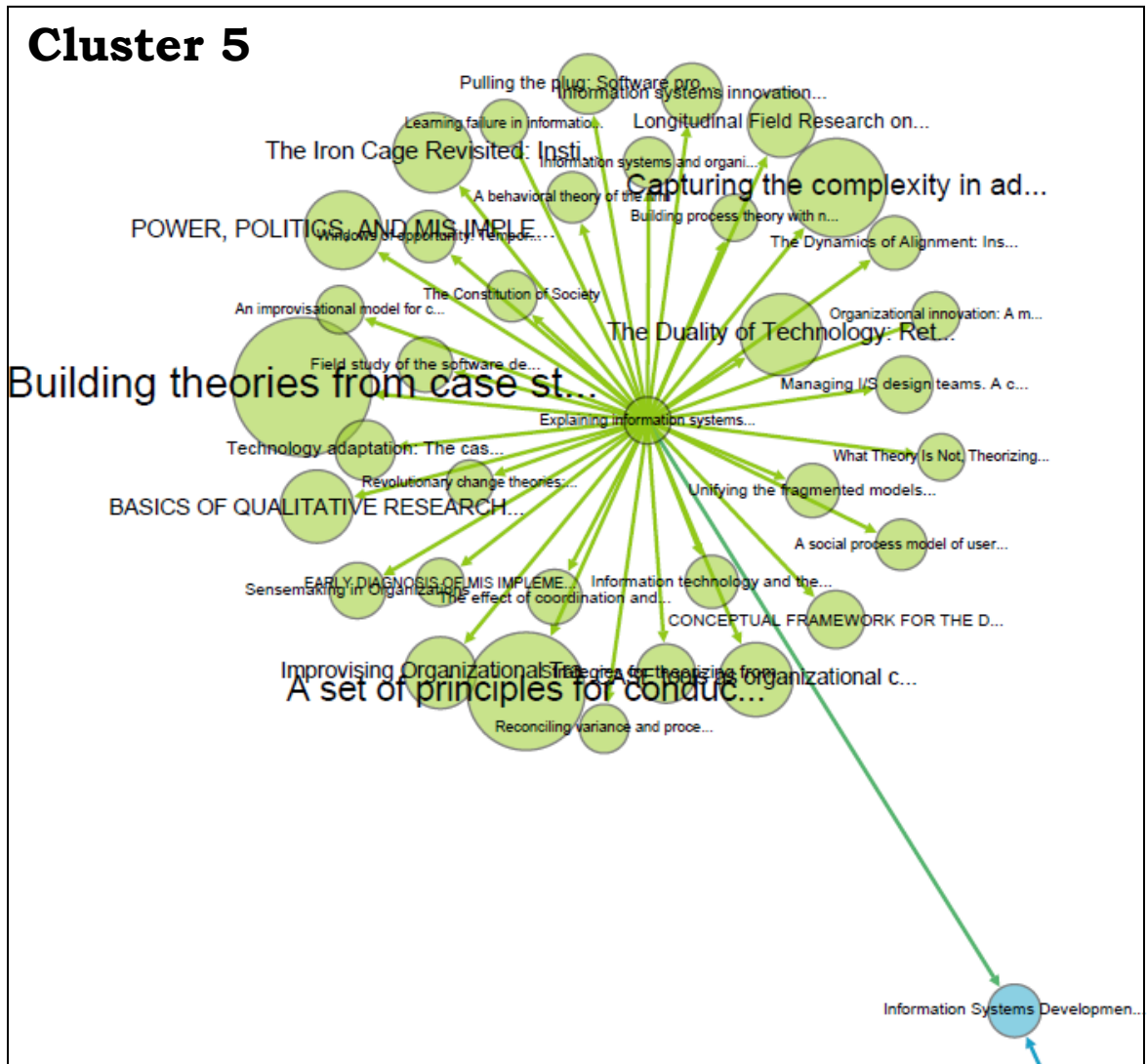
Figure 10- Cluster 5: IS theory building and organizational studies

The following papers contribute to Topic: IS theory building and organizational studies. The detailed list of articles forming this topic is attached in appendix F

Table 11- Cluster 5: IS theory building and organizational studies

Rank	Citation	Author	Year	Title	Source
1	102	Eisenhardt	1989	Building Theories from Case Study Research	*Academy of Management Review, 14*(4), 532-550
2	81	Klein,& Myers,	1999	A set of principles for conducting and evaluating interpretive field studies in information systems	*MIS quarterly*, 67-93
3	62	DeSanctis, & Poole	1994	Capturing the complexity in advanced technology use: Adaptive structuration theory	*Organization science, 5*(2), 121-147
4	45	Orliko-wski	1992	The Duality of Technology: Rethinking the Concept of Technology in Organizations	*Organization science, 3*(3), 398-427
5	43	DiMaggio Powell	1991	The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields	*The New Institutionalism in Organizational Analysis* (Vol. 17, pp. 63-82).

5.11.5 Cluster 6: Research methods

The analysis reveals that research methods is one of the topics of IS research that is referenced a lot. The most cited publications in this regard is Yin (1994, 2003) which gives guidelines for conducting case study research and also gives wide-range of examples of case studies drawn from a variety of academic and applied fields. For example Yin describes how and when to apply qualitative data collections techniques such as interviews, archives, questionnaire, and observation and how to further analyse the collected data to answer the research questions. More to this Miles & Huberman (1994) also gives guidelines for analysing and presenting qualitative results without destroying the meaning of the data such as using tabulation and graphs to present qualitative results.

Furthermore (Benbasat & Zmud, 1999: Walsham, 2006) also provide additional guidelines on conducting empirical research. On the other hand Kent & Andres (2000) also address the needs for Information Systems software development conducted by Extreme teams in a face of vague or changing environments. Figure 11 shows cluster 6: Research methods and table 12 shows the list of the contributing literature to the topic.
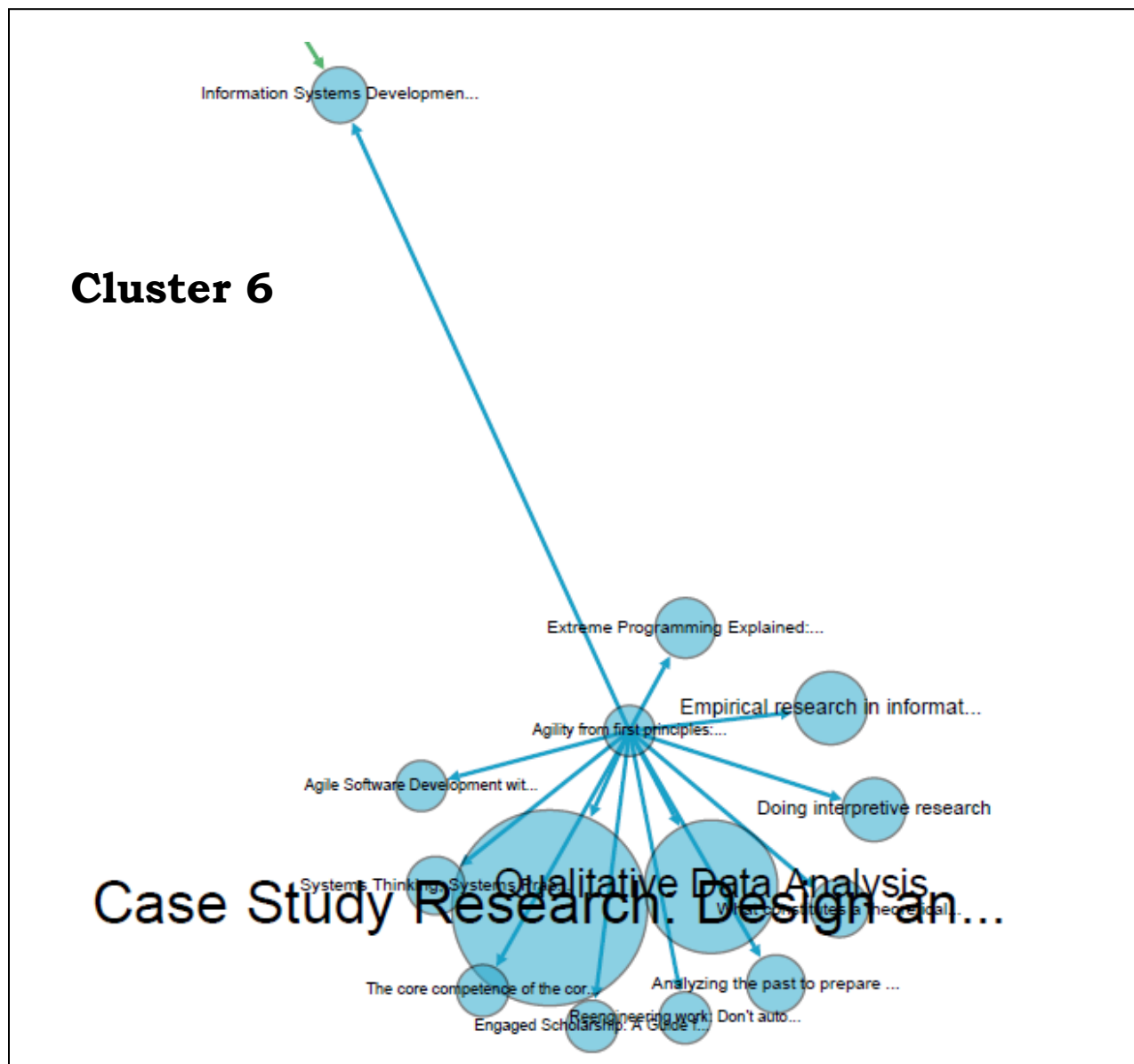
Figure 11-Cluster 6: Research methods

Table 12- Cluster 6: Research methods

Rank	Citation	Author	Year	Title	Source
1	148	Yin, R. K.	1994	Case study research: Design and methods	Sage (Vol. 5)
2	89	Miles & Huberman	1994	Qualitative Data Analysis: An Expanded Sourcebook	*Sage Publications* (Vol. 2, p. 338).
3	32	Benbasat, & Zmud,	1999	Empirical Research in Information Systems The Practice of Relevance	*MIS quarterly*, 3-16
4	23	Walsham, G	2006	Doing interpretive research.	*European journal of information systems*, *15*(3), 320-330.
5	20	Kent & Andres	2000	Extreme programming explained: embrace change. *Reading, Mass*	*Adison-Wesley*

5.11.6 Cluster 2: Quantitative methods

The analysis also reveals that quantitative research methods is yet another topic referenced a lot in IS research. The most cited publications in this regard is Fornell & Larcker (1981) which discusses about statistical tests used in the analysis of structural equation models with unobservable variables and measurement errors faced while applying these equation models in different contexts. Method biases are one common source of measurement error and hence can influence behavioural research results, therefore Podsakoff *et al.* (2003) having identified the potential sources of these biases suggests for statistical techniques that can be used to control method biases. In addition Hair *et al,* 1995; Chin, 1998) contribute further on the use of structural equation modelling techniques to handle multivariate data. The quantitative research methods according to this analysis are mostly associated with technology acceptance studies. Table 14 shows the list of literature contributing to the topic of Quantitative methods and the rest of the list is attached in appendix G
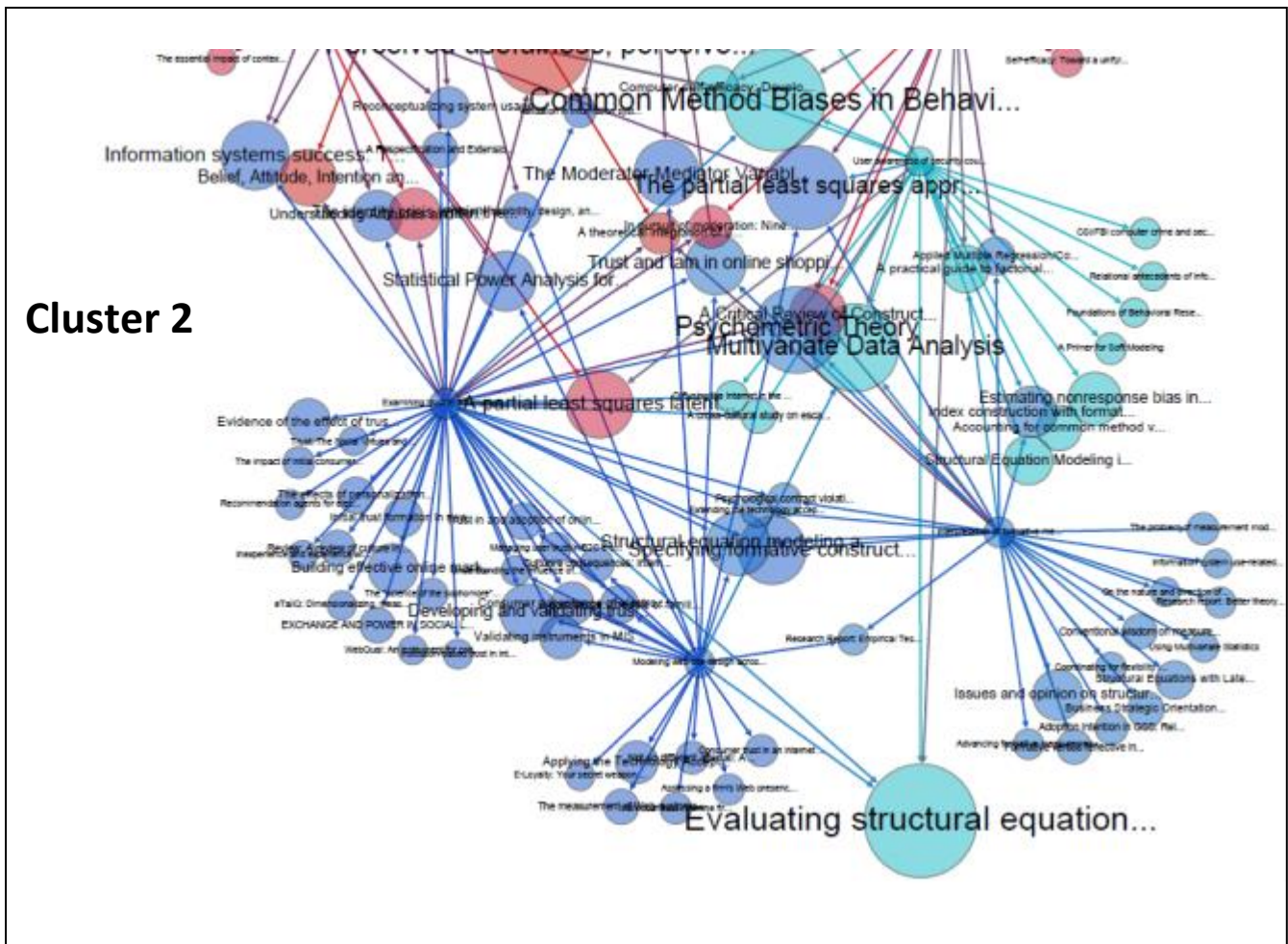
Figure 12: Quantitative methods

The following table 13 contains a list of contributing literature to the topic of Quantitative methods

Table 13-Cluster 2: Quantitative methods

Rank	Citations	author	Year	Paper	Source Title
1	147	Fornell & Larcker	1981	Evaluating structural equation models with unobservable variables and measurement error	Journal of Marketing Research,(39-50)
2	129	Podsakoff *et al*	2003	Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies	Journal of Applied Psychology,88(5), 879-903
3	105	Hair *et al*	1995	Multivariate Data Analysis	Prentice Hall, Englewood Cliffs, NJ, 178-256
4	103	Nunnally, J.C	1978	Psychometric theory	*NY: McGraw-Hill.*
5	99	Chin W.W.	1998	The partial least squares approach to structural equation modeling	Lawrence Erlbaum Associates Publishers, pp. 295-336

In conclusion the analysis of unit 1 in chapter 5 gave an overview of the IS research topics, theoretical foundations and models applied in various IS research subjects. We also discovered the most influential and contributing papers to IS research. This analysis provided answers to research questions 1-3. In the next section in unit 2 we focused on the analysis of the research trends within the AIS basket papers only and to discover what topics are currently researched in the AIS basket journals.

6 Unit 2: Analysis of research trends in the AIS basket articles

Unlike in unit 1 where the analysis was based on both the combination of the basket articles that cited each other together with all the references contained in the articles upon which the research topics were discovered, the analysis in unit 2 was based on only the 1,205 articles in the basket of 8 which cited each other within the period 2008-2012. This analysis enabled us to discover the research topics currently discussed by the AIS basket journals. The findings in both unit 1 and 2 were discussed in chapter 7 of this thesis.
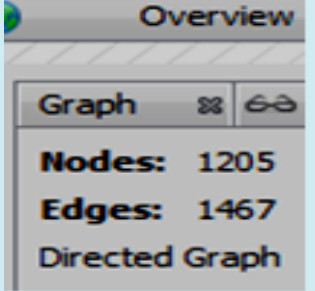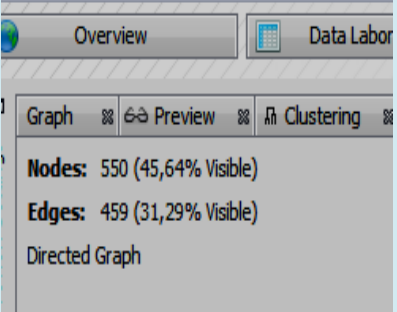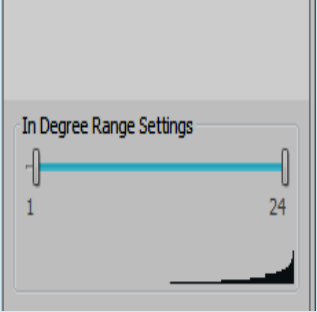
The findings from this analysis provided answers to research question 4: What are the differences in the trends of research topics within the basket papers compared to those discovered from its references?

6.1 Social network analysis of the basket of 8 journals

Social network analysis was performed on the basket articles that referenced each other during this period. The objective was to discover the most influential articles within the basket evidenced by the number of citations those articles have received during the specified time period. Furthermore cluster analysis was performed to discover if there was a pattern of research topics discussed within the basket journals. A total number of the 1,205 articles from the basket of 8 was the basis for the social network analysis. Using Gephi visualization software for social network analysis, a total number of 1,205 unique nodes and 1,467 edges were generated from all the matched pairs of articles that referenced each other. Yifan Hu layout algorithm was applied to display the network structure.

Due to the small number of citations received per journal, the in-degree range of 1 -24 was applied during the analysis, whereby the minimum number of citations received per article is at least 1 considering the highest being 24. Table 14 shows an overview of the network context considering the applied in-degree range. Observing from cell A and B in table 14 reveals that out of the 1,205 articles which formed the nodes table, only 550 papers were cited at least once.

Table 14: The network context

Total number of nodes and edges before filtering	Total number of nodes and edges with in-degree range of 1-24	In-degree range
A	**B**	**C**
Overview	Overview Data Labor	
Graph ✂ ⊖⊜	Graph ✂ ⊖⊜ Preview ✂ ♫ Clustering ✂	In Degree Range Settings
Nodes: 1205	**Nodes:** 550 (45,64% Visible)	1 24
Edges: 1467	**Edges:** 459 (31,29% Visible)	
Directed Graph	Directed Graph	

6.2 The percentage of citation distributions per journal

The following figure 13 shows a snapshot of the distribution of citations per journal considering the applied in-degree range. The figure reveals that the journal of MIS Quarterly received the highest percentage of total citations by 19.82% from all citations among the articles followed by journal of Information systems research with 19.09% whereas Journal of Information Technology received the least percentage of 5.85% total citations from all articles in the given period.

Figure 13 Citation distributions per journal in the basket of 8

Percentage of total citations per journal	Citation chart per journal
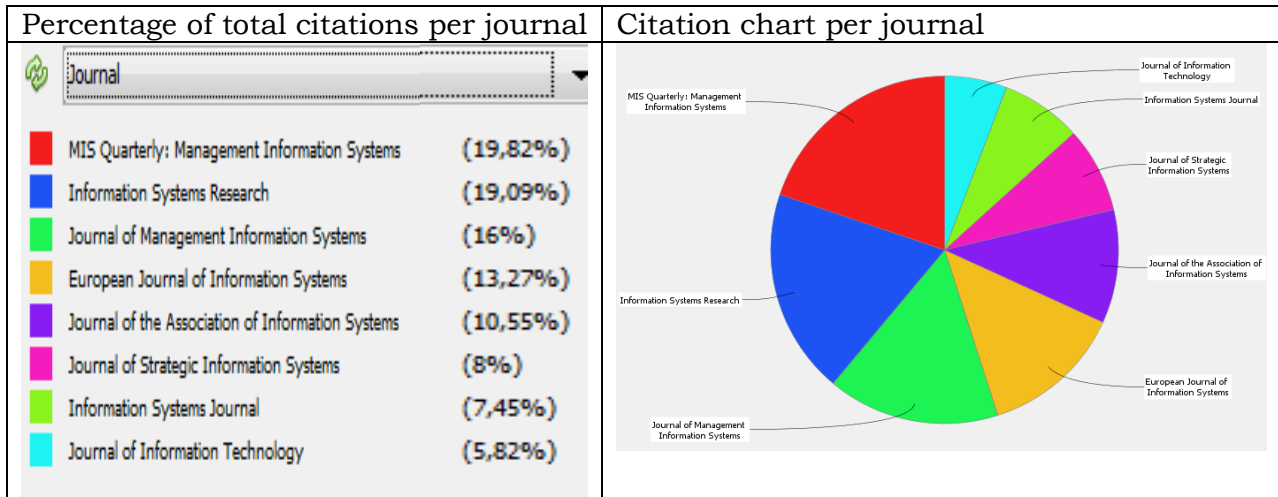
6.3 The main component of the citation network of the basket of 8 articles

The network in figure 14 below shows the main citation network component for the basket papers. Although the network is less populated compared to prior network in unit 1 there is however a defined structure of the citation pattern with some visible clusters. However a further filtration was done such that only the giant network component was selected while other nodes which were not connected to the giant component were repulsed away automatically by the algorithm and therefore were not included in the selected network.
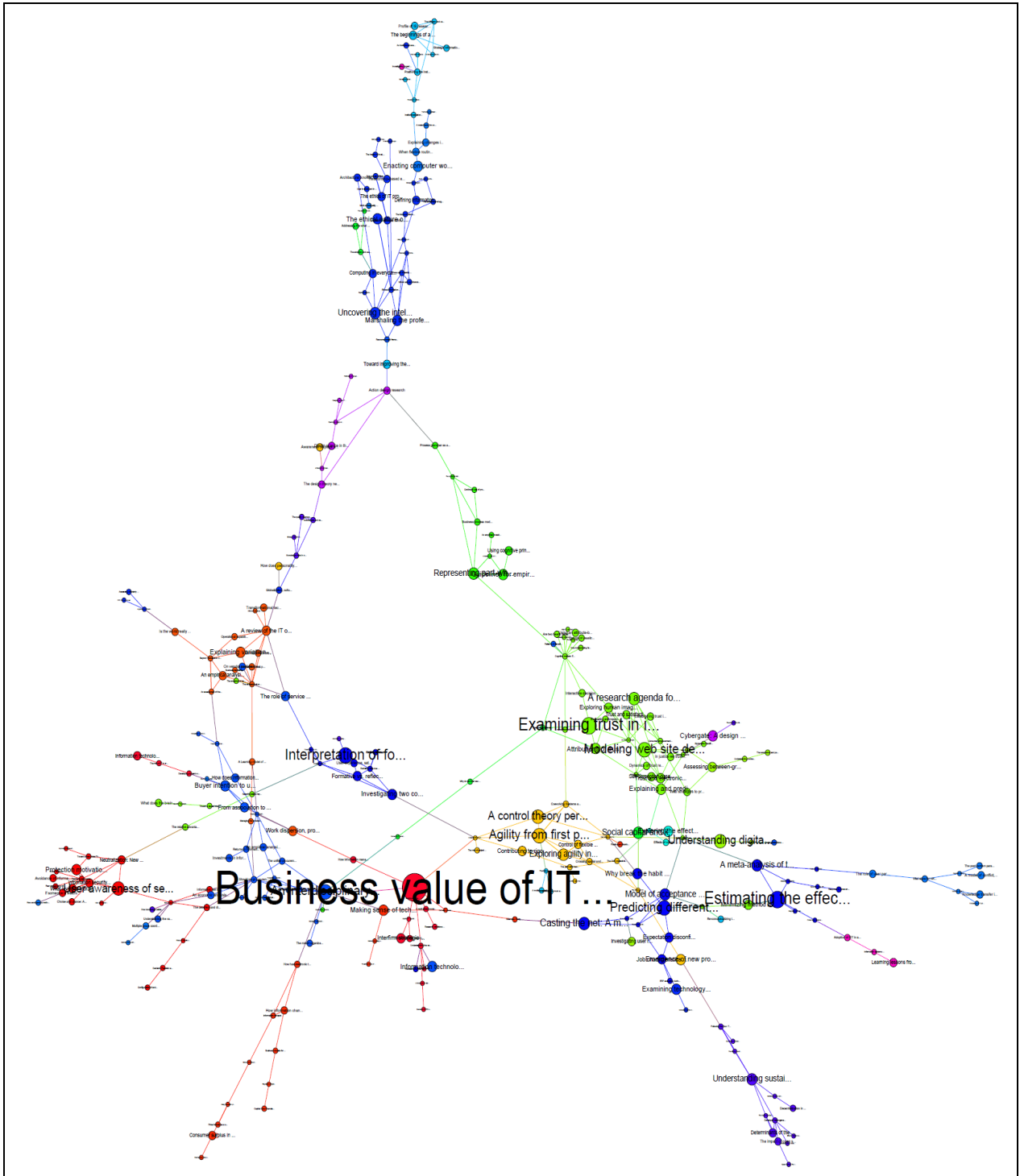
Figure 14: Main component of the basket of 8 citation network

6.4 Findings for the most influential papers in the basket of 8

Table 16 shows the most cited papers from the basket journals identified by applying in-degree centrality measure. The table presents the list of 10 most cited papers ranked in order of the paper with highest citations. The analysis reveal that the most contributing paper in the basket with the highest number of citations almost doubling the rest of the papers is Kohli, R., & Grover, V. (2008). Business value of IT: an essay on expanding research directions to keep up with the times. *Journal of the Association for Information Systems*, *9*(1), 23-39.The top list of the 10 also reveal that Journal of Management Information systems and MIS Quarterly both have 3 papers in the top 10 most cited. Furthermore from the list also reveals that out of the 10 most cited at least five from the top list were papers published in 2008 followed with at least four papers published in 2009 and only one paper published in 2010.as seen in Table 16 below.

Table 15: List of top 10 cited papers in the basket of 8

Rank	Citations	Authors	Title	Year	Source title	Volume	Issue	Page start	Page end
1	24	Kahli, R., Grover, V.	Business value of IT: An essay on expanding research directions to keep up with the times	2008	J AI S	9	1	23	39
2	13	Vance, Elie-dit-cosaque, & Straub,	Examining trust in information technology artifacts: The effects of system quality and culture	2008	JMIS	24	4	73	100
3	13	Sharma, Yetton, & Crawford	Estimating the effect of common method variance: The method-method pair technique with an illustration from tam research	2009	MIS Quarterly:	33	3	473	490
4	12	Cenfetelli, & Bassellier,	Interpretation of formative measurement in information systems research	2009	MIS Quarterly:	33	4	689	707
5	11	Petter, DeLone, & McLean,	Measuring information systems success: Models, dimensions, measures, and interrelationships	2008	E J I S	17	3	236	263
6	11	Conboy, K.	Agility from first principles: Reconstructing the concept of agility in information systems development	2009	I S R	20	3	329	354
7	11	Bardhan, Demirkan, Kannan, Kauffman, & Sougstad,	An interdisciplinary perspective on IT services management and service science	2010	J M I S	26	4	13	64
8	11	Cyr, D.	Modeling web site design across cultures: Relationships to trust, satisfaction, and E-Loyalty	2008	J M I S	24	4	47	72
9	11	Venkatesh, Brown, Maruping, Bala,	Predicting different conceptualizations of system USE: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation	2008	MIS Quarterly	32	3	483	502
10	10	Maruping, Venkatesh, & Agarwal,	A control theory perspective on agile methodology use and changing user requirements	2009	I S R	20	3	377	399

6.5 Findings for research topics in the AIS basket of 8

The following research topics were identified from the citation network in figure 15 based on the critical observation and review of the literature in the identified clusters.

The findings from this analysis were the basis for addressing the research Question 4: What are the differences in the trend of research topics within the basket papers compared to its predecessors?

The following figure 15 was plotted to indicate the identified clusters which were examined to discover research topics therein.
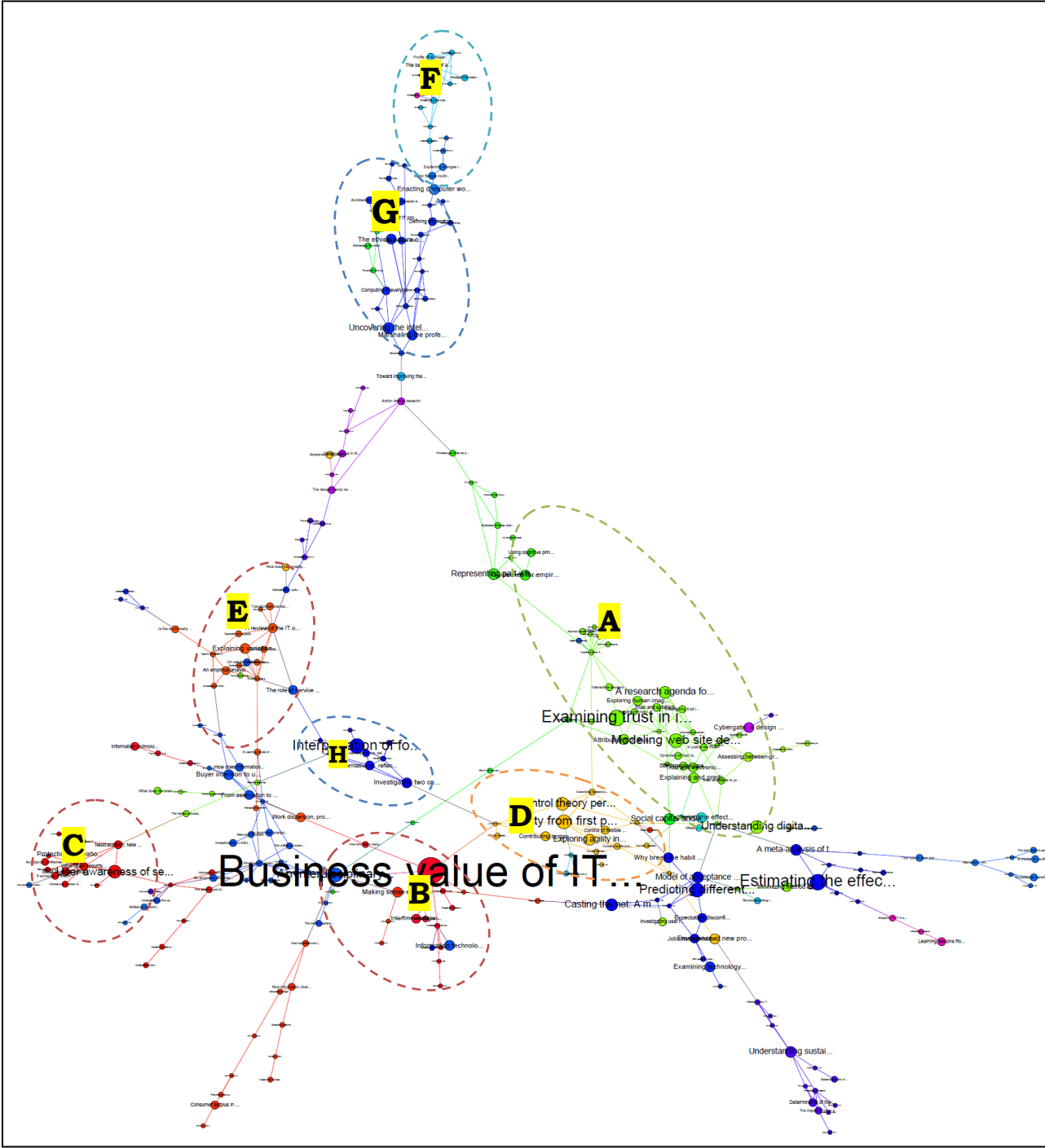
Figure 15: clusters from the Basket of 8 citation network

6.5.1 Topic- A: IT Trust

Research on the role of IT trust for E-commerce transitions is of big concern in IS research as observed in cluster A. In the current digital age, assurance of trust on IT products is of importance to the users. In the context of trust in online environment Gefen, Benbasat & Pavlou (2008) defines trust as the willingness to depend on a trustee based on the beliefs in the trustworthiness of a trustee, whereby trustworthiness consists of integrity, ability and goodwill. Contributing to the topic Vance, Elie-Dit-Cosaque & Straub (2008) suggested two factors that could determine IT trust which include culture and system quality. Explaining the two variables with the theory of reasoned action (Ajzen *et al.* 1980) Vance *et al.* (2008) argue that people's intention to involve in E-commerce is dependent on culture and system quality of the IT products whereby the system quality factors include navigation structure and visual appeal of the web interfaces. In addition (Cyr, 2008; Lowry *et al.,* 2008) argue that the relationship of website design to trust, satisfaction and loyalty need to be modelled across cultures adding that these three components have greater impact on determining the intention of a user to engage in online transactions. Furthermore Wang & Benbasat (2008) affirm that as organizations increasingly utilize web-based technologies to support customers better, trust in decision support technologies has become paramount. This also applies for E-government management (Teo, Srivastava & Jiang, 2008). At the same time the issue of digital inequality is also addressed in an effort to avail internet to all public (Hsieh, Rai & Keil, 2008).

Apart from the need for well-designed interfaces to attract users who engage in in e-commerce, (Wang & Benbasat 2009; Kamis, Koufaris & Stern 2008) commend on the need for interactive decision support systems to further aid consumers in making informed purchase decisions amidst the vast availability of products online as these too contribute to trust. Furthermore Deng (2010) add that visual complexity and order are central factors in the design of webpages to enhance the users' positive emotional reactions while engaging in online transactions and adds that this also applies for the need for good designs for applications accessible via mobile hand held devices which is rather very common media used for personal online transactions today.

The figure 16 below shows cluster A upon which the topic of IT Trust was discovered while the contributing papers to the topic are listed in table 16 with the long list of papers in appendix H.
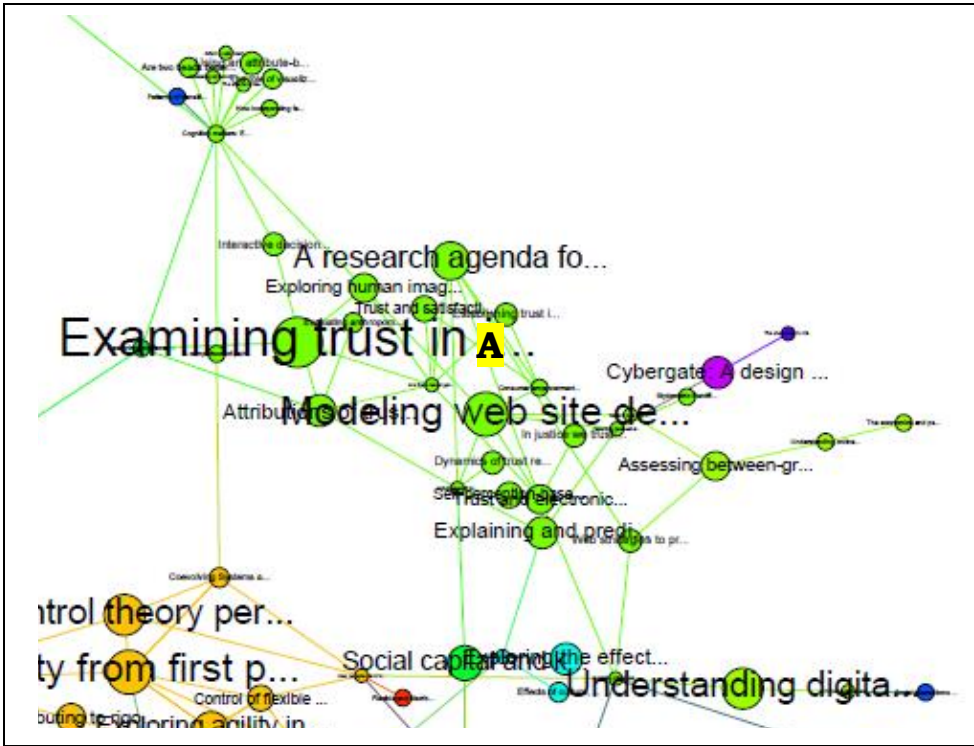
Figure 16-Cluster A: IT Trust

Table 16-Cluster A: IT Trust

Rank	Citation	Author	Year	Title	Source
1	13	Vance, *et al*	2008	Examining trust in information technology artifacts: The effects of system quality and culture	*Journal of Management Information Systems, 24*(4), 73-100
2	11	. Cyr, D.	2008	Modeling web site design across cultures: Relationships to trust, satisfaction, and E-Loyalty	*Journal of Management Information Systems, 24*(4), 47-72.
3	10	Hsieh *et al.*	2008	Understanding digital inequality: Comparing continued use behavioral models of the socio-economically	*MIS quarterly, 32*(1), 97-126

				advantaged and disadvantaged	
4	9	Gefen, *et al*	2008	A research agenda for trust in online environments	*Journal of Management Information Systems, 24*(4), 275-286.
5	7	Lowry, et al	2008	Explaining and predicting the impact of branding alliances and web site quality on initial consumer trust of E-commerce web sites	*Journal of Management Information Systems, 24*(4), 199-224.

6.5.2 Topic B: IT business value

The topic of IT business value examines the economic benefits of IT investments in relation to organizational performance. The most contributing literature on this topic is Kohli & Grover (2008) and describes IT value to include all computer hardware and software systems that are used to automate work process in organizations. The profitability of IT value is realized in its efficiency in terms of improving the productivity of the firm such as how information management capabilities can improve a firm's performance (Mithas *et al.*, 2011) and how the value of IT can be realized in the supply chain (Dong, Xu & Zhu, 2009; Klein & Rai 2009). IT value studies also include the investigations on the negative effects of IT such as techno stress (Ayyagari, Grover & Purvis, 2011). Figure 17 shows the cluster B upon which the topic was discovered and table 17 shows the literature that contributed to the topic in the cluster B.
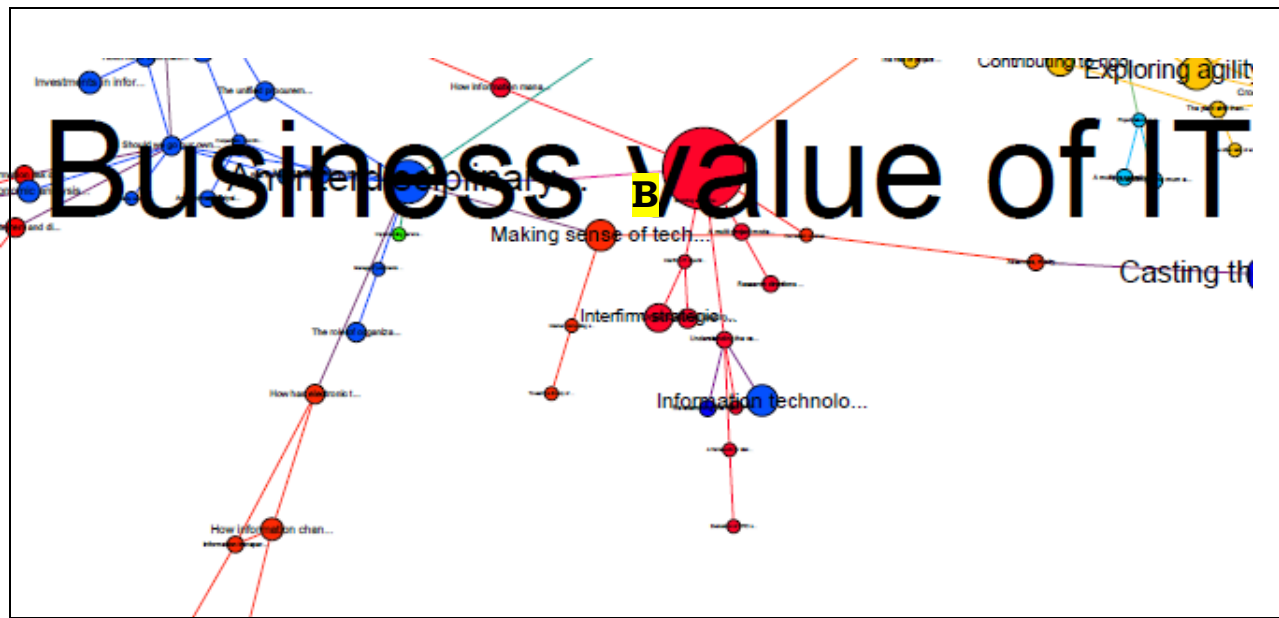
Figure 17- Cluster B: IT business value

Table 17-Cluster B: IT business value

Rank	Citation	Author	Year	Title	Source
1	24	Kahli, & Grover	2008	Business value of IT: An essay on expanding research directions to keep up with the times	*Journal of the association for information systems, 9*(1), 23-39.
2	7	Adoma vicius, *et al*	2008	Making sense of technology trends in the information technology landscape: A design science approach	*Mis Quarterly, 32*(4), 779-809
3	7	Dong, Xu & Zhu	2009	Information Technology in Supply Chains: The Value of IT-Enabled Resources Under Competition	*Information Systems Research, 20*(1), 18-32
4	6	Klein & Rai	2009	Interfirm strategic information flows in logistics supply chain relationships	*MIS Quarterly, 33*(4), 735-762
5	3	Mithas *et al.*	2011	How information management capability influences firm performance	*MIS quarterly, 35*(1), 237-256.

6.5.3 Topic C: IS security

The question of IS security is discussed. Studies on IS security reveal that organizations and end users have to be aware of IS security threats. Contributing to the subject, D'Arcy, Hovav & Galletta (2008) propose countermeasures such as punishments on individuals who misuse or abuse information security in organizations. Furthermore Herath & Rao (2009) argue that secure management of information systems is critically important in today's information intensive society. IS security is also seen to have an impact on technology adoption. The theories of planned behavior, motivation and deterrence are used to explain human behavior and intentions towards security policies. Other IS security studies such as Bulgurcu, Cavusoglu & Benbasat (2010) call for employee' compliance on information security policies. In addition Myyry *et al.* (2009) explain the reasons for employees' noncompliance to information security policies in relation to their moral reasoning and values in society while other studies such as Siponen & Vance (2010) propose other theories such as the neutralization theory to control IS crime in organizations while Xue (2009) emphasis on avoidance theory to control security threats in organizations. Figure 18 shows the cluster on security

Figure 18 shows a snap shot of the cluster of IS security and table 18 shows the list of the contributing literature on IS security
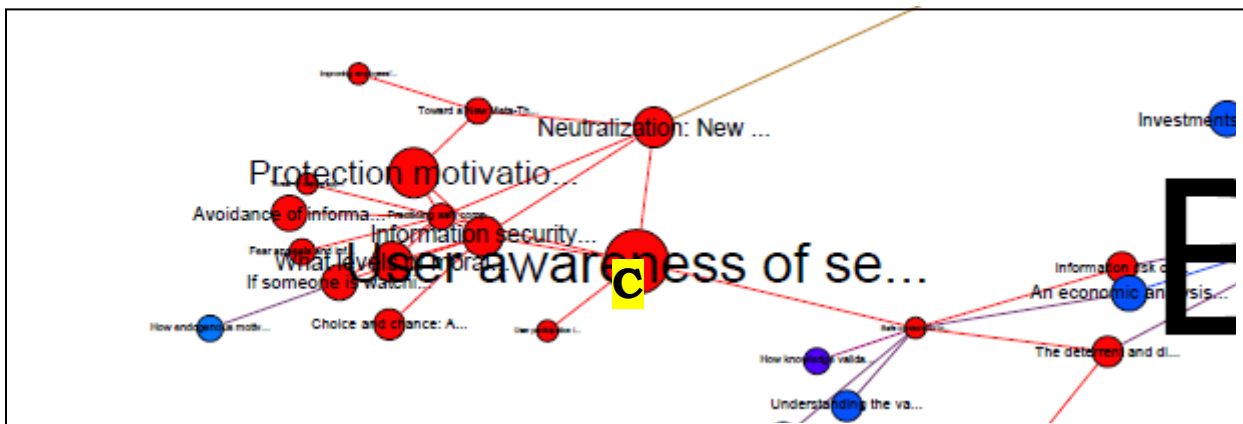
Figure 18 Cluster C: IS security

Table 18 Cluster C: IS security

Rank	Citation	Author	Year	Title	Source
1	10	D'Arcy *et al.*	2009	User awareness of security countermeasures and its impact on information systems misuse: A deterrence approach	*Information Systems Research, 20*(1), 79-98
2	7	Herath & Rao	2009	Protection motivation and deterrence: A framework for security policy compliance in organisations	*European Journal of Information Systems, 18*(2), 106-125
3	5	Bulgurcu *et al*	2010	Information security policy compliance: An empirical study of rationality-based beliefs and information security awareness	*MIS Quarterly, 34*(3), 523-548
4	5	Myyry *et*	2009	What levels of moral reasoning and values explain adherence to information security rules? An empirical study	*European Journal of Information Systems, 18*(2), 126-139
5	5	Siponen & Vance	2010	Neutralization: New insights into the problem of employee information systems security policy violations	MISQuarterly, 34(SPEC. ISSUE 3), 487-502
6	4	Xue, Y.	2009	Avoidance of information technology threats: A theoretical perspective	MIS Quarterly, 33(1), 71-90
7	4	Boss *et al*	2009	If someone is watching, I'll do what I'm asked: mandatoriness, control, and information security	European Journal of Information Systems, 18(2), 151-164

6.5.4 Topic D: Agility in Information Systems Development

This topic concerns the awareness and contribution of agile methods for information systems development (ISD). Conboy (2009) reports that although

agile methods for ISD development is one of the first expanding methods in the recent history, the concept of agility still lacks a theoretical backing to rationalize its application hence Maruping, Venkatesh & Agarwal (2009) justify for the adoption of the control theory to help project managers to structure the software development processes so as to fully maximize the benefits of using agile methods during the ISD projects. On the other hand Harris, Collins & Hevner (2009) argue that although controls are essential in structuring ISD projects, project managers should allow room for flexibility among the software development teams especially where modifications are needed, however Harris et *al.* (2009) argue that there should be a balance between control and flexibility so as to prevent conflicts. In this regard therefore Harris *et al.* (2009) support for adoption of dynamic capabilities theory to balance between control and flexibility during software development projects.

Figure 19 shows a snap shot of the cluster D and table 19 shows the list of contributing literature to the topic.
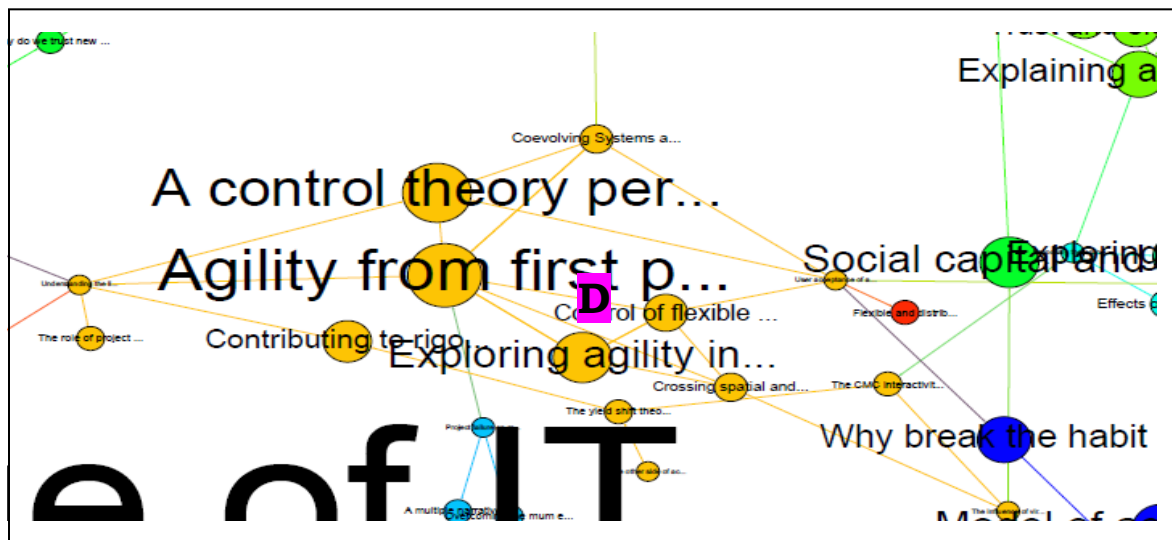
Figure 19-Cluster D: Agility in information systems development

Table 19-Cluster D: Agility in information systems development

Rank	Citation	Author	Year	Title	Source
1	11	Conboy, K.		Agility from first principles: Reconstructing the concept of agility in information systems development	*Information Systems Research, 20*(3), 329-354.
2	10	Marupin *et al*	2009	A control theory perspective on agile methodology use and changing user requirements	*Information Systems Research, 20*(3), 377-399
3	8	Sarker & Sarker	2009	Exploring agility in distributed information systems development teams: An interpretive study in an offshoring context	*Information Systems Research, 20*(3), 440-461
4	6	Grover *et al*	2008	Contributing to rigorous and forward thinking explanatory theory	*Journal of the association for information systems, 9*(2), 40-47
5	5	Harris *et al.*	2009	Control of flexible software development under uncertainty	*Information Systems Research, 20*(3), 400-419.*
6	3	Vidgen & Wang	2009	Coevolving systems and the organization of agile software development.	*Information Systems Research, 20*(3), 355-376

6.5.5 Topic E: IT Outsourcing

This subject concerns the role of IT outsourcing in business practices as well as the increased reliance of companies on IT outsourcing from both domestic and off shore firms. A part from sourcing for high technology and services from higher levels of expertise Mahnke, Wareham & Bjorn-Andersen (2008) add that

other reasons for IT sourcing include the lower labour costs. Drawing from Transaction Cost theory (Dibbern, Winkler & Heinzl 2008; Gopal & Sivaramakrishnan 2008) argue that gaining economic benefits from substantially lower labor costs has been one of the major reasons for IT outsourcing by profit driven firms, however Goo *et al.* (2009) argue that the success of IT outsourcing however still requires trust and commitment by the service providers and hence proposed the adoption of formal mechanisms such as implementation of Service Level Agreements (SLA) to improve the various aspects governing IT outsourcing with the view that SLA could provide a way to measure the service provider's performance as well as effective management of outsourcing engagements. In addition to that Heiskanen, Newman & Eklin (2008) also argues that before entering any outsourcing deal, it is essential to establishing a solid legal contract with the service provider to ensure success and prevent hazards that might arise. Figure 20 shows a snap shot of the cluster upon which this topic was determined and Table 20 presents the list of contributing papers to topic of IT outsourcing. The detailed list of the contributing papers to the topic of IT outsourcing in Cluster E is listed in appendix J

Figure 20-Cluster E: IT Outsourcing

Table 20-Cluster E: IT outsourcing

Rank	Citation	Author	Year	Title	Source
1	7	Dibbern *et al*	2008	Explaining variations in client extra costs between software projects offshored to India	*MIS quarterly, 32*(2), 333
2	6	Goo *et al*	2009	The role of service level agreements in relational management of information technology outsourcing: An empirical study	*MIS Quarterly, 33*(1), 119-145
3	6	Lacity *et al*	2009	A review of the IT outsourcing literature: Insights for practice	*The Journal of Strategic Information Systems, 18*(3), 130-146.
4	5	Chen, & Bharadwaj	2009	An empirical analysis of contract structures in IT outsourcing	*Information Systems Research, 20*(4), 484-506
5	4	Gopal, *et al*	2008	On Vendor Preferences for Contract Types in Offshore Software Projects: The Case of Fixed Price vs. Time and Materials Contracts	*Information Systems Research, 19*(2), 202-220

6.5.6 Topic F: The IS profile and organizational studies

This topic entails reflections on IS research as a community that accommodates great deal of journals that address a vast number of research disciplines such that individual/ groups journals have a custom to reflecting back on its previous research activities as a follow-up so as to shape its future developments. These reflections normally are conducted covering specific periods of time. The reflections among others include assessment of number of papers a journal has published, assessment of authors' contributions, assessment of research topics covered and methods of research among others, for instance Avison *et al.* (2008) reflection on the Information Systems Journal's

17 years of research as a self-assessment of the journal's current standing. In another instance a reflection of IS research in the European Journal of Information Systems covering the period 1997-2007 was conducted that covered research topics, methods, origin of papers published and authors contributions among others (Dwivedi & Kuljis, 2008). Furthermore Gable (2010) similarly carried a study reflecting back on the Strategic Information Systems research in the period 1991-2009 reflecting on its research trends so as to gauge the future direction of its research roadmap.

On the other hand, the topic also provides a review of the trends of theories that address various subject categories in the IS research. For instance Williams *et al.* (2009)'s reflections on theoretical trends in IS/technology acceptance studies in the period 1995-2007 which revealed that the technology acceptance model theory was the most predominant in technology acceptance studies. Williams *et al.* (2009) further commended that such reflections provide an arena for researchers to make new contributions to diversity the research subject in question. Furthermore in a study conducted by Weerakkody, Dwivedi & Irani (2009) in the period 1978-2008, report that various IS studies have applied institutional theory to address issues in various disciplines such as in business and management to shape the future of various institutions. Figure 21 is a snap short of the cluster F upon which the research topic was discovered and table 21 provides a list of papers contributing to the topic. The rest of the list is provided in appendix K
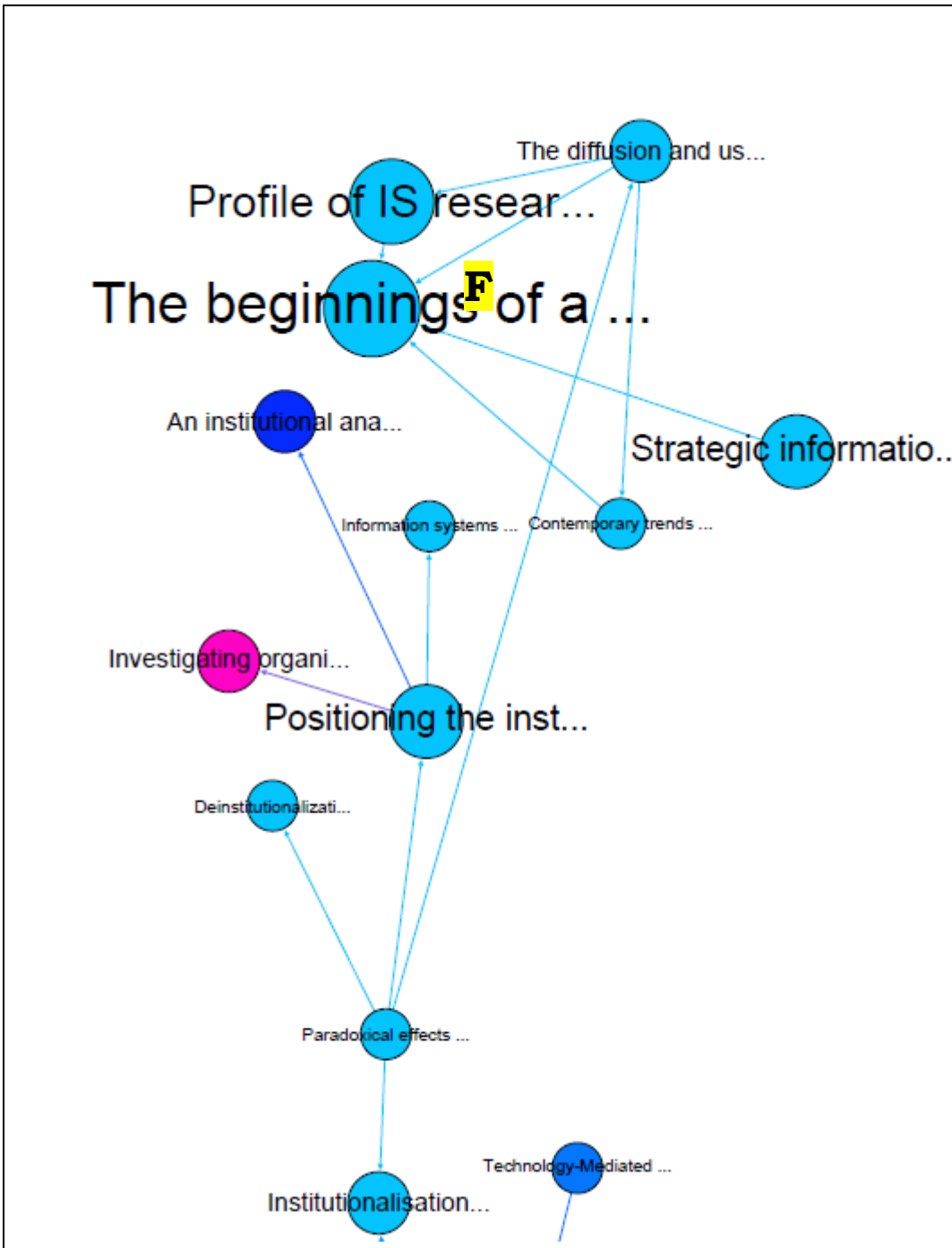
Figure 21-Cluster F: The IS profile and organizational studies

Table 21-Cluster F: The IS profile and organizational studies

Rank	Citation	Author	Year	Title	Source
1	5	Avison. *et al*	2008	The beginnings of a new era: time to reflect on 17 years of the ISJ	*Information Systems Journal, 18*(1), 5-21
2	4	Dwivedi & Kuljis,	2008	Profile of IS research published in the European Journal of Information Systems	*European Journal of Information Systems, 17*(6), 678-693
3	3	Gable, G	2010	Strategic information systems research: An archival analysis	*The Journal of Strategic Information Systems, 19*(1), 3-16
4	3	Mignerat & Rivard	2009	Positioning the institutional perspective in information systems research	*Journal of Information Technology, 24*(4), 369-391
5	2	Weerakkody *et al.*	2009	The diffusion and use of institutional theory: A cross-disciplinary longitudinal literature survey	*Journal of Information Technology, 24*(4), 354-368

6.5.7 Topic G: Ethics in IS

The topic of IS ethics claims that any critical research in IS is based on and inspired by ethics and morality. Stahl (2008) characterizes research as critical if it's based on critical intentions, tackles a critical topic and applies critical theories and methods to systematically asses the problem under study. Therefore the contributions of such kind of research according to Stahl are considered ethical in nature. For instance the study by Sidorova *et al.* (2008) on "uncovering the intellectual core of IS discipline" was explored by critically examining the common words used in IS abstracts. According to Sidorova et al. (2008) this was achieved by systematically applying well accepted information

retrieval and text mining procedures to compile and analyze the list all terms used in MIS abstracts. The outcome of this kind of research is assumed be ethical in nature. On the other hand Davison *et al.* (2009) calls for ethical integrity and accountability among IT professionals given the growing need of the world's population relying on IT applications for business transactions especially in facilitating for both transfer of money and information, therefore ethical behaviors among IT professionals is needed as more business applications are developed and the world's largest population's continues to rely on IT. Furthermore Chatterjee, Sarker & Fuller (2009) attributes IS failures to lack of ethical considerations during systems development hence calls for moral responsibility in ISD adding that ethical analysis be undertaken in conjunction with traditional ISD approaches in the software development. In addtion Mudgal & Vassileva (2008) calls for the need to examine the ethical values of the type of knowledge acquired by professionals while also Mingers & Walsham (2010) calls for increased emphasis on ethics in the IS field as a whole. Figure 22 shows a snap shot of the cluster contributing to the topic and table 22 gives a list of the papers contributing to the topic.
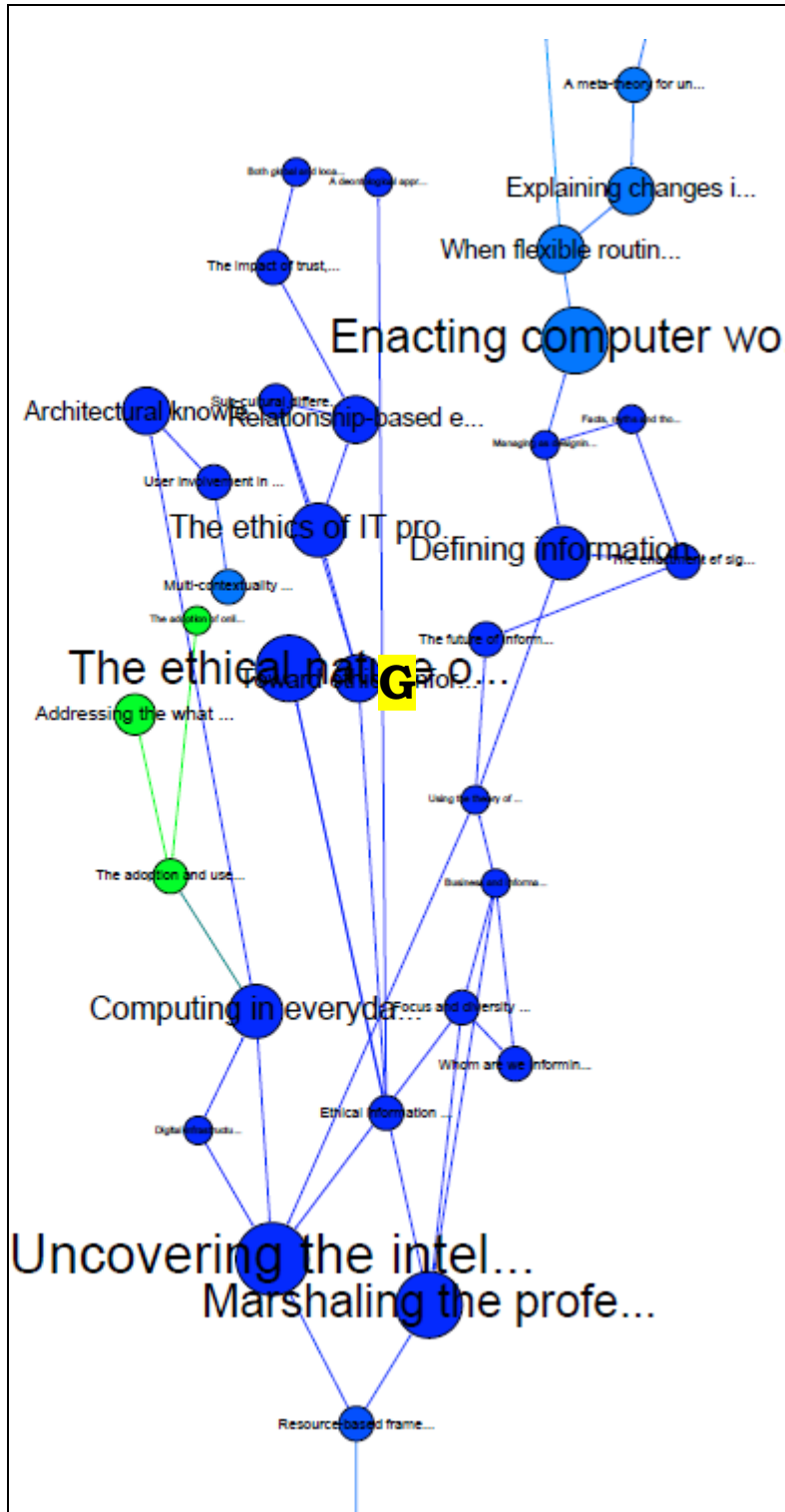
Figure 22: Cluster G: Ethics in IS

Table 22-Cluster G: Ethics in IS

Rank	Citation	Author	Year	Title	Source
1	8	Sidorova *et al.*	2008	Uncovering the intellectual core of the information systems discipline	*MIS Quarterly*, *32*(3), 467-482
2	7	Stahl, B.	2008	The ethical nature of critical research in information systems	*Information Systems Journal*, *18*(2), 137-163
2	7	Klein & Rowe	2008	Marshaling the professional experience of doctoral students: a contribution to the practical relevance debate	*MIS Quarterly*, *32*(4), 675-686.
3	5	Davison *et al*	2009	The Ethics of IT Professionals in Japan and China.	*Journal of the Association for Information Systems*, *10*(11), 834-859
4	4	Mingers & Walsham	2010	Toward Ethical Information Systems: The Contribution of Discourse Ethics	*MIS Quarterly*, *34*(4), 833-854
5	2	Chatterjee *et al.*	2009	Ethical Information Systems Development: A Baumanian Postmodernist Perspective	*Journal of the Association for Information Systems*, *10*(11), 787-815.

6.5.8 Topic H: Formative measurements

This topic discusses the use of formative measurements in the interpretation of research findings. For instance Cenfetelli & Bassellier (2009) provides guidelines for the use of formative measurements in structural equation modeling (SEM) techniques to produce accurate results when testing for example hypothetical or conceptual constructs. In addition Hardin, Chang & Fuller (2008) complement on the use of formative measurements in measuring computer self-efficacy constructs. In addition Deng *et al.* (2010) also demonstrated the application of formative measurements to test the effect TAM model on IT adoption. However, Hardin, Chang & Fuller (2008) warms IS researchers on the pitfalls of misapplying formative measurements on the issues related to computer self-efficacy. Figure 23 gives a snapshot of the cluster that forms this topic and table 23 gives a list literature contributing to the topic.
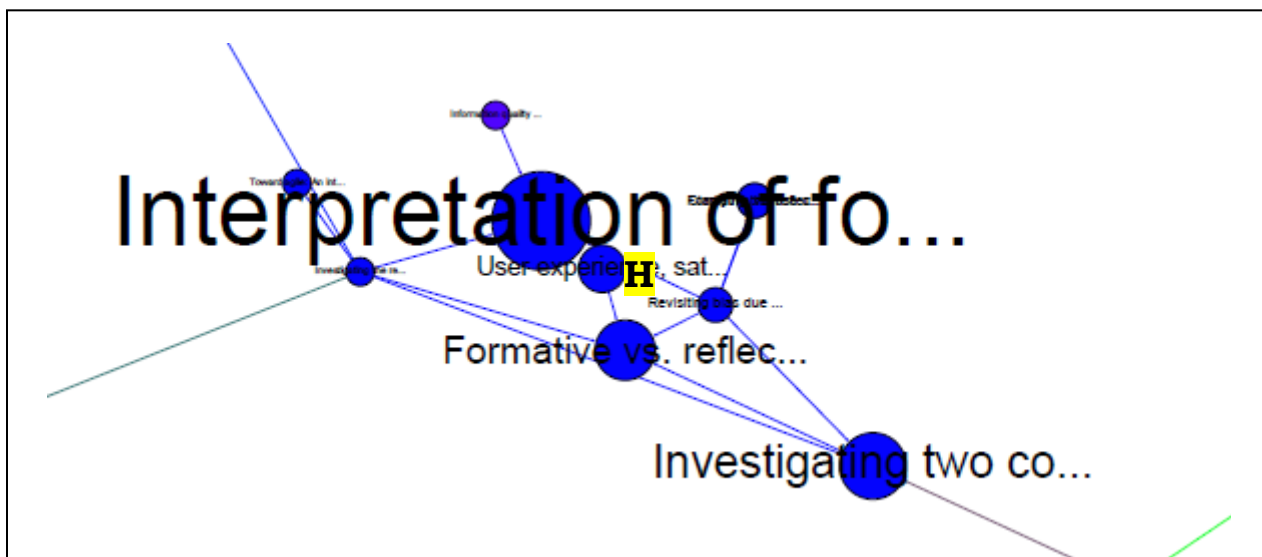
Figure 23-Topic: Formative measurements

Table 23-Cluster H: Formative measurements

Rank	Citation	Author	Year	Title	Source
1	12	Cenfetelli & Bassellier	2009	Interpretation of formative measurement in information systems research	*MIS Quarterly, 33*(4), 689-707

2	7	Kim *et al*	2010	Investigating two contradictory views of formative measurement in information systems research	*MIS Quarterly, 34*(2), 345-365
3	4	Deng *et al*	2010	User experience, satisfaction, and continual usage intention of IT	*European Journal of Information Systems, 19*(1), 60-75
4	2	Hardin *et al.*	2008	Formative vs . Reflective Measurement: Comment on Marakas, Johnson, and Clay (2007).	*Journal of the Association for Information Systems, 9*(9), 519-534
5	2	Hardin *et al*	2008	Clarifying the Use of Formative Measurement in the IS Discipline: The Case of Computer Self-Efficacy	*Journal of the Association for Information Systems, 9*(9), 544-546

7 Discussion of the findings

The goal of this research was to discover the fundamentals of IS research through citation analysis. After analyzing the citation data of 1,205 articles containing 80,906 references from the basket journal publications in the period 2008-2012, the findings from the analysis of the references revealed a system flow of research topics and a clear structure of the IS discipline . The results from the analysis is discussed and compared with the findings from prior research.

7.1 Discussion regarding the most influential papers from citation analysis

Upon applying the in-degree centrality, the findings revealed the most influential papers that were highly cited during the given period. Ranked from the highest with 148 total citations was the paper by Yin R.K. (1994) Case Study Research: Design and Methods, Sage Publications. This finding is also consistent with (Bernroider, Pilkington & Córdoba 2013; Galliers & Whitley 2007). The second and third most cited papers include Fornell & Larcker (1981) Evaluating structural equation models with unobservable variables and measurement error, Journal of Marketing Research,(39-50) and Podsakoff *et al.* (2003) Common Method Biases in Behavioural Research: A Critical Review of the Literature and Recommended Remedies- Journal of Applied Psychology,88(5), 879-903. The top 10 list is presented in table 7 in chapter 5

7.2 Discussion regarding IS topics from the analysis of the references

From the 6 clusters discovered in the reference network, the topics of IS research in the order of the network layout included

1. Technology acceptance
2. Business value of IT
3. Electronic markets for competitive advantage
4. IS theory building and organizational studies
5. IS research methods
6. Quantitative research

The list of the topic categorization was found consistent with the established categorized list of IS research topics according to (Palvia *et al.,* 2007).

Among the topics discussed technology acceptance studies covered a larger part of the network. These results were found consistent with (Shiau & Dwivedi 2013; Palvia *et al.*, 2007). Technology acceptance and adoption studies in IS research were described using conceptual models of which the TAM model of technology acceptance (Davis 1989; Davis *et al.* 1989; & Venkatesh *et al.* 2003) was the most cited in Technology acceptance studies. These results were also found consistent with Shiau & Dwivedi (2013). This was followed by the D &M model for IS success (DeLone & McLean, 2003) the two IS success models were the most dominant in technology acceptance and adoption studies, this findings were also found consistent with (Hsiao & Yang, 2011). The most contributing theories to technology acceptance as discovered from the analysis include innovation diffusion theory (Rogers, 1995), theory of planned behaviour

(Ajzen, 1991) and theory of reasoned action (Fishbein & Ajzen, 1975) also found consistent with the findings of Shiau & Dwivedi (2013).

Overall the findings of the list of research topics discovered from the analysis of the references was closely consistent with previous studies including the findings of (Shiau & Dwivedi, 2013; Bernroider, Pilkington & Córdoba, 2013; Palvia, Pinjani *et at.,* 2007).

7.3 The road map of IS research based on the reference analysis

Observing from the main network component in figure 6 we see a clear and progressing road map of IS research topics. For instance we observe a close relationship of research topics in cluster 1 (technology acceptance), cluster 3 (Business value of IT), cluster 4 (Electronic markets for competitive advantage). On the other hand we also observe a different area of research interest running in parallel as seen in cluster 5 (IS theory building and organizational studies and cluster 6 (Research methods).The two research areas (Clusters 1, 3, 4) and (cluster 5 and 6) could be summarized to have two distinctive roles; where by clusters 1, 3, and 4) is focused on scanning the environment for business opportunities with an IT focus while research in cluster (cluster 5-6) is focused on building IS theories and structuring of IS organizations.

7.4 Comparison of the findings from the references and the basket of 8 articles

The following section compared the findings from the basket of 8 journal citations and findings from the analysis of the references. The objective of this comparison was to find whether there was continuation of research topics in the two units. The finding provided answers to question 5 of this thesis: What are the differences in the trend of research topics within the basket papers compared to its predecessors? The following observations were noted:

7.5 Comparison for most cited journals

In the analysis of both the references and basket journal citations, the journal of MIS Quarterly and Information Systems Research led with higher distribution of citations across the two units of analysis thus both from the reference analysis in unit one and from the AIS basket journal citations.

7.6 Comparison for research topics

Table 24 shows a list topics discovered from the analysis of the two units as listed below

Main theories from the past used in the current IS research	Topics in the current IS research
1. Technology acceptance 2. Business value of IT 3. Electronic markets for competitive advantage 4. IS theory building and organizational studies 5. Research methods 6. Quantitative research	1. IT trust 2. IT business value 3. IS security 4. IT outsourcing 5. The IS profile and organization studies 6. Agility in ISD 7. Ethics in IS 8. Formative measurements

8 Conclusions

This thesis presented an analysis of the fundamentals of the IS research by means of citation and Social network analysis of the basket of 8 articles published within the period 2008-2012. We analysed the references on the basis of discovering the most influential IS papers, theoretical foundations of IS research and the research topics. We further analysed the basket of 8 articles themselves to discover topics in the current IS research. The results from cluster analysis of the references revealed 6 research topics which include Technology acceptance, business value of IT investments, Electronic markets for gaining competitive advantage, IS theory building and organizational structuring, research methods, quantitative research. From the analysis also reveal that the topic of Technology acceptance dominates IS research. In this regard the TAM model (Davis, 1989) is the dominant basis for determining Technology acceptance. The model asserts that technology acceptance is determined by perceived usefulness of the technology, perceived ease of use of the technology and intention of use of technology by the prospective user. The TAM model was developed in combination with other contributing theories including diffusion of innovation theory (Rogers, 1995), theory of planned behaviour (Ajzen, 1991) and theory of reasoned action (Fishbein & Ajzen, 1975). Other technology acceptance studies such as the D&M IS success model (DeLone & McLean, 2003) contributed to the topic. The topic of research

methods reviewed articles more from case studies by Yin, (1994, 2003. The rest of the topics including business value of IT investments and E-markets strategies have preceded after technology acceptance. On the other hand the topics of IS theory building and organizational structuring in cluster 5 were running parallel to the first 3 topics mentioned in cluster 1, 2 & 3. These results have been found consistent with a recent study on the identification of the core and emerging knowledge of E-commerce in the IS discipline (Shiau & Dwivedi, 2013) and also the recent findings of Bernroider, Pilkington& Córdoba (2013).

Finally the analysis of the references also revealed the top 3 most cited and influential IS literature from the highly ranked include Yin (1994), Fornell & Larcker (1981) and Podsakoff *et al.* (2003).

In Unit 2 of this thesis we conducted a citation analysis for only the 1,205 published articles that have cited each other within the period 2008-2012 to discover the research topics in the current IS research. The analysis revealed some new topics in the current IS research such as IT outsourcing in cluster E among others. However the results also reveal more focus on IT trust in respect to E-commerce engagements. With the consistency of the findings of this analysis and also in comparison with findings from related work, one can clearly predict therefore the road map of IS future research developments. However the recommendations suggested for future work in this study would improve the development of IS research as a discipline.

8.1 Limitations of the study

The study focused only on the top 8 quality journals as basis for analysing the IS research discipline as a whole; however these results could have a bias as they do not fully address all the diverse aspects of IS research in its various disciplines. In addition the selected time period of 5 years does not give a complete background of IS research trends upon which to base a good prediction for a future research roadmap.

One of the limitations faced during the network analysis was the uncertainty in determining what in-degree range to consider while laying out the citation networks as there is was no documented guiding principle for choosing the right in-degree range therefore vital insights could have been left out.

Other limitations encountered in this study include the inadequacy of computer memory to handle large citation data for further analysis in social network analysis platforms. The limitation of computer memory and slow computer

systems was a barrier for deeper manipulation and analysis of the entire network. Computer memory limitation has been a prevailing bottle neck for many citation based studies in IS, also encountered in previous studies by Polites & Watson (2009). Another limitation encountered in the study was the citation data contained lots of inconsistencies which took a great deal of time to edit the data for the final analysis. Many errors such papers with missing source titles were very common especially from book references, elimination of multiple versions in a same reference also consumed a lot of time otherwise required in other phases of the research. This study required more time for deeper analysis which was also one of the limitations faced in this study. On the hand as observed, high citation counts is based on the assumption that only relevant literature is cited, however there is not proven scientific measure to account for why paper is cited highly therefore we remain to base reasoning on the assumptions. In addition to this most of the highly cited literature is very old yet it continues to receive higher citations moreover some of the authors of these literature could be deceased and cannot be reached to seek for further investigations from the source, this problem has been longed lamented by many IS researches such as (Chappin & Ligtvoet, 2012; Katerattanakul, Han & Rea, 2006; Vessey, Ramesh & Glass, 2002). Therefore there is need for creation of new knowledge in IS research to address various context of the problems in the field. It is upon these limitations that the following recommendations are put forward for future improvements in IS research

8.2 Recommendations for future research

As one of the fastest growing disciplines (Willcocks, Whitley & Avgerou, 2008) my recommendation based on the outcome of the citation analysis results is that IS as a discipline needs to get more involved in creating new knowledge as its evidenced from the citation results that most highly ranked citations are from old literature some of which are more than 2 decades old yet It is not known whether these papers continue to effectively fit in needs of the changing business environment. This if not taken into consideration could lead research in the IS discipline to keep re-inventing the same wheel over and over again hampering further growth and innovation.

Lastly future studies could conduct citation and network analysis for a larger basket of IS journals and not only the top quality journals. IS being a growing multi-disciplinary field could benefit more from analysing a larger basket of journals across various disciplines of research specializations by integrating the small scale journals into larger ones and analysing the knowledge flow gap existing between the two classes of best performing and least forming journals.

This in a way will encourage the young and upcoming journals to grow alongside the prosperous journals. In addition these practices will also reduce the usual tendency by journals citing within their niche- a kind of group think which Granovetter (1973) termed as "the dark side of social networks".

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10 List of Appendix

10.1 Appendix A: Data collection process in chapter 4.0

The steps in table 2 outlining how the data was collected are described as follows:
Because Scopus is such a large database storing more than 19,000 journals (http://info.scopus.com/) these steps were used to identify the basket journals and their citation data.

1. Open Scopus home page: www. Scopus.com

2. Input key search term on the document search window in combination with the AND function to increase the search options so as to allow the database give enough alternatives.

3. Select the time range in years from the dropdown list to narrow the search to only specified time window

4. Select the document type, In this case only articles were selected.

5. select source type, In this case only journals were selected

6. Select source title, in this case only the 8 journals were selected from the large list of journals.

7. This customisation process allowed only the 8 selected journals to be displayed.

8. Further filtering was done to exclude non article documents from the source data which include Notes, editorials, Erratum, Reviews and conference papers.

9. After all the filtering, each journal together with its reference data was downloaded per year and saved into a temporary list within Scopus

10. After all the 8 journals together with their references were saved to the temporary list, the data was exported into excel database. A total number of 1,206 source articles and 81,461 references were exported as raw data.

10.2 Appendix B: List of top 70 cited references by the AIS basket of 8 journals

Rank	Citations	Author	Year	Title	Source title
1	148	Yin R.K.	1994	Case Study Research: Design and Methods	Sage Publications
2	147	Fornell & Larcker	1981	Evaluating structural equation models with unobservable variables and measurement error	Journal of Marketing Research,(39-50)
3	129	Podsakoff *et al*	2003	Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies	Journal of Applied Psychology,88(5), 879-903.
4	123	Davis F.D.	1989	Perceived usefulness, perceived ease of use, and user acceptance of information technology	MIS Quarterly,13(3), 319-340
5	108	Venkatesh *et al*	2003	User acceptance of information technology: Toward a unified view	MIS Quarterly: 27(3), 425-478
6	105	Hair *et al*	1995	Multivariate Data Analysis	*Prentice Hall, Englewood Cliffs, NJ*, 178-256
7	103	Nunnally J.C.	1978	Psychometric Theory	McGraw Hill
8	102	Eisenhardt K.M.	1989	Building theories from case study research	*Academy of Management Review, 14*(4), 532-550.

9	99	Chin. WW	1998	The partial least squares approach to structural equation modelling	Lawrence Erlbaum Associates Publishers, pp. 295-336
10	89	Miles & Huberman	1994	Qualitative Data Analysis	Sage Publications, Thousand Oaks, CA
11	84	Rogers E.M.	1995	Diffusion of Innovations	Free Press, Vol. 65, p. 519.
12	81	Klein & Myers	1999	A set of principles for conducting and evaluating interpretive field studies in information systems	*MIS Quarterly*, *23*(1), 67-94.
13	78	Davis *et al*	1989	User Acceptance of Computer Technology: A Comparison of Two Theoretical Models	*Management Science, 35*(8), 982-1003
14	76	Hevner *et al*	2004	Design science in information systems research	*MIS Quarterly, 28*(1), 75-105
15	74	DeLone & McLean	1992	Information systems success: The quest for the dependent variable	*Information Systems Research, 3*(1), 60-95.
16	74	Petter *et al*	2007	Specifying formative constructs in information systems research	*MIS Quarterly, 31*(4), 623-656
17	73	Chin *et al*	2003	A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study	*Information Systems Research, 14*(2), 189-217

18	71	Orlikowski & Iacono	2001	Research Commentary: Desperately Seeking the "IT" in IT Research - A Call to Theorizing the IT Artifact	*Information Systems Research, 12*(2), 121-134
19	69	Baron & Kenny	1986	The Moderator-Mediator Variable Distinction in Social Psychological Research. Conceptual, Strategic, and Statistical Considerations	*Journal of Personality and Social Psychology, 51*(6), 1173-1182
20	67	Moore & Benbasat	1991	Development of an instrument to measure the perceptions of adopting an information technology innovation	*Information Systems Research, 2*(3), 192-222
21	66	Venkatesh & Davis	2000	Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies	*Management Science, 46*(2), 186-204
22	66	Gefen *et al*	2000	Structural equation modeling and regression: Guidelines for research practice	*Communications of the Association for Information Systems, 4*(7), 1-78
23	62	DeLone & McLean	2003	The DeLone and McLean model of information systems success: A ten-year update	*Journal of Management Information Systems, 19*(4), 9-30.
24	62	DeSanctis & Poole	1994	Capturing the complexity in advanced technology use: Adaptive structuration theory	*Organization Science, 5*(2), 121-147
25	62	Bharadwaj A.S.	2000	A resource-based perspective on information technology capability and firm	*MIS Quarterly, 24*(1), 169-196

				performance: An empirical investigation	
26	62	Barney J.	1991	Firm resources and sustained competitive advantage	*of Management, 17*(1), 99-120. Sage Publications
27	61	Gefen *et al*	2003	Trust and tam in online shopping: AN integrated model	*MIS Quarterly, 27*(1), 51-90
28	60	Cohen J.	1988	Statistical Power Analysis for the Behavioral Sciences	Lawrence Erlbaum Associates(Vol. 2, p. 567).
29	55	McKnight *et al*	2002	Developing and validating trust measures for e-commerce: An integrative typology	*Information Systems Research, 13*(3), 334-359
30	55	Melville *et al*	2004	Review: Information technology and organizational performance: An integrative model of it business value	*MIS Quarterly, 28*(2), 283-322
31	55	Jarvis *et al*	2003	A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research	*Journal of Consumer Research, 30*(2), 199-218.
32	54	Sambamurthy *et al*	2003	Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms	*MIS Quarterly, 27*(2), 237-263
33	54	Fishbein & Ajzen	1975	Belief, Attitude, Intention and Behavior: An Introduction to Theory	*Philosophy Rhetoric* (Vol. 10, p. 578)

				and Research	
34	54	Benbasat *et al*	1987	The case research strategy in studies of information systems	*MIS Quarterly, 11*(3), 369-386
35	53	Ajzen I.	1991	The theory of planned behavior	*Organizational Behavior and Human Decision Processes, 50*(2), 179-211
36	51	Orlikowski & Baroudi	1991	Studying information technology in organizations: Research approaches and assumptions	*Information Systems Research, 2*(1), 1-28
37	51	Glaser & Strauss	1967	The Discovery of Grounded Theory: Strategies for Qualitative Research	*Observations* (Vol. 1, p. 271). Aldine
38	50	Taylor &Todd	1995	Understanding information technology usage: A test of competing models	*Information Systems Research, 6*(2), 144-176
39	50	Wade & Hulland	2004	Review: The resource-based view and information systems research: Review, extension, and suggestions for future research	*MIS Quarterly, 28*(1), 107-142
40	50	Gregor S.	2006	The nature of theory in Information Systems	*MIS Quarterly, 30*(3), 611-642
41	49	Armstrong &, Overton	1977	Estimating nonresponse bias in mail surveys	*Journal of marketing research, 14*, 396-402

42	48	Alavi &Leidner	2001	Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues	*MIS Quarterly, 25*(1), 107-136.
43	47	Greene W.H.	1997	Econometric Analysis	3rd ed. Prentice-Hall, Englewood Cliffs, NJ
44	47	Benbasat & Zmud	2003	The identity crisis within the IS discipline: Defining and communicating the discipline's core properties	*MIS Quarterly, 27*(2), 183-194.
45	46	Liang *et al*	2007	Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management	*MIS Quarterly, 31*(1), 59-87.
46	46	Mayer *et al*	1995	An integrative model of organizational trust	*Academy of Management Review, 20*(3), 709-734. JSTOR
47	46	Diamantopoulos & Winklhofer	2001	Index construction with formative indicators: An alternative to scale development	*Journal of Marketing Research, 38*(2), 269-277.
48	46	Walsham G.	1995	Interpretive case studies in IS research: Nature and method	*European Journal of Information Systems, 4*(2), 74-81
49	45	Orlikowski W.J.	1992	The Duality of Technology: Rethinking the Concept of Technology in Organizations	*Organization science, 3*(3), 398-427
50	45	Cohen &Levinthal	1990	Absorptive Capacity: A New Perspective on	*Administrative Science*

				Learning and Innovation	*Quarterly, 35*(1), 128-152
51	45	Ajzen & Fishbein	1980	Understanding Attitudes and Predicting Social Behavior	*EnglewoodCliffs NY Prentice Hall* (Vol. 278, p. 278).
52	45	Mata *et al*	1995	Information technology and sustained competitive advantage: A resource-based analysis	*MIS Quarterly, 19*(4), 487-505
53	45	Chin W.W.	1998	Issues and opinion on structural equation modeling	*MIS Quarterly, 22*(1), vii-xvi
54	44	Podsakoff & Organ	1986	Self-reports in organizational research: Problems and prospects	*Journal of Management, 12*(4), 531-544
55	44	Pavlou & Gefen	2004	Building effective online marketplaces with institution-based trust	*Information Systems Research, 15*(1), 37-59.
56	43	Malone Thomaset al	1987	ELECTRONIC MARKETS AND ELECTRONIC HIERARCHIES.	*Communications of the ACM, 30*(6), 484-497
57	43	DiMaggio & Powell	1991	The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields	*American Sociological Review, 48*(2), 147-160
58	43	Lee & Baskerville	2003	Generalizing Generalizability in Information Systems Research	*Information Systems Research, 14*(3), 221-243.
59	42	Anderson & Gerbing	1988	Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach	*Psychological Bulletin, 103*(3), 411-423

60	42	Teece *et al*	1997	Dynamic capabilities and strategic management	*Strategic Management Journal, 18*(7), 509-533.
61	41	Markus & Lynne	1983	POWER, POLITICS, AND MIS IMPLEMENTATION.	*Communications of the ACM, 26*(6), 430-444. ACM
62	41	Orlikowski W.J.	2000	Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations	*Organization Science, 11*(4), 404-428.
63	41	Agarwal & Karahanna	2000	Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage	*MIS Quarterly, 24*(4), 665-694
64	40	Bhattacherjee A.	2001	Understanding information systems continuance: An expectation-confirmation model	*MIS Quarterly, 25*(3), 351-370.
65	40	Gefen & Straub	2005	A practical guide to factorial validity using PLS-graph: Tutorial and annotated example	*Communications of the Association for Information Systems, 16*(1), 91-109.
66	39	Goodhue & Thompson	1995	Task-technology fit and individual performance	*MIS Quarterly, 19*(2), 213
67	38	Venkatesh V.	2000	Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model	*Information Systems Research, 11*(4), 342-365

68	38	Malhotra *et al*	2006	Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research	*Management Science, 52*(12), 1865-1883
69	38	Karahanna *et al*	1999	Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs	*MIS Quarterly, 23*(2), 183-213.
70	37	Orlikowski W.J.	1993	CASE tools as organizational change: Investigating incremental and radical changes in systems development	*MIS Quarterly, 17*(3), 309-340.

10.3 Appendix C: Table 8-Cluster 1: Technology Acceptance

Rank	Citations	author	Year	Paper	Source title
1	123	Davis, F. D	1989	Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.	*MIS Quarterly, 13*(3), 319-340
2	108	Venkatesh, *et al*	2003	User acceptance of information technology: Toward a unified view.	*MIS Quarterly, 27*(3), 425-478.
3	84	Rogers, E.	1995	*Diffusion of innovations.*	Free Press, Vol. 65, p. 519.

4	78	Davis *et al*	1989	User Acceptance of Computer Technology: A Comparison of Two Theoretical Models	Management Science, 35(8), 982-1003
5	73	Chin *et al*	2003	A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study	Information systems research, 14(2), 189-217.
6	66	Venkatesh, *et al*	2000	A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies.	*Management Science, 46*(2), 186-204.
7	67	Moore, & Benbasat,	1991	Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation.	*Information Systems Research, 2*(3), 192-222.
8	62	DeLone, & McLean,	2003	The DeLone and McLean Model of Information Systems Success: A Ten-Year Update.	*Journal of Management Information Systems, 19*(4), 9-30
9	54	Fishbein & Ajzen	1975	Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research	*Philosophy Rhetoric (Vol. 10, p. 578)*
10	53	Ajzen, I.	1991	The theory of planned behavior	*Organizational Behavior and Human Decision Processes, 50*(2), 179-211

11	50	Taylor, S., & Todd, P.	1995	Understanding information technology usage: A test of competing models	Information systems research, 6(2), 144-176
12	41	Agarwal, & Karahanna, E. (2000).	2002	Time flies when you're having fun: cognitive absorption and beliefs about information technology usage	MIS quarterly, 24(4), 665-694
13	38	Karahanna, et al	1999	Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs	MIS quarterly, 183-213
14	25	Dennis et al	2001	Understanding fit and appropriation effects in group support systems via meta-analysis	MIS Quarterly, 167-193.
15	24	Benbasat, I., & Barki, H.	2007	Quo vadis, TAM.	Journal of the Association for Information Systems, 8(4), 211-218.

10.4 Appendix D Table 9-Cluster 3: IT business value

Rank	Citations	Author	Year	Title	Source
1	55	Melville *et al*	2004	Review: Information technology and organizational performance: An integrative model of IT business value	*MIS quarterly*, *28*(2), 283-322
2	50	Wade & Hulland	2004	Review: The resource-based view and information systems research: Review, extension, and suggestions for future research	*MIS quarterly*, *28*(1), 107-142.

3	36	Devaraj & Kohli,	2003	Performance impacts of information technology: is actual usage the missing link?.	*Management science, 49*(3), 273-289
4	36	Carr, N.	2003	IT doesn't matter	*Educause Review, 38,* 24-38
5	28	Rai, *et al*	2006	Firm performance impacts of digitally enabled supply chain integration capabilities	*MIS Quarterly, 30*(2), 225-246.
6	26	Kohli, & Devaraj,	2003	Measuring information technology payoff: A meta-analysis of structural variables in firm-level empirical research.	*Information systems research, 14*(2), 127-145
7	26	Hitt, L. M., & Brynjolfsson,	1996	Productivity, business profitability, and consumer surplus: three different measures of information technology value	*MIS quarterly,* 121-142
8	21	Brynjolfsson, E., & Hitt, L.	2000	Beyond computation: Information technology, organizational transformation and business performance	*The Journal of Economic Perspectives, 14*(4), 23-48.
9	20	Santhanam, R., & Hartono	2003	Issues in linking information technology capability to firm performance	*MIS quarterly,* 125-153
10	20	Bhatt, *et al*	2005	Types of information technology capabilities and their role in competitive advantage: an empirical study	*Journal of Management Information Systems, 22*(2), 253-277

10.5 Appendix E Table 10- Cluster 4: Electronic markets for competitive advantage

Ra nk	Citatio ns	Author	Year	Title	Source
1	54	Samba murt *et al*	2003	Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms	*MIS quarterly*, 237-263.
2	43	Malone, *et al*	1987	Electronic markets and electronic hierarchies	*Communic ations of the ACM, 30*(6), 484-497
3	42	Teece *et al*	1997	Dynamic capabilities and strategic management	*Strategic Manageme nt Journal, 18*(7), 509-533.
4	30	Clemon s, *et al*	1993	The Impact of Information Technology on the Organization of Economic Activity: The" Move to the Middle55 Hypothesis	*Journal of manageme nt information systems, 10*(2), 9-35.
5	23	Katz, & Shapiro,	1985	Network externalities, competition, and compatibility	*The American economic review, 75*(3), 424-440.
6	21	Sabher wa *et al*	2001	Alignment between business and IS strategies: a study of prospectors, analyzers, and defenders	*Information systems research, 12*(1), 11-33

10.6 Appendix F: Table 11- Cluster 5: IS theory building and organizational studies

Rank	Citation	Author	Year	Title	Source
1	102	Eisenhardt	1989	Building Theories from Case Study Research	*Academy of Management Review, 14*(4), 532-550
2	81	Klein,& Myers,	1999	A set of principles for conducting and evaluating interpretive field studies in information systems	*MIS quarterly*, 67-93
3	62	DeSanctis, & Poole,	1994	Capturing the complexity in advanced technology use: Adaptive structuration theory	*Organization science, 5*(2), 121-147
4	45	Orliko-wski	1992	The Duality of Technology: Rethinking the Concept of Technology in Organizations	*Organization science, 3*(3), 398-427
5	43	DiMaggio Powell	1991	The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields	*The New Institutionalism in Organizational Analysis* (Vol. 17, pp. 63-82).
6	41	Markus & Lynne	1983	POWER, POLITICS, AND MIS IMPLEMENTATION	*Communications of the ACM, 26*(6), 430-444. ACM
7	36	Corbin, J., & Strauss,	1990	Basics of qualitative research: Grounded theory procedures and techniques	*41*
8	35	Orlikowski, W. J.	1996	Improvising organizational transformation over time: A situated change perspective	*Information systems research, 7*(1), 63-92.
9	31	Pettigrew, A. M.	1990	Longitudinal field research on change: theory and practice.	*Organization science, 1*(3), 267-292

Rank	Citations	author	Year	Paper	Source Title
10	21	Ouchi, W. G. (1979).	1979	A conceptual framework for the design of organizational control mechanisms.	*Management science, 25*(9), 833-848

10.7 Appendix G- Table 13-Cluster 2: Quantitation methods

Rank	Citations	author	Year	Paper	Source Title
1	147	Fornell & Larcker	1981	Evaluating structural equation models with unobservable variables and measurement error	Journal of Marketing Research,(39-50)
2	129	Podsakoff *et al*	2003	Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies	Journal of Applied Psychology,88(5), 879-903
3	105	Hair *et al*	1995	Multivariate Data Analysis	Prentice Hall, Englewood Cliffs, NJ, 178-256
4	103	Nunnally, J.C	1978	Psychometric theory	*NY: McGraw-Hill.*
5	99	Chin W.W.	1998	The partial least squares approach to structural equation modeling	Lawrence Erlbaum Associates Publishers, pp. 295-336
6	74	DeLone, & McLean,	1992	Information systems success: the quest for the dependent variable.	*Information systems research, 3*(1), 60-95.
7	74	Petter, Straub, & Rai,	2007	Specifying formative constructs in information systems research	*Mis Quarterly, 31*(4), 623-656.
8	73	Chin *et al*	2003	A partial least squares latent variable modeling approach for measuring interaction effects:	*Information systems research, 14*(2), 189-217.

				Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study	
9	69	Baron, & Kenny	1986	The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations	*Journal of personality and social psychology, 51*(6), 1173
10	66	Gefen, Straub, & Boudreau,	2000	Structural equation modeling and regression: Guidelines for research practice	*Communications of the Association for Information Systems.*

10.8 Appendix H- Table 16-Cluster A: IT Trust

Rank	Citation	Author	Year	Title	Source
1	13	Vance, *et al*	2008	Examining trust in information technology artifacts: The effects of system quality and culture	*Journal of Management Information Systems, 24*(4), 73-100
2	11	. Cyr, D.	2008	Modeling web site design across cultures: Relationships to trust, satisfaction, and E-Loyalty	*Journal of Management Information Systems, 24*(4), 47-72.
3	10	Hsieh *et al.*	2008	Understanding digital inequality: Comparing continued use behavioral models of the socio-economically advantaged and disadvantaged	*MIS quarterly, 32*(1), 97-126
4	9	Gefen, *et al*	2008	A research agenda for trust in online environments	*Journal of Management Information Systems,*

					24(4), 275-286.
5	7	Lowry, et al	2008	Explaining and predicting the impact of branding alliances and web site quality on initial consumer trust of E-commerce web sites	*Journal of Management Information Systems, 24*(4), 199-224.
6	7	Wang & Benbasat,	2008	Attributions of trust in decision support technologies: A study of recommendation agents for e-commerce	*Journal of Management Information Systems, 24*(4), 249-273
7	7	Abbasi & Chen	2008	CyberGate: a design framework and system for text analysis of computer-mediated communication	*MIS Quarterly, 32*(4), 811-837.
8	6	Cyr *et al.*	2009	Exploring human images in website design: a multi-method approach	*MIS Quarterly, 33*(3), 539
9	6	Teo*, et al*	2008	Trust and electronic government success: An empirical study	*Journal of Management Information Systems, 25*(3), 99-132
10	5	Kim *et al.*	2009	Trust and satisfaction, two stepping stones for successful e-commerce relationships: A longitudinal exploration	*Information Systems Research, 20*(2), 237-257.
11	4	Wang & Benbasat	2009	Interactive decision aids for consumer decision making in e-commerce: The influence of perceived strategy restrictiveness	*MIS Quarterly, 33*(2), 293
12	4	Kamis *et al.*	2008	Using an attribute-based decision support system for user-customized products online: an experimental investigation	*MIS Quarterly, 32*(1), 159-177
13	1	Deng & Poole,	2010	Affect in web interfaces: A study of the impacts of web page visual complexity	*MIS Quarterly, 34(4), 711-*

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10.9 Appendix J Table 20-Cluster E: IT outsourcing

Rank	Citation	Author	Year	Title	Source
1	7	Dibbern *et al*	2008	Explaining variations in client extra costs between software projects offshored to India	*MIS quarterly, 32*(2), 333
2	6	Goo *et al*	2009	The role of service level agreements in relational management of information technology outsourcing: An empirical study	*MIS Quarterly, 33*(1), 119-145
3	6	Lacity *et al*	2009	A review of the IT outsourcing literature: Insights for practice	*The Journal of Strategic Information Systems, 18*(3), 130-146.
4	5	Chen, & Bharadwaj	2009	An empirical analysis of contract structures in IT outsourcing	*Information Systems Research, 20*(4), 484-506
5	4	Gopal, *et al*	2008	On Vendor Preferences for Contract Types in Offshore Software Projects: The Case of Fixed Price vs. Time and Materials Contracts	*Information Systems Research, 19*(2), 202-220
6	4	Leonardi, & Bailey	2008	Transformational technologies and the creation of new work practices: Making implicit knowledge explicit in task-based offshoring	*MIS Quarterly, 32*(2), 411
7	4	Gefen, & Carmel	2008	Is the world really flat? A look at offshoring in an online programming marketplace	*MIS quarterly, 32*(2), 367
8	3	Jarvenpaa, &	2008	Operational capabilities development	*Journal of Information*

		Mao		in mediated offshore software services models	*Technology, 23*(1), 3-17
9	3	Heiskane,*et at*	2008	Control, trust, power, and the dynamics of information system outsourcing relationships: a process study of contractual software development.	*The Journal of Strategic Information Systems, 17*(4), 268-286
10	1	Mahnke *et al*	2008	Offshore middlemen: transnational intermediation in technology sourcing	*Journal of Information Technology, 23*(1), 18-30.

10.10   Appendix K Table 21-Cluster F: IS profile and organizational studies

Rank	Citation	Author	Year	Title	Source
1	5	Avison. *et al*	2008	The beginnings of a new era: time to reflect on 17 years of the ISJ	*Information Systems Journal, 18*(1), 5-21
2	4	Dwivedi & Kuljis,	2008	Profile of IS research published in the European Journal of Information Systems	*European Journal of Information Systems, 17*(6), 678-693
3	3	Gable, G	2010	Strategic information systems research: An archival analysis	*The Journal of Strategic Information Systems, 19*(1), 3-16
4	3	Mignerat & Rivard	2009	Positioning the institutional perspective in information systems research	*Journal of Information Technology, 24*(4),

						369-391
5	2	Weerak kody *et al.*	2009	The diffusion and use of institutional theory: A cross-disciplinary longitudinal literature survey		*Journal of Information Technology, 24*(4), 354-368
6	2	Baptist a, J	2009	Institutionalisation as a process of interplay between technology and its organisational context of use		*Journal of Information technology, 24*(4), 305-319.
7	2	Mekonn en & Sahay	2008	An institutional analysis on the dynamics of the interaction between standardizing and scaling processes: a case study from Ethiopia		*European Journal of Information Systems, 17*(3), 279-289
8	2	Phang. *et al*	2008	Investigating organizational learning in eGovernment projects: A multi-theoretic approach		*The Journal of Strategic Information Systems, 17*(2), 99-123
9	1	Newell & Currie	2010	Paradoxical effects of institutionalisation on the strategic awareness of technology in organisations		*The Journal of Strategic Information Systems, 19*(3), 171-183
10	1	William s *et al*	2009	Contemporary trends and issues in IT adoption and diffusion research		*Journal of Information Technology, 24*(1), 1-10.