Theoretical Backbone of Library and Information Science: A Quest

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Abstract

This study primarily aims to identify unique theories and specific uses of theories in the library and information science (LIS) domain. It provides a comprehensive list of the theories used in LIS journal articles indexed by Scopus (an abstract and citation database) from 1970–2021. It expands on the most common theories and highlights the areas and purposes for which used theories in the LIS domain. Our goal is to demonstrate the usages and applications of various borrowed theories from complementary disciplines in the LIS domain. A systematical methodology is applied, following a few open-source AI-based software packages (such as ASReview, and OpenRefine), to analyse the theories against different parameters, keeping in mind the drawbacks of the previous studies. The study's findings show that the LIS domain's theoretical foundations are understudied. Researchers mainly borrowed theories from social sciences such as sociology, psychology, and management studies to solidify their domain. The paper provides a clear road map for the theoretical development of LIS research. And the resulting outputs may help policymakers, academicians, and researchers, irrespective of disciplines in general and information science in particular, understand the foundations and theoretical and methodological trends of theories that

may lead to a better understanding of the theories before their selection and applications.

Keywords: LIS theory; theory building; middle-range theory; grounded theory; learning theory; information studies; OpenRefine

1. Introduction

The presence of theory is an indication of research eminence and respectability (Van Maanen, 1998), as well as a feature of the discipline's maturity (Brookes, 1980; Hauser, 1988). The development of theory is the central goal; the '*jewel in the crown*' of research (Eisenhardt, 1989). Theory plays a vital role in research (Ngulube, 2020; Thomas, 1997). A good theory continually advances knowledge, directs researchers to essential questions, and provides knowledge and understanding about a research topic and the discipline (Sonnenwald, 2016; van de Ven, 1989). Moreover, in any research, the effective and practical application of theory has always been critical to developing new knowledge or interpretations of existing knowledge. Research without the use of theories is poor and lacks a sound foundation and limited usefulness to the particular domain (Sarter, 2006). Theories are essential in research, and the importance of theories in research cannot be denied (Doherty, 2012; Gregor, 2006; Hall, 2003; Hider & Pymm, 2008; Jeong & Kim, 2005; Lee et al., 2004; Neuman, 2000; Ngulube, 2018; Van de Ven, 1989).

Research in LIS during the 1980s and 1990s produced several foundational theories in this domain. (Chatman, 1999; Cole, 2011; Dervin, 1998; Kuhlthau, 1991). For example, Dervin's (1983) sense-making theory, Mellon's (1986) library anxiety theory, Ellis's (1987) model of information-seeking behaviour (ISB), Bates' (1989) berry-picking theory, Kuhlthau's (1991) information search process (ISP), Chatman's (1996) theory of information poverty, and others. As a result, the use and application of theory in LIS research increased during the 1990s and early 2000s (Kim & Jeong, 2006; McKechnie et al., 2001; Pettigrew & McKechnie, 2001). In the LIS domain, theories are used to guide the analysis, explanation, and prediction of phenomena and to provide design and action guidelines (Gregor, 2006). It tells us why they are correlated (Sutton & Staw, 1995). It is necessary, in research writing, to explain relationships among concepts. Hence, it is an essential and crucial

task for LIS professionals to form a clear picture of the application and use of the theories in LIS research.

Nevertheless, there is a lack of theoretical research in LIS (Kim & Jeong, 2006), and there is little discussion in different platforms and forums of what theory means in LIS. Indeed, the need to develop, teach, and apply theory in LIS research remains acute (Buckland, 2003; Hjørland, 2000; Thompson, 2009). Although a few LIS researchers and practitioners have created many useful conceptual frameworks, models, and theories (Fisher et al., 2005), they are restricted in their use in LIS. For example, Hartel (2009) and Bates (2006) reported on the development of meta-theories in this domain of LIS. In a more in-depth analysis of theory use in LIS, Kumasi et al. (2013) qualitatively analysed the extent to which theory is meaningfully used in the scholarly literature by developing a theory talk coding scheme, that included six analytical categories, describing how theory is discussed in a study. The intensity of theory talk in the articles was described across a continuum from *minimal* (e.g., a theory is discussed in the literature review and not mentioned later) through *moderate* (e.g., multiple theories are introduced but without discussing their relevance to the study) to *major* (e.g., a theory is employed throughout the study). Finally, they concluded that "*LIS discipline has been focused on the application of specific theoretical frameworks rather than the generation of new theories*".

In the same vein, Pettigrew and McKechnie (2001) reported the limited application of theory and the failure of LIS research to address the practical problems of the profession. The same observation was made by Ukwoma and Ngulube (2021), who reported that much research works, such as theses and dissertations in LIS, needed more theory. Some studies used concepts like theory, theoretical framework, and conceptual framework interchangeably. This may be due to the fact that LIS researchers are not aware of the role of theory, including different components of a theory in the research process (Dankasa, 2015; Kim & Jeong, 2006; Pettigrew & McKechnie, 2001), or they have a lack of knowledge about the utility of theory in LIS research or have misconceptions about the theory and theoretical contribution in the LIS field (Ngulube, 2018; Ocholla & Roux, 2011).

LIS theories are usually vague and conceptually unclear, and basic concepts must be defined in the literature (Jarvelin & Vakkari, 1990; Poole, 1985; Schrader, 1986) and research in LIS has been dominated by a paradigm that

"has made little use of such traditional scientific approaches as foundations and conceptual analysis, or of scientific explanation and theory formulation" (Jarvelin & Vakkari, 1990). Our field, LIS, depends on other disciplines for theoretical work (Ferraro et al., 2009; Kumasi et al., 2013; Weber, 2003), and LIS researchers borrow theories mainly from several branches of social science such as psychology, sociology, or management (Hjørland, 1998; Morgan & Wildemuth, 2009; Poole, 1985). This is due to lack of qualitative scholarly literature on theory use in LIS (Kumasi et al., 2013). On the contrary, Ferraro et al. (2009) reported that theory borrowing like other disciplines is the tradition of information science. And, importing theories from other disciplines is not an indication of weakness in the discipline (Truex et al., 2006). Actually, researchers borrow a concept or a theory from other disciplines out of its original context to explain the same or a different phenomenon (Murray & Evers, 1989) for the purpose of investigating the questions of the form, structure, and organization of information and the social impacts of information technologies (Bates, 1999).

Many researchers (Hall, 2003; Oswick et al., 2011) argued that theory borrowing is a common practice prevalent in academic research and is an inevitable and integral part of theory development in all disciplines (Kenworthy & Verbeke, 2015; Truex et al., 2006; Whetten et al., 2009), especially those with a broad disciplinary base, including LIS (Mutula & Majinge, 2017; Ukwoma & Ngulube, 2021) as a result of a shortage of applicable home-based or native theories and core theories. Scholars borrow, adapt, extend and at times generate new theories when conducting research (Doherty, 2012). Theories are adopted and adapted or some variables are excluded to suit the LIS context. LIS has an interdisciplinary foundation that results in its borrowing from other disciplines. LIS domesticate theories mainly from sociology, management, psychology and information systems (Ukwoma & Ngulube, 2021). Incorporating theories from another discipline strengthens and enhances the linkages or connections between the two disciplines (Stock, 1997). So, there is a continuous call for developing "good theories" (Watson, 2001), especially home-based (here LIS) theories, e.g., theories of our "own" (Lee et al., 2004; Neuman, 2000; Weber, 2003). The paper reports the extent of theory use in LIS research and how and where researchers use theories in their papers, whether in their original format or otherwise modified.

The paper is structured as follows: Section 2 discusses the meaning and role of theories in research. Section 3 describes similar works related to theories,

including the importance of theorising in LIS research. Section 4 elaborately discusses the scope and limitations of the study. Section 5 focuses on the research questions formulated for this study. Section 6 deals with the methodology used to fulfill the research questions. Section 7 shows the results from different perspectives. Section 8 provides an overall assessment of the study and proposes several critical directions, and Section 9 concludes the paper with avenues for future exploration.

2. What Actually is a Theory?

The term "theory" derives from the Greek "theoria" and, in modern usage, from the Latin "teoria," which means "a looking at, viewing, contemplation, or speculation". It may have derived from the philosophy of science, particularly from Kuhn's account of theory change and scientific revolutions and has a complicated origin story with roots in several philosophical and psychological doctrines (https://iep.utm.edu/theory-theory-of-concepts/).

Still, there is no agreed-upon definition of "theory". Different experts have defined theories from different perspectives (Babbie, 1992; Merton, 1957; Odi, 1982; Schwandt, 1997; Vogt, 1993), and there is a considerable level of disagreement among experts about what constitutes a theory (Sutton & Staw, 1995). Sutton and Staw (1995) further stated that a consensus on exactly what theory is and why it is so challenging to develop a robust theory had not been reached.

Not everything is a theory, and it is quite difficult to judge what is actually a theory irrespective of disciplines as theory work may take a variety of forms. The term "theory" is almost a common phenomenon and is applied to all types of research both quantitative and qualitative, and to mixed methods irrespective of disciplines or domains. Experts have already admitted the essence of using theory in research and learning. It is used for giving meaning to abstractions and/or concepts to explain and aid understanding of phenomena by making generalisations about proven facts (Chijioke et al., 2021). Bhattacherjee (2012) clarifies that theory explains and predicts through building correlations and causations-cause-effect) relationships, respectively. It helps us understand things, events, activities, behaviours, and/or situations (Scott et al., 2008). In general, theory answers a human need to make sense of the world and to accumulate a body of knowledge that will aid in

understanding, explaining, and predicting the things we see around us, as well as providing a basis for action in the real world (Gregor, 2002). Babbie (2013) defined it as an organised explanation for the purpose of making observations regarding a specific aspect of life. Corley and Gioia (2011) concluded that theory shows relationships among different concepts that show how and why a phenomenon occurs.

So, it is difficult for the authors to give a solid definition of theory in the context of LIS research and the role of theory in the domain of LIS has been a subject for debate for several decades (Pinfield et al., 2021). Here, the authors have tried to focus on theory by citing experts' views. For example, Boyce and Kraft (1985) regarded theory as 'a body of principles: fundamental laws or empirical regularities. Sugimoto (2016) defined it as "a set of statements, systems, or principles, used to describe or explain phenomena". Gregor (2002) opined that theory should be considered from many different dimensions and it could be classified in such a way that would fulfill its purposes. In the same line, Neuman (2000) proposed five factors of a theory, such as (i) the direction (deductive or inductive), (ii) the level of the theory, (iii) whether it is formal or substantive, (iv) the forms of explanations it employs, and (v) the overall framework of assumptions and concepts in which it is embedded, by which it could be classified. On the other hand, Wacker (2004) identified four key properties that constitute a good theory: "formal conceptual definitions, theory domain, explained relationships, and predictions". He also considered theory as a link that creates relationships between concepts. Whereas Garver (2008) suggested that theories vary in their specifications. Another researcher (Buckland, 1991) said that a "good" theory is one that matches well our perception of whatever the theory is about. The closer the match, the better the theory is. Van Maanen (1998) suggested that theory must be convenient and should help and support to organise and communicate unwieldy data and simplify the terrible complexities of the social world, matters that may well be more important to the field than whether or not a given theory is true of false. Buckland (1991) defined theory "in the broad sense of a description or explanation of the nature of things, not in the more restricted sense, used in some sciences, of denoting fundamental laws formally stated and falsifiable." Some other researchers have given the basic definitions of theory precisely such as Smit (1995) 'a set of principles that is used to explain a certain phenomenon or phenomena; Silverman (2006) defines 'a set of explanatory concepts'; Vogt (1993) defines ' a statement or group of statements about how some part of the world works—frequently explaining relations among phenomena'; Odi

(1982) defines 'an internally connected and logically consistent proposition about relationships among phenomena'; Welman and Kruger (1999) define 'a group of logical, related statements, which is presented as an explanation of a phenomenon'; Babbie (1992) defines 'a systematic explanation for the observed facts and laws that relate to a particular aspect of life'; Kaplan (1964) defines 'a way of making sense of distributing situation'; Schwandt (1997) defines 'a unified, systematic explanation of a diverse range of social phenomena'; Grover and Glazier (1986) define 'generalisations which seek to explain relationships among phenomena'; and 'a set of statements about the relationship(s) between two or more concepts or constructs' (De Vos et al., 2005; Jaccard & Jacoby, 2010; Swanson, 2013). Sutton and Staw (1995) rightly said that the lack of a unified definition among scholars of what a theory is has often made it difficult to develop a strong theory for any discipline. But they all agreed that theory develops as an explanation to advance knowledge in the particular field (Thomas, 1997). Most of these definitions of 'theory' mention the relationships between or amongst several variables.

According to Babbie (1995), social science theory is *'a systematic explanation for the observed facts and laws that relate to a specific aspect of life'*. The role of theory in the social sciences is, among other things, to explain and predict behaviour, be usable in practical applications, and guide research (Glaser & Strauss, 1999). Some other experts have tried to give a formal definition of theory in the context of information science. Lee et al. (1997) discussed theory in this context in terms of underlying causal relationships, but primarily from a statistical viewpoint. Gregor (2002) identified and distinguished five different types of theory important for the discipline of LIS: (i) theory for analysing and describing, (ii) theory for understanding, (iii) theory for predicting, (iv) theory for explaining and predicting, and (v) theory for design and action. In the same study, she reported that many LIS researchers had failed to give any explicit definition of their own view of theory. Walster (1995) examined five instructional design theories valuable to LIS education and also described the basic components of the theories and their application in this domain.

Based on the discussion, determining the scope of the theory and suggesting a comprehensive definition of the theory is quite difficult. These vary depending on the type of research, academic field, and researcher. Hjørland (2013) correctly opined that the situation is somewhat chaotic and that it is difficult to get a clear overview of the theoretical landscape of the field as a whole. So, a theory, built from concepts, variables, or phenomena, is a mental

activity and an interrelated set of constructs that seeks to explain an object or things, explains observed regularities or relationships between two or more variables, and shows how and why events occur.

3. Literature Review

The use and application of theory are common in any academic discipline, and LIS is no exception. Apart from its own theory, many theories from other disciplines have also been used in the LIS field for the development of research productivity in this domain. Many LIS researchers, particularly in the field of information science, have developed theories about information-seeking behaviour. Initially, a theory was developed for a particular discipline and has since been modified and utilised in other disciplines or for any set of phenomena. For example, management theory is now being taught in different library schools (Trosow, 2000).

The LIS literature, according to Feehan et al. (1987), has not evolved sufficiently to support a rigid body of its own theoretical basis. Chatman (1996) is indeed correct when she claims that using and developing a theory is hard work in LIS. Vakkari and Kuokkanen (1997) attempted to analyse theory development in LIS using a case study from information seeking studies. Hjørland (2000) reported that LIS lacks good theories because there are no explicit theories in LIS. Many of the theories used in LIS are from other fields such as psychology, sociology, or management (Dillon, 2007). In the same vein, Ocholla and Roux (2011) opined that LIS largely relies on theories from other disciplines. They also presented a theoretical framework model used in LIS research and clustered it by research themes. Pierce (1992), citing the work conducted by Pettigrew and McKechnie (2001), also reported that LIS researchers tend to borrow theories from other disciplines. Furthermore, most LIS researchers borrowed theories from the social sciences (Oswick et al., 2011). Onyancha and Kwanya (2019) were in support. Again, Pettigrew and McKechnie (2001) found that 45.4% of theories used in LIS came from the social sciences, followed by LIS (29.9%), sciences (19.3%), and humanities (5.4%). Besides, more than 70% of the theories applied in Chinese LIS journals (Wang et al., 2016) and 57.5% of the theories used in Korean LIS journals (Kim & Jeong, 2006) were borrowed from other disciplines.

There have been many efforts by researchers to analyse the state of theoretical research in LIS. Here, authors have tried to give an overview of theories used in the LIS domain. Many authors have advocated for the development and application of theory in LIS (Buckland, 2003; Hjørland, 2000; Thompson, 2009). Many authors have developed many conceptual frameworks, models, and theories (Fisher et al., 2005; Pettigrew & McKechnie, 2001). dos Santos Maculan and de Oliveira Lima (2017) reported two theories, viz., *Dahlberg's analytical concept theory* and *Ranganathan's faceted classification theory* on concepts that are commonly taken for granted and discussed in the LIS literature. Some other experts reported the use of different theories in several branches of LIS research. For example, Mellon (1986), Mansourian (2006) and Ellis (1993) used grounded theory; Aluri (1981) applied learning theory; Middleton et al. (2019) used social cognitive theory; Bossaler et al. (2010) applied critical theory; Rogers (1995) used diffusion of innovation theory; Fishbein and Ajzen (1975) used the theory of reasonable action; Ajzen (1991) used the theory of planned behaviour in different areas of the LIS domain. Oliveira Machado et al. (2019) discussed concept theory in LIS from an epistemological perspective. Benoit (2007), on the other hand, provided an overview of major critical theories from a variety of disciplines, including the humanities, social sciences, and education. Michell and Dewdney (1998) provided a brief explanation of another social science theory i.e., the mental models theory, and the use of it in LIS research. There are many meta-theories operating in the field currently. Vickery (1997) discussed the meta-theory of information science research. Grover and Glazier (1986) proposed a model for theory building in LIS called "circuits of theory". The model includes a taxonomy of theories, developed earlier by the authors. The purpose of the taxonomy was to demonstrate the relationships among the concepts of research, theory, paradigms, and phenomena. Rioux (2010) explored the use of meta-theory as an integrative conceptual tool that can help analyse, direct, and enhance theory building, professional practice, and professional preparation in LIS. Kaijun et al. (2019) discussed fractal theory in information science (Parsa et al., 2016) including other domains such as mechanical science (Rinaldo et al., 1993), astronomical meteorology (Fossum et al., 2013), and life sciences (Puetz & Borchardt, 2015).

In reality, little research has been conducted to investigate the use of theory in LIS, and thus has been often criticised as being fragmentary, narrowly focused, and oriented to practical problems (Grover & Glazier, 1986). Many

authors have noticed limited use of theory in published research and have advocated greater use of theory as a conceptual basis in LIS research (Boyce & Kraft, 1985; Feehan et al., 1987; Grover & Glazier, 1986; Hjørland, 1998; Spink, 1997). Some quantitative studies have been conducted on the theory use in LIS. A number of studies (Feehan et al., 1987; Jarvelin & Vakkari, 1990; Julien, 1996; Julien & Duggan, 2000; Nour, 1985; Peritz, 1980) concluded that most LIS research is atheoretical, with the rate of theory use in LIS ranging from 10 to 21 percent. For example, Peritz (1980) reported that only 14% of sample articles from 1950 to 1975 could be considered theoretical research. Whereas Nour (1985) reported 21.2%, Feehan et al. (1987) reported 13%, and Järvelin and Vakkari (1990) reported 10% of the literature published in 1980 using theory. Julien (1996) found that theoretical studies occupied 32% of the 241 randomly selected papers on information needs and use from 1990 to 1994. Gonzalez-Teruel and Abad-Garcia (2007) found that theories were used in only 14% of the papers on information needs published in Spanish journals from 1990 to 2004. Even so, variations in the use of theory may also be regional. Wang et al. (2015) found that at least one theory was mentioned in the full-texts of 30.2% of papers from the Journal of the China Society for Scientific and Technical Information (JCSSTI) from 2000 to 2013, which is taken as the top one journal of information science by Chinese universities. Then, Wang et al. (2018) further analysed the LIS papers published in all 52 Chinese LIS journals from 2008 to 2017 and found that 18.97% of them mentioned at least one theory in their abstracts. Wu et al. (2017) found that 49.9% of articles published in Taiwanese LIS journals between 2010 and 2015 use theory. In Korean LIS research journals, Jeong and Kim (2005) found only 10% of studies applied a theory. The authors observe that these variations in the use of theory among different LIS journals are due to the number of journals as well as the journal selection process used by the researchers.

According to another study (Mckechnie & Pettigrew, 2002), a theory was discussed in 34.2 percent of the articles. The study covered almost 1,160 articles published in six prominent LIS journals from 1993 to 1998. The same type of work has been conducted by Järvelin and Vakkari (1990). Authors reported 10% use of theories in LIS, whereas it was 18.3% in another work (Julien & Duggan, 2000). Kim and Jeong (2006) reported that the use of theory was only 17.57%. Nour (1985) reported that while 21.2% of articles used theory in an analytical sense, less than 3% of the articles were about information science

theory. Feehan et al. (1987) reported that only 13% of the 123 research articles sampled from 91 LIS journals either discussed or applied theory in the study design or attempted to formulate theories or principles that could provide a theoretical basis for LIS.

4. Scope and Limitations

As previously stated, (see Section 2), the term "theory" refers to ideas, works, opinions, models, hypotheses, and so on (see also Section 6). The sample the authors have analysed does not claim to be exhaustive, as the search operators or the search syntax (part of our search strategy) were limited to those articles that contained the term 'theory' or its equivalent terms, as stated above, in the title and in the abstract, along with the other two terms, viz. 'library' and 'librarian'. The authors face specific difficulties where researchers have used such parallel terms in place of the 'theory' or a different name but not the word 'theory'. The authors have considered articles where these terms were not present/used or were used in other ways, but the creator of the theory was mentioned, or researchers did mention the name of the theory. The keywords provided by the researchers were not used as such words were manually added and might not capture all the topics being discussed in the papers. The authors have identified many retrieved papers that do not directly relate to the development of the LIS theory. Moreover, these papers were rejected from our analysis for not covering any potential theoretical work promoting LIS research. Another problem relates to suggesting the definition of the 'theory' and determining the scope of the 'theory'. The authors do not claim that the journals covered by Scopus or the articles the authors have studied exclusive representatives of LIS research. Our classification of LIS sub-fields (Section 7.4) and grouping of all theories based on originating domain (Section 7.7) needs to be more foolproof.

In many cases, extended abstracts were not provided by the researchers, and authors could not identify the areas where theories were used in the article, i.e., the introduction, method, results/discussion, or at what level or extent researchers had used the theory with fidelity. The authors could not identify the type of research for which theories were tested or employed. Moreover, determining the quality of the theories used differs from our study's objective.

5. Research Questions

Summarising the above, we have set the following research questions to fulfill our objectives for this study:

1. What were the theories applied in LIS research? Or which were the most important theories discussed in the corpus data from 1970–2021?
2. Which topics were most discussed? Or what were the research topics studied in the LIS area during the period?
3. How, and to what extent a data carpentry tool (viz. OpenRefine) can be applied to quantify the structured data set and for deep faceting the text corpora to identify categories of the theories used in LIS research?
4. Does LIS have any systematic theoretical base? Or, to what extent does LIS research rely on other disciplines for its theoretical foundations? Or, from which disciplines did LIS researchers borrow or draw theories?

6. Methodology

Traditional quantitative content analysis, with natural language processing (NLP) and text mining technology, is taken as the research method. Data were extracted only from LIS journals covered by Scopus (*https://www.scopus.com/*) against carefully crafted search queries: library, librarian, theory, and synonymous/equivalent terms related to 'theory'. For example, sometimes, keywords such as 'framework', 'model', 'pattern', 'paradigm' 'method' were used interchangeably by scholars in place of 'theory' and thus were used and considered to search for information. The authors have selected the Scopus database as the primary data source and limited the search to only LIS research articles published from 1971 to December 2021. A total of 14,294 raw articles (from 1971 to 2021) were downloaded or extracted using various search terms like 'library', 'librarian', 'theory', and parallel/synonymous terms of 'theory', all of which appeared in the title and the abstract of the paper. The authors have excluded 368 titles or papers for not having an abstract. A total of 61 articles were also removed from three unrelated journals. Only full-length articles written in English were collected where the specific application of theories was made. Editorials, book reviews, letters,

interviews, commentaries, non-research articles, and news items were also excluded from the analysis.

A total of 13,865 articles were considered for this paper, and all the relevant bibliographic data, such as titles, abstracts, authors, names of the journals, etc., were recorded in a single Excel file. The sample data were then ranked and curated using ASReview (*https://asreview.nl/*) to examine whether the articles were relevant to the development of LIS theory. It is used to rank a set of selected abstracts based on their context and relevance. Finally, 13,225 (95.4%) articles were removed for not having a direct link with the LIS theory. The sample size for this study was 640 (4.6%) research articles directly related to the development of LIS theory. In the next step, OpenRefine (*https://openrefine.org/*), an open-source data rackling tool, is used to obtain the results as reflected in Table 1. The CSV file of sample data is transformed into 'OpenRefine' for further processing, and Table 1 reflects the dataset generated by 'OpenRefine' after analysing the corpus data. This tool helps quantify

Table 1: Parameters for evaluation.

Parameters	Results
Number of unique theories identified (combining Appendices A, B & C)	411
Number of theories of Library and Information Science (see Appendix C)	45 (10.94%)
Most dominant theory used by maximum number of papers (see Appendix A) (here grounded theory)	83 papers
Number of articles in which the term 'theory' was mentioned in the 'title' of the paper	191 (29.84%)
Number of articles in which the term 'theory' was not mentioned in the 'Abstract' of the paper	39 (6.09%)
Number of articles that did mention the term 'theory' both in the 'title' and in the 'abstract' of the paper	566 (88.43%)
Number of articles that used other equivalent/synonymous words in place of 'theory'	67 (10.46%)
Number of articles in which originators' names were not mentioned	531 (82.9%)
Number of theories appeared more than once in the papers (see Appendix A) (calculation is made based on 411 unique theories)	31 (7.54%)
Average number of theories per article or paper (which used at least 1 theory)	1.56
Occurrences of theories (more than once) in number of articles **[Break-up]:** [Two theories used = 9 papers, Three theories used = 8 papers, Four theories used = 5 papers, Five theories used = 2 papers, Six theories used = 1 paper, Seven theories used = 1 paper, Eight theories used = 1 paper]	27 articles (4.21%)
Number of unique theories used 10 times or more (greater than equal to 10) in any paper (see Annexure I)	5 theories

and deep faceting the text corpora to identify categories of the theories used in LIS research.

The authors have taken only those papers where theories of LIS or theories of other disciplines were applied. The 'title' and the 'abstract' and 'index terms' of the papers were used as chief sources of information. All the articles were checked and validated by domain experts other than the authors to improve the sample data's validity and reliability. The authors have classified all papers using a descriptive framework that considers the level of theories used and the stages at which theories are used as it reflects the intensiveness of the use of theories within the studies. Again, the authors have critically reviewed and analysed each theory against selected criteria and consulted different documentary sources to determine its originating discipline. Furthermore, for this purpose, the paper's focus and the background information of the creator of the particular theory are considered.

7. Results

This section presents our results, organised by analysis of research questions as stated in Section 5. Keeping in mind the study's objectives, the following aspects of importation are examined considering the stated parameters (Table 1).

7.1. General Statistics

This section overviews the theories used in LIS research from different perspectives (Table 1). Altogether, there were 531 (82.9%) papers (out of 640 papers) where researchers did not mention the name of the originator of the theory (originator was not mentioned at all neither in the abstract nor in the title). Even so, 449 (70.15%) articles did not mention the 'theory' in the 'title' of the articles (but the term 'theory' was present in most of the abstracts). The authors identified one reason for this: researchers using other parallel and synonymous terms (such as principles, frameworks, schemes, concepts, models, works, ideas, paradigms, and so on) in place of 'theory', which were also counted. Kumasi et al. (2013) also reported that the multiple terms or words such as "framework," "model," were used interchangeably in the articles

by the scholars to describe a theory. Booth and Carroll (2015) also reported that the various connotations of theories were synonymously used in the social sciences and humanities. In many cases, researchers mentioned only the name of the person who was probably the theory's creator. Most studies (95%) used only one theory. However, in many cases, it was unclear how multiple (Table 1) theories were mentioned and discussed in the paper. The maximum number of theories used by researchers in any study was eight (8) (Table 1). In addition, five (5) theories were mentioned ten times or more in any paper (see Appendix A & Table 1).

Many authors have reported the percentage or proportion of theories used in LIS, ranging from 13% to 34.1% in LIS journals (Feehan et al., 1987; Julien, 1996; Pettigrew & McKechnie, 2001). For example, it was 14% (Peritz, 1980); 13% (Feehan et al., 1987); 21.2% (Nour, 1985); 10% (Järvelin & Vakkari, 1990); and 18.3% (Julien & Duggan, 2000). All these studies were restricted to selected LIS journals, and the sample sizes were limited. In our study, the percentage or proportion of theories used was 64.21% (here 411 unique theories and N= 640 papers). A recent study by Kim and Jeong (2006) also reported the use of theory in LIS research at 41.4%. So, we can say that the total percentage of theories used in our study is higher than the findings of previous studies conducted from time to time. Again, we can say that the average number of theories per article (which used at least one theory) based on weighted average mean is 1.56. In their study, McKechnie and Pettigrew (2002) reported that 34.2% of articles incorporated theory in either the title, abstract, or text, for a total of 1,083 theory incidents or an average of 0.93 incidents per article.

This study has identified 411 unique theories and a comprehensive list of theories, are provided in the appendices. There were 31 (7.54%) theories (see Appendix A) that appeared more than once among the 238 (37.18%) articles. Appendix B provides a list of 335 theories which appeared only once in the paper. Apart from that, there were 45 (10.94%) theories in LIS (Appendix C). It was also found that there were 366 (89.05%) theories (Appendix A & B) of other disciplines used in the LIS research.

Theories used mainly were drawn from the social sciences (177 theories, 43.06%) in some tangible way, followed by sciences (50 theories, 12.16%), management studies (42 theories, 10.21%), information studies (8 theories, 1.94%), linguistics (8 theories, 1.94%), communication studies and epistemology (7 theories each, 1.70%), and the humanities (5 theories, 1.21%) (Appendix B).

And rest of the theories (31) were from other subjects (Appendix B). A few studies have also reported theories used in LIS research. For example, Pettigrew and McKechnie (2001) reported more than 100 theories used in LIS research. On the other hand, Lim et al. (2009) identified 154 theories used in LIS research. Furthermore, most theories came from the social sciences like us.

In the same vein, we have calculated in how many papers theories from the social sciences were mentioned. It was found that there were 355 (55.46%) papers in which theories from the social sciences were applied. And the rest of the papers were from other domains, such as 62 (9.68%) papers from Sciences, 68 (10.62%) papers from management studies, and so on. We have also calculated the percentage of articles, in which the originators' names were mentioned in the 'title' and in the 'abstract' of the articles. There were only 21 (3.28%) articles in which the originators' names were mentioned in the 'title' of the articles. And there were 134 (20.93%) articles in which the originators' names were mentioned in the 'abstract' of the articles. But there were many common articles in which the originators' names were mentioned in both places.

7.2. Mostly Dominating Theories

Table 2 shows the most frequently used key theories from the 640 articles. It displays the top 14 most dominant theories (in terms of its use in number of articles) in LIS research during the period under study. This arrangement is a subjective ranking of theories based on our assessment of the theories presented in the papers. The most used theories were grounded theory, learning theory, activity theory, and the unified theory of acceptance and use of technology model, which were prominent over the whole period under study (Appendix A). For example, grounded theory was used in 83 (12.96%) papers whereas learning theory was used in 20 (3.12%) papers, activity theory was used in 19 (2.96%) papers, UTAUT was used in 17 (2.65%) papers respectively. The first three theories were from social sciences whereas UTAUT was from management studies. Together, these 14 theories (Table 2) accounted for about 30.55% of the theories used during 1970–2021 in Scopus database. Almost all these theories were from several branches of the social sciences, except a few were from 'management studies' (ranking position 4, 7); 'sciences' (ranking position 9); 'communication studies' (ranking position 8),

*Table 2: Top theories and their contributions in LIS research.*

Originating discipline	Ranking (based on % of usage)	Name of the theories (Top 14)	No. of articles used	Percentage of used (%)
Socio-Psychology	1	Grounded theory	83	12.96
Psychology	2	Learning theory	20	3.12
Psychology	3	Activity theory	19	2.96
Management Studies	4	Unified Theory of Acceptance and Use of Technology Model	17	2.65
Education	5	Adult Learning theory	10	1.56
Management Studies	7	Technology Acceptance Model (TAM)/theory	07	1.09
Communication Studies	8	Everett Rogers' diffusion of innovations theory	06	0.93
Science	9	Fuzzy set theory	05	0.78
[Socio-Psychology!Information Studies!Sociology! Communication Studies! Psychology]	10*	Critical Race theory! Kuhlthau's theory of the information search process! Queer theory! Shannon's theory of communication! Social cognitive theory	04	3.1 [0.62 × 5]
		Total		**30.55**

*These five theories appeared four times (Appendix A) and thus jointly ranked 10 positions.

'information studies' (ranking position 10, two theories, viz. *Kuhlthau's theory of the information search process and Shannon's theory of communication*). Westin et al. (1994) rightly said that LIS research draws from various reference and complementary disciplines. One of our study's objectives (RQ 1 & RQ 4) was to show dominant theories and how LIS researchers borrowed theories from other domains or disciplines. However, most of the theories within the social sciences came from psychology (88 theories), sociology (52 theories), philosophy (19 theories), economics (9 theories), and education (9 theories) (see Appendix B). Figure 1 also gives an overview of the proportion of theories used under selected broad disciplines, and different colors and bold types indicate their contributions.

So, most papers used less popular and less well-known middle-range theories (as proposed by Gregor, 2006), such as media richness theory, TAM, information processing theory, sense-making theory, etc. Psychological theories under Social Sciences dominated LIS research, while theories from sociology and philosophy came next and held second and third positions, respectively.

Fig. 1: Proportion of theories used (value-wise).
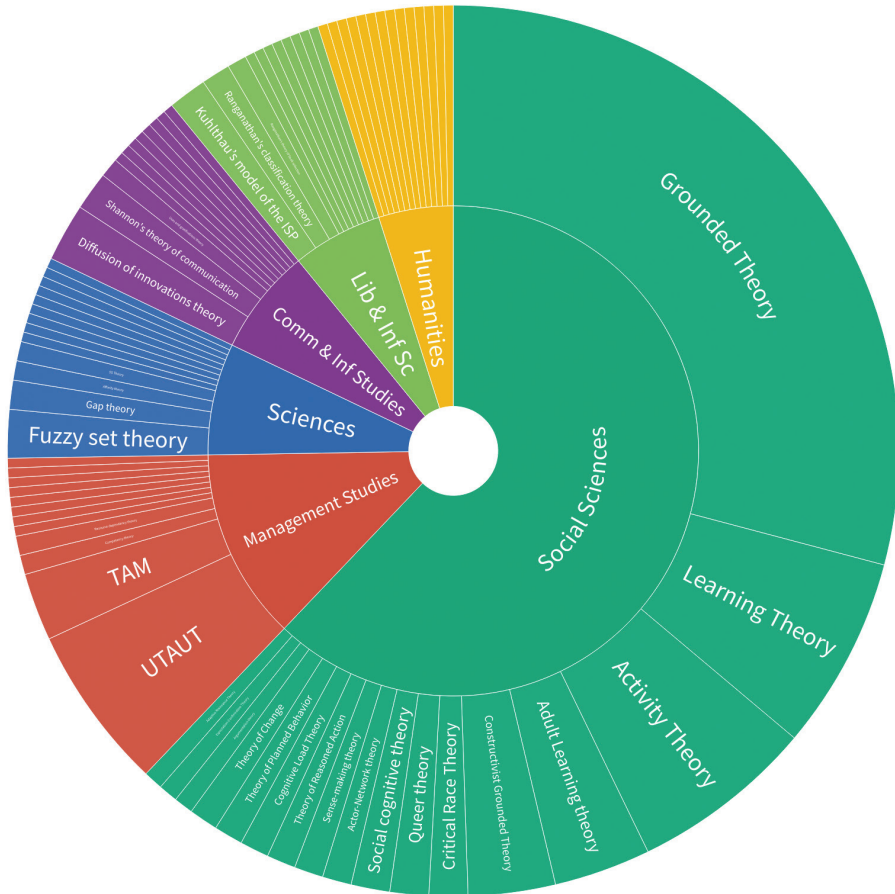
However, there is a significant difference in the number of theories that came from these two disciplines (e.g. sociology (52 theories) and philosophy (19 theories). Economics and education came close behind and jointly ranked fourth, respectively. Psychology and Sociology accounted for about 34.06% (140 theories) of the theories used during the study period. Here, authors have eliminated some theories from the LIS category, that were closely associated with and supposed to originate from the sciences and social sciences

and thus were not kept in Appendix C under the LIS theory group. For example, the theory of communication, LibQUALþ TM Model. A study conducted by Lim et al. (2009) also reported almost the same results. Lor (2014) rightly stated that LIS had produced very little theory of any significance, and thus LIS researchers have used theory from other fields such as psychology, sociology, or management studies.

7.3. Location (Sections) Where Theories were Mentioned

There were differences among articles using the term 'theory' and its name. The authors have tried to find out the trend, pattern, and depth of use of theories in the papers by identifying the areas of use of theories. Theories were mentioned in almost every section, including the methodology section, the hypothesis section, the analysis section, and the research process itself. In the introduction section, theories were even used to review the background of the articles. Only a few papers mentioned it in conclusion.

It was found that, out of 640 articles, there were only 39 (6.09%) papers where 'theory' was not mentioned in the 'abstracts'. It indicates that almost all the papers in the abstract used the term 'theory' and accounted for 601 (93.91%). But the most disappointing fact was that the term 'theory' was missing from most of the 'titles' of the articles and accounted for 449 (70.15%). It is because researchers had used other parallel or equivalent terms in place of 'theory'. Pettigrew and McKechnie (2001) reported that the terms 'theory or theories' were mentioned in 99% of the 'abstracts', whereas only 1% was mentioned in the 'title'. They only studied two areas, and their conclusions were vastly different from ours.

Apart from that, this study has also identified other vital areas where researchers have used the term 'theory' (or name of the particular theory or name of the creator of the theory). The term "theory" was most frequently used in the methodology (43%) part to develop the method/model or framework for preparing the article, data collection (28%) part as a tool, introduction (which includes the purpose or objective) (21%), data analysis and interpretation (almost 6%), and discussion (below 3%) part to justify the results or its relevancy in the paper. In a few cases, it was just mentioned in the conclusion part of the articles.

7.4. Sub-Domains of LIS

Now, we examine the use of articles in different sub-fields and streams of LIS research (RQ 2). The authors cannot give an exact figure for the number of articles used in different sub-areas of information studies. As shown in the scope (below Table 3), the focus of the articles was not always limited to a single topic due to their interdisciplinary nature. There is no standard tool by which we can present the actual divisions of LIS literature. Authors have examined existing literature (Kim & Jeong, 2006; Sidorova et al., 2008; Wang et al., 2021), and there were significant differences among researchers in their categorization of LIS subjects into different sub-fields due to their interdisciplinary or multidisciplinary nature. For our understanding, the authors have identified the following six major areas/sub-domains of LIS research based on the scope, coverage, and focus of the articles under study.

Lim et al. (2009) reported that most articles were about '*information seeking and use*', '*information retrieval,*' and '*library administration and management*'. Our findings are pretty similar to those of another study by Kim and Jeong (2006). However, it is unclear how they arrived at these classifications, their sample data, or how and from what sources the data was gathered. It is to be noted

Table 3: Sub-fields and their contribution.

Rank	Sub-fields of LIS*	Number of articles	Percentage of articles (%)
1	Information Seeking	136	21.25
2	Information Retrieval and Information Services	125	19.53
3	Technical Works	114	17.81
4	ICT-enabled Services	105	16.40
5	Library Administration and Management	98	15.31
6	Metrics Study	62	9.70
	Total	**640**	100

*Information Seeking: information needs, information seeking behaviour, user study; ***Information Retrieval and Information Services***: vocabulary control, user services, user education and pedagogy, information literacy, information management, reference services; ***Technical works***: cataloguing, classification, indexing, knowledge management, knowledge organisation; ***ICT-enabled services***: digital preservation including archiving, academic/public/digital library, scholarly communication, open access, institutional repository, open source, social media, e-learning, library 2.0, metadata; ***Metrics study***: bibliometrics, informatics, scientrometrics, webometrics; ***Library Administration and Management***: system design, MIS, planning.

that the results may differ if the components are changed. So, our grouping may not be similar to other studies, and it will be unfair if we compare these findings with other similar works conducted from time to time in different domains, including LIS.

Four groups (Table 3) with more than 100 articles came close to each other. With a total of 136 (21.25%) articles, information seeking takes first place. 'information retrieval and information services' came close to 'information seeking', ranking second with 125 articles (19.53%). 'Technical Works' has 114 (17.81%) papers and is ranked third. Another important group is '*ICT-enabled services*'; unlike other groups, most papers date after 2000. It is because applications of ICT and especially open-source software, started growing in the library environment after that period. Another two groups hold less than 100 papers.

7.5. Research Stages Concerning the Use of Theories

This section examines the purpose of the theories used in LIS research (Table 4). Hannay et al. (2007) opined that theories were used to serve different purposes within a research article. Tsang and Ellsaesser (2011) said that theories were mainly employed in LIS research to extract findings. A recent study (Park et al., 2022) specifically mentioned that the theories of the information world were mainly used to guide the collection and analysis

Table 4: Research stages in which theories were used.

Research stages in which theories were used	Scope and coverage
Used as Inputs (research design)	Developing the theoretical/conceptual/analytical/qualitative framework/model, using as method for data collection or as analysing strategy, framing for evaluation, testing hypothesis, designing or setting up research questions, identifying key constructs, guiding/specifying implementation planning, enhancing conceptual clarity, conveying the larger context of the study
Used as Process (analysis and explanation)	Analysing or processing data for interpretation and discussion, explaining phenomena or variables
Used as Outputs (results)	Specifying research outcomes, justifying the findings, establishing results

of empirical data. In addition, it could be used to perform three types of research, viz., qualitative research, quantitative research, or mixed research (Creswell, 2009).

However, the authors have identified all the research activities and divided the sample data into three major parts or levels: *input stages, processing stages*, and *output stages*. These three levels are created for a better understanding of theories used at different stages of LIS research. The following are the details, clarifications, and works involved in these three stages:

So, we can say that the most common roles of theories used were to design the study, e.g., research design (39%), data collection (35%), data analysis or explanation (13%), and research outcomes or results (5%). In a few cases, authors could not trace the intentions and motives behind the researchers' use of such theories and, thus, were not calculated. Van der Waldt (2021) also expressed a similar view, reporting that theories were mainly used to design research protocols and task materials; formulate hypotheses, research questions, design frameworks or models; and develop questionnaires and other instruments. McKechnie and Pettigrew (2002) also reported that they were used to frame, design, and interpret findings. They reported 19% (results section) and 15% (discussion section). However, these studies revealed less than this one does.

As identified in this study, theories were used to serve different purposes, such as the design of the work, explanation, application, motivation, hypothesis testing, modification, and basis. Theories were discovered to be primarily used as a research method or tool (for data collection, surveying the user community, designing and constructing a theoretical framework or model), data analysis or discussion, and results. In many cases, theories were used as research inputs to identify and formulate research problems or test hypotheses in research designs. Theories were also used as an output to justify the results or findings.

7.6. Types of Theories Used

Another critical area that previous studies have not covered is identifying the types of theories (Table 5). None of the researchers in the LIS domain have mentioned the type in their studies as proposed by Gregor and other experts

Table 5: Types of theories used.

Theory type	Function and purpose of use
Type 1 theory	Analysis and description
Type 2 theory	Explanation and interpretation
Type 3 theory	Prediction
Type 4 theory	Both explanation and prediction
Type 5 theory	Design and action
Grand theory	Provides an overall conceptual framework, used for structuring ideas, defines universal truths, explains relationships among variables, answers basic fundamental questions
Middle-range theory	Integrating theory and empirical research aimed at creating general statements, suggests an intervention
General theory or process theory	Explains how an entity changes and develops over time

as discussed. Various levels of theories, with implications for research in LIS are described (Togia & Malliari, 2017). Gregor (2006) proposed five types of theories based on philosophical and disciplinary orientations (Table 5). Even so, it could be *'theory as input'*, *'theory as process'*, or *'theory as output'* (Van der Waldt, 2021). Other experts (Doty & Glick, 1994; Schneberger et al., 2014) categorised theories as *'theory type 1'*, *'theory type 2'*, and so on up to *'theory type 5'*. Another expert (Reynolds, 1971) identified another four forms of theory, namely *a set of laws*; *an inter-related set of definitions, axioms and propositions*; *descriptions of causal processes* and; *vague concepts, untested hypotheses, and prescriptions for good behaviour*. In addition, it could be of *'grand theory'*, *'middle-range theory'*, or *'general theory or process theory'* (Table 5). The final level, grand theory, is "a set of theories or generalisations that transcend the borders of disciplines to explain relationships among phenomena" (Glazier & Grover, 2002). The first theory level, called substantive theory, is defined as "a set of propositions that furnish an explanation for an applied area of inquiry" (Grover & Glazier, 1986). In fact, it may not be viewed as a theory but rather as a research hypothesis that has been tested or even a research finding (Kim & Jeong, 2006). The next level of theory, called formal theory, is defined as "a set of propositions that furnish an explanation for a formal or conceptual area of inquiry, that is, a discipline" (Grover & Glazier, 1986). Their difference lies in their ability to structure generalisations and their potential for explanation and prediction. Substantive and formal theories together are usually considered "middle-range" theories in the social sciences (Togia & Malliari, 2017). Here, the authors have attempted to categorise articles based on the types of

the theories proposed in the existing literature. The explanations are given below:

In our study, it was found that most of the theories were "*middle-range theories*" (e.g., TAM, self-efficacy theory, Maslow's hierarchy of needs theory, media richness theory) (see Appendix B) and numbered 567 (88.59%). Morgan and Wildemuth (2009), citing Poole (1985), stated that middle-range theories were perfect for a professional field like information and library science. Pinfield et al. (2021) also shared the same view, stating that "mid-range" or "middle-range" theories were mostly used in the LIS domain. And the rest of the theories were "*general theories*" or "*process theories*" (e.g. expectancy theory). Although a few articles were about "*grand theories*" such as communication theory, cognitive theory, and critical theory.

If we classify the theories according to their types as proposed by Gregor, most of the articles were "*type 5*" theory (used for research design and action). They numbered 428 (66.87%) articles, followed by "*type 1*" theory (179 articles, 28%) meant for the analysis of data including description, and "*type 2*" theory (33 articles, 5.1%) used for interpretation and explanation. Sonnenwald (2016) reported that all five of Gregor's types of theory exist in the LIS literature, although types 1 and 2 predominate. Our study is quite different and does not match previous studies. Another study (Bélanger & Crossler, 2011) discovered that 'type 4' theory predominated, followed by types 1 and 2. In contrast, another view is expressed by Alter (2017), who found 'type 4' theory dominant. The authors observe that these differences are likely due to the sample size and type, sample selection, search operators used, the method applied, and the nature and type of sources used (here, Scopus) for collecting samples.

7.7. Categorisation of Theories Used

Apart from LIS theories (Appendix C), this study also reports the use and application of different theories of other domains used from different dimensions to support LIS research. It was challenging and took much work for the authors to identify and classify theories because theory classification depends on many factors, including the type of use, stage of use (Davies et al., 2010), and purpose of use (Gregor, 2006). Even, theories could be classified based on their scope and structure, where they are used in an article, the way they are

used in the paper, or what they are meant for. Markus and Robey (1988) also distinguished theory in terms of causal structure.

In categorising theories, Hjørland and Pedersen (2005) emphasised knowledge of the broader meaning-producing contexts rather than focusing on trivial or naive descriptions of the documents.

The authors have classified all the theories according to their domain of origin (Appendix A & B). When determining the originating discipline of theories, the focus of the papers and the inventors' backgrounds were taken into account. This classification is no longer final and somewhat subjective, as theories were unambiguously identified in some cases, and readers may disagree with our classification. Furthermore, our goal is not to show how different theories were applied in LIS research or how LIS theories were used outside of the field.

Appendix B gives a comprehensive picture of theories in the sciences, social sciences, management studies, communication studies, information studies etc. Appendix C gives a comprehensive overview of LIS theories to pinpoint the focus of this paper. But it could have been kept under '*information studies*'. In the same way, theories of '*organisational studies*' or '*strategy*' are kept under '*management studies*'. Even the theories under '*communication studies*' (see Appendix B) could have been kept under '*information studies*' or '*sciences*'. It is a fact that most of the '*communication theories*' or '*information theories*' have originated from 'science'.

8. Discussions and Implications

The essence of using theory from other domains for conducting LIS research has been felt since the beginning of the 21st century (Hall, 2003; Kenworthy & Verbeke, 2015; Oswick et al., 2011; Ukwoma & Ngulube, 2021). Moreover, establishing a link between theory and research has become a hot topic among LIS researchers (Mueller & Urbach, 2013). However, the development of theory or the range of theories used in LIS research has expanded over the past forty or fifty years (Sonnenwald, 2016), and the use and application of socio-cultural theories to uncover or underpin LIS research continue to increase. Furthermore, this is reflected in our study (Section 7.1), where the rate of use of theories in LIS research was 64.21%.

As discussed in Sections 4 and 6, there were misconceptions, a lack of awareness regarding theoretical discussions, and misuse of the term 'theory' among researchers (Ngulube, 2018). Only 640 (4.83%) core articles were finally selected for this study, which indicates that researchers have used unintentionally theories without having a clear idea of theory regarding their application and utilisation in research. This conceptual misunderstanding regarding the 'theory' among scholars may misdirect the focus of the research and affect the results. Bibliometric *laws, classification rules, and cataloguing rules* were considered theories in many cases. The theories included -

- *Wilson's general model of information behaviour,*
- *Ranganathan's five laws of library science,*
- *Information Theory/Theory of Information,*
- *Information Theory of Communication, and*
- *Kuhlthau's model of the Information Search Process.*

Researchers disagree and hold opposing views on whether these should be considered theories (Ngulube, 2020; Ocholla & Roux, 2011). In a few cases, two or more theories were used or applied in the same paper. However, there was no such application of said theories, and it was difficult to measure at what level or for which purpose a theory was used in the study. As a result, the relevance of the theory to the study could not be identified and was unclear as it was not used consistently throughout the study.

In many cases, the purpose of using a theory in the paper was unclear and misleading. So, researchers should have mentioned their roles in the article or the extent to which they employed the theory with fidelity. Even so, some articles used multiple or one theory in multiple ways. It is unclear how a particular theory was used in the work. In most cases, the researchers did not mention the origin of the single theory (e.g., the discipline of origin). Additionally, the researchers should have mentioned the name of the particular theory with further explanation including the theory's originator (Section 7, Table 1). So, these issues must be reworked and clarified adequately in the text.

Another problem was identifying the original subject or discipline from which a theory had come (Section 7.7). The authors found that the same theory was simultaneously considered as 'science' and 'social science' theory by the experts and was kept in both places. The same theory may be applied to science and social science or management studies depending on the context

of the research work with any necessary modifications or extensions to the original theory. It is important to remember that the authors did not find any best practices or formal guidelines to identify the emerging discipline of the theories, which appeared to belong to more than one discipline. The authors have noticed that, in many cases, some theories originating from multiple disciplines had no option but to fit into a particular discipline considering the focus of the paper and the background information of the originator. The situation mostly happened in the 'social sciences'. For example, it can be argued that the '*resource-based-view*' (RBV) theory may be placed in '*management studies*' in a broader context or in '*economics*' under 'social sciences'. Moreover, both sides/cases have compelling logic. Even the discipline of '*management studies*' could be treated as a 'social science' subject rather than a separate discipline. This aspect may be one of the drawbacks of this study.

The assessment of the past studies by different scholars has criticised LIS for its lack of theoretical research and may be trending downward. Regarding theory, Orlikowski and Iacono (2001) argued that LIS research is under-theorised. Rayward (2004) also supports this view. It is a hard fact that the LIS domain has yet to produce grand theories, and LIS researchers have used theories in their studies mainly to frame, design, and interpret findings. Many commentators have also suggested that the LIS domain needs to make more use of theory (Pinfield et al., 2021) and has thus been criticised for relying on theories imported from other disciplines rather than applying or developing theories from within (Park et al., 2022). The same view was also expressed by McKechnie and Pettigrew (2002). Although Kim (2004) disagreed with previous studies that reported that theoretical research was insufficient in LIS research. He found that 41.4% of the studies dealt with theoretical development and utilisation.

Still, research in LIS is confined to theories developed and used in complementary disciplines. In this study, it was found that, out of 411 theories, only 45 were from the LIS domain, and the majority of the theories (366) were from adjacent disciplines. This is due to the lack of sound or home-based theories of LIS. Even the home-based theories are pragmatic and descriptive. This lack of theoretical contributions may be associated with the fact that LIS emanates from professional practice and is therefore closely linked to practical problems such as the processing and organisation of library materials, documentation, and information retrieval (Jarvelin & Vakkari, 1990; Kim &

Jeong, 2006). As previously stated, LIS has borrowed many theories from other disciplines due to a scarcity of theorists and theory-illuminated practitioners (Schrader, 1986).

The authors think that there is considerable scope for further research in this area of theorising LIS research and identified mainly two areas: *the development, use, and application of home-based theory;* and *general conceptual and methodological awareness among LIS researchers regarding theories*, particularly the specific use of the meta-theoretical assumptions inherent in LIS research. However, the advancement of information technology and the use of such technologies in the library environment have significantly contributed to the domain of LIS research. Feather (2008) urged LIS researchers to prioritise various aspects of LIS research. He correctly stated that now is the time for LIS researchers to engage in and focus on several important issues that are more important in the LIS domain than today's management theories or tomorrow's technological miracle.

However, many articles are published, and many practical works are done without explicating any theoretical or meta-theoretical assumptions. These works were not tested for how the term 'theory' is operationalised in the study, at what level it is used or generalised, or how the theory is proposed to operate within the study. In most cases, theories were discussed and talked about marginally or minimally. Freehan et al. (1987) correctly observed that LIS research had not matured sufficiently to support a cohesive body of its theoretical foundation and was instead built on theories from other disciplines (Gregor, 2006). However, the authors disagree with previous researchers who have treated our field as under-theorised because more than forty-five LIS theories have been identified (see Appendix C). Moreover, we fully support the view of Gregor (2006), who rightly realised the potential benefits of using theories in the LIS domain by saying that LIS professionals use both home-based and borrowed theories in a new look/way to make sense of their data.

9. Conclusion

The authors claim that LIS is facing a '*theory crisis*' and is still in a grey area. Existing findings of our study focus on essential insights for the LIS research

community, which raises different questions about LIS research. Does this mean that LIS research has no systematic theoretical base? Do we have our own or native theories? Or to what extent does LIS depend on other neighbouring disciplines for its theoretical base? How will LIS respond to this unmet situation? What will be at the forefront of LIS research in the near future?

The process of theory building in LIS was not so strong and is evident through the tremendous borrowing of various theoretical concepts and the use of theoretical frameworks from other disciplines to address various LIS issues. Rawson & Hughes-Hassell (2015) rightly opined that the treatment of theory in LIS research covers a spectrum of intensity, from marginal mentions to theory revising, expanding, or building. He further stated that the field of LIS has not been very successful in contributing to existing theory or producing new theory. In spite of this, one may still assert that LIS research employs theory, and, in fact, there are many theories that have been used or generated by LIS scholars. However, "*calls for additional and novel theory development work in LIS continue, particularly for theories that might help to address the research practice gap*".

As stated, using theory in research is essential as it helps produce transformative knowledge (Ngulube, 2020). As is evident in this study, the results focus on the fact that LIS researchers could not develop home-based theories and make good use of social science theories due to its (LIS) interdisciplinary nature or being transdisciplinary. As a result of the absence of its own or discipline-based theories, researchers have borrowed from other disciplines (see Appendix B). However, it would be improper to say that LIS research is conducted in collaboration but is widely connected with other disciplines. Even so, authors have noted a decreasing trend among LIS researchers to use existing theories rather than develop new ones. As there is no "*best theory*" (Weick, 1985), we should develop and improve theory-building skills (e.g. theorising of theories) to develop more home-based theories (Weick, 1989). Doherty (2012) rightly said that theory-building research is important to ensure the development of LIS research. LIS professionals should invest more in theory building and conducting such studies on the trends of theoretical and conceptual frameworks in LIS research. Researchers should focus more on the theoretical ties between LIS research and research in other neighbouring disciplines, and a meta-analysis of LIS theories could be a solution. Boyce and Kraft (1985) and Buckland (1991) have suggested a strictly defined standard

would not allow for the finding of many theories, even those considered theories within the bounds of LIS, because theories in this field may have had the status of "quasi-theories" (Boyce & Kraft, 1985). Moreover, the lack of a clear road map for theory development in LIS makes the process '*one of the most frustrating and arduous tasks in which a scholar engages*' (Cunningham, 2013).

10. Software and Data Attribution

Active Learning for Systematic Reviews (ASReview) is a free (Libre) open-source machine learning tool for screening and systematically labeling a large collection of textual data. It is designed to accelerate the step of screening abstracts and titles with a minimum of papers to be read by a human with no or very few false negatives. It employs a machine learning technique known as active learning to help with screening for efficient and transparent systematic reviews for academia and beyond. The goal of ASReview is to help scholars and practitioners to get an overview of the most relevant papers for their work as efficiently as possible, while being transparent in the process.

OpenRefine is a free, open source, standalone Java application which visualises and manipulates large quantities of data all at once. It is used for exploring, cleaning, linking and transforming data (an activity commonly known as data wrangling) on a large scale. The functions include are data normalisation, column reorganisation, faceting/clustering, tracking operations, exporting data and so on. It is similar to spreadsheet applications, and can handle spreadsheet file formats such as CSV, but it behaves more like a database. It is more powerful than a spreadsheet; more interactive and visual than scripting; more provisional/exploratory/experimental/playful than a database.

Scopus is an abstracting, indexing and citation database with enriched data and linked scholarly literature across a wide variety of disciplines. It indexes content that is rigorously vetted and selected by an independent review board of experts in their fields. With comprehensive content coverage, high-quality data, and precise search and analytical tools. Scopus gives researchers, librarians, research managers, and R&D professionals the insights to drive better decisions, actions, and outcomes. It empowers users to discover critical information, monitor trends, and identify subject matter experts. It also helps users visualise, compare and export data to evaluate research output and trends.

References

Ajzen I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Alter, S. (2017). Nothing is more practical than a good conceptual artifact … which may be a theory, framework, model, metaphor, paradigm or perhaps some other abstraction. *Information Systems Journal*, *27*(5), 671–693. https://doi.org/10.1111/isj.12116

Aluri, R. (1981). *Application of learning theories to library - Use instruction. Libri*, *31*(1981), 140–152. https://doi.org/10.1515/libr.1981.31.1.140

Babbie, E. (1992). *The practice of social research.* Wadsworth Publishing Company.

Babbie, E. (1995). *The practice of social research* (7th ed.). Wadsworth Publishing.

Babbie, E. (2013). *The practice of social research* (13th ed.). Wadsworth Cengage Learning.

Bates, M. J. (1989). The design of browsing and berrypicking techniques for the online search interface. *Online Review*, *13*(5), 407–424. https://doi.org/10.1108/eb024320

Bates, M. J. (1999). The invisible substrate of information science. *Journal of the American Society for Information Science*, 50(12), 1043–1050. https://doi.org/10.1002/(SICI)1097-4571(1999)50:12<1043::AID-ASI1>3.0.CO;2-X

Bates. M. J. (2006). An introduction to metatheories, theories, and models. In K. Fisher, S. Erdelez. & E. F. McKechnie (Eds.), *Theories of information behavior: A researcher's guide* (pp. 1–24). Information Today.

Bélanger, F., & Crossler, R. (2011). Privacy in the digital age: A review of information privacy research in information systems. *MIS Quarterly*, *35*(4), 1017–1041. https://dx.doi.org/10.2307/41409971

Benoit, G. (2007). Critical theory and the legitimation of LIS. *Information Research*, *12*(4). https://InformationR.net/ir/12-4/colis30.html

Bhattacherjee, A. (2012). S*ocial science research: principles, methods, and practices*. Global Text Project. https://scholarcommons.usf.edu/oa_textbooks/3

Booth, A., & Carroll, C. (2015). Systematic searching for theory to inform systematic reviews: Is it feasible? Is it desirable? *Health Information and Libraries Journal*, *32*(3), 220–235. https://doi.org/10.1111/hir.12108

Bossaler, J., Adkins, D., & Thompson, K. M. (2010). Critical theory, libraries and culture. *Progressive Librarian*, (34/35), 25–38. http://www.progressivelibrariansguild.org/PL/PL34_35/025.pdf

Boyce, B. R., & Kraft, D. H. (1985). Principles and theories in information science. *Annual Review of Information Science and Technology*, *20*, 153–178.

Brookes, B. C. (1980). The foundations of information science Part I. Philosophical aspects. *Journal of Information Science*, 2(3/4), 125–133.

Buckland, M. K. (2003). Five grand challenges for library research. *Library Trends*, *57*(4), 675–686.

Buckland, M. (1991). *Information and information systems*. Greenwood Press.

Chatman, E. A. (1996). The impoverished life-world of outsiders. *Journal of the American Society for Information Science*, *47*(3), 193–206. https://doi.org/10.1002/(SICI)1097-4571(199603)47:3<193::AID-ASI3>3.0.CO;2-T

Chatman, E. A. (1999) A theory of life in the round. *Journal of the American Society of Information Science*, *50*(3), 207–217. https://doi.org/10.1002/(SICI)1097-4571(1999)50:3<207::AID-ASI3>3.0.CO;2-8

Chijioke, O. C., Ikechukwu, A., & Aloysius, A. (2021). Understanding theory in social science research: Public administration in perspective. *Teaching Public Administration*, *39*(2), 156–174. https://doi.org/10.1177/0144739420963153

Cole, C. (2011). A theory of information need for information retrieval that connects information to knowledge. *Journal of the American Society for Information Science and Technology*, *62*(7), 1216–1231. https://doi.org/10.1002/asi.21541

Corley, K. G., & Gioia, D. A. (2011). Building theory about theory building: What constitutes a theoretical contribution? *Academy of Management Review*, *36*(1), 12–32. https://doi.org/10.5465/AMR.2011.55662499

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approach*. SAGE.

Cunningham, G. B. (2013). Theory and theory development in sport management. *Sport Management Review*, *16*(1), 1–4. https://doi.org/10.1016/j.smr.2012.01.006

Dankasa, J. (2015). Developing a theory in academic research: A review of experts' advice. *Journal of Information Science Theory and Practice*, *3*(3), 64–74. https://doi.org/10.1633/JISTaP.2015.3.3.4

Davies, P., Walker, A. E., & Grimshaw, J. M. (2010). A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. *Implementation Science, 5*(14), 1–6. https://doi.org/10.1186/1748-5908-5-14

Dervin, B. (1983). An overview of sense-making research: Concepts, methods, and results to date. Paper presented at Annual Meeting of the International Communication Association, Dallas, TX, USA.

Dervin, B. (1998). Sense-making theory and practice: An overview of user interests in knowledge seeking and use. *Journal of Knowledge Management*, *2*(2), 36–46.

De Vos, A. S., Strydom, H., Fouché, C. B., & Delport, C. S. L. (2005). *Research at grass roots: For the social sciences and human service professions* (3rd ed.). Van Schaik.

Dillon, A. (2007). LIS as a research domain: Problems and prospects. *Information Research, 12*(4). https://informationr.net/ir/12-4/colis/colis03.html

Doherty, A. (2012). Investing in sport management: The value of good theory. *Sport Management Review*, *16*(1), 5–11. https://doi.org/10.1016/j.smr.2011.12.006

dos Santos Maculan, B. C. M., & de Oliveira Lima, G. A. B. (2017). Seeking a definition for the concept of concept. *Perspectivas em Ciência da Informação.*, *22*(2), 54–87. https://doi.org/10.1590/1981-5344/2963

Doty, D. H., & Glick, W. H. (1994). Typologies as a unique form of theory building: Toward improved understanding and modeling. *The Academy of Management Review*, *19*(2), 230–251. https://doi.org/10.2307/258704

Eisenhardt, K. (1989). Building theories from case study research. *Academy of Management Journal*, *14*(4), 532–550. https://www.jstor.org/stable/258557

Ellis, D. (1987). *The derivation of a behavioural model for information retrieval system design*. [Unpublished doctoral dissertation]. University of Sheffield. https://core.ac.uk/download/pdf/9554645.pdf

Ellis, D. (1993). Modeling the information-seeking patterns of academic researchers: A grounded theory approach. *The Library Quarterly*, *63*(4), 469–486. https://doi.org/10.1086/602622

Feather, J. P. (2008). *The Information society: A study of continuity and change* (5th ed.). Facet Publication.

Feehan, P. E., Gragg, W.L., Havener, M.M., & Kester, D.D. (1987). Library and information science research: An analysis of the 1984 journal literature. *Library and Information Science Research, 9*(3), 173-185. https://eric.ed.gov/?id=EJ361398

Ferraro, F., Pfeffer, J., & Sutton, R. I. (2009). How and why theories matter: A comment on Felin and Foss. *Organization Science*, *20*(3), 669–675. https://doi.org/10.1287/orsc.1090.0432

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Addison-Wesley.

Fisher, K. E., Erdelez, S., & McKechnie, L. (Eds.). (2005). *Theories of information behavior*. Information Today.

Fossum, P. K., Fryd, L., & Dahlhaug, O. G. (2013). Design and fatigue performance of large Utility-Scale wind turbine blades. *Journal of Solar Energy Engineering*, *135*(3), 14–16. https://doi.org/10.1115/1.4023926

Garver, N. (2008). What theory is. *Journal of Folklore Research*, *45*(1), 63–70.

Glaser, B., & Strauss, A. L. (1999). *The discovery of grounded theory: Strategies for qualitative research*. Aldine Transaction.

Glazier, J. D., & Grover, R. (2002). A multidisciplinary framework for theory building. *Library Trends, 50*(3), 317–329.

Gonzalez-Teruel, A., & Abad-Garcia, M. F. (2007). Information needs and uses: An analysis of the literature published in Spain, 1990–2004. *Library and Information Science Research*, *29*(1), 30–46. https://doi.org/10.1016/j.lisr.2007.01.001

Gregor, S. (2002). A theory of theories in information systems. In S. Gregor & D. Hart (Eds.), *Information Systems Foundations: Building the Theoretical Base* (pp. 1–20). Australian National University.

Gregor, S. (2006). The nature of theory in information Systems. *MIS Quarterly*, *30*(3), 611–642. https://doi.org/10.2307/25148742

Grover, R., & Glazier, J. (1986). A conceptual framework for theory building in library and information science. *Library and Information Science Research, 8*(3), 227–242.

Hall, H. (2003). Borrowed theory: Applying exchange theories in Information Science research. *Library and Information Science Research, 25*(3), 287–306. https://doi.org/10.1016/S0740-8188(03)00031-8

Hannay, J., Sjoberg, D., & Dyba, T. (2007). A systematic review of theory use in software engineering experiments. *IEEE Transactions on Software Engineering, 33*(2), 87–107. https://doi.org/10.1109/TSE.2007.12

Hartel. J. (2009). Metatheoretical snowmen. *Proceedings of the American Society for Information Science and Technology, 46*(1), 1–5. https://doi.org/10.1002/meet.2009.145046013

Hauser, L. (1988). A conceptual analysis of information science. *Library and Information Science Research, 10*(1), 3–35.

Hider, P., & Pymm, B. (2008). Empirical research methods reported in high-profile LIS journal literature. *Library & Information Science Research*, *30*(2), 108–114. https://doi.org/10.1016/j.lisr.2007.11.007

Hjørland, B. (1998). Theory and meta-theory of information science: A new interpretation. *Journal of Documentation, 54*(5), 606–621. https://doi.org/10.1108/EUM0000000007183

Hjørland, B. (2000). Library and information science: Practice, theory, and philosophical basis. *Information Processing & Management*, *36*(3), 501–531. https://doi.org/10.1016/S0306-4573(99)00038-2

Hjørland, B. (2013). Information Science and its core concepts: Levels of disagreement. In F. Ibekwe-Sanjuan & T. Dousa (Eds.), *Theories of Information,*

Communication and Knowledge (pp. 205–235). Springer.
https://doi.org/10.1007/978-94-007-6973-1_9

Hjørland, B., & Pedersen, K. N. (2005). A substantive theory of classification for information retrieval. *Journal of Documentation, 61*(5), 582–597.
https://doi.org/10.1108/00220410510625804

Jacard, J., & Jacoby, J. (2010). *Theory construction and model-building skills: A practical guide for social scientists*. Guilford.

Jarvelin, K., & Vakkari, P. (1990). Content analysis of research articles in library and information science. *Library and Information Science Research, 12*(4), 395–421.

Jeong, D. Y., & Kim, S. J. (2005). Knowledge structure of library and information science in South Korea. *Library & Information Science Research, 27*(1), 51–72.
https://doi.org/10.1016/j.lisr.2004.09.004

Julien, H. (1996). A content analysis of the recent information needs and uses literature. *Library & Information Science Research*, *18*(1), 53–65. https://doi.
org/10.1016/S0740-8188(96)90030-4

Julien, H., & Duggan, L. J. (2000). A longitudinal analysis of the information needs and uses literature. *Library and Information Science Research*, *22*(3), 291–309.
https://doi.org/10.1016/S0740-8188(99)00057-2

Kaijun, Y., Ruiyi, G., Shanshan, H., & Song, L. (2019). Using fractal theory to study application in Library and Information Science. *Advances in Economics, Business and Management Research*, *100*, 779–782. https://doi.org/10.2991/icoi-19.2019.137

Kaplan, A. (1964). *The conduct of enquiry*. Chandler.

Kenworthy, T. P., & Verbeke, A. (2015). The future of strategic management research: Assessing the quality of theory borrowing. *European Management Journal, 33*(3), 179–190. https://doi.org/10.1016/j.emj.2015.03.007

Kim, S. J. (2004). *A study on efficiency and use of theory in library and information science*. [Unpublished doctoral dissertation], Ewha Womans University.

Kim, S. J., & Jeong, D. Y. (2006). An analysis of the development and use of theory in Library and Information Science research articles. *Library & Information Science Research*, *28*(4), 548–562. https://doi.org/10.1016/j.lisr.2006.03.018

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science*, *42*(5), 361–371. https://doi.org/10.1002/(SICI)1097-4571(199106)42:5<361::AID-ASI6>3.0.CO;2-%23

Kumasi, K. D., Charbonneau, D. H., & Walster, D. (2013). Theory talk in the library science scholarly literature: An exploratory analysis. *Library & Information Science Research*, *35*(3), 175–180. https://doi.org/10.1016/j.lisr.2013.02.004

Lee, B., Barua, A., & Whinston, A. B. (1997). Discovery and representation of causal relationships in MIS: A methodological framework. *MIS Quarterly, 21*(1), 109–134.

Lee, Y., Lee, Z., & Gosain, S. (2004). The evolving diversity of the IS discipline: Evidence from referent theoretical frameworks. *Communications of the Association for Information Systems*, *13*(33), 546–579. https://doi.org/10.17705/1CAIS.01333

Lim, S., Saldanha, T., Malladi, S., Melville, N.P (2009). Theories used in Information Systems research: Identifying Theory Networks in Leading IS Journals. *ICIS 2009 Proceedings, USA, 91*. https://aisel.aisnet.org/icis2009/91

Lor, P. J. (2014). Revitalizing comparative library and information science: Theory and meta-theory. *Journal of Documentation*, *70*(1), 25–51. https://doi.org/10.1108/JD-10-2012-0129

Mansourian, Y. (2006). Adoption of grounded theory in LIS research. *New Library World*, *107* (9/10), 386–402. https://doi.org/10.1108/03074800610702589

Markus, L. M., & Robey, D. (1988). Information technology and organizational change: Causal structure in theory and research. *Management Science*, *34*(5), 583–598. https://www.jstor.org/stable/2632080

McKechnie, L. E. F., & Pettigrew, K. E. (2002). Surveying the use of theory in Library and Information Science research: A disciplinary perspective. *Library Trends*, *50*(3), 406–417.

McKechnie, L. E., Pettigrew, K. E., & Joyce, S. L. (2001). The origins and contextual use of theory in human information behavior research. *New Review of Information Behaviour Research*, *2*(November), 47–63. https://dl.acm.org/doi/10.5555/567681.567685

Mellon, C. A. (1986). Library anxiety: A grounded theory and its development. *College & Research Libraries*, *47*(2), 160–165. https://crl.acrl.org/index.php/crl/article/view/14195/15641

Merton, R. K. (1957). *Social theory and social structure*. Free Press.

Michell, G., & Dewdney, P. (1998). Mental models theory: Applications for Library and Information Science. *Journal of Education for Library and Information Science*, *39*(4), 275–281. https://doi.org/10.2307/40324303

Middleton, L., Hall, H., & Raeside, R. (2019). Applications and applicability of Social Cognitive Theory in information science research. *Journal of Librarianship and Information Science*, 51(4), 927–937. https://doi.org/10.1177/0961000618769985

Morgan, C., & Wildemuth, B. M. (2009). Questions related to theory. In B. N. Wildemuth (Ed.). *Applications of social science research methods to questions in information and library science* (pp. 40–47). Libraries Unlimited.

Mueller, B., & Urbach, N. (2013, December 15–18). *The why, what, and how of theories in IS research* [Conference presentation]. *Thirty Fourth International Conference on*

Information Systems, Milano, Italy. https://aisel.aisnet.org/icis2013/proceedings/ResearchMethods/8

Murray, J. B., & Evers, D. J. (1989). Theory borrowing and reflectivity in interdisciplinary fields. *Advances in Consumer Research*, 16, 647–652. https://www.acrwebsite.org/volumes/6929/volumes/v16/NA-16

Mutula, S. M., & Majinge, R. M. (2017). Shortcomings in library and information science (LIS) PhD projects: Analyses of examined theses and supervised for the period 2008–2016 at select universities in eastern and southern Africa. *Mousaion*, *35*(1), 114–129. https://doi.org/10.25159/0027-2639/1886

Neuman, W. L. (2000). *Social research methods: Qualitative and quantitative approaches* (4th ed.). Allyn & Bacon.

Ngulube, P. (2018). Overcoming the difficulties associated with using conceptual and theoretical frameworks in heritage studies. In P. Ngulube (Ed.), *Handbook of research on heritage management and preservation* (pp. 1–23). IGI Global. https://doi.org/10.4018/978-1-5225-3137-1.ch001

Ngulube, P. (2020). Theory and theorising in information science scholarship. In P. Ngulube (Ed.), *Handbook of Research on Connecting Research Methods for Information Science Research* (pp. 18–39). IGI Global. https://doi.org/10.4018/978-1-7998-1471-9.ch002

Nour, M. M. (1985). A quantitative analysis of the research articles published in core library journals of 1980. *Library and Information Science Research*, *7*(3), 261–273.

Ocholla, D. N., & Roux, J. L. (2011). Conceptions and misconceptions of theoretical frameworks in Library and Information Science Research: A Case Study of Selected Theses and Dissertations from Eastern and Southern African Universities. *Mousaion*, *29*(2), 61–74.

Odi, A. (1982). Creative research and theory building in library and information sciences. *College and Research Libraries*, *43*(4), 312–319. https://doi.org/10.5860/crl_43_04_312

Oliveira Machado, L. M., Martínez-Ávila, D., & da Graça de Melo Simões, M. (2019). Concept theory in library and information science: An epistemological analysis. *Journal of Documentation*, *75*(4), 876–891. https://doi.org/10.1108/JD-11-2018-0195

Onyancha, O. B., & Kwanya, T. (2019). Application of Information Systems theories in library and Information Science Research: A Content Analysis. In D. Njiraine (Ed.), *Digital Technologies for Information and Knowledge Management* (pp. 390–399). The Technical University of Kenya.

Orlikowski, W. J., & Iacono, C. S. (2001). Research commentary: Desperately seeking the 'IT' in IT research–A call to theorizing the IT artifact. *Information Systems Research*, *12*(2), 121–134.

Oswick, C., Fleming, P., & Hanlon, G. (2011). From borrowing to blending: Rethinking the processes of organizational theory-building. *Academy of Management Review, 36*(2), 318–337. https://doi.org/10.5465/amr.2009.0155

Park, S., Lee, J., & Hollister, J. M. (2022). A systematic review on the application of the theory of information worlds. *Journal of Information Science Theory and Practice*, *10*(4), 87–109. https://doi.org/10.1633/JISTaP.2022.10.4.7

Parsa, M., Maghsoudi, A., & Ghezelbash, R. (2016). De composition of anomaly patterns of multi-element geochemical signatures in Ahar area, NW Iran: A comparison of U-spatial statistics and fractal models. *Arabian Journal of Geosciences*, *9*(4), 1–16. https://doi.org/10.1007/s12517-016-2435-5

Peritz, B. C. (1980). The methods of library science research: Some results from a bibliometric survey. *Library Research*, *2*(3), 251–268.

Pettigrew, K. E., & McKechnie, L. E. F. (2001). The use of theory in information science research. *Journal of the American Society for Information Science and Technology*, *52*(1), 62–73. https://doi.org/10.1002/1532-2890(2000)52:1<62::AID-ASI1061>3.0.CO;2-J

Pierce, S. J. (1992). Dead Germans and the theory of librarianship. *American Libraries*, 23(8), 641–643. https://www.jstor.org/stable/25632667

Pinfield, S., Wakeling, S., Bawden, D., & Robinson, L. (2021). *Open access in theory and practice: The theory-practice relationship and openness*. Routledge. https://doi.org/10.4324/9780429276842

Poole, H. L. (1985). *Theories of the middle range.* Ablex.

Puetz, S. J., & Borchardt, G. (2015). Quasi-periodic fractal patterns in geomagnetic reversals, geological activity, and astronomical events. *Chaos Solitons & Fractals*, *81*(12), 246–270. https://doi.org/10.1016/j.chaos.2015.09.029

Rawson, C., & Hughes-Hassell, S. (2015). Research by Design: The promise of design-based research for school library research. *School Libraries Worldwide, 21*(2), 11–25. https://doi.org/10.29173/slw6891

Rayward, W. B. (2004). Pioneers in library and information science. *Library Trends*, *52*(4), 671–987.

Reynolds, P. D. (1971). *A primer in theory construction*. Routledge.

Rinaldo, A., Rodriguez-Iturbe, I., Rigon, R., Ijjasz-Vasquez, E., & Bras, R. L. (1993). Self-organized fractal river networks. *Physical Review Letters*, *70*(6), 822–825. https://doi.org/10.1103/PhysRevLett.70.822

Rioux, K. (2010). Metatheory in Library and Information Science: A nascent social justice approach. *Journal of Education for Library and Information Science*, *51*(1), 9–17.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). Free Press.

Sarter, M. (2006). The consequences of atheoretical, task-driven experimentation: Theoretical comment on Paban, Chambon, Jaffard, and Alescio-Lautier (2005). *Behavioral Neuroscience*, *120*(2), 493–495. https://psycnet.apa.org/doi/10.1037/0735-7044.120.2.49316719713

Schneberger, S. L., Hovorka, D. S., & Larsen, K. R. (2014). Introduction to theories in IS Research minitrack. *47th Hawaii International Conference on System Sciences, USA*, 4588–4588. https://doi.org/10.1109/HICSS.2014.563

Schrader, A. M. (1986). The domain of information science: Problems in conceptualization and in consensus-building. *Information Services & Use*, *6*(5–6), 169–205. https://doi.org/10.3233/ISU-1986-65-601

Schwandt, T. A. (1997). *Qualitative inquiry: A dictionary of terms. Thousand Oaks*. Sage.

Scott, R., Albert, M., Kuper, A., & Hodges, B. D. (2008). Qualitative research - why use theories in qualitative research. *British Medical Journal, 337*, Article 949. https://doi.org/10.1136/bmj.a949

Sidorova, A., Evangelopoulos, N., Valacich, J. S. & Ramakrishnan, T. (2008). Uncovering the intellectual core of the information systems discipline. *MIS Quarterly, 32*(3), 467–482. https://www.jstor.org/stable/25148852

Silverman, D. (2006). *Interpreting qualitative data: Methods for analysing talk, text and interaction*. Sage.

Smit, G.J. (1995). *Research: Guidelines for planning and documentation*. Southern Bank Publishers (Pty) Ltd.

Sonnenwald, D. H. (2016). Exploring theory development: Learning from diverse masters. In D. H. Sonnenwald (Ed.), *Theory development in the information sciences* (pp. 1–18). University of Texas Press.

Spink, A. (1997). Information science: A third feedback framework. *Journal of the American Society for Information Science*, *48*(8), 728–740. https://doi.org/10.1002/(SICI)1097-4571(199708)48:8<728::AID-ASI6>3.0.CO;2-U

Stock, J. R. (1997). Applying theories from other disciplines to logistics. *International Journal of Physical Distribution & Logistics Management*, *27*(9/10), 515–539. https://doi.org/10.1108/09600039710188576

Sugimoto, C. R. (2016). Introduction. In C. R. Sugimoto (Ed.), *Theories of informetrics and scholarly communication* (pp. 1–9). De Gruyter Saur. https://doi.org/10.1515/9783110308464

Sutton, R. I., & Staw, B. M. (1995). What theory is not. *Administrative Science Quarterly*, *40*(3), 371–384. https://doi.org/10.2307/2393788

Swanson R. A. (2013). *Theory building in applied disciplines*. Berrett-Koehlers.

Thomas, G. (1997). What's the use of theory? *Harvard Educational Review*, *67*(1), 75–105. https://doi.org/10.17763/haer.67.1.1x807532771w5u48

Thompson, M. (2009). Remembering Elfreda Chatman: A champion of theory development in library and information science education. *Journal of Education for Library and Information Science*, *50*(2), 119–126.

Togia, A., & Malliari, A. (2017). Research methods in library and information science. In S. O. Dora (Ed.), *Qualitative versus quantitative research* (pp. 43–64). IntechOpen https://doi.org/doi:10.5772/intechopen.68749

Tsang, E. W., & Ellsaesser, F. (2011). How contrastive explanation facilitates theory building. *Academy of Management Review*, *36*(2), 404–419. https://dx.doi.org/10.5465/AMR.2011.59330963

Truex, D., Holmström, J., & Keil, M. (2006). Theorizing in information systems research: A reflexive analysis of the adaptation of theory in information systems research. *Journal of the Association for Information Systems*, *7*(12), 797–821. https://doi.org/10.17705/1jais.00109

Trosow, S. E. (2000). Organizational theory in Library and Information Science Education. *Journal of Education for Library and Information Science*, *41*(2), 129–142. https://doi.org/10.2307/40324060

Ukwoma, S. C., & Ngulube, P. (2021). To borrow or not to borrow is the question? Theory borrowing in Library Information Science postgraduate research in Nigeria and South Africa. *International Information and Library Review, 53*(1), 48–62. https://doi.org/10.1080/10572317.2020.1790261

Vakkari, P., & Kuokkanen, M. (1997). Theory growth in information science: Applications of the theory of science to a theory of information seeking. *Journal of Documentation*, *53*(5), 497–519. https://doi.org/10.1108/EUM0000000007210

Van de Ven, A. H. (1989). Nothing is quite so practical as a good theory. *Academy of Management Review*, *14*(4), 486–489. https://doi.org/10.5465/amr.1989.4308370

Van der Waldt, G. (2021). The judicious use of theory in social science research. *The Journal for Transdisciplinary Research in Southern Africa*, *17*(1), 1–9. https://doi.org/10.4102/td.v17i1.1039

Van Maanen, J. (1998). Different strokes: Qualitative research in the Administrative Science Quarterly from 1956 to 1996. In J. Van Maanen (Ed.), *Qualitative studies of organizations* (pp. 9–32). Sage.

Vickery, B. (1997). Metatheory and information science. *Journal of Documentation*, *53*(5), 457–476. https://doi.org/10.1108/EUM0000000007206

Vogt, W. P. (1993). *Dictionary of statistics and methodology: A nontechnical guide for the social sciences*. Sage.

Wacker, J. G. (2004). A theory of formal conceptual definitions: Developing theory-building measurement instruments. *Journal of Operations Management*, 22(6), 629–650. https://doi.org/10.1016/j.jom.2004.08.002

Walster, D. (1995). Using instructional design theories in library and Information Science Education. *Journal of Education for Library and Information Science*, 36(3), 239–248. https://doi.org/10.2307/40323743

Wang, F., Shi, H., & Ji, X. (2015). The use of theory in Chinese information science research: Based on the content analysis of the journal of the China society for scientific and technical information. *Journal of the China Society for Scientific and Technical Information*, 34(6), 581–591.

Wang, F., Chen, F. and Zhu, N. (2016). Theories of information science in China: Sources, uses and discipline exclusive degrees. *Journal of the China Society for Scientific and Technical Information*, 35(11), 1148–1164.

Wang, F., Zhao, H., & Zhang, W. (2018). Full-scale data analysis on the patterns and academic influence of information science theoretical research in China. *Document, Information and Knowledge*, 6, 15–28. https://doi.org/10.13366/j.dik.2018.06.015

Wang, F., Yang, J., & Wu, Y. (2021). Non-synchronism in theoretical research of information science. *Journal of Documentation*, 77(6), 1430–1454. https://doi.org/10.1108/JD-12-2020-0215

Watson, R. (2001). Research in information systems: What we haven't learned. *MIS Quarterly*, 25(4), 5–15.

Weber, R. (2003). Editors comments: Theoretically speaking. *MIS Quarterly*, 27(3), 3–23. https://doi.org/10.2307/30036536

Weick, K. E. (1985). Theoretical assumptions and research methodology selection. In F. W. McFarlan (Ed.), *The information systems research challenge* (pp. 111–132). Harvard Business School Press.

Weick, K. (1989). Organized improvisation: Twenty years of organizing. *Communications Studies, 40*(3), 241–248.

Welman, J. C., & Kruger, S.J. (1999). *Research methodology for the business and administrative sciences*. Oxford University Press.

Westin, S. M., Roy, M., & Kim, C. K. (1994). Cross-Fertilizations of knowledge: The case of mIS and its reference disciplines. *Information Resources Management Journal*, 7(2), 24–34. https://doi.org/10.4018/irmj.1994040103

Whetten, D. A., Felin, T., & King, B. G. (2009). The practice of theory borrowing in organizational studies: Current issues and future directions. *Journal of Management*, 20(10), 1–27. https://doi.org/10.1177/01492063083305

Wu, M. M., Liang, H.S., Hsieh, H.H., & Lee, V. (2017). Theory use in library and information science journals in Taiwan 2010–2015. In W. Sterzer (Ed.), *Proceedings of the iConference* (pp. 717–721). https://hdl.handle.net/2142/96706

Appendix A: Theories and origin of discipline including purposes and application areas (Ranking by frequency of their occurrences) [31 theories appeared more than once].

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
Grounded theory	Social Science (Socio-Psychology)	83	Usage behavior of library Web sites Data collection and data analysis tool Used as methodology or analysing strategy of library data Developing framework for taxonomy of topics	Public library User service Information literacy Information seeking E-learning
Learning theory	Social Science (Psychology)	20	To design of information literacy instruction Used as a teaching method in producing a more productive learning environment Used as a useful framework for understanding how students learn Focus on the impact of digital library To develop information systems To describe the information searching process	Information literacy Reference service Information seeking
Activity theory	Social Science (Psychology)	19	Data analysis, interpretation & analysis of investigations Impact of blended learning Conceptual framework for the development of information systems Analytical framework for Students' information literacy	Web 2.0 Information Literacy LIS education Knowledge organisation Digital humanities ICT application User studies Information literacy Information seeking

Appendix A; continued

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
Unified theory of Acceptance and Use of Technology (UTAUT)	Management Studies	17	Why to adopt technologies in libraries Acceptance of digital library model and its validation To identify technological gaps among users To understand acceptance and use of open-source library system among university librarians To show adoption and use of social media in university libraries To show use and adoption of e-learning systems To show effect of technology on students' e-learning motivation To understand use behaviour regarding electronic library services To identify factors affecting student use of Web-based services Student's usage of e-learning systems Students' capacity in information searching To identify factors that influence the behavioral intention to use ICT among Polytechnic students Usage intention of learning management systems To study the behavioural intention of student/staff towards use of technology	Open source software Social media E-learning Web-based services Academic library Digital library User study Learning management systems/information system Information Retrieval ICT application
Adult Learning theory	Social Science (Education)	10	To identify the changes in cataloging code and mode of recording metadata To provide reference services in a digital age To develop curriculum or on-line tutorials To identify instructional role of the academic librarian to the teaching-learning transactions in the library To design effective growth opportunities for staff	Information literacy Cataloguing Reference service

Appendix A; continued

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
Constructivist Grounded theory	Social Science (Educational Psychology)	9	Recognises the guiding role & behaviour of the library professionals; Qualitative framework for collection and analysis of data; To measure awareness level of staff	Linked Data; Digital library; Information management
Technology Acceptance Model (TAM)	Management Studies	7	Acceptance and use of e-library services; To identify individuals' technology behaviours	ICT application; Digital library; Library automation
Everett Rogers' diffusion of innovations theory	Communication Studies	6	To identify users and their behaviour towards use of e-library & e-resources; Used as a tool to investigate the process of adoption or non-adoption of social media; To analyse factors contributing to the adoption of virtual worlds by librarians & academicians	Library management; Social media; Digital library
Fuzzy set theory	Science	5	Used as a method of document retrieval; To evaluate student knowledge in e-Learning environment; To measure information and uncertainty	Information Retrieval; Informetrics; E-learning
Critical Race theory	Social Science (Socio-Psychology)	4	Evaluation of bibliographic classification schemes; Perception differences among library users due to Racism and the culture; To organise knowledge (Indexing and Retrieval; To examine the reading lists in LIS courses; To focus on racial differences among library users in the use of library	Academic Library; Classification; Knowledge organisation
Kuhlthau's theory of the information search process	Information Studies	4	As teaching methods; As model/diagram to identify information search processes & search behaviour of users	Information retrieval; Information seeking; Information system and services

Appendix A; continued

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
Queer theory	Social Science (Sociology)	4	To propose different method in which original classification terminology is used To point out the troubles with classification and cataloging decisions	Classification Cataloguing
Shannon's theory of communication	Communication Studies	4	For processing information For understanding and teaching information science and systems To identify the semantic problem in communication To measure the performance retrieval system. To identify difficulties in reference interaction	Information management Knowledge organisation Information Retrieval
Social Cognitive theory	Social Science (Psychology)	4	To identify the factors & to focus on learner´s perception or seeking behaviour towards technology-based learning process	Information-seeking Knowledge organisation Digital library E-learning
Actor-Network theory	Social Science (Sociology)	3	To understand innovation process To understand the process of information systems curriculum	Digital library Information system
Gap theory	Science	3	To measure of library service quality Used as a library assessment tool	Metric Study (Informetrics)
Cognitive Load theory	Social Science (Educational Psychology)	3	How cognitive load affects learning & research Minimising distractions while maximising the student's learning potential Identification of factors that impact learning by librarians during research guide design, multimedia development, and database administration Assistance to research guide editors in assessing their guides	User study User education
Ranganathan's facet theory of classification	Information Studies	3	To organise & search both printed & web resources Used as a framework for describing and syndicating digital repository content	Information Retrieval

Appendix A; continued

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
			To develop automated information retrieval system; To develop cognitive modeling, neural network techniques & pattern recognition; To remove complexities involved in selection of reading and research material in libraries	Library management (Collection development)
Sense-making theory	Social Science (Socio-Psychology)	3	Used as a method to conduct online survey & the follow-up interviews to know the use of digital community information systems by the public; To suggest user-centered ideas for the conceptualisation of information seeking and use	Information seeking; User study
Theory of Change	Social Science (Socio-Political)	3	Used as a method for collecting data to evaluate social values of librarians; To evaluate curriculum; To evaluate professional quality competence	Information literacy; Public library
Theory of Planned Behavior (TPB)	Social Science (Psychology)	3	To identify usefulness and satisfaction level of users towards mobile learning environment; To analyse the factors affecting students' acceptance of mobile learning; To identify the behavioural intention of users in the use of e-resources	Information-seeking; Digital library; E-learning or mobile-learning
Theory of Reasoned Action (TRA)	Social Science (Psychology)	3	Examine and predict users' information-seeking intention; Attitude and behavioural of users towards e-library & LIS schools	Information seeking; User study
5S theory	Science (Computer Science)	2	Examines digital library initiatives; Used for analysing activities in digital libraries; Used as a framework for the development of digital library	Digital library
Adaptive Resonance theory	Social Science (Psychology)	2	To classify web document; To satisfy users' requirement by improving the accuracy of the recommendations for reading materials anticipating their needs in advance	Classification; Digital library

Appendix A; continued

Name of the theory	Originating discipline	Number of articles	Purpose of use	Areas of application
Affinity theory	Science	2	To examine the factors influencing patrons' intention to use university digital libraries To develop a model to identify the antecedents and consequences of user satisfaction with digital libraries	Digital library Information-seeking
Argumentation theory	Social Science (Philosophy)	2	Used for data gathering & its analysis web presence of the scholarly communities	Information seeking Information literacy
Competency theory	Management Studies	2	Focus on competencies required of LIS professionals To assess information literacy skills & actual skill of students	Information literacy Information-seeking
Expectation-Confirmation theory	Social Science (Psychology)	2	To measure the level of satisfaction on their perception regarding the library services To measure the adoption, acceptance & use of mobile learning	Social media Library management Library services
Role theory	Social Science (Social Psychology)	2	To identify the effects of team autonomy on the job satisfaction and psychological well-being of team members To examine the dynamics of librarians as instructors in teaching & research	Library management Information literacy
Structuration theory	Social Science (Sociology)	2	To elucidate the factors that affect collaboration between academics and library staff To focus on collaborative studies	Information-seeking
Uses and Gratifications theory (UGT)	Communication Studies	2	To know information seeking pattern in computer-mediated system To select information media & its use	Information-seeking

Appendix B: Theories & Origin of Discipline (Appeared once in articles) [335 theories].

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Organisational theory	Social Science (Sociology)	Vygotsky's Action theory	Social Science (Sociology)
Mintzberg's organisation theory	Social Science (Sociology)	Vygotsky's Activity theory	Social Science (Psychology)
Social reproduction theory	Social Science (Sociology)	Cognitive Evaluation theory	Social Science (Psychology)
Rights theory	Social Science (Philosophy)	Self-determination theory	Social Science (Psychology)
Theory of orders	Science (Mathematics)	Glaserian Grounded theory	Social Science (Sociology)
Dual Coding theory	Social Science (Psychology)	Spatial Culture theory	Social Science (Anthropology)
Knowledge Creation theory / Theory of Knowledge Generation	Epistemology	Theory of information process / Information processing theory	Social Science (Cognitive Psychology)
Anderson's theory of ACT-R Cognitive Architecture	Social Science (Psychology)	DeLone and McLean IS success theory	Information Systems
Critical theory	Social Science (Sociology)	Open systems theory/Theory of open systems	Sciences (Physics)
Critical theory of Barthes, Deleuze & Guattari & Hayles	Social Science (Philosophy)	Social constructivist theory of learning	Social Science (Sociology)
Theory of Disruptive Innovation	Management Studies	Information foraging theory	Social Science (Psychology)
Conversation theory	Communication Studies	Tzvetan Todorov's structural theory of narrative	Linguistics
Sociocultural theory of Lev Vygotsky & Jean Lave	Social Science (Psychology)	Lewin's Field theory	Social Science (Psychology)
Theory of Management Strategy	Management Studies	Festinger's theory of Cognitive Dissonance	Social Science (Psychology)
Semantic value-theory	Linguistics	MacIntyre's practice-based ethical theory	Social Science (Philosophy)
Ginsberg & Venkatraman's Organisational Structure theory	Social Science (Sociology)	Theory of graphs or hypergraphs	Science (Mathematics)
Three-dimensional structure theory	Sciences	Ingetraut Dahlberg's Concept theory	Social Science (Philosophy)
Education Change theory	Social Science (Sociology)	Edgar Morin's Complex Thought theory	Social Science (Psychology)
Information System Success theory	Information Systems	Tony Becher's theory of tribalism	Social Science (Sociology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Ikujiro Nonaka's Dynamic theory of Organisational Knowledge Creation	Management Studies	Pierre Bourdieu's theories of habitus, cultural capital and reproduction	Social Science (Sociology)
Media Affinity theory	Communication Studies	Rost's theory to academic reference leadership	Management Studies
Engagement theory of Greg Kearsley	Social Science (Educational- Psychology)	Paulo Freire's Critical Educational theory	Social Science (Education)
Laclau & Mouffe's Discourse theory	Humanities	Foucault's theory of power relation	Social Science (Socio-Political)
Management of Change theory	Management Studies	Spatial/Temporal theory	Sciences
Graph theory	Sciences	Theory of Formal Concept Analysis	Sciences
Theory of Choice	Management Studies	Lattice theory	Science (Mathematics)
Theory of Meaning Structures	Social Science (Sociology)	Rhodes's theory of hollowing	Sciences
Pask's Conversation theory	Communication Studies	Information source horizon theory	Information Studies
Theory of Connectivity	Science (Mathematics)	Schon's reflection theory	Social Science (Sociology)
Self-Efficacy theory	Social Science (Psychology)	Darwin's theory of evolution	Sciences
Henry Mintzberg's Management theory	Management Studies	Theory of customer values	Management Studies
C.S. Peirce's Semiotic theory	Humanities	Richard Florida's Creative Class theory	Social Science (Socio-economics)
Constructivist theory	Epistemology	Emotional intelligence theory	Social Science (Psychology)
Satisfaction-Loyalty theory	Management Studies	J.R. Bettman's Consumer Choice theory	Social Science (Sociology)
Cognitive development theory	Social Science (Psychology)	Symbolic Interactionism theory	Social Science (Psychology)
Theory of Daniel Bell/Daniel Bell's theory of the information society	Social Science (Sociology)	Whitley's theory of the intellectual and social organisation of the sciences	Management Studies
Theory of Wittgenstein's notion of language games	Social Science (Philosophy)	Theory of job satisfaction	Social Science (Psychology)
Goal-Setting theory	Social Science (Psychology)	Howard Gardner's multiple intelligence theory	Social Science (Psychology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Counseling theory	Social Science (Psychology)	Maturana and Varela's theory of knowing	Epistemology
Affordance theory	Social Science (Psychology)	Information technology theory	Science (Computer Science)
Theory of social change	Social Science (Sociology)	Resource based-view theory	Management Studies
Theory of value-expectancy	Social Science (Psychology)	Planning and design theory	Sciences
Social network theory	Social Science (Psychology)	Social justice metatheory of Kevin Rioux	Social Science (Sociology)
Expectation-Confirmation theory	Social Science (Psychology)	Pierre Bourdieu's cultural theory of action	Social Science (Sociology)
Locus of Control theory	Social Science (Psychology)	Anthony Giddens' structuration theory	Social Science (Sociology)
Bounded Rationality & Satisficing theory	Social Science (Psychology)	Theory of communicative action	Social Science (Sociology)
Darwin's theory	Sciences	Expectancy Disconfirmation theory	Social Science (Psychology)
Field theory	Social Science (Psychology)	Nudge's theory and gamification	Management Studies
Bourdieu's theory of Field & Habitus	Social Science (Sociology)	Chris Anderson's Long-Tail theory	Management Studies
Selznick's Core competency theory	Management Studies	Quality management theory	Management Studies
Pierre Bourdieu's theory on cultural practices	Social Science (Sociology)	Quality controll theory	Management Studies
Theory of constructivism	Social Science (Sociology)	Contact-zone theory of Mary Louise Pratt	Social Science (Sociology)
Radical Change theory	Social Science (Sociology)	Dempster-Shafer evidence theory	Sciences
Dretske's Semantic Information theory	Information Studies	Adaptive structuration theory	Social Science (Sociology)
Theory of Language Games	Social Science (Philosophy)	Chaos theory	Science (Mathematics)
Decision theory/Decision making theory	Science (Mathematics/Statistics)	Theory of Empiricism, Rationalism & Positivism	Social Science (Philosophy)
Quantum theory	Sciences	Theory of appraisal	Social Science (Psychology)
Vroom's expectancy theory	Social Science (Psychology)	SERVQUAL's gap theory	Management Studies
Mayera's Cognitive theory	Social Science (Psychology)	Goffman's theory of Dramaturgy	Social Science (Sociology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Mayer's Cognitive theory of multimedia learning	Social Science (Psychology)	Abbott's Chaos of Disciplines theory	Science (Mathematics)
Dunns' learning styles theory	Social Science (Psychology)	Maturana and Varela's theory of knowing	Social Science (Philosophy)
Transaction cost theory	Social Science (Economics)	Herzberg Hygiene's motivational theory	Social Science (Psychology)
Resource dependency theory	Management Studies	John Rawls's theory of Justice	Social Science (Philosophy)
Game theory	Social Science (Economics)	Ludwig Wittgenstein's Picture theory	Linguistics
Stakeholder theory	Management Studies	Extension theory	Sciences
Lefebvrea's Spatial Triad theory	Sciences	Theory of Task–Technology-Fit	Management Studies
Habermas's theory	Social Science (Media Studies)	Social Influence theory	Social Science (Psychology)
David A. Kolb's theory of Experiential Learning	Social Science (Socio-psychology)	Educational theory of John Dewey	Social Science (Educational Psychology)
Social capital theory	Social Science (Sociology)	Prospect theory	Social Science (Psychology)
The Theory of Radical Change of Eliza Dresang	Social Science (Sociology)	Elementary theory of knowledge interaction	Social Science (Cognitive psychology)
Bandura's Social Learning theory	Social Science (Psychology)	Eleanor Rosch's basic-level theory	Social Science (Psychology)
Vygotsky's Social Constructivism theory	Social Science (Sociology)	Abraham Maslow's Hierarchy of Needs Theory	Social Science (Psychology)
Gate-keeping theory	Social Science (Socio-psychology)	Clayton Alderfers' ERG theory	Social Science (Psychology)
Stephen Krashen's Cognitive theory	Social Science (Psychology)	Frederick Herzberg's two-wire theory	Social Science (Psychology)
Felder-Silverman Learning Style Model theory	Social Science (Psychology)	Douglas McGregor's theory of X and Y	Management Studies
Cole's theory of information needs	Information Studies	David's theory of needs	Management Studies
Originating Discipline	**Originating Discipline**	**Originating Discipline**	**Originating Discipline**
Maniotes' concept of Third Space	Social Science (Psychology)	McKeland, Porter & Loller's theory of similarity	Social Science (Psychology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Brian Cambourne's theory of learning	Social Science (Sociology)	Lev Vygotsky's Zone of Proximal Development theory	Social Science (Psychology)
Kolb's Learning theory	Social Science (Sociology)	Toren theory	Information Studies
Carol S. Dweck's theory of Intelligence/Carol S. Dweck's entity and incremental theory of intelligence	Social Science (Psychology)	Becher, Trowler & Whitley's theories of the cultural organisation of disciplines	Social Science (Sociology)
Complexity theory	Science (Computer Science)	Optimal Foraging theory	Social Science (Psychology)
Robert Gagne's Educational theory	Social Science (Education)	Leadership theory	Management Studies
Systems theory	Sciences (Biology)/Social Science (Sociology)	Pierre Bourdieu's theory of practice	Social Science (Anthropology & Sociology)
Educational theory	Social Science (Educational Psychology)	Johari's Window theory	Social Science (Cognitive Psychology)
Theory of communication	Communication Studies	Sandra Erdelez's theory of Information Encountering	Social Science (Psychology)
Contingency theory	Management Studies	Mathematical theory of classification	Science (Mathematics)
Pedagogical theory of Kolb & Vygotsky	Social Science (Education)	Education Change theory of Fullan	Social Science (Sociology)
Social Positioning theory	Social Science (Philosophy)	Path dependence theory	Social Science (Economics)
Weick's sensemaking theory	Social Science (Psychology)	Theory of knowledge classification	Epistemology
Theory of homophily and proximity	Social Science (Sociology)	Rough set theory	Sciences
Theory of social exchange/Social exchange theory	Social Science (Sociology)	Least Information theory	Sciences
Family systems theory	Social Science (Sociology)	Tarasti's theory of musical semiotics	Humanities/Linguistics
Theory of probability	Science (Mathematics)	Theory of discourse structure	Humanities/Linguistics
Fuzzy logic theory	Sciences (Statistics)	Hofstede's cultural dimensions theory	Social Science (Socio-psychology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Fiedler's Contingency theory	Management Studies	Sound theory	Management Studies
Fiedler's Contingency theory of Leadership	Management Studies	Social justice theory	Social Science (Psychology)
Bardin's contingency analysis theory	Social Science (Psychology)	Theory of clustering	Management Studies
Argumentation theory	Social Science (Philosophy)/ Communication Studies	Media richness theory	Social Science (Cognitive Psychology)
Theory of information discernment	Social Science (Philosophy)	Social choice theory	Social Science (Sociology)
Likert's theory	Management Studies	French theory on information study	Social Science (Philosophy)
Motivation theory	Social Science (Psychology)	Theory of the wisdom of crowds	Social Science (Psychology)
Control theory	Sciences	Trust and Commitment Theory of Relationship Marketing	Management Studies
Theory of Public Choice	Social Science (Sociology)	Conspiracy theory	Social Science (Psychology)
Lakoff & Johnson's Conceptual Metaphor theory	Linguistics	Discrepancy theory	Social Science (Psychology)
Nonaka's knowledge creating theory	Management Studies	Set theory	Science (Mathematics)
Luhmann's systems theory	Social Science (Sociology)	Weak-tie theory of Nick Granovetter	Social Science (Psychology)
Information theory/Theory of information	Information Studies	James Moor's just-consequentialist theory	Social Science (Philosophy)
Gap theory of Service Quality	Management Studies	Theory of experiment	Sciences
Mathematical theory of communication	Science (Mathematics)	Meaning-Text theory	Linguistics
Simon's Bounded Rationality theory	Social Science (Economics)	Hypertext theory	Sciences
Information Problem Solving Model	Science (Mathematics)	Garfield's citation theory	Sciences
Chatman's theory of information poverty	Social Science (Sociology)	Fractal theory	Sciences
Role theory	Social Science (Socio-psychology)	Theory of quantum information	Sciences
Structural Functionalism theory	Social Science (Sociology)	Boundary object theory	Social Science (Sociology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Cultural Historical Activity theory	Social Science (Psychology)	Behavioural decision theory	Behavioral Science & Economics
Theory of connectivism	Social Science (Educational Psychology)	Stages theory of Nolan	Social Science (Psychology)
Christensen's disruptive technologies theory	Management Studies	Belkin's Anomalous State of Knowledge (ASK) theory	Information Studies
Change management theory	Management Studies	Theory of open access	Social Science (Philosophy)
Genre theory	Sciences (Biology)	Principle of Least Effort of George Zipf	Social Science (Educational psychology)
Goffman's theory of interaction	Social Science (Sociology)	Educational theory of Constructivism	Social Science (Sociology)
Social epistemological theory	Social Science (Psychology)	Postmodern theory of knowledge organisation	Humanities
Information Utilisation theory	Social Science (Cognitive Psychology)	Theory of innovation and strategy	Social Science (Sociology)
Adaptive structuration meta-theory	Social Science (Sociology)	Jung's theory of psychological nature	Social Science (Psychology)
Diffusion of Innovations theory	Social Science (Sociology)	Leisure theory	Social Science (Socioeconomic)
Brenda Dervin's sense-making theory	Social Science (Psychology)	Attribution theory	Social Science (Psychology)
Anxiety-uncertainty management theory	Management Studies	Constructivist-influenced grounded theory	Social Science (Sociology)
Habermas' theory of the Public Sphere	Social Science (Educational-sociology)	Concept of meaning holism	Social Science (Philosophy)
Whitley's theory of mutual dependence' and task uncertainty	Social Science (Economics)	Theory of Peter Checkland	Management Studies
Straussian Grounded theory	Social Science (Sociology)	Glaser & Strauss's grounded theory	Social Science (Sociology)
Active learning theory	Social Science (Educational Psychology)	Sociocultural learning theory	Social Science (Educational Psychology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Learning style theory	Social Science (Psychology)	Kurt Lewin's gatekeeping theory	Social Science (Social Psychology)
Expectancy theory	Social Science (Psychology)	Theory of constructionism of Seymour Papert	Social Science (Psychology)
Mayer's theory of Multimedia Learning	Social Science (Psychology)	Cognitive flexibility theory	Social Science (Psychology)
Cognitive theory of Howard Gardner	Social Science (Psychology)	Classical learning theory	Social Science (Sociology)
Stephen Krashen's cognitive theory	Social Science (Psychology)	Cognitive theory	Social Science (Psychology)
Knowledge Life Cycle theory	Epistemology	Knowledge stickiness theory	Communication Studies
Regulation theory	Social Science (Economics)	Motivational design theory	Social Science (Psychology)
Instructional design theory	Social Science (Cognitive & behavioral Psychology)	Stephen Grossberg & Gail Carpenter's Adaptive Resonance theory	Social Science (Psychology)
Concept theory in LIS and KO	Social Science (Psychology)	Leong's theory of racial capitalism	Social Science (Sociology)
Resource-based theory	Management Studies	Theory of cognitive fit	Information Studies
Competency theory	Management Studies	Small-world theory	Social Science (Psychology)
Level theory / Construal level theory	Social Science (Socio-psychology)	Information system theory	Information Studies
Knowledge Organisation theory	Management Studies	Theory of team learning and pedagogy	Social Science (Education)
Social computing theory	Science (Computer Science)	Cultural dimensions theory of Geert Hofstede	Social Science (Psychology)
Contextual learning theory	Social Science (Education)	Distant education theory	Social Science (Education)
Theory of student development	Social Science (Socio-psychology)	Self-regulated learning theory	Social Science (Psychology)
Interaction Theory	Social Science (Psychology)	Theory of generalised exchange	Social Science (Sociology)
Means-end chain theory	Management Studies	Social process theory	Social Science (Psychology)
Practice theory	Anthropology & Sociology	Theory of information management	Epistemology
Transition theory	Sciences	Innovation management theory	Social Science (Sociology)

Appendix B; continued

Name of the theory	Originating discipline	Name of the theory	Originating discipline
Linguistic theory	Linguistics	Medium-theory	Communication and media studies
Hierarchism and binary theory	Sciences	Unit theory	Science (Mathematics)
Personal construct theory	Social Science (Psychology)	Interpretive theory of action	Social Science (Sociology)
Evolutionary theory	Sciences	Perry's theory of intellectual and moral development	Social Science (Socio-psychology)
Stuart Selber's theory of multiliteracies	Social Science (Education)	Renninger's theory of interest development	Social Science (Psychology)
Gunther Kress's theory/Kress's communication theory	Communication Studies	Grow's theory of self-directed learning	Social Science (Education)
Development theory/Theory of development	Social Science (Psychology)	Waismann's theory of open texture	Social Science (Philosophy)
Epistemological development theory	Social Science (Philosophy)	Bakhtin's theory	Social Science (Philosophy)
Information Systems Design theory	Information studies	Theory of collaboration	Social Science (Sociology)
Cultural theory	Social Science (Sociology)	Archive theory	Sciences/Archival Science
Entropy theory	Sciences	Communication theory of cultural cognitive design	Science (Mathematics)
Theory of Knowledge Communication	Communication Studies	Theory of cultural cognitive design	Social Science (Psychology)
Common good theory	Social Science (Philosophy)	Epistemological theory	Epistemology
Contemporary practice theory	Social Science (Sociology)	Ikujiro Nonaka's theory	Management Studies
Digital preservation theory	Sciences/Archival Science	Intelligent Tutoring System theory	Science (Computer Science)
Information Literacy theory	Social Science (Education)	Record Management theory	Sciences/Archival Science
The LibQUALp TM Model/LibQUALp TM Model	Management Studies	Non-communication models of information theory	Science (Mathematics)

[**Social Sciences Subjects & Number of Theories** = 5 subjects and 177 theories [Psychology = 88; Sociology = 52; Philosophy = 19; Economics = 9; Education = 9]; **Sciences** = 50 theories (Mathematics = 15; Computer Science = 4); **Management Studies** (organizational studies & strategy) = 42 theories; **Information Studies** = 8 theories; **Linguistics** = 8 theories; **Communication Studies** = 7 theories; **Epistemology** = 7 theories; **Humanities** = 5 theories; **Others/Not calculated** = 31 theories].

Appendix C: Library & Information Science (LIS) theories (occurrence is not counted) [45 theories].

Ranganathan's theory of library services	Brown's theory on Classification	Haines's theory of book selection
Document theory/Theory of documentary	Kuhlthau's model of the information search process	Carter's theory of book selection
Ranganathan's theory of book selection	Marchionini's information-seeking behaviour theory	Bonk's theory of book selection
Information retrieval theory/Theory of information retrieval	Theory of authorship and bibliographic identity	Osborn's theory of serials cataloging
Noruzi's five laws of the Web	Library 2.0 theory	Birdsall's theory of Progressive Librarianship
Faceted theory of classification	Theory of metadata enriching and filtering	Thompson's five laws of librarianship
Facet analytical theory	Theory of digital library metadata	Dynamic theory of classification
Information-seeking behaviour model/Theory of information seeking	Wilson's information-seeking behaviour theory/Wilson's general model of information behaviour	Thomas Adams and Nicholas Baker's 'new model for the study of the book
Jonker, Heilprin, Landry & Salton's theory of indexing	van Dijk's bibliographic classification theory	Theory of collection development
Wittgenstein's remarks theory in information retrieval	Explanatory theory of librarianship	Cataloguing and classification theory
The Information use and user behaviour theory	Indexing theory	Informetrics theory
Drury's theory of book selection	Theory of reference and information service	Nicholas Belkin's information theory
Heany's cataloguing theory	Theory of cataloguing	Unified theory of librarianship
Library automation theory	Dewey's theory of book selection	Theory of green library management
Teacher and librarian collaboration theory	Crowd's theory of collection development	Ranganathan's classification theory