Information Overload and Information Poverty: challenges for healthcare services managers?

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Abstract

Purpose – To gain insight into managers' decision making practices when challenged by inappropriate information quality, and to test frameworks developed from research to see if they apply to these managers.

Design/methodology/approach - This exploratory, multiple case study used the critical incident technique in nineteen semi-structured interviews. Responses were analyzed using framework analysis, a matrix-based content analysis technique, and then considered with respect to the research literature on information overload, information poverty and satisficing.

Findings – The managers in this study tended to *satisfice* (terminate the search process and make a good enough decision while recognizing that information gaps remain). Those challenged by too little information appear to fit descriptions of information poverty while others described aspects of information overload.

Research limitations/implications –A shortage of information behaviour research on managers makes it difficult to conclude whether these results are typical of managers in general or of healthcare services managers specifically. Further research is needed to confirm initial findings and address questions suggested by this paper.

Practical implications – This paper suggests that existing definitions for the concepts of information poverty and information overload can be used to describe managers' experiences.

Originality/value – This paper contributes to what is known about information behaviour in managers in general and healthcare services managers specifically. It may serve as an example of how to consider new research findings within existing frameworks.
Keywords: healthcare services managers, satisficing, information poverty, information overload.
Article Type: Research paper

1. Introduction

This paper presents findings from the first phase of a two-part PhD research study designed to increase understanding of managers' workplace information behaviours. Healthcare services managers making critical decisions were asked about their information practices. It is suggested that the information behaviours of these healthcare services managers are similar to those of managers in general. Content for this paper was gathered to specifically to answer a question that arose during the data analysis phase.

LIS (Library and Information Science) researchers have noted that librarians designing library and information services and acquiring information resources for workplace use must first understand the needs of the groups who will use them:

> *..the search for determining factors related to needs and information-seeking behaviour must be broadened to include aspects of the environment within which the work-role is performed* (Wilson, 1981).

> *In order to investigate the information-seeking behaviors of professionals, the broader working context in which professional practice is conducted must be closely examined and understood* (Leckie *et al.,* 1996).

There is comparably less LIS research to help those designing information services and selecting information resources to understand managers (Case, 2006) than for those serving students and academic staff, professional groups and members of the general public (Julien and Duggan, 2000). Although not focused on information behaviour, decision-making research from business and the management sciences, particularly from Operations Research, contributes to what we know about workplace information needs:

> *The work of managers, of scientists, of engineers, of lawyers--the work that steers the course of society and its economic and governmental organizations--is largely work of making decisions and solving problems. It is work of choosing issues that require attention, setting goals, finding or designing suitable courses of action, and evaluating and choosing among alternative actions.* (Simon *et al.,* 1986)

This paper will be of interest to those studying the effects of inappropriate information quantity on decision-making and to those who provide information services to managers. It also exemplifies how a framework developed from studies of specific occupational or demographic groups might be used to look at other groups. Finally, it will interest researchers who are exploring characteristics of information poverty and information overload by suggesting how well existing definitions describe issues relating to the quantity of information for managers.

1.1. Definitions

For the purposes of this research, a *manager* is defined as a paid employee charged with the responsibility of leading an organization or one of its subunits; the manager may or may not have staff to supervise or budgets to manage. A manager may be a member of *senior executive*, the Chief Executive Officer, or a Vice-president who manages a portfolio of services, a *director* who oversees services of two or more departments, or a department *manager*. Those in a fourth category, termed "Junior Leader", oversee specific initiatives within a department or service, such as injury prevention, health planning, or infection control but do not supervise staff or manage budgets.

A manager's *information behaviour* is defined as:

> *...how individuals approach and handle information. This includes searching for it, using it, modifying it, sharing it, hoarding it, even ignoring it. Consequently, when we manage information behavior, we're attempting to improve the overall effectiveness of an organization's information environment through concerted action.* (Davenport and Prusak 1997).

2. Literature Review

Preliminary data analysis from 19 semi-structured interviews with managers revealed a pattern of satisficing (i.e. that managers would terminate the search process and make a good enough decision while recognizing that information gaps remain). When participants said they made decisions without all of the information they would like to have had, the researchers wanted to know why. A previous literature review conducted in 2003-2004 to support proposal development and study design had not included research on information quantity and related concepts. A subsequent literature review therefore explored the concepts of information poverty and satisficing to explore the extent to which they applied to these managers.

This section describes the literature search conducted during data analysis and then updated for this paper.

2.1. Search Methods

A scoping search using *Web of Knowledge* was conducted in 2008 to gain an impression of the size of the body of literature related to information quantity. It was repeated in early 2010 for this paper. *Web of Knowledge* was chosen as a useful starting point because it suggests fields of study that might be searched together with the relative size and publication date range of the literature in each field.

General natural language terms used in the Web of Knowledge scoping search included the phrases "information quantity", "information overload", "information poverty" and the word stem "satisfic*" to retrieve satisficing, satisfice and satisficed. As a snapshot of the literature written by researchers using these terms was needed, a decision was made to limit the search to these topics. Retrieval was neither limited to research publications nor to publications where these were the main focus of the publication. This overview thus includes opinion pieces and narrative reviews as well as articles where information quantity and related concepts are minor aspects of the publication.

From fields suggested by the scoping search, databases within LIS, Business, and the Management Sciences, the Computer Sciences, Health and Medicine were searched. Individual databases

included *MEDLINE; ACM Digital Library; Library Literature, Library and Information Sciences Abstracts; CINAHL; ABI Inform; Digital Dissertation*s and *Ebsco Health Business Elite*. Citation chaining using *Web of Knowledge* (Akin, 1998) allowed follow up of articles that seemed particularly relevant to help identify additional key research articles.

This review was undertaken as preparatory work for part 2 of the PhD thesis research. It was not meant to be an exhaustive search for research as required for a systematic review. Elements of the literature review presented in this paper include research on information quantity and related concepts that included definitions with potential for use in cross-case analysis and research on managers' workplace information behaviours with an emphasis on healthcare services managers.

2.2. An Overview of the Relevant Literature

The scoping search identified 4,183 records that mentioned information quantity, information overload, information poverty and/or satisficing. These were spread through twelve broad and overlapping fields of study created by combining narrower subject areas (Table 1).

2.2.1. Fields of Study

About one third of the references came from the Computer Sciences, including Artificial Intelligence.

Fields of Study	Number of References			
	Information Quantity	Information Overload	Information Poverty	Satisficing
Computer Science, including Artificial Intelligence	993	971	11	288
Mathematics and the Physical Sciences	725	80	0	163
Engineering and Architecture	540	223	1	141
Health and the Biomedical Sciences	637	168	9	31
Business, Operations Research, Economics and the Management Sciences	191	264	2	218
Agriculture, Fisheries and the Biological Sciences	269	37	0	25
Social Sciences	53	100	21	100
Psychology and the Behavioural Sciences	101	64	0	79
Library and Information Science	47	139	15	16
Earth Sciences	133	17	0	34
Other Sciences	131	27	1	5
Law and Political Science	0	14	0	1

Table 1: Analysis of 4,183 records related to information quantity and satisficing, published in twelve broad and overlapping fields of study, 1934-2009, as indexed in Web of Knowledge February 2010.

About half came from four areas: Mathematics and the Physical Sciences (14%), Engineering and Architecture (13%), Health and the Biomedical Sciences (12%) and Business, Operations Research, Economics and the Management Sciences (10%). The rest came from other fields including Library and Information Science, which accounted for only 3% of references.

2.2.2. Publication Dates

Web of Knowledge indexed articles related to information quantity back to 1934, with 81 publications published between 1934 and 1989. These articles related to either information overload (56%, n=45) or information quantity (44%, N=36). After 1990, the number of publications related to information overload, information quantity generally, and satisficing increased annually (Figure 1). There has been less research on information poverty (Table 1); a slight increase noted in 2003-2004 was not sustained (Figure 1).

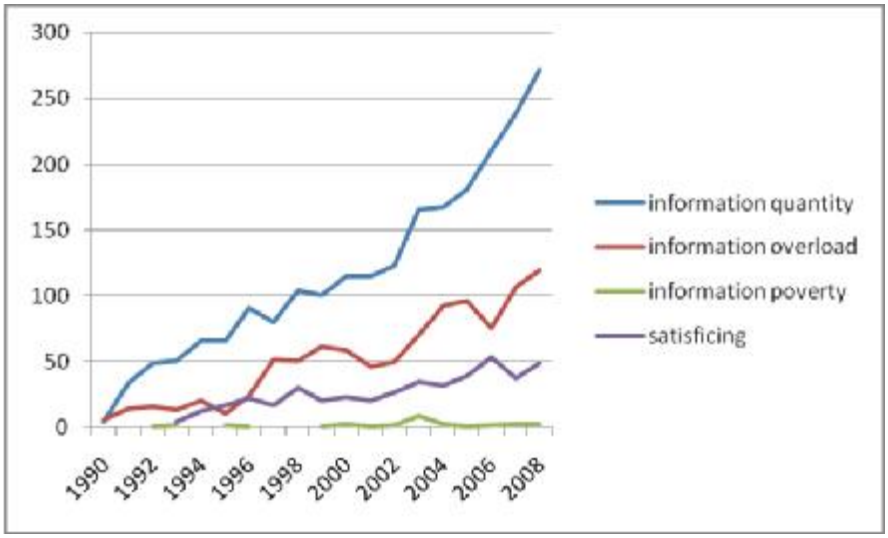

Figure 1 Line chart showing increases in publications related to information overload, information quantity and satisficing, as indexed in Web of Knowledge for 1990-2008 publications.

2.2.3. Information Quantity and Managers

Only 2.6% (N=95) of the 4,183 publications retrieved referred to managers in the title, abstract or subject group. Most were from Business or Computer Science literature; only 12 from the LIS literature.

2.2.4. Review Articles

One function of a scoping search is to identify existing reviews (University of York. Centre for Reviews and Dissemination, 2009). Thorough literature reviews were identified in three recent papers on information quantity concepts. Haider and Bawden (2007) reviewed and discussed 35 LIS articles on information poverty. An article on satisficing (Prabha *et al.,* 2007) also included a review. Bawden and Robinson (2009) reviewed the literature on both information overload and satisficing. Thesis work on information poverty completed by Britz (2004) and by Iastrebova (2006) on information overload also included literature reviews.

2.3. Information Behaviours of Healthcare Services Managers Compared with Other Groups

Several researchers have considered whether healthcare services managers are similar to other groups with respect to their information needs and practices. They have been compared with health care clinicians, with scholars studying, teaching or conducting research in health fields and with managers in general. To extend the usefulness of this article beyond understanding healthcare services managers, this work is summarized below.

Head (1996) looked for differences between career managers (entering healthcare services as managers rather than as clinicians), and hybrid managers (who began as clinical professionals and later became managers). She found that some hybrid managers carried over some skills learned as healthcare professionals to their management roles but found that the nature of their need for information as managers had changed from that experienced in their earlier role.

Choo (1993) compared managers with scholars and scientists. He found that managers frequently need to solve immediate problems that are presented to them, rarely with time to study them or read related research. In comparison, scholars and scientists first work to identify research problems and then are free to study them for long periods of time before reaching conclusions (Choo and Auster 1993). Labadie (2005) used a metaphor of firefighters and arsonists at a house fire to describe the difference between healthcare services managers and health services researchers. He likened healthcare services managers to firefighters, running around trying to put the fire out and researchers to arsonists, getting their matches ready to see if the house down the street will burn the same way.

Moahi (2000) looked at tasks carried out by healthcare managers, their information needs, motivation for information seeking, information seeking behaviour, information sources and channels, and problems and barriers to information. She concluded that participants in her study were similar to managers in general with respect to their information behaviour.

In two earlier publications the authors (MacDonald *et al.,* 2008a); (MacDonald *et al.,* 2008b), have identified similarities between healthcare services managers and managers in general with respect to managers' roles, reliance on personal information sources and approaches to decision making. The first used Mintzberg's ten managerial roles (Mintzberg, 1973) to classify how healthcare services managers described their own roles when engaging in decision-making (MacDonald *et al.,* 2008a) .

Managers value internal information sources and rely on co-workers and colleagues with whom they have established relationships (MacKenzie, 2005). Information flow is often hierarchical with managers obtaining most information from subordinates closest to them (Jones and McLeod, 1986). A second paper by the authors described how managers rely on information from subordinates and counterparts (MacDonald *et al.,* 2008b) concluding that findings were similar to those described by MacKenzie (2005).and Jones et al. (1986).

Researchers who have considered decisions in real world settings have classified a typical decision-making approach used by managers who are proficient decision makers as *Naturalistic decision-*

making (NDM) ((Berryman, 2008, Lipshitz *et al.,* 2001). NDM is characterized by group decisions, time pressures, poorly defined goals, high stakes, the importance of expertise, a focus on assessing the situation over selecting a course of action, reliance on experience in the form of situation matching and story-telling to anticipate the decision outcome rather than on searching for new information (Lipshitz *et al.,* 2001). NDM tends to *singular evaluation approach* where each option is evaluated on its own merits. Even if several options are considered, they are considered one at a time (Klein, 1998). This differs from *optimizing* where in a *comparative evaluation approach* features of several alternatives are compared before the best one is selected. Baker *et al.,* (2004) have suggested that naturalistic decision making is used in healthcare services. This has also been suggested in an earlier publication by the same authors (MacDonald *et al.,* 2008a).

There is not sufficient research on healthcare services managers' information behaviour to allow firm comparisons with other groups. The work that does exist suggests that they have more in common with managers in general than with health care clinicians or with scholars studying, teaching or conducting research in health related fields.

2.4. Information Quantity and Related Concepts

Three recent studies suggest information overload is more likely a problem for managers than information poverty. A survey of over 1,000 managers in large profitable American and British companies (Accenture Information Management Services, 2007) determined that the ever-increasing amount of information flooding the workplace, e.g., via e-mail, instant messaging systems and the Blackberry, was the most important reason participants experience difficulty with information. A LexisNexis survey of 650 American white collar and knowledge workers across 23 sectors (WorldOne Research, 2008) found virtually every industry being adversely affected by information overload. It was a particular concern in the legal sector where almost 80% of participants reported being increasingly overloaded with information. Neither study referred to managers not having enough information but the Accenture (2007) survey participants noted that it was easier to get information about their competitors than about their own companies.

A survey of 124 managers in Australia, Hong Kong, United States and the United Kingdom identified too much information as the leading factor in information overload, followed by difficulty managing information, irrelevance or unimportance of most information, lack of time to understand information, and multiple sources of information (Farhoomand and Drury, 2002).

A recent study of 205 healthcare services planners and decision makers identified problems with both too little and too much information. Bowen *et al.,* (2009) identified four factors affecting use of evidence in decision-making by healthcare services managers; lack of data, lack of systems to track and manage data, data overload and lack of capacity and support to search for information (Bowen *et al.,* 2009).

On the surface, information poverty and information overload appear at opposite ends of an information quantity continuum with too little information, or else ignorance about information, at one end and too much information or anxiety about too much information at the other. These phenomena are generally considered separately in the literature. In his book on information seeking, Case (2006) looks at them consecutively but separately in a section on avoiding information.

Authors writing on the concepts separately observe that each lacks a firm definition and is associated with several closely related concepts (Britz, 2004, Wilson, 2001). Goulding considers these two concepts together (Goulding, 2001), concluding that those suffering from information overload, and the more severe information fatigue syndrome, risk suffering the same fate as the information poor. In another discussion of the information rich and the information poor, (Feather, 2004) notes that although the value of information accumulates, adding value to prior information until it reaches the point of information overload, unlike many commodities, information has no scarcity value. When information is scarce, its value does not increase.

2.4.1. Information Poverty

As suggested by Table 1, there are fewer publications on information poverty than on other concepts considered in this paper. A higher proportion of information poverty references exists in the LIS literature than for other concepts (N=15, 1 in 4). No specific research on organizational information poverty in managers has been identified. This section of the literature review, therefore, focuses on information poverty in general.

In their discourse analysis investigating information poverty within LIS research and practice, Haider and Bawden (2007) identified 35 papers published between 1995 and 2005. Through *close reading* (a literary analysis technique that uses careful reading, re-reading and analysis to interpret meaning from text), the authors identified four determining factors associated with information poverty. These are *economic determinism*, whether rich or poor; *technological determinism*, whether connected to the Web or having access to the right tools or skills; *historicizing the information poor*, associated with public libraries' traditional role in providing a way to share information among those without the means to acquire it for themselves, and the *profession's responsibility and moral obligation* to take action over political or moral concerns, such as censorship or apartheid.

Early work on information poverty (Childers and Post 1975) focused on people who are socio-economically disadvantaged, judged of limited relevance to studies of managers' information practices. Studies of well-to-do, but marginalized, populations (Chatman, 1991) may be more relevant. Chatman (1996) considered Merton's sociological theory about insiders and outsiders (Merton, 1972) to develop a theory about information poverty whereby the insider group has privileged access to information and the outsider group does not. Chatman's six propositions about information poverty (Chatman, 1996) are broadly characterised in Table 2.

	Chatman's Theory of Information Poverty	*Britz' Main Variables of Information Poverty*
1	*The information poor believe they are devoid of any sources that might help them.*	*Related to the inaccessibility of quality, relevant and suitable information;*
2	*Information poverty is partially associated with class distinction ...influenced by outsiders who withhold privileged access to information.*	*Co-determined by the absence of a well-developed, well maintained and user-friendly information infra structure ;*
3	*Determined by self-protective behaviors that are used in response to social norms.*	*Closely linked to the level of education and literacy, particularly information literacy;*
4	*Secrecy and self-deception are self-protecting*	*Determined by the attitude/approach towards information and the use thereof as well as the understanding of the value that can be attributed to it;*
5	*A decision to risk exposure about true problems is often not taken due to a perception that negative consequences outweigh benefits.*	*A global phenomenon, but can also occur within the same community and context;*
6	*New knowledge will be selectively introduced into the information world ...influenced by its relevance to everyday problems and concerns & usefulness to a current situation*	*Related to a lack of material and other means to access information; and not only an economic occurrence, but has an important bearing on the cultural, political and social spheres of society*
7		*Not only an economic occurrence, but has an important bearing on the cultural, political and social spheres of society*

Table 2 Chatman's Theory of Information Poverty (Chatman, 1996, p.197) and Britz' Main Variables of Information Poverty (Britz, 2007, p.76)

Britz (Britz, 2004) takes an even broader perspective with less emphasis on people who are socioeconomically disadvantaged. He defines information poverty as

> *"The situation in which individuals and communities, within a given context, do not have the requisite skills, abilities or material means to obtain efficient access to information, interpret it and apply it appropriately. It is further characterized by a lack of essential information and a poorly developed information infrastructure* (Britz, 2004, p.192)

Britz (2007) outlined the main variables of information poverty (**Error! Reference source not found.**). These may be more appropriate for considering managers' information situations than Chatman's (Chatman, 1996).

2.4.2. Information Overload

Most work on information overload has been published in the computer sciences followed by business and the management sciences, then engineering and architecture (Table 1). There are more publications on information overload than on information poverty with work spanning a longer

period of time. Much research about information overload has developed since the early 1900s as the world changed from an industrial to an information-based economy (Tidline, 1999).

Information overload has been defined at both personal and organizational levels. At the personal level, it is

> *"...a perception on the part of the individual ... that the flow of information associated with work tasks is greater than can be managed effectively, and a perception that overload in this sense creates a degree of stress for which his or her coping strategies are ineffective (Wilson, 2001, p.113)*

At the organizational level, information overload is

> *"...a situation in which the extent of perceived individual information overload is sufficiently widespread within the organization as to reduce the overall effectiveness of management operations (Wilson, 2001 p.113)*

Other characteristics of information overload are considered by Iastebova (2006) who compiled an initial definition for the concept of information overload from the research literature for her PhD thesis (Table 3). In the most current and comprehensive work on organizational information overload identified by this review she concluded that personal, situational, and contextual factors are key contributors to organizational information overload.

1. ***The volume and speed of incoming information is beyond processing capacity***
2. ***Decline in user performance***
3. ***Failure to achieve a balance between task requirements and processing capacity***
4. ***Decrease in task performance with increased information***
5. ***Time needed to process information exceeds available time***
6. ***Receipt of more information than is needed or wanted to function effectively***
7. ***Information processing requirements exceeds available information processing mechanisms***

Table 3: Compiled definition of information overload (Iastrebova, 2006, p. 62), abbreviated and numbered for use as a framework in this paper.

Extreme information overload has been labelled *information fatigue syndrome*, said to cause

> *"…paralysis of the analytical capacity, constant searches for more information, increased anxiety and sleeplessness, as well as increasing self-doubt in decision making leading to 'foolish decisions and flawed conclusions"* (Goulding, 2001, p.109).

Information overload has been described in academic researchers with respect to their difficulty keeping up-to-date in their fields (Wilson, 1993). Unlike information poverty, the body of research on organizational information overload (Edmunds and Morris, 2000, Eppler and Mengis 2003), includes articles that discuss information overload in healthcare managers (Wilson, 2001, Hall and Walton, 2004).

Five groups of causes were identified in organizational information overload (Eppler and Mengis 2003). These were **personal factors**, such as senders failing to screen outgoing information well enough; **information characteristics**, including increased diversity of information; decreased information quality and relevancy; **task and process parameters**, including decreases in routine work and increases in interdisciplinary and collaborative work; **organizational design factors** such as bottlenecks that come with centralization; and **information technologies** such as email, lower duplication costs and faster information access. The same review (Eppler and Mengis 2003) listed 25 symptoms of information overload, including inefficiencies in searching for, analyzing and managing information, delayed and inferior decision making and personal stress and dissatisfaction.

The impact of organizational information overload on system performance is demonstrated by Iasterbova (2006) drawing on work completed by Iselin (1988). Iselin (1988) defined cues to support a decision in terms of the quantity of *different dimensions* (for example, information on time, information on cash flow and information on cost) and quantity of *repeated dimensions* (for example, information on five time periods, or information on five cash flows. Iastrebova (2006) used these dimensions in her research on information overload, demonstrating that organizations have reason to be concerned about information overload, both for different and repeated dimensions. She observed a positive relationship between quantity of repeated dimensions and decision accuracy to a certain point. She also reported a negative relationship between quantity of repeated dimensions and time needed to make a decision, once again to a certain point (Iastrebova, 2006, p. 47). With increased quantity of different dimensions (different kinds of information cues) more time was required to make a decision with poorer decision accuracy. If information continued to be provided, decision quality declined and the time needed to make the decision increased.

2.5. Satisficing

Consideration of information quantity issues includes whether or not information seekers find enough information to meet their needs. LIS researchers are interested in why people stop searching before locating all available information (Prabha *et al.,* 2007, Mansourian and Ford, 2007). Theories associated with why people stop searching or how they determine that they have enough information to support a decision include *Mooers' Law of Retrieval Systems*, *Zipf's Law of Least Effort*, and *Simon's Satisficing Theory*.

The satisficing theory of search describes search targets as branch points considered sequentially rather than a series of alternatives considered at the same time (March, 1994). Traditional decision makers faced with an array of poor alternatives are more likely to take a passive approach and select the best of a bad lot of options. Satisficing decision makers are more active in the face of adversity. If they are unable to identify a solution that will allow a good enough outcome they are likely to change the problem (March, 1994).

16 articles were retrieved on satisficing, published in the LIS literature between 1998 and 2009, less than 2% of satisficing articles retrieved (Figure 2). About one third of satisficing references came from Computer Sciences, including Artificial Intelligence (N=288, 26.16%). About half came from four areas: Mathematics and the Physical Sciences (N=163, 14.80%), Engineering and Architecture (N=141, 12.81%), and Business, Operations Research, Economics and the Management Sciences (N=218, 19.80%).

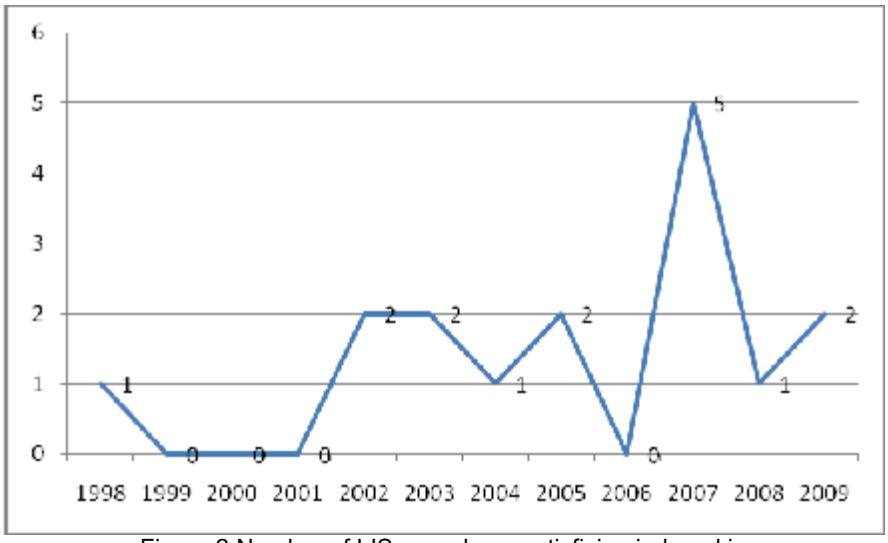

Figure 2 Number of LIS records on satisficing indexed in Web of Knowledge by year, 1998-2009, February 13, 2010.

The earliest LIS article retrieved was published in 1998 with remaining articles spread between 2002 and 2009. Satisficing was a focus of only six of the 16 papers retrieved in the Web of Knowledge search (Table 4) being mentioned in the title, results and discussion.

Publication Year	Satisficing in title or clearly a main focus of the paper	Group studied or discussed
1998	No	Professionals - accountants
2002	No	Professionals – librarians
2002	Yes	General public - subgroup - General public - subgroup - Adolescent females
2003	No	Professionals – subgroup(s) unclear
2003	No	Managers - government
2004	No	General public - subgroup -End users for day to day tasks in sub-Saharan Africa (SSA)
2005	No	Managers - Bank managers
2005	Yes	Managers - Non profit arts administrators
2007	No	Scholars - Grad & undergrad students
2007	No	General public - subgroup People with disabilities using public and retail services
2007	No	Scholars - College students and independent published sources
2007	Yes	Scholars - academic staff, research staff and research students
2007	Yes	Scholars (faculty, grad, undergrad)
2008	No	Scholars (academic biologists)
2009	Yes	Scholars - Undergrad students

2009	Yes	N/A - Review article

Table 4 Groups studied or discussed in LIS records that mentioning satisficing and whether satisficing was a key part of study design, findings or discussion, [Web of Knowledge February 13, 2010].

Other LIS work retrieved by the Web of Knowledge search included studies of scholars (N=6) and of several subgroups from among the public (N=3) (Table 4).

2.5.1. Simon's Satisficing

Simon (Simon, 1947) described a practice in business decision making where the importance of conserving scarce resources resulted in settling for the best decision to be made under the circumstances rather than working to *"maximize the attainment of certain ends with the use of scarce means"*. He later labelled the practice *satisficing*, adopted from a Northumbrian term used in the Sixteenth Century (Oxford English Dictionary, 1989).

Satisficing has been recognized as a common practice in real world decision-making (Berryman, 2008) where it has been linked with the *singular evaluation approach* (Klein, 1998). It has been described as *"a decision that satisfies and suffices … satisfactory sufficiency"* (Brown, 2004) and "*less a decision rule than a search rule*" (March, 1994).

Simon's early work on satisficing concerned managers and professionals working in business and government organizations. Seven LIS satisficing publications retrieved in the Web of Knowledge search concerned similar populations: three were about managers and four involved different groups of professionals. Just one (Zach, 2005) considered satisficing as a main focus and studied managers. Zach (2005) found that American arts administrators satisficed when they had just enough information to be comfortable when making a decision and not enough time to search further (Zach, 2005). Satisficing has been discussed with respect to healthcare services decision making (Grant *et al.,* 2004) although no specific research concerning this has been identified. Other LIS work on satisficing includes work by Savolainen (2007) who studied a group of environmental activists and observed that "*people tend to stop information seeking at the point where a good enough solution has been found with regard to their information needs or interests at hand*".

2.5.2. Mooers Law

Mooers' *Law for Retrieval Systems* observes that finding and using information is painful and troublesome; finding, reading and understanding new information takes time and effort at the expense of quickly producing and completing work. Work based on new information may conflict with earlier work or decisions so may make more work.

Mooers further observed that if people are rewarded for an action they will repeat it. So if they do not use information and are rewarded they will continue not to use it; if they use information and are rewarded they will continue to use it (Mooers and Mooers, 1996).

2.5.3. Zipf's Law

In considering word frequencies in natural language speech and texts, Zipf (1949) suggested that while only a few words are used very often, many or most are used rarely. He found that the frequency of a word occurring in a body of text or documents is approximately inverse to the rank of

that word by its number of occurrences (J. Robertson "Zipf's Law. The fundamentals of information science an online overview"). Zipf's law was subsequently generalized by others to discrete probability distribution and used to express other regularities.

It has since been used in urban planning where populations in cities can be plotted as a function of their popularity rank (J. Robertson "Zipf's Law. The fundamentals of information science an online overview")Within LIS, Zipf's Law has been applied to information seeking as the *Law of Least Effort* (Poole, 1985) which suggests that people invest little in seeking information, preferring easy-to-use accessible sources over sources that they may realize are higher quality but more difficult to use or access (J. Robertson"Zipf's Law. The fundamentals of information science an online overview").

2.5.4. Good and Bad Satisficing

In their review of information issues and problems, Bawden and Robinson (2009) describe satisficing as a coping mechanism for information overload where just enough information is taken to meet a need so as not to become overwhelmed by all of the information available. The authors distinguish between "g*ood satisficing*" defined as clear rationale in making decisions and choices when the full spectrum of options may not be known, and "*bad satisficing*" defined as information avoidance or information selected at random.

2.5.5. Discussion – Good and Bad Satisficing and the Three Theories

Simon's satisficing (balancing cost with quality to achieve an outcome that is good enough rather than spending resources to achieve what may be incremental improvements) has been likened to Zipf's Law (people will spend as little effort as possible looking for information) by an LIS researcher (Bates, 2005).

However, Zipf's law has more in common with Mooers' Law (if finding and using information is more trouble than not finding and using it, then people will do without it) as each takes a *Theory X* perspective, people are inherently lazy, dislike work and will avoid it if they can (McGregor, 1960). Zipf's Law, Mooers' Law and Bad Satisficing (Bawden and Robinson, 2009) appear to share a common perspective.

In balancing cost with real information need to achieve a good outcome, Simon's satisficing takes a *Theory Y* perspective, that people naturally enjoy working and, given responsibility, will do their best. Simon's Satisficing has more in common with Good Satisficing (Bawden and Robinson, 2009).

Simon's satisficing as originally conceived has been used in LIS research studies of scholars (Mansourian and Ford, 2007, Connaway *et al.,* 2006, Adamson *et al.,* 2006, Mansourian *et al.,* 2008) with more recent work focusing on web searching. Such situations would be similar to ideal search and decision situations enjoyed by scholars as described by Choo (1993). More work is needed to isolate aspects of satisficing that contribute to its whole definition to determine those behaviours that are satisficing (balancing cost with outcome), those that represent least effort (laziness) and those that are common sense.

2.6. Literature Review Conclusion

This literature review highlights research that contributes to what we know already about managers' information behaviour, satisficing and challenges related to inappropriate information quantity. While there is some understanding of the way that managers use information and experience information poverty and overload, there is very little LIS research examining these issues among managers. The next section discusses the study's overall aims and objectives as well as the focus of this paper.

3. Study Aims and Objectives

Work related information needs must be understood in the context in which they arise (Wilson, 1981, Leckie *et al.,* 1996). The study described below sought to understand why participants satisficed, and whether issues related to inappropriate information quantity, either too much information or too little information, were a challenge for these managers. The research team also wanted to determine whether these managers' information situations corresponded to information poverty or information overload as defined in the research literature (Iastrebova, 2006, Chatman, 1996, Britz, 2007).

4. Methods

This exploratory study used a multiple case study approach as outlined by Yin (2003). This approach identifies a menu of methods to be used together to gather and analyze qualitative interview data.

Semi-structured qualitative interviews were conducted using the critical incident technique (CIT) (Flanagan, 1954). The CIT is a five-step procedure for gathering facts designed to isolate the significant or critical factors that contribute to success or failure. It frequently employs in-depth semi-structured interviews, and has been adapted for use in examining specific processes. The five steps in CIT are similar to those in the scientific method. These are:

1. Outline the general aims of the activity (Flanagan, 1954);
2. Outline a plan with specifications including specific group to observe and the standards to use in evaluation and classification (Flanagan, 1954, Flanagan, 1954);
3. Collect the data (Flanagan, 1954) ;
4. Analyze the data (Flanagan, 1954) and
5. Interpret and report (Flanagan, 1954).

All nineteen participants interviewed were located in Nova Scotia, Canada. Seventeen were selected from the paid leadership of a rural district health authority and two were volunteer board members, Participants were healthcare services managers selected based on their work position and leadership status within the organization (i.e., senior executives, directors, managers, Junior Leaders, or board members); by portfolio (i.e., Acute Care, Community Health, Operations, or Administration); and by employer (i.e., single district health authority, or shared health service).

The interviewer is a member of the same leadership team and their manager of library services manager and was aware of some of the decisions discussed before the interviews.

Interview questions were organized in three sections: critical incident technique questions, general questions about information seeking, and population health knowledge questions. These are published as an Appendix in an earlier paper (MacDonald *et al.,* 2008b). Each interview question had a set of additional probing questions for use as needed.

All interviews were audiotaped and transcribed verbatim. They were indexed categorically with 526 terms in four broad families using ATLAS.ti 4.1 software, to provide the qualitative data analysis. After indexing was complete, the researcher looked across all of the indexed interviews for indexing patterns and selected indexing families (groups of related terms) for cross case analysis. Interviews were then analyzed according to "Framework," a matrix-based content analysis technique developed for applied social policy qualitative research questions by the U.K. National Centre for Social Research (Ritchie and Spencer, 1994). This data analysis tool facilitates within- and between case comparisons providing more structure to the cross-case analysis approach recommended by Yin (Yin, 2003).

An Atlas.ti family of terms related to information quantity was brought together for this paper. As a third step, passages indexed were organized under components of definitions related to information overload (Goulding, 2001; Edmunds and Morris, 2000; Eppler and Mengis, 2003; Hall and Walton, 2004; Wilson, 2001; and Iastrebova, 2006) and information poverty (Haider and Bawden, 2007, Chatman, 1996, Britz, 2007). These components were used as headings for Framework cross case analysis. This paper considers how well three of these models serve to organize discussion of these managers' information quantity and satisficing situations.

5. Results and Discussion

5.1. Participant characteristics

Nineteen interviews were carried out. All participants had been educated beyond the secondary level. Eleven had post-graduate degrees and four had undergraduate degrees. Of the twelve who were registered professionals, only one did not have a university degree. The mean participant age was 51 years old, and the mean length of healthcare career was 21 years.

Four main themes were identified from the analyses: information and decisions, information and sharing, information and seeking, and information and population health. Findings presented in this paper relating to information quantity are drawn from the information and decisions theme which also included healthcare services managers' work roles and decision complexity (MacDonald *et al.,* 2008a) and the information they use in decision making (MacDonald *et al.,* 2008b).

5.2 Decision characteristics

Participants chose critical incidents representing complex, unstructured, and mostly administrative, decisions. No clinical decisions were discussed. Several cases involved public policy decisions. Most decisions spanned two or more levels: operational and tactical, tactical and strategic, or all three decision levels. Decisions were classified by complexity according to a framework compiled

from the literature that also included decision modes, decision phases, decision situations, and decision makers – whether individual or group ((MacDonald *et al.,* 2008a).

5.3 Study Results

Results and discussion related to information poverty and information overload are presented within three frameworks developed from the literature. The two information poverty frameworks were developed from LIS study and research of groups other than managers (Britz, 2004, Chatman, 1996). The framework used to consider information overload was developed from a definition of organizational information overload to support management sciences research (Iastrebova, 2006). Results related to satisficing are presented with reference to Simon's original work, to good and bad satisficing (Bawden and Robinson, 2009) and to Zipf's Law, Mooers' Law and Simon's Satisficing.

5.3.1 Information Poverty

Information responses that mentioned an information gap were examined using two frameworks, both developed from LIS study of groups other than managers. One of these was created from Chatman's six propositions for describing information poverty, (Hersberger, 2005).The other more contemporary framework used work by Britz (2007). These are shown in **Error! Reference source not found.**.

Participant comments supported the first two of Chatman's propositions namely that many participants did not expect to be able to find the information they needed - they believed it did not exist:

> *For all of the areas in the portfolio we get almost no information from a data perspective (Senior Executive)*
>
> *... I can never get the level of detail I need. (Junior Leader)*

Others expected the information they needed was available but that they would have difficulty getting it from those who had it:

> *I ask for [data] on a quarterly basis and they always forget to send it to me. (Junior Leader)*
>
> *They keep a lot of information - to get it from them may not be that easy ... (Manager)*

No responses supported the next three of Chatman's propositions related to hoarding of, rather than sharing of, information. Many positive comments suggested that participants relied on information sharing as a way to get good information. This may be due to the prevailing organizational climate. Information is shared openly and actively in more highly functioning organizations. It is regarded as a personal resource and hoarded in organizations that are less highly functioning (Westrum, 2004).

It is also possible that participants demonstrated social desirability bias in advocating information sharing behaviours. Further work is needed to determine the culture of the study organisation and then to investigate the role organizational culture plays in workplaces challenged by information poverty.

There was some support for Chatman's proposition 6 with respect to introducing new knowledge as required to meet immediate needs:

> *I don't spend a lot of time looking for information if I am reasonably sure that it is not going to change any decision that I make. (Senior Executive).*
>
> *...if I know that a decision is really going to impact on an individual or on the organization - cost a lot of money - then I know I spend more time and effort in looking for what the right answer should be ... (Director)*

Participants identified an array of factors, all related to the outcome and its significance or benefit, as the most important drivers that determined their level of effort in information seeking. Managers, particularly those at lower levels, indicated they were expected to gather information and maintain awareness of subjects related to their service and to their position. Participants at all levels mentioned that they tried to stay up to date in their fields but did not always have the time.

Responses were next examined with respect to the information poverty variables identified by Britz (2007) adapted and numbered as shown in **Error! Reference source not found.**. The first two variables, similar to Chatman's propositions 1 and 2, described study participants' situation. These reflect the expectation that information needed would not be available, and that the information available was not always credible.

> *Trying to find something that is specific, that really relates to the situation ...is very difficult ... (Director)*
>
> *I don't always feel that our data is reliable and valid ... (Junior Leader)*

Congruent with observations by Bowen *et al.,* (2009) about the current lack of lack of systems and resources for tracking, organizing and retrieving data in healthcare services, several comments illustrated the lack of information management infrastructure in the organization:

> *We don't have a good reporting framework for the indicators ... in my portfolio (Senior Executive)*
>
> *The lack of a [participant's department] information system.. I can't tell you [figures for] workload management, case management, program activity and output. (Director)*

Variable 3 was only partially relevant as most study participants had both professional degrees and graduate degrees and so had higher levels of literacy skills than the general population. Some participants indicated their own level of information literacy was not as high as it might be and some mentioned a need for better data analytic and evaluation skills within the organization:

> *I often think my level of computer skill in figuring out how to find information is the biggest barrier (Manager)*
>
> *We don't have ... much information and are not 100% sure of what it means. (Director)*

The literature suggests that few Canadian healthcare organizations have staff skilled in interpreting information such as vital and health-related statistics (Smith, 2005; Bowen, *et al*, 2009). No comments were identified to support the fourth variable; there was no indication that a negative

attitude toward information existed within in the organization. In this study, all participants engaged in information seeking to support their decision. Specific references to the many internal and external information sources used to support decisions suggest a positive attitude toward information and an understanding of its value:

> *I would never want my thoughts and ideas to go forward without having been well researched and well educated, well put together. (Manager)*
>
> *…if we are looking at a project, or whatever we will look at what the regulatory bodies say first… (Director)*

The final variable relates to material means and does describe study participants. Participants identified information and information management gaps that would need additional resources to remedy. These included lack of human resources, a shortage of space, equipment and other physical resources and budget issues. Many participants commented on their need for systems to track services and staff workload, frequently commenting about not having enough time to do all the work they needed to do:

> *…one of the things that I don't think we are really good at, giving people enough time to make decisions around certain things. (Manager)*

There are sufficient data to suggest that healthcare managers in this study may experience information poverty. Further research is needed to determine whether healthcare services managers in other areas of the health sector similarly experience these issues.

5.3.1 Information Overload

Whether participants were challenged by information overload was considered using the framework developed from a definition compiled by Iastrebova (2006). Components of this definition of information overload have been abbreviated and numbered from one to seven (**Error! Reference source not found.**) to facilitate its use as a framework. In this study, information in part 1 is considered as pushed, unsolicited information and that in part 6 as pulled, requested or specifically searched information to differentiate between the two.

Parts 1 and 2 of the definition describe difficulties with information processing capacity due to the volume and speed of incoming information, and decreased performance due to information overload. From rereading Iastrebova's work (2006), and the source for this part of her definition (Hiltz and Turrof, 1985), this information was considered to be information pushed out to managers rather than information that they requested or searched for themselves. Some participants did mention that they had trouble dealing with information they requested or searched for themselves and these are discussed below. Nothing in these responses supports the first two parts of the information overload definition. Participants did not specifically comment on difficulties with information processing capacity due to the volume and speed of incoming unsolicited information pushed out to them nor about diminished performance within the organization due to information overload.

Part 3 of the definition relates to the failure to balance task requirements and processing capacity (Iastrebova, 2006). Again, this was not supported by participant responses. No participant reported failure to balance task requirements and processing capacity. Instead, those mentioning anything

related to this issue appeared to have developed coping mechanisms that drew on their own experience and expertise:

> *If someone gives me a 50 page report, I am not that keen on reading it. In other words if I have a 5 minute tape or series of charts, that is the stuff I will rapidly process. And then I will go and look for data if I need it, if there is an anomaly there ... (Manager)*

The fourth part of the definition relates to decreased performance with increased information. No comments suggested that too much information affected task performance. Participants did satisfice; it is possible, if information overload was an issue for these participants, that as suggested by Bawden and Robinson ((2009) they use satisficing as a coping mechanism:

> *… because of time restraints we do limit information that we gather, and we limit the possibilities in terms of decisions that we make, so to be able to streamline decision making … (Manager)*

The fifth and six parts of the definition note that time needed to process the information exceeds available time, and more information is received than wanted or needed to function effectively. Both are supported by comments from participants. One participant referred to information overload with respect to the amount of information available. Most participants mentioned time pressures suggesting they did not have enough time to process all of the information they found:

> *I was looking for something for [a specific] forum and found 2000 sites - you can't just go through them - it is mind boggling really because you can't figure out which are good sources, you don't have time. (Director)*

> *Can I get through those thirty papers? Oh my ... I can't do that ... (Director)*

Participants at higher levels in the organization chart mentioned using intermediaries to meet specific information needs. All participants asked co-workers and colleagues, with experience and expertise familiar with the context, to provide information. One participant mentioned asking questions on email list servers and then receiving too many responses to process. Another mentioned receiving requested information in writing and not having time to look at it. Although no participant in this study mentioned receiving too much unsolicited information, recent initiatives in the same District suggest that unsolicited email is indeed an information overload issue. These findings are similar to those by Bowen *et al.,* (2009) who reported that managers found e-mail and Blackberry technology intrusive contributors to fractured attention.

Part 7 of Iastrebova's definition relates to information processing requirements exceeding available mechanisms. Many comments referred to the inadequacy of information management systems, especially for tracking services. The lack of workload performance data was mentioned frequently. The lack of an information management infrastructure was seen as a barrier to effective information use:

> *I can't possibly keep track of all of it (Director)*

> *... the tracking and the follow-up pieces are what was the big challenge for us (Director)*

In summary, although findings are less conclusive for information overload than for information poverty, information overload may also be an issue for healthcare services managers. Further work is needed to determine whether participants have developed coping mechanisms that enable them to deal more successfully with information overload than with information poverty.

5.3.1 Satisficing

Interview responses were considered with respect to satisficing during the decision process. In congruence with Zach (Zach, 2002) most participants said that they were comfortable with their decision although they did not have all the information they would have liked by the time they made their decision:

> *I said I didn't find all the information that I needed. I still don't have other policies and procedures that I wish that I had ...and I probably didn't access all the resources that I could have accessed simply because of the timeframe … I would say … not 100% satisfied …I think I did an ok job. (Manager)*

Participants noted that they preferred to make a good enough decision in time to make a difference, rather than make a perfect decision too late:

> *There is also a time sensitivity to this so the other maxim is a decision on time is better than the right answer too late. All these things inform the extent to which one can get the perfect answer all tied up in a nice bow before it [the information/decision/answer] isn't useful. (Senior Executive).*

March described satisficing decision makers as active in the face of adversity, changing the decision problem if a good enough solution is not available to address the original situation ((March, 1994). Kovner (2005) found that managers who face time pressures make decisions with only 40% of the information they would like to have had, then change the decision if it does not work. Participants in this study described similar decision situations where the decision itself changed **during** the decision-making process:

> *So some of the information I got, some of it I didn't….I don't know how others are dealing with it. …but I got the minimum that I thought that I needed to make the decision - because the decision right now is … a much easier decision on our part. (Director)*

All participants engaged in satisficing to some degree, settling for the best decision they could make under the circumstances, rather than continuing to search for information, identifying and evaluating alternatives until they were certain they made the best possible decision.

In all cases, it appeared that satisficing was carried out as originally suggested (Simon, 1947) within the context of good administration, making the decision that best balanced administrative objectives with least expenditure. Zipf's Law did not apply because the information that participants needed was not available through any system, whether low quality and easily accessible, or high quality and more difficult to use and less accessible. Mooers' law (Mooers and Mooers, 1996) did not apply in these cases because participants did not have an information system to help them retrieve the information they needed most. Participants were not asked directly whether they were encouraged to use information or discouraged from using it. Some commented that information use was effectively discouraged by imposed short deadlines that did not allow time for information seeking.

Although satisficing has been discussed with respect to healthcare services decision-making (Baker *et al.,* 2004, Grant *et al.,* 2004), no research has been identified that studies a group of healthcare services managers and considered whether they engage in satisficing. Therefore, it is not possible to say conclusively whether this group of healthcare managers is typical of healthcare services managers, in respect of satisficing, in general. However existing literature on healthcare services managers is sparse but what does exist (Head, 1996, Moahi, 2000, MacDonald *et al.,* 2008a) suggests that healthcare services managers are more like managers in general than they are like clinicians, researchers or academics.

6. Conclusions and Implications for Further Research

This section summarizes conclusions in three areas: 1. Whether these managers' faced inappropriate information quantity that can be described as information poverty or information overload and 2. Whether inappropriate information quantity led to satisficing and 3. Whether frameworks developed from work with other groups or from outside LIS were useful in describing these managers' situations.

6.1. Information Quantity Issue – Poverty or Overload?

Interview analysis suggests that participants were challenged by information poverty. Three out of six propositions and at least three of five variables contributing to information poverty accurately described the situation experienced by participants. Information poverty may contribute to explaining why managers satisfice. Participants need, and look for, internal information to help supply needed context when solving problems and making decisions without an information management infrastructure to support them.

It is possible that study participants are also challenged by information overload, although this was less discernible from interview analysis. Some participants referred directly to information overload situations, although only two of seven parts of the composite definition of information overload were supported by participants' comments. Recent research suggests that information overload is prevalent in today's workplaces (Accenture Information Management Services, 2007, WorldOne Research, 2008, Farhoomand and Drury, 2002). One review (Hall and Walton, 2004) documents research and descriptions of information overload in healthcare services organizations. Healthcare services restructuring and downsizing has been identified as one cause of information overload in healthcare organizations (Wilson, 2001). Healthcare services in Nova Scotia have completely restructured with downsizing twice within the last fifteen years (Canadian Institute for Health Information, 2005). It would thus be remarkable if in 2010 these healthcare services managers did not experience information overload. Information overload may be less of an issue for them than information poverty.

Further research is needed to determine which of the two phenomena, information overload or information poverty, presents the greater challenge to healthcare services managers and whether both challenges can co-exist for the same decision situation. Comments suggest that healthcare managers learn to cope with information poverty, and perhaps also with information overload through expertise-related information sharing. This also requires further exploration.

6.2. Why Did They Satisfice?

This study suggests that healthcare managers do indeed satisfice. In all cases, it appeared that satisficing was carried out as Simon originally suggested, i.e., within the context of good administration, making the decision that best balanced administrative objectives with least expenditure, or "good satisficing" (Bawden and Robinson, 2009).

All participants' CIT decisions were unstructured, not previously encountered and so not guided by existing policy. Participants' mean length of healthcare career was 21 years and so they may have drawn on their own expertise and experience. It is not possible to determine why participants satisficed but participants described time pressures, competing priorities and other factors that characterize NDM as likely causes (MacDonald *et al.,* 2008a).

Lack of information management infrastructure is common to studies of information poverty and information overload. Many participants mentioned this as a problem. Alternatively, they may simply have used common sense. It is not possible to determine from these interviews whether participants were satisficing or simply using common sense or whether there is a difference between the two. Perhaps good satisficing is common sense balanced with Theory Y.

This paper has examined information quantity in an effort to determine whether participants who satisficed did so in response to an inappropriate quantity of information. The original study did not consider satisficing, so it was only when such a pattern emerged that a closer look at satisficing was taken. This paper has not determined whether satisficing is a coping mechanism for dealing with information overload rather than an outcome of information poverty, or whether it is due to other factors. Some components of Simon's original definition of satisficing may have to be retained for concept integrity.

6.3. Is it useful to apply research from one group to other groups and one field to other fields

Three frameworks developed from researchers' definitions were used to consider information poverty and information overload. These had two variables: with the same or different group and within or outside LIS. The two frameworks for information poverty were developed from LIS work on groups other than managers; the definition used for information overload was developed from management sciences research with organizational information overload in mind. As noted above, three of Chatman's six propositions (Chatman, 1996) applied to these managers, four of Britz' six variables applied (Britz, 2007) and three of Iastrebova's seven definition components (Iastrebova, 2006) applied to these managers. The frameworks were equally useful for considering managers' situations of inappropriate information quantity. It did not appear to matter whether they were developed for use with managers or other groups, or whether they were developed within LIS or other fields. Further study is needed to determine whether frameworks developed from outside LIS would be as useful if applied to groups other than those studied.

LIS researchers have tended to mainly cite LIS research (Julien and Duggan, 2000, Julien, 1996). Sense-making is an important LIS concept with mostly separate bodies of literature within (Dervin, 1983, Dervin, 2003) and outside LIS (Louis, 1980, Weick, 1995). Zipf's Law is taken from outside LIS and then adapted within LIS to become almost unrecognizable. It would be interesting to identify

concepts that exist both within and outside LIS and examine citation patterns to determine how LIS research contributes to knowledge in other areas. Satisficing, in its application to more ideal search and decision situations may develop as a separate concept within LIS when applied to scholars and web searching.

References

Abbott, R.D. (1999), *The world as information: overload and personal design.* Netlibrary.

Accenture Information Management Services (2007), *Managers say the majority of information obtained for their work is useless, Accenture survey finds.* Accenture, New York, available at: http://newsroom,accenture, com/article_display,cfm?article_id=4484 (accessed 2007 February 12).

Adamson, S.K., Dervin, B., Case, D., Dillon, A., Fisher, K., Normore, L. and & Tenopir, C. (2006), *Quandaries about users, user research, and each other: The impressionistic essays.* In Dervin, B., *et al.,* (Eds.), *Sense-making the information confluence: The whys and hows of college and university user satisficing of information needs. Phase I: Project overview, the Three-Field Dialogue Project, and state-of-the-art reviews.* Report on National Leadership Grant LG-02-03-0062-03, to Institute of Museum and Library Services, Washington, D.C. Columbus, Ohio: School of Communication, The Ohio State University. http://imlsproject.comm.ohio-state.edu/imls_reports/imls_PH_I_report_list.html

Akin, L. (1998), "Methods for examining small literatures: explication, physical analysis, and citation patterns", *Library and Information Science Research,* 20, 3, 251-270.

Baker, G.R., Ginsburg, L. and Langley, A. (2004), *An organizational science perspective on information, knowledge evidence and organizational decision making.* University of Toronto Press, Toronto.

Bates, M.J. (2005), *An introduction to metatheories, theories, and models.* Information Today, Medford, New Jersey.

Bawden, D. and Robinson, L. (2009), "The dark side of information: overload, anxiety and other paradoxes and pathologies", *Journal of Information Science,* 35, 180-191.

Berryman, J.M. (2008), "Judgements during information seeking: a naturalistic approach to understanding the assessment of enough information", *Journal of Information Science,* 34, 2, 196-206.

Bowen, S., Erickson, T., Martens, P.J. and Crockett, S. (2009), "More than using Research. The real challenges in promoting evidence-informed decision-making", *Healthcare Policy,* 4, 3, 87-102.

Britz, J.J. (2004), "To know or not to know: a moral reflection on information poverty ", *Journal of Information Science,* 30, 1, 192-204.

Britz, J.J. (2007), *A critical analysis of information poverty from a social justice perspective,* PhD, Pretoria, South Africa, University of Pretoria.

Brown, R. (2004), "Consideration of the origin of Herbert Simon's theory of "satisficing" 1933-1947", *Management Decision,* 42, 1240-1256.

Canadian Institute for Health Information (2005), *Health care in Canada.* Canadian Institute for Health Information, Ottawa.

Case, D.O. (2006), *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior.* 2nd ed., Academic Press, New York.

Casey Jr., C.J. (1980), "Variation in accounting information load: The effects on loan officers' predictions of bankruptcy", *Accounting Review,* 55, 36-49.

Chatman, E.A. (1996), "The impoverished life-world of outsiders", *Journal of the American Society for Information Science,* 47, 193-206.

Chatman, E.A. (1991), "Channels to a larger world: Older women staying in contact with the great society", *Library & Information Science Research,* 13, 281-300.

Childers, T. and Post, J.A. (1975), *The information poor in America.* Scarecrow Press, Metuchen, N.J.

Choo, C.W. and Auster, E. (1993), *Environmental scanning: acquisition and use of information by managers.* Learned Information, Medford, MJ.

Connaway, L.S., Prabha, C. and Dickey, T.J. (2006), *Sense-making the information confluence: The whys and hows of college and university user satisficing of information needs. Phase III: Focus Group Interview Study. Report on National Leadership Grant LG-02-03-0062-03,* to Institute of Museum and Library Services, Washington, D.C. Columbus, Ohio: School of Communication, The Ohio State University.

Davenport, T.H. and Prusak, L. (1997), *Information behavior and culture.* Oxford University Press.

Dervin, B. (2003), *A sense-making methodology primer: what is methodological about sense-making?* San Diego, CA.

Dervin, B. (1983), *An overview of sense-making research: concepts, methods and results to date.* Paper Presented at Annual meeting of International Communication Association. Dallas, Texas, USA, available at http://faculty.washington.edu/wpratt/MEBI598/Methods/An%20Overview%20of%20Sense-Making%20Research%201983a.htm (accessed 15 October 2007).

Edmunds, A. and Morris, A. (2000), "The problem of information overload in business organizations: a review of the literature", *International Journal of Information Management,* 20, 17-28.

Eppler, M.J. and Mengis, J. (2003), *A framework for information overload research in organizations: insights from organization science, accounting, marketing, MIS, and related disciplines.*

Farhoomand, A.F. and Drury, D.H. (2002), "Managerial information overload", *Communications of the ACM,* 45, 10, 127-131.

Feather, J. (2004), *Information rich and information poor.* 4th ed., Facet Publishing, London.

Flanagan, J.C. (1954), "The critical incident technique", *Psychological Bulletin,* 51, 327-359.

Goulding, A. (2001), "Information poverty or overload?, *Journal of Librarianship and Information Science,* 33, 109-111.

Grant, A., Kushniruk, A., Villeneuve, A., Bolduc, N. and Moshyk, A. (2004), *An informatics perspective on decision support and the process of decision making in health care.* University of Toronto Press, Toronto.

Hahn, M., Lawson, R. and Lee, Y.G. (1992), "The effects of time pressure and information load on decision quality", *Psychology and Marketing,* 9, 5, 365-378.

Haider, J. and Bawden, D. (2007), "Conceptions of “information poverty” in LIS: a discourse analysis", *Journal of Documentation,* 63, 4, 534-557.

Hall, A. and Walton, G. (2004), "Information overload within the health care system: a literature review", *Health Information and Libraries Journal,* 21, 102-108.

Head, A.L. (1996), *An examination of the implications for NHS information providers of staff transferring from functional to managerial roles,* MSc. Econ., Aberystwyth, University College of Wales, Aberystwyth.

Hersberger, J.A. (2005), “Chatman's Information Poverty”, In Fisher,K.E., Erdelez,S. and McKechnie,E.F. (Eds). *Theories of Information Behaviour.* Information Today, Medford, New Jersey.

Hiltz, S.R. and Turrof, M. (1985), "Structuring computer-mediated communication systems to avoid information overload", *Communications of the ACM,* 28, 7, 680-689.

Iastrebova, K. (2006), *Managers’ information overload: The impact of coping strategies on decision-making performance,* PhD, Erasmus University Rotterdam.

Iselin, E. (1988), "The effects of information load and information diversity on decision quality in a structured decision task", *Accounting, Organizations and Society,* 13, 2, 147-164.

Jones, J.W. and McLeod, R. (1986), "The structure of executive information systems: An exploratory analysis", *Decision Sciences,* 17, 220-249.

Julien, H. (1996), "A content analysis of the recent information needs and uses literature", *Library & Information Science Research,* 18, 53-65.

Julien, H. and Duggan, L.J. (2000), "A longitudinal analysis of the information needs and uses literature", *Library and Information Science Research,* 22, 291-309.

Klein, G.A. (1998), *Sources of power: how people make decisions.* MIT Press, Cambridge, MA.

Kovner, A.R. (2005), *Factors Associated with Use of Management Research by Health Systems.* Unpublished report for the Center for Health Management Research, University of Washington, Seattle.

Labadie, J. (2005), Comment made during "L'ALLIANCE interrégionale de courtage de connaissance sur les services de première ligne", paper presented at the Fourth Annual National Knowledge Brokering Workshop, Halifax, Nova Scotia. Available at http://www.santemontreal.qc.ca/csss/bcstl//docs/alliance/Halifax_ALLIANCE_octobre%202005.pdf (accessed 10 September 2007) with reference to similar metaphor at http://www.chsrf.ca/brokering/pdf/National_Workshop_Report_2005_e.pdf?p#=8 (accessed 4 May 2010).

Leckie, G.J., Pettigrew, K.E. and Sylvain, C. (1996), "Modelling the information seeking of professionals. A general model derived from research on engineers, health care professionals, and lawyers", *Library Quarterly,* 66, 161-193.

Lipshitz, R., Klein, G.A., Orasanu, J. and Salas, E. (2001), "Taking stock of naturalistic decision making", *Journal of Behavioural Decision Making,* 14, 332-352.

Losee, R.M.J. (1989), "Minimizing information overload: the ranking of electronic messages", *Journal of information science,* 15, 3, 179-189.

Louis, M. (1980), "Surprise and sensemaking: What newcomers experience in entering unfamiliar organizational settings", *Administrative Science Quarter,* 25, 226-251.

MacDonald, J.M., Bath, P.A. and Booth, A. (2008a), "Healthcare managers' decision making: findings of a small scale exploratory study", *Health Informatics Journal,* 14, 4, 247-258.

MacDonald, J.M., Bath, P.A. and Booth, A. (2008b), "Healthcare services managers: what information do they need and use?", *EBLIP Evidence Based Library and Information Practice,* 3, 3, 18-38.

MacKenzie, M.L. (2005), "Managers look to the social network to seek information", *Information Research,* 10, 2.

Mansourian, Y. and Ford, N. (2007), "Search persistence and failure on the web: a "bounded rationality" and "satisficing*"* analysis.", *Journal of Documentation,* 63, 5, 680-701.

Mansourian, Y., Ford, N., Webber, S. and Madden, A. (2008), "An integrative model of "information visibility" and "information seeking" on the web". *Program: Electronic Library and Information Systems,* 42, 4, 402-417.

March, J.G. (1994), *A primer on decision making: How decisions happen.* The Free Press, New York.

McGregor, D. (1960), *The human side of enterprise.* McGraw-Hill, New York.

Merton, T.K. (1972), "Insiders and outsiders: a chapter in the sociology of knowledge", *American Journal of Sociology,* 78, 1, 9-47.

Mintzberg, H. (1973), *The nature of managerial work.* Harper and Rowe, New York.

Moahi, K.H. (2000), *A study of the information behavior of health care planners, managers and administrators in Botswana and implications for the design of a national health information system,* PhD, Pittsburgh, PA, University of Pittsburgh.

Mooers, C.N. and Mooers, C. (1996), "Mooers' Law or why some retrieval systems are used and others are not", *Bulletin of the American Society for Information Science,* 23, 22-23.

O'Reilly, I., C.A. (1980), "Individuals and information overload: is more necessarily better?", *Academy of Management Journal,* 23, 4, 684-696.

Oxford English Dictionary (1989), *satisfice, -fise, v.* 2nd ed., Oxford University Press.

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

Prabha, C., Connaway, L.S., Olszewski, L. and Jenkins, L.R. (2007), "What is enough? Satisficing information needs", *Journal of Documentation,* 63, 1, 74-89.

Robertson, J. (1996), *Zipf's Law. The fundamentals of information science an online overview,* available at: http://web.njit.edu/~robertso/infosci/zipf.html (accessed 19 August 2007).

Savolainen, R. (2007), "Filtering and withdrawing: strategies for coping with information overload in everyday contexts", *Journal of Information Science,* 33, 5, 611-621.

Schick A.G., G.L.A. and Haka, S. (1990), "Information overload: a temporal approach", *Accounting, Organizations, and Society,* 15, 3, 199-220.

Schneider, S.C. (1987), "Information overload: causes and consequences", *Human Systems Management,* 7, 143-153.

Simon, H.A. (1947), *Administrative Behavior.* MacMillan, New York, NY.

Simon, H.A., Dantzig, G.B., Hogarth, R., Piott, C.R., Raiffa, H., Schelling, T.C., Shepsle, K.A., Thaier, R., L Tversky, A. and Winter, S. (1986), *Decision Making and Problem Solving.* National Academy Press, Washington, DC.

Tidline, T. (1999), "The mythology of information overload", *Library Trends,* 47, 485-506.

University of York. Centre for Reviews and Dissemination. (2009), *Methods. Scoping Searches.* University of York.

Weick, K.E. (1995), *Sensemaking in organizations.* Sage, Thousand Oaks, CA.

Westrum, R. (2004), "A typology of organisational cultures", *Quality and Safety in Health Care,* 13, 22-27.

Wilson, P. (1993), "Interdisciplinary research and information overload: navigating among the disciplines: The library and interdisciplinary inquiry", *Library Trends,* 45, 192-203.

Wilson, T.D. (2001), "Information overload: implications for healthcare services", *Health Informatics Journal,* 7, 112-117.

Wilson, T.D. (1981), "On user studies and information needs", *Journal of Librarianship,* 37, 1, 3-15.

WorldOne Research (2008), *LexisNexis Workplace Productivity Survey.* LexisNexis.

Yin, R.K. (2003), *Case study research: design and methods.* 2 ed., Sage, Newbury Park, CA.

Zach, L. (2005), "When is "enough" enough? Modelling the information-seeking and stopping behavior of senior arts administrators", *Journal of the American Society for Information Science and Technology,* 56, 23-35.

Zach, S.E. (2002), *When is "enough" enough? An investigation of the information-seeking and stopping behavior of senior arts administrators.* PhD, College Park., University of Maryland.

Zipf, G.K. (1949), *Human behavior and the principle of least effort: An introduction to human ecology.* Addison Wesley, Cambridge, MA.