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Coping with Information Overload: A Business Perspective

Muddassar Sarfraz[1*], Shuangqin Liu[1], Muhammad Ibrahim Abdullah[2]
[1]Business School, Hohai University, Nanjing, Jiangsu Province, PR China; [2]Department of Management Sciences, Comsats Institute of information Technology, Lahore, Pakistan
*E-mail: muddassar.sarfraz@gmail.com

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Abstract

Study examines the sources and origins of information overload, its effects on knowledge workers, and its overall implications for business companies. The main argument presented in this study is that information overload is not a singular issue but that it arises out of a combination of excessive amount of both sought information and supplied information (i.e. interruptions and distractions). An empirical study conducted as a part of the research revealed that information overload is a widespread problem at modern workplace. Furthermore, the empirical research suggests that the level of perceived information overload depends on both the nature of performed work task and individual personality disposition.

Keywords: Information overload, Organizational behavior, Information management, knowledge management, Management information system

Introduction

Modern technology has enabled humans to produce and distribute information quickly, cheaply and to a wide range or recipients regardless of their actual information needs. The introduction of internet to private sector and its subsequent popularization and incorporation into almost every aspect of human life, combined with other communication technologies, has facilitated, even accelerated, information generation and duplication, leading to the expansion of information networks both within inside and outside organizations (Farhoomed & Drury, 2002). However, information overload is not just limited to new technology of the internet; it originates from traditional sources of information as well. For example, there are significantly more TV channels than ever before that are catering to an increasingly fractured market of viewers. In the publishing industry an unprecedented number of new book titles are published every year. In the European Union and European Economic Area member states in the year 2011 alone a total of about 530,000 new book titles have been published. When added to the existing book titles, European publishers held a total of close to 8.5 million different titles in stock that year (Federation of European Publishers, 2012). Just in the year 2000, there were one to two thousand books published every day in the world. In the USA alone, 50,000 new titles from 14,000 book publishers appear every year. Around 40,000 scientific journals publish more than 1 million original papers each year (White, 2000). John Feather: "The technological developments of the last 50 years have made more information more available to more people than at any other time in human history." (Feather, 2008).

Human need for information is certainly not a trend that has just emerged recently. Right from the ancient times until today human beings have always had the need to document information, pass it onto other fellow humans and even to store it to enable other people to benefit from it. Metcalfe's law states that a given number of nodes (node is meant to be any device capable of making a connection with other device, for example desk telephones, fax machines, mobile phones,

internet connected computers etc.) can form a network with a precise number of unique connections between them that can be expressed mathematically as the triangular number:

N (n - 1)/ 2

To get some idea about the potential of modern communication networks to spread information, we can apply Metcalf's law on the number of internet users in the world. In 2012 there were approximately 2.4 billion internet users in the world (Internet World Statisics, 2014), which translates to more than 1.6 quintillion (1.6 x 1030) unique connections that can exist between people. This number is by no means final because the number of internet users in the world was growing steadily by approximately 15% every year from 2001 to 2011 (International Telecommunications Union, 2012) and it is expected that it will rise in the future as well. Add to that the existing mobile phone networks and the total number of unique connections that people can use will increase even further.

According to research conducted by Gantz and Reinsel in their study for International Data Corporation: the amount of information created between 2009 and 2020 is expected to grow by a factor of 44, number of so called "files" (i.e. distinctive documents) will grow by a factor of 67, and total data storage capacity will grow by a factor of 30. On the other hand, ICD estimates that the investments into managing the digital information and staffing costs will increase by a mere factor of 1.4 (Gantz & Reinsel, 2010).

International Data Corporation predicts that between 2009 and 2020 the amount of digital information created will rise to 35 trillion gigabytes, represented by all types of media (TV, radio, newspapers, and magazines) that will finish its transition from analog to digital form (International Data Corporation). This will put more strain on individuals and organizations to manage, store, protect and dispose of this ever growing amount electronic content.

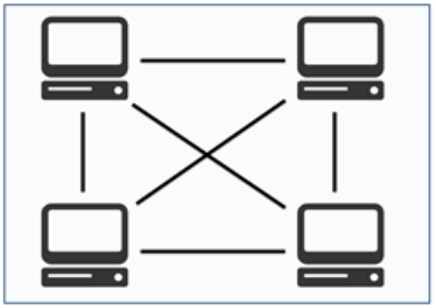


Figure 1: Four node network

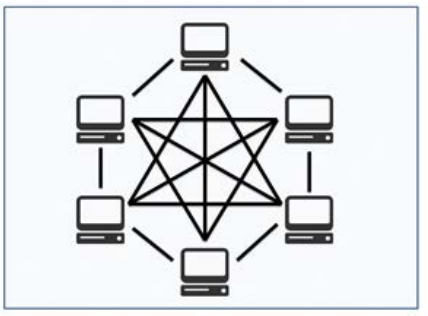


Figure 2: Six node network

Literature review

The term "Information overload" was first popularized by a futurologist Alvin Toffler in 1970 in his book Future Shock. He predicted that rapidly increasing amounts of information will eventually cause people problems. Several years earlier in 1964, Bertram Gross formulated one of the first definitions of information overload in his book The Managing of Organizations: "Information overload occurs when the amount of input to a system exceeds its processing capacity. Decision makers have fairly limited cognitive processing capacity. Consequently, when information overload occurs, it is likely that a reduction in decision quality will occur." (Gross, 1964). In the simplest terms "information overload" happens when the information that is available to one person exceeds that person's ability to process it. Information overload is the inability to absorb and process all the information that one is exposed to. The definition presented by Jones, Ravid and Rafaeli is probably the most eloquent:

"Information overload is a state of an individual (or system) in which not all communication inputs can be processed and utilized, leading to breakdown." (Jones, Ravid, & Rafaeli, 2004). The available literature on the topic of coping with too much information sometimes offers different terms other than "information overload", such as "data smog" (Shenk, 1997), "analysis paralysis" (Stanley & Clipsham, 1997) , and "information fatigue syndrome" (Oppenheim, 1997). The meanings of all these terms, with slight variations, have the same implications as the term "information overload". For the sake of simplicity and clarity I will be using the term "information overload" exclusively throughout this work.

Between the years 1999 and 2006 three extensive surveys of e-mail communication in the Intel Corporation were conducted by Nathan Zeldes and his colleagues. Similar studies that focused on exposure to information at workplaces have been conducted by researchers at other companies. These studies show the extent of information overload that workers encounter at business corporations in knowledge intensive industries (Zeldes, Sward, & Louchheim, 2007) (Gonzales & Mark, 2004) (Mark, Gonzales, & Harris, 2005) (Jackson, Dawson, & Wilson, 2001):

- Workers receive an average of 350 messages per week
- Every day workers spend an average of 2.5 hours processing e-mail messages, 30% of which were perceived as unnecessary
- Workers encounter a major interruption every 11 minutes
- It takes workers approximately 25 minutes to return to the task that was interrupted
- Many e-mail messages, up to 70%, were responded to within 6 seconds after arrival; 85% of e-mail messages have been responded to within 2 minutes (this implies that workers are constantly monitoring and processing incoming messages instead of focusing on the work task at hand)
- The recovery from e-mail notification distraction takes approximately 64 seconds
- 40 % of employees feel that processing e-mail has a negative effect on their stress level
- 31 % of employees feel that e-mail has a negative effect on their quality of life

Other studies have aimed to quantify the time lost due to interruptions and distractions. The study conducted by Basex Inc., an IT research and consulting firm that focuses on knowledge management and information management, over the course of 18 months on hundreds of workers in a knowledge intensive industry reveals that interruptions and distractions are very common in a modern office. They now consume 28% of worker's day with approximately 2.1 hours of every work day that are spend by knowledge workers on interruptions and distractions (Spira & Feintuch, 2005). The time loss included both the length of the actual interrupting or distracting event and the time needed to recover one's attention after the event. The chances of being able to complete a task without interruption are very slim. Furthermore, Basex extrapolates that the cost of productivity that has been lost due to interruptions and distractions is almost USD 588 billion in the United States alone (Spira & Feintuch, 2005).

The biggest issue that is facing knowledge workers when they seek out information for work related purposes is, as was already illustrated above, the sheer volume of information that is readily available. The problem lies in the fact that particularly the information originating from the internet is largely uncategorized, unsorted and many times duplicated. In other words, we cannot precisely determine if a piece of information is relevant or not unless we examine it first. Thus, we are forced to examine the information regardless of its value, process it, and then decide if it is useful or not.

Multitasking is less efficient because human brain is incapable of performing two conceptual tasks simultaneously. Part of the brain that is most involved during multitasking is the prefrontal lobe. Prefrontal lobe, located behind the forehead, is the center for human attention, planning,

structuring, logic, information processing, abstract reasoning, and decision making (Palladino, 2007). During multitasking, prefrontal lobe does not actually permit human beings to consciously work on several things at once. What really happens is that attention is quickly shifted from one task to the other (Palladino, 2007) (Pashler, 1994).

The trend towards outsourcing non-essential work tasks to other companies translates into a wider range of stakeholders with which it is necessary to communicate (Bird, 1997). Add to this the extra communication needed to coordinate work of company employees in subsidiaries in foreign countries, matters such as language barrier, different cultural background and time zones often makes communication and processing information difficult and lengthy. Having access to information is essential. Knowledge workers are actively seeking out information for two main reasons (Bird, 1997): as a basis to back up decisions, and to keep up with colleagues and new developments in the industry.

Causes of information overload in business world

Setting aside the trends that influence the growth of the amount of information, in their empirical study of 124 managers in manufacturing, financial services, transportation, and government agencies, Ali F. Farhoomand and Don H. Drury have identified five major reasons contributing to the perception of information overload (Farhoomed & Drury, 2002):

- Excessive volumes of information
- Difficulty or impossibility of managing information
- Irrelevance or unimportance of most of information
- Lack of time to understand information
- Multiple sources of information

A. Negative effects of Information Overload

Herber Simon (Political scientist, sociologist and psychologist): “What information consumes is rather obvious: It consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.

Studies have shown that there are both business and human costs associated with information overload (Lewis, 1996). The following list summarizes the most significant effects of information overload on both single individuals and whole organizations: Productivity loss, Innovation loss, Decreased quality of decision making, Organizational breakdown, Workplace relationships and Personal harm and discomfort

Methodology

Empirical research of information overload consists of the application of Need for Closure Scale to found out if there is a correlation between the tendency of knowledge workers to seek out information and their experienced level of information overload. Need for Closure (NFC) is a psychological term that describes individual's desire for a firm answer to a question and an aversion toward ambiguityfive facet scales representing various ways in which NFC expresses itself (Webster & Kruglanski, 1994):

Need for Closure concept was introduced by Arie Kruglanski to develop a theoretical framework for the cognitive-motivational aspects of decision making and it denotes a person's motivated tendency to seek out information (Kruglanski & Webster, 1996). Two highly entwined tendencies are assumed to underlie the NFC: the urgency tendency refers to the inclination to ‘seize’ on closure quickly whereas the permanence tendency refers to the desire to maintain or ‘freeze’ on

closure. Both tendencies serve to avoid the aversive lack of closure, the first by terminating this state quickly, and the second by keeping it from recurring.

Although the 42-item NFC Scale was envisioned as a one-dimensional measure of the NFC construct (i.e. measuring a single factor of NFC), the scale actually contains two orthogonal factors. The first factor comprised items from the facets Order, Predictability, Ambiguity and Closed-mindedness, whereas the Decisiveness items loaded on a second, orthogonal factor. The distinct status of the Decisiveness factor is due to contamination by 'ability-content' as opposed to the intended measurement of a motivational 'need'. In other words, the Decisiveness facet of the 42-item NFC scale taps into the ability of an individual to achieve cognitive closure rather than to probe into the motivation or need to achieve closure (Roets & Van Hiel, 2007). To alleviate this problem of multiple interpretations of the original NFC scale and also to reduce its length while still retaining validity, Arne Roets and Alain Van Hiel have made a revised 15-item scale in 2007. This revised 15-item NFC scale is not only much shorter but also provides one-dimensional version of the original scale with high internal consistency and a minimal loss of the content richness. Therefore, the revised 15-item NFC scale developed by Roets and Van Hiel is used for this study instead of the original 42-item one. The second part of the empirical research consists of a survey of 91 individuals and a detailed interview of 16 of these individuals whose job descriptions included managers, engineers, analysts, accountants, logistics coordinators, marketing and promotion personnel, sales personnel and administrative assistants

Results

On the NFC Scale the participants' final score was raging from 35 to 70 points, the average NFC Scale score was 52.51 points. The age difference of participants did not significantly influence their respective NFC score:

Table 1: Age to NFC correlation

Age group	Need for Closure Score	Deviation from average
25 - 35 years	49.62 points	-2.89
36 - 45 years	53.28 points	0.77
46 - 60 years	54.16 points	1.65

Table 2: Correlation between need for closure and Information overload

Frequency of experiencing information overload	Average NFC Score	Deviation from overall NFC Score average
Everyday	55	2.49
Often	52.79	0.28
Sometimes	52.92	0.41
Seldom	51.25	-1.26
Never	49.30	-3.21

The frequency of experiencing information overload, or in other words the feeling of being overwhelmed by information, varied greatly with each respondent. As much as 12% of respondents experience information overload on a daily basis, which contrasts with 11% of respondents who have stated that they have not yet experienced the feeling of being overwhelmed by information at workplace. The results obtained from the survey research suggest that there is a correlation between the Need for Closure and information overload. Those respondents who reported experiencing information overload on a daily basis have an average NFC Score of 55 points, which is approximately 5.7 points above those respondents who do not experience information overload at

workplace at all. Similarly, higher NFC Score increased the likelihood of knowledge workers experiencing information overload more often. However, even those knowledge workers scoring around the overall average on the NFC Scale still report being afflicted with information overload in various degrees.

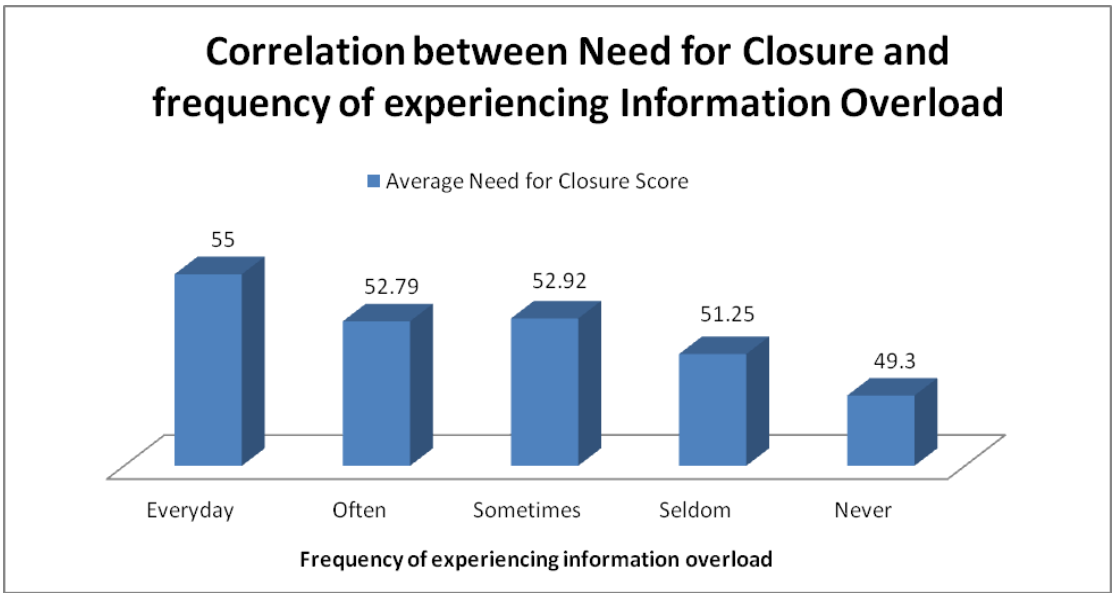


Figure 3: Correlation between need for closure and information overload

Conclusions

The conducted research shows that information overload is still a persistent problem at business companies. Although the surveyed and interviewed knowledge workers have identified several methods they regularly employ to cope with information overload the level of skepticism towards efficiency of such measures is still very high. This leads to a situation where the problem of information overload and information management strategy in general is largely ignored in small to middle-sized business companies. Such situation can in turn have an influence on the knowledge worker's efficiency because the companies they work for do not have any information support systems, guidelines or training that could facilitate better information processing.

Furthermore, several sources of information overload have been cited by the participants of the research. This reveals that the issue of information overload arises from a combination of several factors rather than coming from a single source. On interesting factor that has been cited by the knowledge worker is the ambiguity of work task. When the goal or assignment of a task is ambiguous or unclear, employees feel compelled to analyze more information to compensate.

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