The Consequences of Information Overload in Knowledge Based Service Economies: An Empirical Research Conducted in Geneva

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We have conducted survey research to measure the perception of the Genevese population regarding the problem of information overload. The sample size is 581. Main findings indicate that information overload is a real concern in Geneva and seems to affect the efficiency of companies. Themes like sources and mediums of communications, utility of information, information pollution are investigated. In the first part of the analysis, we propose descriptive statistics. In the second part we explore a few hypotheses that are tested.

1. Introduction

Service activities are typically described with the help of the IHIP paradigm (Intangibility, Heterogeneity, Instantaneity and Perishability). Compared to the production of goods, services will display a high degree of most of the 4 IHIP dimensions. We propose to define knowledge based services as services that are delivered by highly educated and informed employees responding to specific diagnosed customer demands by offering and delivering customized value-added solutions and relations (Debély *et al.*, 2007). World economies are more and more service-based economies working with a huge volume of exchange of information. Adding value to services requires most often a human input that needs formalized and tacit knowledge developed through experience and intuition.

The main "raw material" of knowledge based services is thus information that will be transformed into knowledge, by making sense of data. Wurman (1989) described that information overload occurs when a person does not understand available information, feels overwhelmed by the amount of information to be understood, or when a person does not know if certain information exists or where to find it, or when it knows where to find this information but does not have access to it. The Internet revolution and the recent electronic mediums of communication exacerbated this problem. Baubin (1998) suggested that the promise of an information society is the delivery of focused information via the most convenient media to communities of interest. We can question if the information society did fulfil its promise…

In a study commissioned by Reuters, Denton (2001) surveyed 1,300 business people in the US, UK, Australia and Hong Kong. He found that 40% of them believed that their ability to make important decisions was hindered by overabundance of information, and given the huge volume of information they were receiving, two-thirds of them were still not getting what they needed. Due to ICT tools and systems, misleading information will be forwarded as efficiently as true information (i.e. ephemeralization phenomenon) and there will have an increasing number of unanticipated or unintended side-effects (Heylighen, 2002). This leads to a greater difficulty to predict and control the overall effects of any event or process. Based on the definition of Wurman, Heylighen described the result of "data smog" as an individual who will not only miss out on potentially important information, but moreover be aware that something is missing, while not knowing precisely what is missing and thus feeling a loss of control.

To study the problem of information overload in the service sector, in 2006, we have questioned service companies in the Geneva area, which encompasses a high proportion of companies providing high added value services such as private banking, insurances, research centres, and headquarters of international organizations. We

initiated our research with in-depth interviews in order to describe the perception of classification, amount and value of information and its consequences. In particular, we wanted to address research questions such as: Does this problem of information overload exist in service organization? Has the Internet revolution contributed to this phenomenon? Are people affected by this problem?

Then, through a questionnaire based survey we attempted to measure the perception of information overload of business people. We collected 581 valid questionnaires. We observed that more than half of the respondents (54%) felt that 10% to 40% of the information they received was considered as useless. About one-third of the respondents felt that we were often or most of their time oppressed by the amount of information to handle.

Relationships between classes as well as relationships between variables were analyzed and then research hypotheses have been verified on the basis of non-parametric statistical tests. For instance, as assumed, our data confirmed a relationship between the perception of information utility and the feeling of oppression.

We strongly believe that the best measure of information utility is the receiver's perception. Feeling overwhelmed with information perceived as useless induces more stress for these people. We also suggest insights about the factors contributing to decreasing the utility function of information.

This short paper is organized as follows. In Section 2, we briefly present the questionnaire and the sampling strategy. In Section 3, we present the main descriptive statistics obtained from the survey. In Section 4, we test a few hypotheses related to the theme retained for this paper: the consequence of information overload in service companies. In conclusion, we indicate limitations of this study and directions for future research.

2.   Questionnaire and Sampling Plan

The Haute Ecole de Gestion of Geneva (HEG-GE) has created a laboratory of market research (LEM, Laboratoire d'Etudes de Marché) whose main objective is to form students to marketing survey techniques. Among the mandates already carried by the LEM, let us quote "Perception of Paléo Festival by the Lemanic population", "Electric tariffs in Geneva" and "New master degrees offered by HEG-Ge". The mandate under study in this paper, "Perceptions of information flows within the companies", was conducted from July to November 2006. A group of students took part in all the phases of the survey, that is: determination of the axes of investigation, development of the questionnaire, data collection, coding and statistical data processing, and finally communication of some results.

In the exploratory phase our team conducted (around 40) in-depth interviews related to this topic. Three main themes emerged from these interviews: information classification (external and internal sources of information, communications used in the workplace), information value (utility, relevance and redundancy of information, reception of information not concerning the person, reliability of the source of information …), and finally information perception (oppression and problems caused by the overload of information, management of the flows of information).

In this survey, we essentially focused perception aspects (subjective) and attitudes of the active population working in the Geneva area. We could make a parallel with the survey recently carried out by the Secretariat to the economy (Simplifier la vie des enterprises, Seco, novembre 2006) at 3000 SME which identifies, in particular, the heaviness of the administrative tasks.

On the basis of our 3 main research themes, we have built a questionnaire administered to the active population of the Geneva area. Our sample is made up of 581 respondents of which 60% of men and 40% of women. 64% are employees, 20% managers, 10% executives and 6% independents. 85% of the respondents are working in the tertiary sector (services) out of which 27% working in the public sector and 14% in the banking sector.

3.   Descriptive Statistics

We present here, a summary of the main descriptive statistics resulting from the analysis of the questionnaire database. The detailed results as well as the questionnaire are presented in a comprehensive report written in French (Debély *et al.*, 2006) ; a part of questionnaire is translated and presented in the appendix.

49.7% of the respondents uses "very often" Internet as a **source of information**, 31.8% uses it "often", 11.4% "rarely", and 5.9% "never". **Communication tools** most often used by the respondents used are the electronic mail (67.4%) and telephone (50.3%). Fax and mail respectively obtained 12.1% and 15.7%.

Is **content information sufficient**?   "Often" is answered by 62%. 23% confirms to obtain "very often" sufficient content of information, 14.1% "rarely". Is **information useful**? We observe that more than half of our

sample indicates receiving from 10% to 40% of useless information, 16% affirm to receive between 40% and 70% of useless information whereas 26% estimate to receive less than 10%.

Is **information overload oppressing**? 41% of the population declares not being oppressed by information overload, 29% affirm that the overload of information is seldom oppressive, and 24% that it is it often oppressive. From the point of view of the **business management**, 32% indicates that the overload of information gives place to a waste of time, 22% to an administrative heaviness, and 12% that information overload is the cause of stress?

Time devoted to emails: 34% of respondents devotes daily between 30 minutes and 1 hour to the consultation of their emails, 30% less than 30 minutes, 17% between 1 and 2 hours, 7% between 2 and 3 hours, whereas 6% devote to it more than 3 hours. More than half of the questioned people say to "seldom" **receive the same information several times** (59%) and 8% "never", whereas 25% "often" and 6.4% "very often". The majority of respondents (63%) do not agree on the fact of being the target of information which is not destined to them, whereas 32% of respondents think the opposite.

4. Hypotheses Testing

The main research question developed in this paper is: "whether the perceived utility of information you get is linked to the feeling of being oppressed by this information". To address this research question we propose to test the following hypothesis scheme:

    H0: There is no relationship between the information utility and the feeling of oppression

    Ha: There is a relationship between the information utility and the feeling of oppression

The utility of information variable is defined over an ordinal scale (non categorical), with 4 levels: less than 10% of useless received information, between 10 and 40%, between 40% and 70%, and more than 70%. The feeling of oppression caused by information overload variable is defined over an ordinal scale as well, with 4 levels: yes all the time, yes often, yes seldom, and no.

The statistical test we have employed here is a non parametric test called rank correlation (Bryman and Cramer, 2001) that is adapted to correlations between ordinal variables. In particular we are employing 2 approaches: Spearman's rho and Kendall's tau. We have retained a significance level of 5% that is the first-type error (or the risk to reject the null hypothesis when it is actually correct).

Table 1 Results for the Rank Correlation Test for the Usefulness of Information

			Useless information	Information overload
Kendall's tau-b	Useless information	Correlation Coefficient	1.000	-.236(**)
		Sig. (2-tailed)	.	.000
		N	575	563
	Information overload	Correlation Coefficient	-.236(**)	1.000
		Sig. (2-tailed)	.000	.
		N	563	567
Spearman's rho	Useless information	Correlation Coefficient	1.000	-.264(**)
		Sig. (2-tailed)	.	.000
		N	575	563
	Information overload	Correlation Coefficient	-.264(**)	1.000
		Sig. (2-tailed)	.000	.
		N	563	567

** Correlation is significant at the .00 level (2-tailed).

The p-value of 0.00 (see Table 1) for the tau and rho cases indicates that we can reject the null hypothesis at the significance level of 5%. So we conclude that there is a relationship between information utility and the feeling of oppression provoked by it (the coefficient in the table is negative because the scales of both variables are opposite in the questionnaire).

The second hypothesis tested puts into relation the professional profile and again the feeling of being oppressed by the information overload. The professional profile caused is defined over an ordinal scale as well, with 4 levels: employee, manager, executive, independent.

So this time we deal with an organizational aspect (i.e. hierarchy and level of decision-making in an organization) of the main research question:

H0: There is no relationship between the professional profile and the feeling of oppression

Ha: There is a relationship between the professional profile and the feeling of oppression

Table 2 Results for the Rank Correlation Test for the Professional Profile

			Information overload	Professional profile
Kendall's tau-b	Information overload	Correlation Coefficient	1.000	-.074(*)
		Sig. (2-tailed)	.	.050
		N	567	548
	Professional profile	Correlation Coefficient	-.074(*)	1.000
		Sig. (2-tailed)	.050	.
		N	548	561
Spearman's rho	Information overload	Correlation Coefficient	1.000	-.083
		Sig. (2-tailed)	.	.051
		N	567	548
	Professional profile	Correlation Coefficient	-.083	1.000
		Sig. (2-tailed)	.051	.
		N	548	561

* Correlation is significant at the .05 level (2-tailed).

The p-value of 0.05 (see Table 2) for the tau case (not significant in the rho case) indicates that we can reject the null hypothesis at the significance level of 5%. So we conclude that there is a relationship between the professional profile and the feeling of oppression provoked by it (the coefficient in the table is negative because the scales of both variables are opposite in the questionnaire). Consequently, more you move upward the hierarchy, more people feel stressed because of information overload. It seems to partially confirm what Heylighen (2002) observed: it is precisely the most highly educated people, the managers, lecturers, scientists and technologists, that seem to suffer most acutely from information overload.

Other hypotheses related to the research question have been identified: first in terms of perception it seems there is no significant difference between men and women, second the generational variable, as expected, has mainly an impact (i.e. behavioural) on the use of communication and information search tools.

5. Conclusion

Information takes on a major importance to pilot correctly a service company. If we refer to the statements of the psychologists, the information is what makes the difference. For the well informed manager, it means the possibility of making relevant, coherent and fast decisions. However, are we able to reach the useful information?

Our survey carried out near 581 people treats certain aspects of these problems. In particular, we discovered that information overload is a curse even if it does not concern the majority of people. We note thus that a whole fringe of the working population can feel oppressed by this overload of information and also disarmed by irrelevant information for the proper conduct of the business. It is clear that our company lived, during these last years, the "upsetting" arrival of new information technologies, and that consequently the new fashions of communication were not completely digested. On the other hand, our service economies could profit thanks to that from many advantages, such as speed of exchange of information, research, accessibility and storage.

Our results thus state that it is important to manage with care and effectiveness information of the company by taking into account the aspects of perception of the value of information. It is only this way our companies will have competing advantages in a knowledge economy.

In terms of future research plans, we are now in the process of completing a research on the transmission of know how in service companies. This research is also based on a questionnaire based survey in the Geneva region. However this time, we are studying elements of tacit knowledge (know how, expertise) rather than explicit knowledge (information) in the production of services.

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APPENDIX

1. How often do you use each of these as a source of information at the workplace? [1 answer for each line]

	Very often	Often	Rarely	Never	I don't know
Press, specialized newspapers, books, magazines	☐	☐	☐	☐	☐
Internet	☐	☐	☐	☐	☐
TV, radio	☐	☐	☐	☐	☐
Internal information source (database, intranet, etc.)	☐				
Other [specify, please] : _____	☐	☐	☐	☐	☐

2. Which communication tool do you use most often at the workplace? [1 answer only]

   ☐ e-mail
   ☐ Fax
   ☐ Phone
   ☐ Mail
   ☐ Other [Specify, please] : _____

3. In general, do you consider the content of information you have in order to get your work done as sufficient?

   ☐ Very often
   ☐ Often
   ☐ Rarely
   ☐ Never
   ☐ I don't know

4. What part of information you get do you consider as <u>useless</u>?

   ☐ Less than 10%
   ☐ Between 10% and 40%
   ☐ Between 40% and 70%
   ☐ More than 70%

5. How often do you get e-mails that are no concern for you?

   ☐ Very often
   ☐ Often
   ☐ Rarely
   ☐ Never
   ☐ I don't know

6. Do you feel oppressed by the amount of information?

   ☐ Yes, always
   ☐ Yes, often
   ☐ Yes, but rarely
   ☐ No
   ☐ I don't know

7. What kind(s) of problem may engender information overload within your company?
   [2 answers maximum]

   ☐ It does not create any problem

☐ Tensions among colleagues
☐ Demotivation
☐ Stress
☐ Administrative burden
☐ Waste of time
☐ Weariness
☐ Other [Be specific, please] _____
☐ I don't feel concerned by information overload
☐ I don't know

8. What time do you spend with e-mails per day ?

☐ Less than 30 minutes
☐ Between 30 minutes and 1 hour
☐ Between 1 and 2 hours
☐ Between 2 and 3 hours
☐ More thant 3 hours
☐ I don't know

9. Do you get the same information several times?

☐ Very often
☐ Often
☐ Rarely
☐ Never
☐ I don't know

10. I feel as I am regularly the target of information of no concern (apart of spam).

☐ I totally agree
☐ I rather agree
☐ I rather disagree
☐ I totally disagree
☐ I don't know

11. What is your present professional status?

☐ Employee
☐ Middle management
☐ Member of the board
☐ Self-employed