The Information Overload Due to Attention, Interruptions and Multitasks

[1]Sérgio Viegas, [2]Luiz Antonio Antunes Teixeira, [3]Darly Fernando Andrade, [4]Jersone Tasso Moreira Silva

[1]*Business Administration Graduate Program, FUMEC University, Av. Afonso Pena, 3880. Bairro Cruzeiro, Belo Horizonte, MG, CEP. 30130-009, Brazil.*
[2]*Business Administration Graduate Program, FUMEC University, Av. Afonso Pena, 3880. Bairro Cruzeiro, Belo Horizonte, MG, CEP. 30130-009, Brazil.*
[3]*UFU, Uberlândia, Brazil.*
[4]*Business Administration Graduate Program, FUMEC University, Av. Afonso Pena, 3880. Bairro Cruzeiro, Belo Horizonte, MG, CEP. 30130-009, Brazil.*

A R T I C L E   I N F O

A B S T R A C T

Background: Since the existence of the nomadic people, throughout the commercial and industrial society, right up to the information society, information has increased its factor by the millions but, however, the human brain has maintained itself as it was created fifty thousand years ago, **Objective:** This article had as its objective to analyze the factors which are related to the Information Overload (IO), in the knowledge workers' perception as to the relationships and the factors' degree of importance used in the framework created by Eppler and Mengis (2003). **Results:** The model that was found presents defined associations and reinforces the model that was studied. The construct Task and Process, in which multitask and interruption are inserted, are in first place in the IO phenomenon's explanation. The attention difficulty obtained a positive correlation with the information overload and the use of e-mail, social network, mobile phone, wireless technologies interfere with the information overload. **Conclusion:** The respondents samples tend to accept the attention's importance in work productivity, the pressure of time over tasks, and the presence of the new communication technologies that increase the quantities of information, the excess of e-mails, and the presence of multitasks and interruptions that affect their performance.

INTRODUCTION

Since the existence of the nomadic people, throughout the commercial and industrial society, right up to the information society, information has increased its factor by the millions but, however, the human brain has maintained itself as it was created fifty thousand years ago, according to Pijpers (2010). He adds that the tendency of irrelevant information will continue to increase in the future, being that the voluntary attention's capacity, focused, will continuously increase, being this capacity of extreme importance in the attempt to separate the relevant information from the excess of irrelevant information.

The information shows itself fragmented, available in exorbitant quantities and with easy access. The attention, however, shows itself as a limited resource: "in this new economy, capital, labor, information and knowledge are abundant factors. [...] the scarce factor is the offer of human attention" (Davenport And Beck, 2001, p. 3). The

attention, a scarce cognitive resource and greatly valued, that, when overloaded with the excessive offer of information, interruptions and multitasks, can generate what is called "Information Overload". Davenport and Beck (2001, p. 238) state that, in today's society, "less is more", and that this society should look for less quantity and more quality in the information.

The quantity is not the only problem; the knowledge worker has as in his working standard other parallel tasks (multitasks), interruption in his activities (telephone, e-mail, etc.) and an up-to-date technology that allows the access to wireless networks and, as consequence, the information at any moment and location, contributing towards the constant interruptions and a feeling of information overload.

To understand how the information overload is presented to the knowledge worker is only the beginning for new studies, which should help to improve the symptoms and provide better productivity at work.

Corresponding Author: Jersone Tasso Moreira Silva. [4]Business Administration Graduate Program, FUMEC University, Av. Afonso Pena, 3880. Bairro Cruzeiro, Belo Horizonte, MG, CEP 30130-009, Brazil.
E-mail: tasso@fumec.br.

Davenport and Beck (2001) had as their objective to pass on a concept that had already been shown in previous publications, synthesizing these concepts in the book *The Economy of Attention*. For them, the economy should be based on the human attention as a resource in which the offer is smaller than the demand and, as a real economic currency, the human attention would occupy the information's place (in an information society), being that the information, knowledge and capital should not be considered scarce resources in today's society (Davenport and Beck, 2001).

Some studies have analyzed the information overload's phenomenon, with the intention of understanding how much is lost with the excess of information, interruptions and multitasks. Hemp (2009) presented a result of a study that was done in this area, in which people spend, in average, twenty-five minutes to return to a working task after an interruption to read an e-mail. A BASEX's research shows that interruptions at work, for a knowledge worker, consumes 28% of the daily working period (Spira and Feintuch, 2005), with a productivity loss of 2.1 hours per day with interruptions that are not important and other distractions (Spira and Feintuch, 2005). It is possible to conclude that 1/3 of the labor cost (salary and benefits) are consumed by these unnecessary interruptions.

Having more available information is not always good (Davenport and Beck, 2001; Eppler and Mengis, 2003; Lazarte, 2000; Haas and Hansen, 2001; Owen, 1992), not only because it is impossible to withhold and process all the available information, but also because of its quality, generally poorer, being summarized in order to have a greater outrange. Klingberg (2009) and Brown (2007) identified that most people suffer an attention deficit in a larger or smaller degree. Due to this factor, to be able to better manage and filter the stimuli's input, the quality in the information's selection process and the use of the existing attention capacity (which depends, now-a-days, in the good use of technology) can lead a professional to produce with better quality and less stress, generating better results for the corporations and, consequently, for the society.

Considering all these assumptions and seeking to divide the problem in a manner to better understand the causes for the information overload's phenomenon, the question that guides this research can be formulated in this manner: Which are the factors that contribute with greater intensity to the information overload?

MATERIALS AND METHODS

This article used a theoretical framework that covers the following constructs: knowledge workers, generations, human attention and information overload.

The knowledge worker has the information and the knowledge as a base for his work. He is a knowledge economy participant, in which information is the main base and not the tangible objects (Spira and Goldes, 2007). Stewart (1998, p. 38) adds that "[...] knowledge workers: information and knowledge are not only their raw material but also their work's product." This author (1998) also identifies other examples of knowledge workers: liberal professionals and technicians, managers, vendors and bureaucratic workers. These descriptions show the sample's profile that was used in this research, a common vision of the professionals in organizations that use information, mainly those that use computers and produce knowledge, being that this professional can be an analyst, a manager or a director. For Davenport, Thomas and Cantrell (2002), the knowledge worker has a high degree of autonomy and control over his own working environment, showing a strong characteristic of a professional that cannot be managed according the industrial era's model, in which the control over working hours and productivity were measured in a rigorous manner and, in several situations, considered the quantity of work that was produced and not the quality and result. For Speier, Valacich and Vessey (1997), the standard knowledge worker has the interruption as a "common thing", which places him as a potential object for this research.

The difference between work and personal life, for this worker, tends to be diluted (Spira and Feintuch, 2005) and mixed increasingly, and the connectivity shows itself to be possible almost all the time.

The term "Information Overload", was here translated in Portuguese as "*Sobrecarga de Informações*". Information is accumulated every day by the Internet servers and in the organizations' databases, plus the other media, such as newspapers, magazines, books, where the increase has no limit, unlike the attention capacity, which remains practically unaltered. Other than reflect the quantity of information, the term also has a relationship with interruptions at work and multitasks, which can be harmful to the attention and the productivity. Spira and Goldes (2007) define the information overload's issue as a multifaceted problem, which involves the excess of e-mails, interruptions, new technologies, all of which compete for attention. Pijpers (2010) on the other hand, describes this phenomenon in two manners: 1) when the knowledge worker receives more information than he can absolve and 2) when the demand of information processing exceeds the offer, in other words, the capacity of available resources to process them.

Information Overload is a paradox. It is like drinking a lot of water; a person cannot receive too much information. What people want to say is that they do not have the capacity, in certain moments, to

process all the information that they receive (Pijpers, 2010, P. 22).

According to Grigg (2011), the information that saturates the modern world should increase the people's ability to solve their problems at work, which would demand more attention, however psychological studies suggest that all this information has really decreased better than increase this capacity. Apparently, the attention's cognitive ability, responsible for decision making and for action, is aggravated by the increasing availability of cheaper technologies, which popularizes their access and the information in the Internet.

For Klingberg (2009), the revolution that occurred with the wireless technology, helped the information overload. Having access to the internet in any place, using a desktop, notebook or a cell phone, allows people to be connected all the time, and some, for this reason, sometimes suffer a sensation attention deficit. Nicholson *et al.* (2005) suggests that an organizational environment that offers a wireless technology is more susceptible to have interruptions at work, which causes a decrease in the worker's performance. Also the cell phones and today's smartphones are not only used to talk and exchange small messages, but also to access the internet, social networks, e-mails and pinpoint a location by using satellites for GPS positioning. This mobility is shown as a necessity in today's society. Several researches demonstrated that performance and quality in a decision making process increases with the quantity of information that a person receives, but only up to a certain point, when, then, they start do decrease (Eppler and Mengis, 2003). These authors declare that: "There is a wide consensus in the academic environment nowadays, that a large load of information can really affect negatively an individual's performance (if measured in terms of precision or speed)" (Eppler and Mengis, 2003).

According to Eppler and Mengis (2003), "a definitive solution for the information overload may not exist, but there is a continuous cycle of the process' improvement and refinement". They identified five possible causes for the overload: the people that deal with information, the information technology, the organizational design, tasks and processes that need to be completed and the information's own characteristics (Eppler and Mengis, 2003).

The human attention acts as a human being's cognitive limiting factor in order to be able to absorb the amount of available information and presents itself with a similar appearance when it is observed by an economic vision: the excess of information by part of the demand and the shortage of attention by part of the offer.

Gutman (2005) defines attention as "[...] a psychic function that selects only some of the stimuli among an almost endless number of them, which are

present in the surrounding world, or even in the so called inner world", reinforcing the selective attention's characteristic, having as its main function to emphasize a few items among several others, which results in organizing the mind to be able to execute the action. This selectivity reduces the need for conscience mental efforts of all the existing stimuli, allowing a person to focus in what is really necessary. The definition of attention is not consensus, but for Roda and Thomas (2006), "most understand it as a set of cognitive processes that select information (stimuli)". Thus, to carry out a study about information overload, it is necessary to deal with attention, which is included in the Personal Factor's construct shown in Eppler and Mengis' (2003) framework.

As for the attention process, it can be controlled or automatic. It does not require an attention effort for the usual and repetitive tasks that are already known, while the others require effort and work in a more conscious field. In most jobs, the voluntary attention is responsible for the focus on the task, being this process controlled by the person, while the reflex attention can arise by interruptions or external stimuli that holds the person's attention, without him having to search for this new focus. Thus, reducing the external stimuli, in most kinds of work, can help to focus and pay attention on the work.

The sensation of ADD – Attention Deficit Disorder, seems to strike people beyond those that have this syndrome and, according to Brown (2007, p. 36), "James observed this inability to concentrate, to pay attention on what we have to do, is experienced by most people, many times a day". The ADD became known by today's society as a disease. Brown (2007) states that "The difference between people that have been legitimately diagnosed of suffering from the disease and those that do not justify this diagnose is, essentially, the degree of the incidence". If people suffer from the lack of attention or of the excess of information, they must be related, since the first sustains the last.

The initial theories about attention had the objective of understanding if the stimuli's selection occurred earlier or later. Studies demonstrated that Broadbent's early selection did not have any support, and the attenuator filter was later accepted (Gazzaniga, Ivry, and Mangun, 2006). These studies about the attention's straitening, in which the captured signals are "filtered", gain importance due to the attention's limited capacity to also be a consequence of this fact, demanding from a person a priority definition, which is the first step of the brain's executive function (Brown, 2007). The newer theories ceased to understand attention only as a filter and altered the perspective to a pool of limited resources that loses capacity when consumed be each specific task and with the increase of its use (Quinlan and Dyson, 2008).

These theories, related to capacity, can contribute in the attempt to reduce the information overload, since they search for a greater knowledge about the multitask effect and the decline of the concurrent tasks' performance, especially if they are tasks that compete for the same resource, at the same time, such as the vision and hearing (Quinlan and Dyson, 2008; Roda and Nabeth, 2006a).

Pashler's (1998, *apud* Quinlan and Dyson, 2008) Model Aggregates these two points of views, the filters' theories as also the capacity in the processing them. Summarizing, if the system is overloaded, the processing efficiency will be compromised, which will generate the necessity of having both systems: a stimuli's filter mechanism and a capacity mechanism, in which the filtered stimuli will compete for the limited capacity, when a semantic analysis of those stimuli will occur, enabling a certain parallelism of the process, provided that the system is not overloaded. Johnson and Proctor (2004) state that the attention strategies can be trained and learned and since the real world shows itself full of information sources, the ability to allocate attention can lead to the success of several tasks. With such relevance and with the possibility of optimizing it, makes the attention control a necessity. The apprenticeship with its daily use can be one of the countermeasures proposed in Eppleer and Mengis' (2003) framework, which is the necessity to reduce the information overload and to improve work.

About the economic attention's aspect, Davenport and Beck (2001) believe that the senior executives will hire specialists in attention management with the objective of helping them to process a greater number of information that reach their tables and personal computers. For these authors, what happened until recently was a management of time and of information systems. The future consists of attention management. For them, "The business strategy consists basically in concentrating the management attention on a few options, in detriment of others" (Davenport and Beck, 2001), indicating the need of attention management and not time management. According to Viegas (2010), time would not be manageable, but human attention would, being that this attention can present itself in different quantity and quality levels within the same time space (Viegas, 2010).

The act of learning strategies to increase the concentrating power or to maintain focus, should be added to the task of setting well developed working objectives and goals. If the goals are linked to the attention objects, the focus will be higher, due to the interest on the subject (Brown, 2007; Muller, 1984 *Apud* Eppler and Mengis, 2003; Kahneman *Apud* Quilan and Dyson, 2008).

Davenport and Beck (2001, p. 8) comment that "since the attention is one of these slippery intangible assets, it is difficult to register its presence (even that its absence will certainly be noticed)". Hitt, Ireland and Hoskisson (2008) define some of the intangible resources, among which are knowledge and ideas, which can be transformed into capacity building, if they are well integrated and then transformed into competitive advantages if they are valuable, scarce, hard to imitate and irreplaceable. A RBV theory– *Resource-Based View* does not mention attention as a limited organizational intangible resource, such as knowledge, ideas, etc., but mentions the inclusion of attention as a factor that should be managed by the companies, with the objective of gaining a greater competitive advantage. This would be essential, due to its scarcity, its importance in generating ideas and in improving productivity, as also because of its importance in the cognitive process to acquire knowledge.

Generation X, Y and Baby Boomer:

Badke (2010, p. 52-54), despite confirming the information of the overload's existence, he believes that the new generation (Generation Y, 18 to 32 years old) has arrived with a revolution in the educational system, the "Google Scholars", quite different from the past generations (Generation X, 33 to 45 years old or the Generation Baby Boomer, over 45 years of age), which had less access to books, magazines, internet and, for this reason, which had the custom of accumulating data and files, learning by means information storage. Now the new generation Y is learning to work with a great number of already available information and of easy access, not having to "learn by heart" and absolve everything.

Johnson and Proctor (2004) claim that the attention's capacity declines with age, with losses occurring in tasks that demand the attention's executive control. They also consider that the increase of age, generally speaking, generates more difficulty in controlling the inhibiting stimuli's process which, in other words, generates inefficiency in the selective attention's process (Johnson and Proctor, 2004).

If, for these authors, there may be a significant difference between the generations, Klingberg (2009) declares that the brain is the same and that the issue about generations would not make any difference. This study reaches positive results after some exercises that had the objective of training the working memory with young and older persons, demonstrating that training the brain, basically the working memory that is highly responsible for the attention's cognitive capacity, is possible for any generation. However, although any age can gain improvements with exercises, there is a noticeable drop in the working memory's performance with age, if this brain is not trained frequently. The memory reaches it maximum around 25 years old and then suffers a slight drop, but continuous, throughout the years (Klingberg, 2009).

Spira and Goldes (2007) followed a line of thought coherent with Badke's (2010) more recent vision, in which the generation Y acts differently than the older ones, apparently better accepting multitasks and the excess of the stimuli and information's overload. They also complement that this ability to do several things at the same time does not necessarily make the workers more productive. This Generation Y, also called Internet Generation (Spira and Feintuch, 2005), is quite inclined to use the so-called *gadgets* (cell phones, tablets, among others), which makes it easier and common to access information at any moment with the consequent interruptions and distractions.

Theoretical model:

Starting from one of Eppler and Mengis' (2003) models, which seeks to identify the information overload's possible causes, is divided into 5 groups, as in FIG. 1, below.
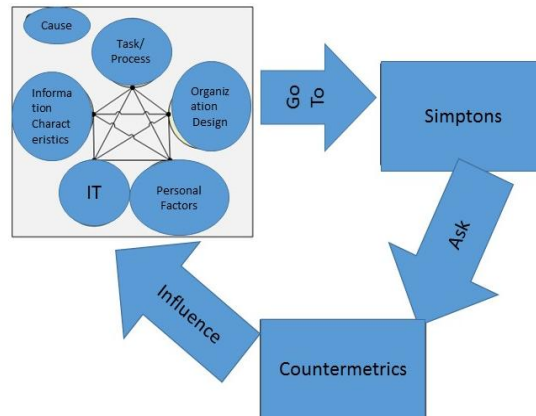

Fig. 1: Conceptual model for Information Overload researches.

This *framework* proposed by Eppler and Mengis (2003) presents a cyclic and interdependent process, aiming in understanding the causes that generate the symptoms, and these, in their turn, require countermeasures to reduce the causes.

Methodology:

This research can be characterized as descriptive as to its purposes, of quantitative nature in its application and the survey's analysis based on the adaptation of Eppler and Mengis' (2003) model described in the theoretical framework. The target public was made up by business professionals and self-employed professionals, with the knowledge worker's profile.

The research was executed in two phases. The first consisted in the questionnaire's formulation and in its pre-test. For the questionnaire's formulation, a limit of 5 questions for each construct was defined (Personal Factors, Information Characteristics, Task and Processes, Organizational Design and Information Technology). The second phase, which consisted in collecting data, began by applying a survey with a self-administered questionnaire, by means of the internet during the period of 27/01/2012 to 07/03/2012 and using an online collecting instrument. A total of 218 (two-hundred and eighteen) respondents were reached in the primary data source, composed by a non-probabilistic sample of professionals so-called "knowledge workers".

As for the data treatment, a result analysis for each one of the questionnaire's question was used, separately and compared using an average sorting method. After this analysis, a statistical evaluation of the main questionnaire was completed, in which a descriptive statistics was obtained, being the confidence interval for the defined average as follows: Averages with the superior limit less than 3 indicates a tendency towards disagreement and averages with the limit inferior than 3 indicate a tendency towards agreement and, when the number three is contained in the confidence interval, there is an indication of neutrality.

In this proposed model, a multivariate analysis technique of modeling by structural equations was used. To evaluate if a multivariate relationship existed between the profile's variables and the constructs. This calculation was done by the Pearson's correlation index.

For Hair *et al.* (2005), the correlation coefficient's value, that measures the association's strength, is based on the rule shown in TAB. 1, which will be used to analyze the associations.

To verify if a relationship exists between the evaluated traits and the respondent's profile variables, the CHAID (Chi-Square Automatic Interaction Detector) was used.

The adjustment model that was found was completed by the Partial Least Squares (PLS) method, using the SmartPLS 2.0 M3 software. The

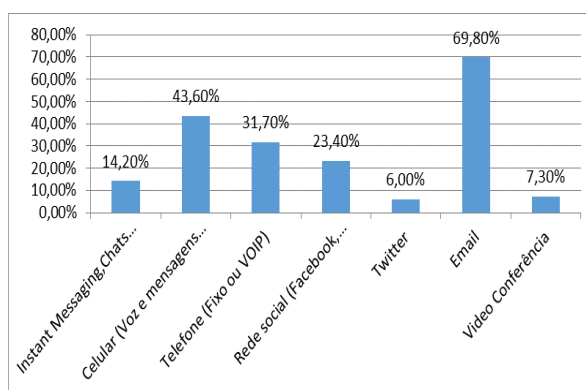confidence interval for the average was maintained at 95%, which corresponds with an error margin of 5%.

Data Analysis:

The importance of the e-mail and cell/smartphones, when the percentages of those

consider it of "high impact" and of "excess impact" was added to the answers. The result was of 69.80%, as shown in the graphic below:
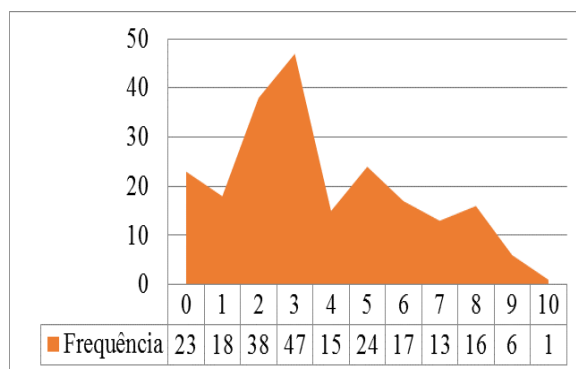
Table 1: Association Strength.

Coefficient's Variation	Association Strength
0.91 to 1.00	Very strong
0.71 to 0.90	High
0.41 to 0.70	Moderate
0.21 to 0.40	Small, but defined
0.01 to 0.20	Slight, almost imperceptible

Graphic 1: Results - Medias – High and excessive impact.

The answers' distribution referring to attention can be checked in GRAF. 2 bellow.

Graphic 2: Results – Attention Difficulty.

The profile's variables and their crossing with the construct were analyzed, identifying the tendency of technological use, such as social network, twitter and Instant Messaging inversely proportional to age, which reinforced other researches, such as that of Spira and Feintuch (2005), according to which the younger generation uses more these technologies. As for the e-mail, it has a slight positive association with the age. Now the e-mail's presence has a slight positive association with age. Regarding the attention and media, the e-mail and the social networks are the items that present the highest positive association (0.23). The e-mail had already been described in previous theories and researches, while the social

network has been occupying inclusively the e-mail's own place in the communication between people as it has been incorporated to the communication mechanisms (messages inbox) in the network's platform. The relationship between the constructs and age, PERSONAL FACTORS has a positive relationship with age, and the INFORMATION TECHNOLOGY shows a slight negative association, having a greater impact with the age's drop.

With relation to the construct and other variables, when crossing with Attention Difficulty, almost all of them presented a positive relationship, which demonstrates that the deficit's increase leads to a greater perception of these constructs, especially

the following: INFORMATION CHARACTERISTICS (0.29) and PERSONAL FACTORS (0.27).

The correlation between age and attention was not verified. This analysis shows itself to be contrary to Badke's (2010) and Johnson and Proctor's (2004) theories, but reinforces Kligberg's (2009), in which age would not have an impact on attention.

Correlations between Attention Difficulty and Media:

The majority of the media that were analyzed presented a correlation between them, all positive, indicating a tendency to use these in conjunction. Here, only the strongest are mentioned: E-mail x Cell Phone (0.43) and Twitter x Social Network (0.47). The cell phone, using the SMS messages and even the e-mail's presence, starts being an extension of the computer for receiving and sending them. This result reinforces the theories in which the e-mails and the

smartphones wireless technology can aggravate the information overload's situation.

Relationship between the Dependent Variables:

In this analysis, only two relationships were found between the ORGANIZATIONAL DESIGN and Gender, and PERSONAL FACTORS and Age. This result, with only two significances between the construct and the profile's variables, suggests that there is no strong tendency of the perception over the information overload's factors among these different profiles.

Presentation of the Questionnaire's Averages:

The answers that have already been treated with their proper average calculations, limits and deviations, are presented in TAB. 2. To better understand the averages, it is necessary to consider the following: 1 - Disagree Totally; 2 – Disagree; 3 – Neither agree nor disagree; 4 – Agree; 5 – Agree Totally. The interval 3 (three) represents neutrality.
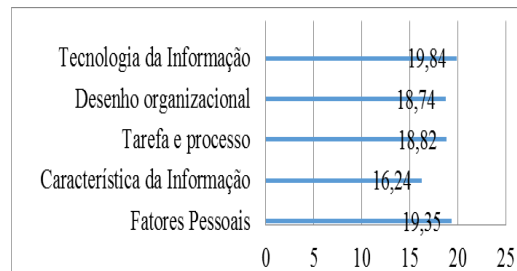
Table 2: Results – Average Analysis.

onstruct	Code	Item	N	Minimum	Maximum	Confidence Interval of 95% for the average			Standard Deviation
						Inferior Limit	Average	Superior Limit	
Personal Factors	FP1	It is difficult to pay attention to the total amount of information that I would like during the day.	218	1	5	3.75	3.87	4.00	0.942
	FP2	When the object of my attention, at any given moment, is related to my goals and motivations, there is an increased productivity.	218	2	5	4.39	4.48	4.58	0.713
	FP3	Simple questions such as room temperature, presence of sleep, time of day, etc. can disrupt my attention and my work.	218	2	5	4.12	4.23	4.34	0.810
	FP4	Technology has evolved so much that it has hindered the adaptation and interaction with all the available and necessary options.	218	1	5	3.03	3.19	3.36	1.226
	FP5	Today it is more difficult focus on a main activity for a very long time.	218	1	5	3.43	3.58	3.72	1.093
Information Characteristics	CI1	There are many alternatives of information available, which makes the selection difficult.	218	2	5	3.51	3.64	3.77	0.979
	CI2	When searching for information, I find most of the time conflicting information and/or ambiguous that makes the decision making more difficult.	218	1	5	2.89	3.03	3.16	1.007
	CI3	I receive new information often, which makes it difficult to give attention to all of them.	218	1	5	3.63	3.75	3.87	0.914
	CI4	The various information dimensions: text, images, sounds, video generate a greater complexity, impairing its understanding.	218	1	5	2.11	2.25	2.38	1.008
	CI5	The information with quality and value are lost in the midst of other information without value and without quality.	218	1	5	3.43	3.57	3.71	1.050
Task and process	TP1	There is pressure to do more in less time.	218	1	5	4.34	4.44	4.53	0.730
	TP2	The existing interruptions, when I carry out complex activities, cause a drop in performance.	218	1	5	4.04	4.17	4.29	0.911
	TP3	The necessity to do several things at the same time makes it difficult to concentrate and be productive.	218	1	5	3.87	3.99	4.11	0.901
	TP4	The excess of details in the processes and tasks demands more my attention, impairs on the work's quality.	218	1	5	2.75	2.91	3.06	1.148
	TP5	The execution of activities is impaired by the quantity of simultaneous information from several sources.	218	1	5	3.17	3.31	3.45	1.066
Desenho organizacional	DO1	The collaborative work between people and teams increases the complexity.	218	1	5	2.91	3.06	3.21	1.144
	DO2	The working groups' heterogeneity generates information of greater complexity	218	1	5	3.41	3.54	3.66	0.956
	DO3	The new communication technologies increase the quantity of information that I receive every day.	218	2	5	4.35	4.44	4.52	0.621
	DO4	People try to accumulate information to demonstrate power.	218	1	5	3.66	3.78	3.90	0.934
	DO5	The search for information is performed by end users and not by information professionals.	218	1	5	3.79	3.92	4.04	0.932
Information Technology	TI1	I receive (if I receive) daily News from RSS, blogs and twitter, but I can (could) read them in a satisfactory manner.	218	1	5	3.74	389	4.04	1.106
	TI2	I receive many e-mails every day.	218	1	5	4.14	4.24	4.35	0.809
	TI3	I check my e-mails (working or personal) the whole time, even after work.	218	1	5	3.84	3.99	4.13	1.062
	TI4	The wireless technology with cell phones, Smartphones, IPad, Notebook, etc. allow me to have access to the Web during several moments, a thing that I do frequently.	218	1	5	3.83	3.99	4.14	1.134
	TI5	With the storage capacity increasing, the costs dropping, I try to store everything that I can in the micro.	218	1	5	3.58	3.73	3.89	1.141

In the TAB. 2, it is possible to observe that most of the questions had an average above 3 (above

neutrality), and only the questions C14 and TP4 had an average bellow 3.

In the average's summing, as presented in GRAP. 3, the Information Technology and the Personal Information are the highest constructs, with a larger concordance. This demonstrates the importance given by the respondents to these two key-themes: technology, as one of the causes in the information overload, and the attention as a scarce cognitive factor which is overloaded by the excess of information.

Graphic 3: Results – Average Summing.

The questionnaire answers' averages were maintained between the extremes 2.25 and 4.48, being that, in most of them, 17 questions of the questionnaire's 25, maintained themselves between 3.00 and 4.00. Due to this reduced variation, the averages summing in GRAPHIC 3 also presents a small difference between the constructs. With an average of 12.5, all the constructs are above this point, showing concordance.

The Model:

The model that was found, based on Eppler and Mengis' (2003) model, presents the relationships generated after the linear regression, as in FIG. 2. The higher the value, greater is the construct's weight in the overload. All the items had a high factorial load with all the considered constructs, with exception of the items FP2, FP3, DO1 and DO2. These items presented inferior factorial loads at 0.3, and were, for this reason, withdrawn from the model that was found.
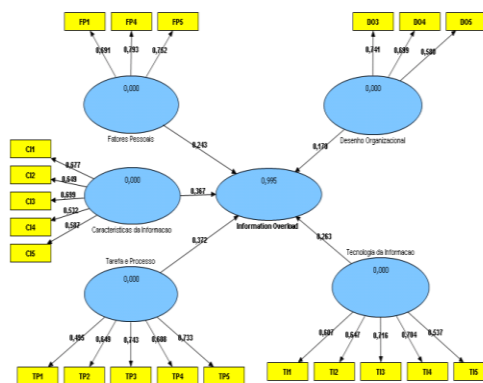

Fig. 2: Results - Analysis – Constructs and Information Overload.

The information overload's construct was defined as a latent variable of the second order, in other words, formed by latent variables of the first order (personal factors, information characteristics and organizational design). The same was estimated as basis for the items that compose each latent variable of the first order (3 personal factors, 5 information characteristics and 5 task and processes), this procedure being shown by Wold (1982).

The following constructs' association forces about information overload were obtained: Organizational Design has a slight association force, almost imperceptible, and the others have a small, but defined, association force.

This statistical result should be evaluated based on the presented theory, since the causality explanation should come from the theory, which is beyond the statistical field (HAIR *et al.*, 2005). The predominant association's force – "Small but defined", signals that these constructs explain in a definite form the information overload's phenomenon, without the predominance of any of them. This result is in agreement with the model presented by Eppler and Mengis (2003) that declare: "Normally the Information Overload happens not because of only one factor, but by a mix of five of them".

Conclusion:

The respondents samples tend to accept the attention's importance in work productivity, the pressure of time over tasks, and the presence of the new communication technologies that increase the quantities of information, the excess of e-mails, and the presence of multitasks and interruptions that affect their performance.

Following Eppler and Mengis' (2003) framework, the Task and Process' construct, in which multitask and interruptions are inserted, showed a greater explanation among the groups that were defined by the authors for the information overload's phenomenon. These, multitasks and interruptions, are also located among the first at the top of the ranking in the averages' list, which are added to attention and technologies, such as e-mails, present in the Personal Factors and Information Technology's constructs. The model that was found, shows definite associations and reinforces Eppler and Mengis' (2003) model, in which the five factors that interfere in a jointly form on the information overload, without the predominance of a single factor.

It is possible to observe that the items that contribute the most within the Organizational Design, Personal Factors and Information Characteristics constructs are, respectively: The New Communication Technologies (DO3), Technological Evolution (FP4) and Frequent Receipt of new information (CI3). These three items refer to a novelty, the evolution that generates new technology and new information, that can be reinforced with the wireless technology (TI4), which is also a new technology with widespread use.

It is understood that Klingberg's (2009) vision, according to which the brain would be the same for any generation, all of them been able to notice this phenomenon, is the one that better adjusts to this research's results. These results, with only a few of relationships found, do not consist in a lack of a statistical correlation that disassembles the theory by complete, on the contrary, it can reinforce the theory that the information overload does not have gender, education, job title, age, in short, it does not reach a specific profile, been able to reach all of them, without distinction. It is not an aspect of a man or a woman, a director or a technician, generation X or generation Y, but a generic phenomenon nowadays for the knowledge worker. This result contrasts, for example, with Pijpers' (2010) vision, according to which the managers would suffer less due to the fact that they have a greater control over their work.

As for the item "attention difficulty", the analysis demonstrated that the increase in the attention deficit's sensation leads to a greater perception of most of the constructs (Personal Factors, Information Characteristics and even Information Overload), which means that those that answered have more attention difficulty and tend to perceive more the causes and the information overload. The attention difficulty also has a positive correlation with the use of the e-mail, twitter, social network and cell phones, being that it is these technologies that overload the system and can generate interruptions. The e-mail, by its turn, is one of the causes of the excess of information, the frequent interruptions and also the multitask, with an impact of 69.8% (High and Excess) over attention, confirming the anterior theories and researches, such as those of Speier, Valacich and Vessey (1997); Spira and Feintuch (2005); Hemp (2009); Pijpers (2010) and Rane and Agrawal (2011). The e-mail, cell/smartphones, wireless technologies, twitter and social network, are points of concern for the managers that are seeking to reduce the information overload, being the e-mail the main one, appearing to have a correlation with all the main constructs. The notebook and smartphones' wireless technology arises as one of the factors that cause the overload, as it increases the connectivity at any moment, generating interruptions and eliminating distances between work and the personal life, which confirms Spira and Feintuch's (2005), Klingberg (2009) and Nicholson *et al.* (2005) position.

As a proposition for future studies, it is suggested: Increase the sample's size so that the analysis of the specific groups can be completed without detriment of its validity; Evaluate the questionnaire's questions and propose a new group disposition; Verify not only Eppler and Mengis (2003) framework's causes, but also the symptoms and the countermeasures, as well as if the self-knowledge's evaluation of this construct (Information Overload) and if the attention management really does generate the best results; Search for work productivity measuring models, confronting them with the information overload sensation and attention management; Carry out separate researches in different kinds of organizations, such as government, private, of different sizes, to be able compare their results; Study the impacting technologies about information overload using the use of time/attention provided to them.

As this research's limitations, it is possible to mention: The time to collect could have been bigger, to be able to capture a larger sample. The necessity to close the research in order to close the statistic, limited the sample to 218 respondents, which limited a more detailed analysis of the samples' cuts and reduced the certainty correlations and associations' force and nature; The difficulty in accessing other anterior researches, mainly those from the authors themselves, such as Eppler and Mengis' (2003) that designed a relatively new field, in which the anterior statistical data about the information overload did not exist to support and improve this model.

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