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Digital Overload: The Effects of The Large Amounts of Information When Purchasing Online

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Abstract

Given the rapid growth of Internet business practices and the need for companies and academia to understand the effect of this new reality for consumers, this article aims to measure whether there is a relationship between information overload in the virtual environment and the response between consumer satisfaction and feeling confused. The research was exploratory-explanatory and made use of a quasi-experiment as a way of operationalism. A factorial matrix was constructed and from this it was observed that the experience of information overload relates to the responses of consumer satisfaction and a sense of confusion in the digital environment. Finally, it was found that the greater the effect of information overload the more confusing for the consumer at the time of purchase, but, paradoxically satisfaction will also be higher.

Keywords: Information Overload; Experimental Research; E-commerce; Consumer Behavior; Website Environment.

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INTRODUCTION

People have needs that can somehow be met by the consumption of products, and the choice of these is the object of this study of *marketing* discipline of, particularly in the field of studies of consumer behavior.

Since its origin in the 1960s to the present day, consumer behavior has been studied as the technological possibilities of sales channels and communication, and it is this context that emerges in the study of consumer behavior *online*.

This decade has seen a significant and growing interest of academia the way that consumers behave in the various purchasing activities *online*. This means the amount allocated to electronic trading is mainly a result of the trade growth carried out by mobile and digital platforms (Elliot and Speck, 2005).

Alterations in demographic and technological scenarios initiated in the 1970s provided significant changes in consumer behavior, in their desires, needs, and consequently, in their lifestyle, creating a new perspective to the field of study (Bretzke, 2005). This change continued in the following decades, especially in the 1990s with the popularity of the web, when the digital revolution emerged.

Changes, particularly technological, that the world has suffered and still suffers led individuals to a new form of consumption, called by Solomon (2004) as digital consumer behavior. Consumers and manufacturers are interacting in a new way of experience that involves the transmission of information quickly and altering the speed of the development of new trends, especially from the time that digital media allows consumers to participate in the creation and dissemination of new products and content.

The digital world, allowing that the purchase occurs in a revolutionary form for its time period, therefore it was independent of the distances (Keegan, 2005), also protagonized the evolution of the ways of obtaining information, thereby differentiating it from traditional commerce, where information is limited by time and space.

Digital platforms provide some comforts and amenities as attractive to consumers, for example, ease and agility in finding information and meeting the right amount of information in a shorter time (Doolin et al, 2005). The speed of communication can make the process of decision making faster and end up favoring the purchase (Aljukhadar et al, 2013).

Currently, companies offer a wide variety of products and brands, which can vary in size, shape, color, and options, in addition to other features. Many researchers of traditional consumer behavior indicate that this excess of alternative offers cause consumers to experience information overload (Anderson et al, 1966; Jacoby et al, 1974a; Malhotra, 1982; Keller and Staelin, 1987). Information overload is defined as the negative (dissatisfaction and confusion) caused by the excess of information that exceeds the individual consumer's processing capacity (Jacoby et al, 1974b).

This classic literature also showed that the negative results, as confusion over the

choice of products and dissatisfaction with the choice made, would also be generated from the experience of information overload (Anderson et al, 1966; Jacoby et al, 1974a; Scammon, 1977; Keller and Staelin, 1987). Or that, instead of assisting the consumer in making the "right decision" to buy, an excess of alternatives and/or attributes may lead the consumer to a state of confusion, reducing their ability to choose (Jacoby et al, 1974a).

In alignment with classical studies, recent investigations such as Baek *et al* (2013) and Aljukhadar *et al* (2013) suggest that such effects previously observed in situations of information overload are also part of the buying behavior in digital environments and, therefore, the management of the amount of information is one of the tasks of digital marketing in the sense of promoting customer satisfaction.

This combination of shopping on digital platforms with the ability to search for information on the *web* leads, then, to a new interpretation of the theory of classic information overload, originally proposed by Jacoby *et al* (1974a), where it was proposed that a large amount of information available at the time of purchase stimulates a state of either consumer satisfaction or confusion.

In this sense, this article proposes to observe the relation of cause and effect between the variables of information overload, consumer satisfaction and sense of confusion when buying in a digital environment of electronic commerce. Although there is recent research in the area, there is an opportunity for research in experimental testing of variables that allow in-depth study of the causal relationships of the variables involved in the phenomenon.

Considering the aforementioned, the problem to be investigated is reflected in the following research question: Does the experience of information overload somehow relate to the responses of consumer satisfaction and the sense of confusion in the digital commerce environment?

To perform this study, it was adopted as an experiment setting of the largest e-commerce company in Brazil in 2012 (Top10 +, 2013a) and the best-selling product on the web in 2012 which was the mobile device (Top10 +. 2013b). The first company on the list of largest digital retailers is Mercado Livre (10.11%) followed by Lojas Americanas (4.80%). As Mercado Livre is a provider of intermediation sales and not a retail company, Lojas Americanas was considered in this study to be the largest digital retailer of Brazil in 2012.

DEFINITION OF INFORMATION OVERLOAD

Consumer behavior is a field of study that incorporates issues related to the interaction between people, products and purchase activities, and within this scope contains the process of decision making that is sub-divided in five steps, of which the relevance for this article is the stage of searching for information.

In this context, it is noted that it is during the information search process that the individual is subject to experience the state of information overload (SIO), which is in its classic definition and still the current consumer behavior is under the influence of a greater amount of information than this may process (Jacoby et al, 1974a).

In other words, when instead of helping in the decision, the information hinders.

From this perspective, Jacoby and Malhotra (1984) and Baek *et al* (2013) also defined the overload state as the condition of being exposed to an excessive amount of information at a level that the person can no longer process it because the fundamental premise that sustains the SIO is that consumers have a finite capacity to absorb and process information in a certain period of time (Malhotra, 1982).

Effects of information overload have been identified not only in consumer behavior, but also in other areas, such as financial management (Swain and Haka, 2000) and health sciences (Jacoby, 1977), which demonstrates the amplitude and relevance of the investigated phenomenon.

However, before delving into the subject, it is required to make an initial distinction between information load and information overload, which for McCormick (1970, p.114) differentiates to find that information load refers to the variety of stimuli to which individuals should respond and information overload, obviously, the excess of these stimuli.

Under this assumption, some studies have set out to investigate what is the optimal level of information to optimize the purchasing process (e.g., Wright, 1975; Bettman, 1979; Olshavsky, 1979; Aljukhadar *et al*, 2013), and the result of this work brings up the proposition Wright (1975) where six alternatives is an ideal number for the consumer to make the decision to purchase without suffering the effects of information overload. However, it is important to note that this finding may not represent the current reality because there is a difference of four decades of great technological capability between the study of Wright (1975) and the digital age. This difference is evidenced by the results of the study by Aljukhadar *et al* (2013) which found that 18 alternatives would already be able to awaken the state of information overload in electronic shopping environments like the web, a number three times greater than that indicated by classic studies.

The phenomenon of information overload can occur under two types of data: alternative overload brands or attributes (Wilkie, 1974). The first occurs when the consumer is facing a situation where they have several brands of competing products and will choose only one. In this scenario, the extra brands to be analyzed, independent of other comparable information between products, features an information overload. The second scenario considers a scenario with a small number of brands available, but much information about attributes of the products, such as buying houses or apartments where the number of features to be compared between only two items can now awaken the SIO.

Thus, from the effects of information overload, Bretzke (2005, p.75) admits that this is the cause of one of the major marketing challenges in a broad way that is the difficulty in managing the distortion between the mental model and actual image of the product or service, because consumers have difficulty distinguishing the difference between the multiple stimuli they receive.

In an attempt to better understand the SIO, it is necessary to reference the preliminary studies of Jacoby *et al* (1974a) which showed the initial correlations between the amount of information and the responses of both satisfaction confusion at the time of purchase.

Through this model, it was also observed that when in a state of information overload, consumers have less ability to choose the "best" brand.

This concept of "best" was adopted by Jacoby et al (1974b) as being the intention of consumer purchase before receiving stimuli of sales information from POS and was defined by measuring which product features consumers considered most relevant at the moment just prior to purchase.

Although the definition of the SIO model involves few variables and shows a simple form, conclusions obtained by preliminary studies are diverse and often contradictory, for example citations that some research indicates that when increasing the number of information there is a greater satisfaction on the part of consumers while others claim that this relationship is inversely proportional (e.g., Jacoby et al, 1974b; Scammon, 1977).

Paying attention to these differences, Malhotra (1982) has proposed to consider other aspects of information on research, such as the variation of attributes (not just alternative) and measuring the relevance of information to the buying decision.

Prior to this impasse over the contradictions in studies of SIO, Anderson *et al* (1966) have already noted that the research area of consumer behavior can present distortions in their results by the fact of the confused consumer aspects intermediating with their (dis)satisfaction with the overall performance of the store or the product, and thus it is assumed that such an effect may be an explanation for the heterogeneity of further studies on the effects of information overload.

Aware of this possible effect, Jacoby *et al* (1974b) has redone his research and again confirmed the previous findings, emphasizing that the greatest amount of information available at the time of purchase may result in decisions far from the "best", previously measured. It was also observed that, even when affected by SIO, individuals felt more satisfied and surer of the product chosen even when the final purchase did not match the "best" purchase. These findings match the answers to the SIO, and are so contradictory that the authors need to discuss them in depth in the next section.

RESPONSES TO THE EFFECT OF INFORMATION OVERLOAD

Among the preliminarily responses to the SIO identified by Jacoby et al (1974a) as well as in current studies by Aljukhadar et al (2013), is customer satisfaction, which will be explored first in this topic, as well as the feeling of confusion.

Satisfaction was conceptualized by Sheth *et al* (2001) as the buyer's cognitive state of being adequately or inadequately serviced by an effort that held the same realization, which is based on the classic study by Oliver (1981) which has defined satisfaction as the psychological state resulting from the excitement around the unconfirmed expectation that is related to the feelings in the first place of the consumer.

Thus, satisfaction is a key variable in the life of organizations as it leads to loyalty and the ability to engage in word-of-mouth favorable to the brand (Anderson et al, 1994). Although this relationship is prior to the popularization of the *web*, it is still current and present in the digital marketing and social networking environment measured by

computer (Baek et al, 2013).

Beyond the satisfaction, the other answer investigated in this article is the feeling of confusion, which is, for most of the literature, the main response to SIO (e.g., Jacoby *et al*, 1974a; Malhotra, 1982), because this feeling can lead the consumer to withdraw from making the purchase because of too much confusion of making any decision at any given time.

Yet from this perspective, we define the sense of confusion as the temporary state of the inability to processing all of the information available to the consumer at the time of purchase. The feeling of confusion can then be understood as a broken behavior (inability to process) generated by a disorder (information overload), or a mental state characterized by a lack of ordination in the thoughts and acts (Jacoby and Malhotra 1984). This effect has already demonstrated its potential negative web shopping by studying Aljukhadar *et al* (2013), who recommended the use of digital tools to control content (filters).

The proposed research, then, for this part of the article is the observation that the SIO can lead to positive or negative responses in relation to consumer satisfaction and the feeling of confusion, and even in digital environments such phenomenon is still observed with the same characteristics of classical studies. As a way to demonstrate the scientific assumptions adopted for the preparation of the research, the next section presents the research method.

RESEARCH METHOD AND OPERATIONALIZATION TEST

This research was explanatory in nature and instrumentalized from a *quasi-experiment*, where such a test is used in empirical studies to estimate the impact of certain causal relations in a given population and has many similarities with the traditional experiment technique, except for the randomization sampling (Draker and Miller, 1969). The *quasi-experiments* differ also by making use of traditional statistical techniques for internal validation to compensate for the lack of randomness in the formation of control and experimental groups (Kerlinger, 1973).

Continuing with *quasi-experiments*, it is emphasized that there are maintained rules of the experiment with a significant modification with no random selection of people or group respondents (Selltiz *et al*, 1977), no total environment control (Malhotra, 2006) and the situation that to which the experiment will be applied is not the same for all groups (Cook and Campbell, 1979). Such situations actually represent limitations on the traditional experiment; however, there are contingencies of a lean operation in terms of time resources, people and capital, to offset such features statistical tests are used to verify internal validity of the *quasi-experiment* (Kerlinger, 1973).

Although there are limitations, the *quasi-experiment* is accepted and widely used in areas such as marketing management and psychology (e.g., Cohen and Ledford Jr., 1994; Taylor et al, 1995; Mayer and Davis, 1999; Evans et al, 2000; Wood, 2002; Jap, 2003; Chang, 2004; Reiser and Simmons, 2005; Gibbons, 2005; Szulanski and Jensen, 2005; Chen and Shaw, 2006 and Smith, 2006).

In this sense, it is important to note that the *quasi-experimental* research is also characterized by the deliberate manipulation of some aspect of reality to be investigated, because, according to Vieira (2002), this type of study is used to obtain evidence of cause and effect and to this end it is necessary to control the *quasi-experimental* variables and environment. Thus, the causality can be inferred when between two or more variables there are concomitant variation and correct order of occurrence of variables in time and when other possible causal factors (extraneous variables) are eliminated (controlled) (Malhotra, 2006). In this research, the investigated variables were controlled are information overload and its two responses of consumer satisfaction and the sense of confusion at the time of purchase.

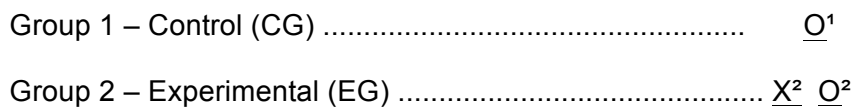
For the elaboration of the *quasi-experiment* there were prepared two groups, the first being the experiment group (EG) and the other the control group (CG). The experimental group will be subjected to treatment which aims to awaken the effect of information overload in the sample while the control group will be monitored without any intentional intervention that causes the SIO.

Regarding the environment, the *quasi-experiments* can be carried out in laboratories or in the field (Malhotra, 2006), but in this study we chose to use the lab environment where the researcher builds a scenario with specific conditions for the experiment because it offers a high degree of control by isolating extraneous variables.

In order to better present the causality between the variables, we will use the following symbols that, according to Campbell and Stanley (1979), are better representations for experimental and quasi-experimental:

- X - Exhibition of a group to an independent variable, treatment or event whose effects must be determined;
- O - Process of observation or measurement of the dependent variable on the test units or groups of units;
- R - Random assignment of units or groups of test to separate treatment;
- Alignment from left to right - movement over time;
- Horizontal Alignment - All symbols refer to a specific group of treatment; and
- Vertical alignment - This involves that these symbols refer to activities or events that occur simultaneously.

By classifying the *quasi-experimental* single case of this study, a random assignment of units will not be used, then the routine for the two groups (experimental and control) will be:



The first group will be tested in the laboratory in a normal purchase situation without SIO, while the experimental group will build a scenario in the laboratory with information overload. The O¹ step represents the observation of a group in a process in a digital purchase laboratory without the effect of information overload, yet X², in turn, is where there will be the task of handling the independent variables that will be followed in its O² measurement.

Both observations occur chronologically in equal times, but the location of the groups must be distinct so that there is no interference in the test.

To operationalize the test, it is necessary to delimit its scope by presenting research propositions, definition of variables and the factorial matrix, then the scenario and the instrument should be validated, and as a way to better organize these contents, the topics for each step are presented in the sequence.

RESEARCH PROPOSITIONS

Some propositions were developed to be investigated in this study starting from the classical studies such as the investigations of Jacoby *et al* (1974b) and Malhotra (1982) and contemporary studies such as Aljukhadar *et al* (2013), where it can be observed that the independent variable information overload must affect the dependent variables such as customer satisfaction and a sense of confusion.

The propositions were still based on other traditional marketing research which shows that the effect of information overload that the consumers feels more confused (Anderson *et al*, 1966; Jacoby *et al*, 1974b; Scammon, 1977; Keller and Staelin, 1987; Garbarino and Edell, 1997) and less satisfied (Anderson *et al*, 1966; Scammon, 1977; Malhotra, 1982; Keller and Staelin, 1987). Thus, the first set of propositions based on the literature can be observed in Table 1.

	Proposição
P1	Information overload is related to the response of consumer confusion with <i>e-commerce</i> .
P2	Information overload is related to the response of consumer satisfaction with <i>e-commerce</i> .

Box 1: Research Propositions

DEFINITION OF THE VARIABLES AND THE FACTOR MATRIX

The independent variable of the model is information overload, which will be conducted in the laboratory by increasing the information available to the consumer at the time of purchase. In this manipulated experimental setting, we used 54 simultaneous informations, including six brands where each had nine attributes. It is emphasized that everything took place on the same screen at the same time in order that the SIO could be observed.

The construct is still composed of the two dependent variables: consumer satisfaction and the feeling of confusion. During the tests it will be measured if there was an increase or decrease in scores on the dependent variables between the EG and CG.

The feeling of confusion is the most frequent response in studies of information overload, and it refers to the inability to process information in overload scenarios (Jacoby *et al*, 1974a; Malhotra, 1982; Jacoby and Malhotra 1984). The other dependent variable of the model, in turn, is the consumer satisfaction with the purchase that in previous studies indicated that the consumer tended to be less satisfied with their purchase experience when experiencing SIO (Anderson *et al*, 1966; Scammon, 1977;

Malhotra, 1982; Keller and Staelin, 1987).

To test these variables, we adopted a factorial study, which is a form of *quasi-experiment*, on a statistical basis, which serves to measure the effects of two or more variables on various levels (Malhotra, 2006). This form of research is useful for considering that the simultaneous effect of two or more variables is different from the sum of their separate effects. Thus, the factorial study can be designed in a table, where each level represents a row or a column.

In this research, the lines are assigned levels of the independent variable, the information overload (overwhelmed / normal). In the columns, the levels of the dependent feeling of confusion (confusing / not confusing) and consumer satisfaction (satisfied / dissatisfied) can be observed, thus forming a 2x2x2 factorial matrix.

Participants were exposed to two levels of the independent variable and then grouped according to their responses. The use of tables improved visualization of variables and their interactions in the study. Table 1 shows how the experiment of this study was structured.

Table 1: 2x2x2 Factorial Matrix

Information Overload	Feeling of confusion		Consumer satisfaction	
	Confused	Not confused	Satisfied	Unsatisfied
Overloaded environment	A	B	C	D
Normal environment	E	F	G	H

CONSTRUCTION AND VALIDATION OF THE SCENARIO

The scenarios, which are simplifications of reality, are used in situations where it requires a controlled investigation under something that is difficult to control in the research field. Thus, this study used this technique to arouse the SIO in the sample. However, two scenarios were necessary given that the control group should not suffer the effects of information overload.

Thus, two scenarios were presented, one being the control group and the other the experimental group. The CG had a reduced amount of information even below the classic study by Wright (1975) to ensure that there was no SIO affecting the consumers. The EG, in turn, was induced to information overload due to the large amount of information available on the digital store *layout*.

The product chosen to illustrate the scenarios was the cell phone, for being the most sold item on the Web in 2012 (Top10+. 2013b). This choice also took into consideration that, due to the popularity of this product, brand attributes and consumer understanding about the experimental task were simplified, requiring no technical explanations during the test.

The cellphones and their attributes that composed the scenarios are presented in Tables 2 and 3, and were chosen for being listed among the top sellers of the Lojas Americanas® website, which was chosen as the environment for this experiment having been the largest e-commerce company in Brazil in 2012 (Top10+, 2013a).

Table 2: Products of the control group (CG)

Attribute \ Product	Apparatus A	Apparatus B
Touch Screen	Yes	Yes
Camera with flash	No	Yes
Price (R\$)	489,00	489,00

Table 3: Products of the information overload group (EG)

Attribute \ Product	Apparatus C	Apparatus D	Apparatus E	Apparatus F	Apparatus G	Apparatus H
Touch Screen	No	Yes	Yes	Yes	Yes	Yes
Camera with flash	No	Yes	Yes	Yes	No	Yes
Weight (grams)	200	104	93	82	93	100
Two chips	No	No	No	Yes	No	Yes
Clock function	Yes	Yes	Yes	Yes	Yes	Yes
Wifi	No	Yes	Yes	No	Yes	Yes
Battery life	Long	Short	Short	Short	Long	Short
SD Memory	No	Yes	Yes	Yes	No	Sim
Price (R\$)	289,00	1.024,00	999,90	469,00	399,00	689,00

For the validation of the scenarios, a focus group consisting of 12 respondents (three men and nine women) post-graduate students chosen by convenience with a profile between 24 and 33 years where it was requested that participants list in order of importance which attributes are more crucial for them at the time of deciding which mobile device to purchase, considering the last time they made this purchase. Nine different items were mentioned, and the main ones are listed in Table 4.

Table 4: Ranking of attributes by importance

Attribute	Nº Cited
Brand	09
Design	09
Practicality	06
Display <i>touch screen</i>	05
Funcionality	05
<i>Wifi</i> access	05
Dimensinos	03
Camera qualiity	02
Weight	01

Among the attributes reported by the participants, the functionality and convenience were not part of the composition of the direct scenario for the purpose of being subjective. Already the brand attributes, design, and dimensions are inextricably linked and are represented by the model in the experiment.

In a second stage of validation, a new focus group was conducted this time, with nine post-graduate student participants chosen for convenience (four men and five women) who have made mobile phone purchases over the Internet and who were aged group between 26 and 30 years. The only task of this group was to analyze the modified layout of the Lojas Americanas® website, which was necessary since the screens on the original site lacked the situation with the amount of information required by the experiment. It is important to emphasize that this task group was to analyze the elements of the website without the purpose of the test that was revealed *a priori*.

The intent, then, of the second focus group was to determine whether participants would notice that the screens were not original, as this could compromise the experiment if the scenario was not similar to the real thing (Boff and Hoppen, 2001). At the end of the false layout analysis section none of the participants raised the suspicion that the pages were fictitious, thus, validating the scenario.

INSTRUMENT FOR MEASURING THE AFFECTIVE EFFECTS

In order to meet the objectives of this research, a questionnaire was developed to use with an instrument to measure the experiment. Two scales were necessary in order to perform the measurement of the responses to the SIO, the overload itself is not observed directly, but, through its responses and above all the difference of scores between the EG and CG, it was possible to infer its existence.

In alignment with the aforementioned, customer satisfaction and a sense of confusion were measured barriers of the classical scale of Jacoby et al (1974b). As for the format, it is a Likert scale and their assertions can be seen in box 2.

Alternatives	Label
I was pleased with my purchase.	SATIS1
I'm happy with my choice.	SATIS2
I am sure I made the best choice.	SATIS3
The other options were certainly worse than the one I chose.	SATIS4
Having the opportunity, I would buy the same product again.	SATIS5
I felt confused before choosing which product I should buy.	CONFUSE1
I am unsure, I may not have purchased the best option.	CONFUSE2
Some of the brands not chosen could have been a better choice.	CONFUSE3
Would have liked more time to think before buying.	CONFUSE4
I would have liked more information to make a better purchase.	CONFUSE5
If I had more information, I would be able to make a	CONFUSE6

better choice among the options.	
I believe that more information would cause more confusion in my choice.	CONFUSE7
I was not able to decide due to lack of information	CONFUSE8
There was little information available at the time of purchase.	CONFUSE9

Box 2: Range of effects of information overload
 Source: Jacoby *et al* (1974b, p.36)

Every scale, *a priori*, must be validated in order for its measurement to be reliable, for this study it was decided by the statistical validation that operationalized through the application of a pre-test and the use of statistical internal consistency, among which the most popular is the calculating of Cronbach's *alpha*. For this study to be conducted, a pretest with 63 respondents, undergraduate students between the ages of 20 and 24, users of mobile and digital technologies that are familiar with the subject matter were used.

The pretest is not classified as part of the experiment and is not under its rigors, though, it opted for an operationalization closest to the desired in order to maintain alignment between the methodological steps of the study, then the questionnaires occurred in a single room where respondents were asked to navigate the actual website of the Americanas® digital store and a fictional budget of 800 reais should decide which mobile phone would represent the best option. After this activity, participants answered the questionnaire with the test scales and this was the material used for the calculation of internal consistency.

In this phase of the pretest, the objective was not to calculate the scores of responses to SIO, rather only to use the input to perform validation. Thus, both scales of consumer satisfaction (Cronbach's *alpha* = 0.763) and the feeling of confusion (Cronbach's *alpha* = 0.742) reached the expected values for the parameters of the adopted test. (Hair *et al*, 2006). Still, there was a factor analysis performed in order to verify that the scales would group in the expected factors.

In the factor analysis test the expected behavior was observed, therefore the scale of customer satisfaction carried only one factor in getting the significance of 0.000, KMO of 0.632, 3 degrees of freedom and a *chi-square* 77.833, while the items of the confused feelings group also in the same factor and analysis obtained a significance of 0.000, KMO of 0.642, 9 degrees of freedom and a *chi-square* 69.585.

Thus, according to the pre-test analysis, the scales were statistically validated and may be used for this study as a means of measuring the desired objectives (HAIR *et al*, 2006).

ANALYSIS OF THE QUASI-EXPERIMENT

The tests were conducted in two groups, both receiving the same task, however, in different environments, at the end each participant was asked to answer a questionnaire on their profile and containing the two valid scales in this study.

The total data of the 400 participants was considered, with 200 in the control group and 200 in the experimental group.

The average profile of the CG was female (53.3%), between the ages of 19 and 25 (42.5%), a personal income between 2 to 4 times the minimum wage (49.5%), with Internet access of more than 10 years (57.6%) and a higher frequency of daily connection up to four hours (33.8%).

Yet the EG, in turn, was formed from an average profile of women (66.3%), between the ages of 19 and 25 (46.3%), a personal income between 2 to 4 times the minimum wage (34.5%), with Internet access of more than 10 years (38.7%), and a higher frequency of daily connection up to four hours (52.3%).

Both groups were formed by students in higher education and post-graduate students who volunteered to participate in the study, constituting therefore a non-probability sample. After the analysis of the average profile of the groups, it was found that there is a close proximity of the profile, which is desired in experimental studies.

Initially it performed the Cronbach reliability test in order to verify the internal consistency of the scales, where it was found that the control group obtained an alpha of 0.694 in the grouping relative to satisfaction and 0.723 for the items of confusion. As for the experimental group, it observed 0.711 and 0.765 in the blocks relating to satisfaction and confusion respectively which are suitable for a marketing research (MALHOTRA, 2005), so there is no recommendation to delete items from the final analysis scores.

After checking the internal consistency, a factor analysis was performed to ascertain whether the items would cluster within a single factor by scale, as predicted by the literature. The scores for the experimental group were KMO 0.675 with 83 degrees of significant freedom to 0.000, with the *chi*-square already found by the Bartlett test at 611.433. The variance explained was 48.497%, then the grouping obtained through this analysis confirmed the expectation because the items were loaded according to the original scale of Jacoby et al (1974b).

Parallel to the CG, the factor analysis was performed for the sample experiment that obtained a KMO of 0.698 while the Bartlett test of sphericity indicated a *chi*-square of 365.237 with 92 degrees of freedom to the significant level of 0.000 and the explained variance was 65.213%, a fact that also confirmed our expectations regarding the operation of the scale. After this step, the items extracted from the factor analysis were summed by the method of regression to form a single latent variable used in the following analyzes.

From possession of these analyzes, the 2x2x2 matrix array was made using the average regression of each factor. To classify if the respondent is positioned positively or negatively in relation to the response of the SIO tested, we used the criterion of the Likert scale where negative scores (-2 and -1) indicate a response to the same direction, while values above zero (1 and 2) indicate positive responses, the neutral point (0) shows no defined position.

Table 5: Factorial Matix 2x2x2

Information Overload	Feeling of confusion		Consumer satisfaction	
	Confused	Not Confused	Satisfied	Unsatisfied
Experiment group	63%	37%	77%	23%
Control group	44%	56%	39%	61%

Although the results in Table 5 indicate a mean difference between the two groups and, therefore, a confirmation of the influence of SIO on them, it is necessary to perform a significance test that is sensitive to the type of sample not parametrically obtained, and for such was chosen the *Mann-Whitney U* test. The scores for this statistic showed that consumer satisfaction compared between EG and CG had an adjusted Z value of 8.002 with a significance of 0.000, while the feeling of confusion demonstrated an adjusted Z value of 6.852 and a significance of 0.000. Thus, the results point to a nonrandom difference between the means of the groups tested and the graphical representation of the model can be seen in Figure 1.

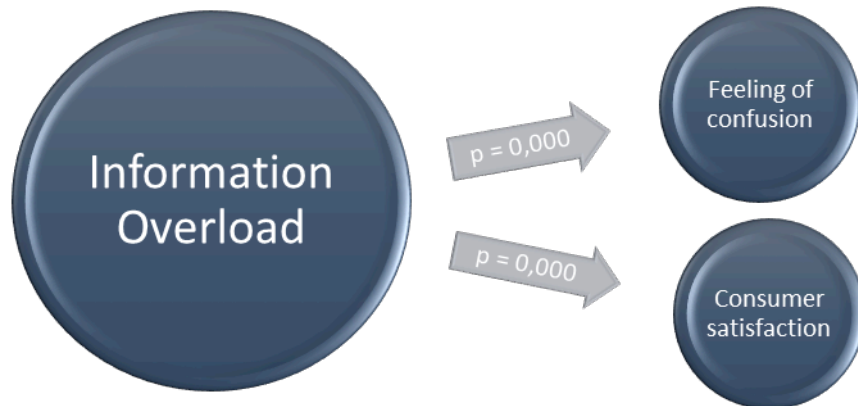


Figure 1: Graphical presentation of the results of the *Mann-Whitney U* test

Considering the above and based on the experimental test performed and the scores calculated it is clear that both propositions of the study were confirmed, so there is a relationship between the experience of information overload and the responses of confusion and feeling of satisfaction in digital commerce environments, where the SIO proved there was greater confusion during the time of purchase and also more satisfaction after doing this, such findings are compared with the theoretical framework and are discussed in the next section.

CONCLUSION

Based on the literature review, two propositions that seek to understand the phenomenon of information overload in digital environments were raised. In this perspective, this study was designed in a general way to investigate if the experiencing of information overload somehow relates to the responses of consumer satisfaction and sense of confusion in the digital commerce environment.

The first finding of the empirical research conducted here and that the phenomenon of information overload exists and can be observed in digital environments in analogous molds in the physical environment Jacoby et al (1974a) and Scammon (1977), with the caveat that the purchase on digital platforms allows a larger number of information pointed to by the classical studies.

The finding that consumers in the digital age are more resistant to the number of information corroborates Aljukhadar et al (2013), which in turn investigated the influence of the indication in making purchasing decision in overloaded environments.

Having established, by way of experiment, that information overload is observed in digital environments, it is necessary to understand the implication of the test of prepositions for the area of theory. Table 3 summarizes the results of the experimental testing performed.

	Proposition	Test	Result
P1	Information overload is related to the response of consumer confusion of e-commerce.	<i>Mann-Whitney U</i>	The proposition was confirmed.
P2	Information overload is related to the response of consumer satisfaction of e-commerce.	<i>Mann-Whitney U</i>	The proposition was confirmed.

The *quasi*-experiment showed that there is a causal relationship between SIO, consumer satisfaction and the feeling of confusion, and in addition, it was observed jointly that while the person experiences the effect of information overload he also is said to be more satisfied and more confused.

The feeling of confusion is detrimental to the purchase and, therefore, can cause the consumer to desist from purchasing at that time and to leave the digital retail environment, where it is possible that he will reconsider his choice and, perhaps, search or shop at competitors, soon companies should avoid SIO.

However, on the other hand, information overload environments demonstrated through this empirical research are the catalysts of consumer satisfaction. This point of the investigation contradicts part of specialized literature, and rightfully so, needs depth explorations to better understand the phenomenon, but some conjectures may be proposed to explain this observation.

It is believed that in crowded environments of information where the consumer feels more confused than usual, it will require a greater degree of certainty and confidence to make the purchase and this will naturally lead to satisfaction.

Alternatively, one can conjecture that the large number of information, although it makes the consumer confused at first, provides more subsidy for the choice to be made and if so the consumer will be closer to making a better purchase, approaching the idea of "best" buying from Jacoby *et al* (1974b).

Finally, either through greater confidence or in a better position to perform the analysis of choice, it is known that the effect of information overload awakens a greater satisfaction in consumers, and this is desired by the brands.

The challenge, then, to marketing professionals is to balance the gain in consumer satisfaction with the negative effect of the feeling of confusion, even more by the fact that both are awakened by SIO, although it needs more studies in the area to be complete, it is possible to propose that different classes of products and purchase involvements lead to different variations of responses to information overload, then it is fitting to understand when it is desired or not such an effect on the view of consumers and brands.

Thus, in this sense it advises future interest in the topic to conduct its research, both investigating the particularities of situations and buying products with SIO, as the deepening of the paradoxical relationship between the increased level of information and consumer satisfaction.

As with any research, there are also limitations here that must be met that do not occur in future studies. Although the *quasi*-experimental research will be accepted by the academia, the real experiments have advantages, especially with regard to external validity and therefore should have been used if there were no resource constraints.

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