

Pull From Here and Stretch From There: An Experimental Study On The Effects of Out-of-Stock in Retail

Autoria

Evandro Luiz Lopes - elldijo@uol.com.br

Prog de Pós-Grad em Admin/Mestr e Dout Acadêmico - PPGA/UNINOVE - Universidade Nove de Julho

Departamento Acadêmico de Administração/UNIFESP - Universidade Federal de São Paulo

Eliane Herrero - liaherrero@gmail.com

Prog de Mestr Acadêmico em Admin - PPGA/FMU - Centro Universitário das Faculdades Metropolitanas Unidas

Prog de Pós-Grad em Admin/Mestr e Dout Acadêmico - PPGA/UNINOVE - Universidade Nove de Julho

Agradecimentos

Os autores agradecem ao Conselho de Desenvolvimento Científico e Tecnológico CNPq pelo apoio financeiro.

Resumo

Material shortage, or out-of-stock merchandise, is characterized by the momentary unavailability of an item from a retailer's assortment. Even if great efforts are directed toward minimizing this problem, out-of-stock merchandise constitutes large billing losses for retailers, and great dissatisfaction for consumers. In this study, we conducted three experiments in which we manipulated the out-of-stock level. Our goal was to identify the effects of this phenomenon on the consumer's purchase intention. We also sought to understand the underlying cognitive mechanisms that result in different levels of purchase intent when an out-of-stock situation is identified. As the main results, we identified that high levels of out-of-stock items resulted in low perception of quality of the retailer's operation, but a positive perception of low prices practiced by the store. We also identified that social influence entirely moderates the relationship between the out-of-stock level and the consumer's stated purchase intention.

Pull From Here and Stretch From There: An Experimental Study On The Effects of Out-of-Stock in Retail

Abstract: Material shortage, or out-of-stock merchandise, is characterized by the momentary unavailability of an item from a retailer's assortment. Even if great efforts are directed toward minimizing this problem, out-of-stock merchandise constitutes large billing losses for retailers, and great dissatisfaction for consumers. In this study, we conducted three experiments in which we manipulated the out-of-stock level. Our goal was to identify the effects of this phenomenon on the consumer's purchase intention. We also sought to understand the underlying cognitive mechanisms that result in different levels of purchase intent when an out-of-stock situation is identified. As the main results, we identified that high levels of out-of-stock items resulted in low perception of quality of the retailer's operation, but a positive perception of low prices practiced by the store. We also identified that social influence entirely moderates the relationship between the out-of-stock level and the consumer's stated purchase intention.

Keywords: out-of-stock; social influence; purchase intention; retail.

Introduction

A successful retail operation depends on the retailer's ability to meet the needs of its customers and prospects. Although there is the understanding that one way to achieve this satisfaction is to keep store shelves fully stocked (Ghose, Ipeirotsis, & Li, 2014), day-to-day business operations often result in product shortages (Machado & Tondolo, 2014), generating what is known as out-of-stock. This service failure can directly affect the behavior of buyers.

Citing a study conducted by ACNielsen Consulting, Cruz (2016) states that the out-of-stock global average is approximately 8.3% of the retail assortment and that in Brazil, this number exceeds 10%. Cruz (2016) further states that in 32.8% of the cases, although there may be additional stock in the storage rooms, the shelves are empty due to supply problems. In addition, a number of retailers spend a lot of time shelving and replacing "out-of-stock" merchandise with other products in the same category, in an attempt to minimize consumers' perceived lack of products. Companies like Wal-Mart spend thousands of dollars every month on this operational activity (Rosenblum, 2014).

Given this scenario, and also motivated by the importance of out-of-stocks for retail outcome indicators, both researchers and retail professionals have sought a better understanding of this phenomenon.

Previous studies have already identified consumer reactions to the lack of inventory availability of their favorite product brands (Ge, Messinger, & Li, 2009; Verbeke *et al.*, 1998; Zinn & Liu, 2001, among others). But the effects of the out-of-stock in the consumer's overall assessment of the retailer have not yet been adequately examined, nor have the underlying mechanisms explaining consumers' behavioral responses been verified.

Given this context, the purpose of the present study is to analyze the effects of out-of-stock situations on the consumer's assessment of the retailer, verifying which mental triggers exert greater influence in this process.

To this end, we conducted three experiments, in which we manipulated the out-of-stock level of three categories of products, in order to verify the effect of this phenomenon on the intention of purchase of the evaluators.

The effect of the out-of-stock on the consumer's assessment of the retailer

Out-of-stock instances influence consumer behavior in a variety of situations. It is already known that the consumer notes the out-of-stock (OOS) more often when the missing commodity was the target product of the purchase (Campo, Gijsbrechts, Nisol, 2003). However, even before any preference has been formed, OOS can arouse consumer attention, for example, during the information-seeking phase (Anderson *et al.*, 2006; Pizzi & Scarpi, 2013).

Previous research has focused on consumer behavioral responses, verifying the effect of OOS on purchase intention (Dhar & Simonson, 2003), postponing the purchase decision (Van Herpen, Pieters, & Zeelenberg, 2009), and substituting the desired product for another available product (Campo, Gijsbrechts, & Nisol, 2003; Sloot, Verhoef, & Franses, 2005).

Consumers who decide to replace the unavailable product are more likely to opt for a similar substitute product (Van Woensel *et al.*, 2007). In addition, if consumers decide to replace OOS, the feeling of dissatisfaction will be lower than that experienced by individuals who postpone purchasing (Zinn, & Liu, 2001; Van Woensel *et al.*, 2007). These studies suggest that OOS has a greater negative impact when individuals already had a target product for acquisition than when the decision was to be made at the point of sale (Zinn, & Liu, 2001; Van Woensel *et al.*, 2007; Pizzi & Scarpi, 2013).

Research on the effects of OOS has given little attention to the scenarios in which the consumer had not yet defined the product that would be acquired (Ge, Messinger, Li, 2009; Parker & Lehmann, 2011), thus constituting a gap in the academic literature. One of the few initiatives to examine this phenomenon is seen in Ge, Messinger, and Li (2009), who identified that the individuals in this condition present a greater sense of urgency and greater celerity in the process of buying the other products that are part of their list.

Certainly, the information available to the retailer will have a greater or lesser degree of influence on consumer behavior, depending on how specific individual goals are (Fitzsimons, 2000). In addition, less decisive consumers are more susceptible to environmental contexts, such as promotions (Breugelmans, Campo, & Gijsbrechts, 2006), signaling (Campo, Gijsbrechts, & Nisol, 2000), product tasting (Anupindi *et al.*, 2010), and commodity presentation strategies (Parker & Lehmann, 2011).

However, when the individual is more oriented to his or her goal, the environmental influence in the decision-making process decreases. In this context, OOS may have a stronger influence on the decision to postpone the purchase (Gruen, Corsten, & Bharadwaj, 2002) or to leave the store and increase the scope of the search to other competing stores (Gruen, Corsten, & Bharadwaj, 2002; Jing & Lewis, 2011). However, this scenario happens to a lesser extent, since most consumers enter a retail store without having the target product defined (Verbeke, Farris, & Thurik, 1998; Parker & Lehmann, 2011).

Many purchasing decisions are made, or at least adjusted, in the store environment (Emmelhainz, Stock, & Emmelhainz, 1991). Thus, the information received at the store will play an important role in the purchasing decision process, especially in the choice of the product to be purchased (Emmelhainz, Stock, & Emmelhainz, 1991; Gruen, Corsten, & Bharadwaj, 2002).

One of the main attributes that influences the purchasing decision process in regular situations is the perception of low prices (Pizzi & Scarpi, 2013). Of course, the price attribute is less relevant in the scenarios of purchases of high-luxury products (Cheema & Kaikati, 2010) or of extreme rarity and exclusivity (Ruvio, 2008) such as works of art, for example. However, to a large extent, in routine purchases – for both convenience products and comparative buying products (Pizzi & Scarpi, 2013) - price has already been identified as one of the main attributes of consumer decisions (Jing & Lewis, 2011; Pizzi & Scarpi, 2013).

One difficulty for consumers is the relationship between price comparison and the information-seeking effort (Ho & Bodoff, 2014). When consumers broaden the search for information, they are likely to find lower prices, but increasing demand. This effect is potentiated in large cities, since the cost in large urban centers - whether financial, time, or energy - is greater than in small centers (Ghose, Ipeirotis, & Li, 2014).

In this context, an individual will probably infer that an OOS situation occurred due to a good economic advantage perceived by other consumers. If the level of OOS is higher, the

consumer may assume a good retailer pricing policy and not just an occasional offer or promotion on an item. With this, we elaborated the first hypothesis that was tested in this study.

H1 - Higher levels of OOS will increase consumer perceptions about the retailer's low price strategy.

Given the importance of price perception for the consumer, it is possible to admit that when the price is perceived as low, there will be greater intention to acquire the product. We can also assume that a retailer's low pricing policy will positively influence the consumer's purchase intention at that store. To the extent that OOS can potentiate the inference of low prices, as we propose in the first hypothesis, we believe that OOS will also cause the consumer's purchase intention to be affected, so that:

H2 - Higher levels of OOS will increase the consumer's purchase intention.

A study conducted by Kramer and Carroll (2009) identified that individuals react distinctly, depending on their belief about the reason for OOS. When there is a belief that OOS was the result of an operational error, such as delay in the purchase order or delivery of the order by the supplier, the phenomenon results in a negative evaluation of the quality of operation of the retailer. However, this negative perception is attenuated if the consumer forms the belief that OOS originated from a promotion or from the simple mismatch between demand and supply. In any case, the evaluation of the quality of the retailer's operation, to a large extent, is affected by the presence of OOS (Kramer & Carroll, 2009).

In fact, high levels of OOS should result in a negative assessment of the quality of retailer services. Even if the urgency of product acquisition is moderate (versus high, as in the case of medicines, for example), consumers facing an OOS situation should infer that the quality of services provided by the retail operator is below average and, with that, make a negative evaluation of this attribute. Hence our third hypothesis is:

H3 - Higher levels of OOS will negatively affect perceived quality of services relative to the retailer.

Study 1 - The effect of OOS on purchase intention, perceived low price, and perceived quality in relation to the retailer

The objective of Study 1 was to analyze the effect generated by OOS on the intention of the evaluators to buy in the store, to identify the respondents' perception of the prices practiced by the retailer, and, finally, to estimate the perceived quality of services that the consumer infers about the operation of the store. To do so, we conducted a single-factor design experiment (Montgomery, 2008).

Stimulus

By means of an initial pre-test, we asked six college students (four women and two men, $M_{age} = 21.5$ years) to indicate product categories that they usually purchased directly from retail stores. A second group, composed of nine students (six women and three men, $M_{age} = 22.1$ years), classified the categories indicated by the first group, using a 10-point scale, 1 = I never buy this type of product and 10 = I buy this type of product often.

The Student's t-test for paired samples indicated that there was a significant difference between the two categories of highest indication product ($M_{hygiene\&beauty} = 8.9$ [$\sigma = .99$]; $M_{food\&beverage} = 7.6$ [$\sigma = 1.26$]; $t_{(9)} = 3.545$, $p < .01$). With this result, the category of hygiene and beauty products was chosen to be used in the experiment.

With the use of SpaceMan 9.0 software, specially developed for the preparation of planograms and studies of product exposition and category management (ACNielsen, 2017), we produced 14 different layouts. All layouts simulated a display from a self-service store, where products are presented for free consumer choice. In all 14 simulations, personal hygiene products were presented, and in seven simulations there were products intended for a male audience and, in seven others, we presented products for a female audience.

We manipulate the level of OOS presented in the stimuli. The manipulation took place at six different levels (0%, 6%, 10%, 15%, 20%, 30% and 40% of OOS), based on the amount of total items. (all manipulations can be viewed through the link: <https://goo.gl/ds5yfG>).

In order to prevent the lack of assortment influencing the respondent's evaluation, even the stimuli that presented 40% OOS (worst-case scenario), contained all the items that were available in stimuli that had 0% OOS (scenario of Supply [in stock]). The manipulation was only in the quantity of products available and not in the variety of items presented.

Measures

The perceived quality of services was estimated by three items, adapted from the Raman, DeHoratius, and Ton (2001) scale (The quality of operation of this store is very good; the service quality of this store is better than the store I currently attend; The managers of this store are concerned about the quality of the services provided there).

The perception that the store was practicing low prices was measured by three items, adapted from Sweeney and Soutar (2001) (I believe that the prices of this store are low; prices in this store are generally lower than the prices charged; I am sure that the prices of the products sold in this store are very good.) Likewise, the intention of the appraiser to buy in the store analyzed was estimated by means of three other statements, adapted from the study of Morwitz, Steckel, and Gupta (2007) (I would buy from the store that I am evaluating; If possible, I would buy at this store; If a store in this neighborhood opened in my neighborhood, I would consider doing my shopping there). All measurements were made on a 7-point scale, ranging from 1 = Strongly disagree to 7 = Strongly agree.

Collection procedures

University students were referred, accompanied by one of their teachers who had previously been trained for this task, to the computer lab at the higher education institution where they studied. The laboratory had 30 computers available for use; however, the groups were formed by a maximum of 15 students so that the teacher had greater control over the participants, avoiding any kind of interaction between them.

Each student was accommodated in front of one of the computers. The teachers then explained the procedure that should be followed. Teachers told the students that they should evaluate a new store for toiletries and beauty products and that they should express some opinions about this new store through a questionnaire that would be presented next. They also explained that the task was not compulsory and, as a result, each person's participation was voluntary and optional. At the end of the introductory explanations, the students began the task. On the computer's home screen, there was the following text:

"Hello! We would like you to evaluate a store in our network. This store sells toiletries and beauty products and often makes good deals with its products.

We ask you to imagine entering our store and walking through its aisles. Imagine you went to visit the store without having in mind the purchase of any specific product. You went there only to see the shop, which is near your residence. Even though you're not looking for any particular product, you're looking forward to a product display that catches your eye. We will show this display on the next screens and your task will be to analyze it and then answer a questionnaire. Do not rush. Take the time you need to observe the product display, and then press the start button. We remind you that this activity is not compulsory, but if you choose to help us by answering the questionnaire, be sure that no information of yours will be released and all data will be treated in a joint manner, preventing your identity from being exposed. Thank you in advance for your attention."

At the bottom of the screen, there were two buttons. One of them directed the respondent to the activity and the other directed the respondent to a screen of thanks. The students who chose to perform the task were asked to indicate their gender on the next screen. Based on this

information, the students were randomly assigned to one of the previously elaborated stimuli, respecting the indicated gender. We use Qualtrics for all phases of data collection.

Results

The sample of this study was composed of 223 university students, of whom 121 (54.3%) were men and 102 (45.7%) were women. The mean age of the sample was 21.3 years (Minimum = 19, Maximum = 34, $\sigma = 2.18$ years).

Regarding purchasing habits, many respondents visit retail stores more than three times a week ($n = 83$, 37.2%), or at least twice a week ($n = 54$, 24.2%). Exposure to the stimuli was conducted randomly and resulted in groups of at least 24 and a maximum of 38 evaluators. Table 1 shows the distribution of the respondents in relation to the analyzed stimuli.

We used the aggregated score of the low price perception scales ($\alpha = .740$), perceived quality of services ($\alpha = .771$) and purchase intention ($\alpha = .658$), due to the results of the exploratory factorial analysis (EFA). The EFA, performed through principal components analysis and Varimax orthogonal rotation, identified three factors with an eigenvalue greater than 1 that explained 65.29% of the total variance, besides presenting KMO = .812 and Bartlett's sphericity coefficient significant at the level of 1% ($\chi^2_{(36)} = 555.339$; $p < .01$). Given this result, we began the analysis of the difference between the means of these constructs. The results of this analysis are presented in Figure 1.

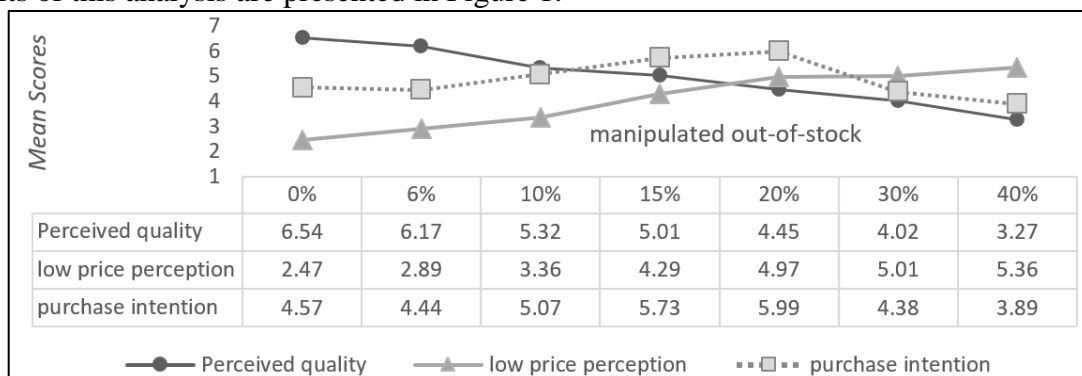


Figure 1 – Effects observed in OOS

As expected, we observed a positive relationship between the OOS levels and the perceived low prices (PPB) declared by the university students. At full supply level (OOS = 0%), PPB was estimated at a lower level. The higher the OOS level presented to the respondent, the higher the PPB. A post hoc analysis TSD (Tukey Significant Difference) showed four groups with statistically significant differences between them. The first group was formed by individuals who evaluated the two stimuli with a lower level of OOS (0% [$M = 2.47$] and 6% [$M = 2.89$], $p = .273$), a second group was formed by stimuli of 6% ($M = 2.89$) and 10% of OOS ($M = 3.36$, $p = .147$), an isolated group was found that evaluated the stimulus with 15% OOS ($M = 4.29$), and finally, a fourth group was formed by the stimuli that presented the highest OOS levels (20% [$M = 4.97$], 30% [$M = 5.01$] and 40% [$M = 5.36$], $p = .358$). The difference in PPB at the extremes of OOS was clearly significant ($M_{0\%} = 2.47$ and $M_{40\%} = 5.36$, $t_{(60)} = 17.171$, $p < .001$).

Also as expected, data analysis indicated a negative effect between OOS levels and the evaluator's perception regarding the quality of store services (QPS). The highest QPS is inferred in the scenario of lower OOS ($M = 6.54$), while the lowest QPS is attributed by the group that evaluated the highest level of OOS ($M_{40\%} = 3.27$, $t_{(60)} = 16.788$; $p < .001$). In this phase, the TSD test identified five distinct groups with significant differences (0 and 6%, 10 and 15%, 15 and 20%, 20 and 30%, and 40% of OOS).

However, it was not possible to accept H2, as we identified an inverted U-shape effect on the relationship between OOS levels and the respondent's purchase intention in the store (PI from this point on). As can be observed in Figure 5, PI increases to a certain level of OOS ($M_{20\%}$

= 5.99), but decreases when OOS levels become very high (for $M_{30\%} = 4.38$; $t_{(68)} = 11.460$, $p < .001$ and for $M_{40\%} = 3.89$, $t_{(71)} = 10.391$, $p < .001$). In addition, the PI was significantly lower in the context of higher OOS ($M_{40\%} = 3.89$), when compared to the CI declared by the evaluators of the lower OOS scenario ($M_{0\%} = 4.57$, $t_{(60)} = 2.647$; $p < .05$). Post hoc analysis is presented in Table 2.

Table 1 – Distribution of respondents for each stimulus

Stimuli (% OOS)	Men	Women	Evaluators
0%	15	9	24
6%	21	12	33
10%	16	8	24
15%	25	9	34
20%	17	18	35
30%	13	22	35
40%	14	24	38
Total	121	102	223

Table 2 – TSD test for stated PI

Stimuli (% de OOS)	n	1	2	3	4
0%	24		4.57	4.57	
6%	33	4.44	4.44		
10%	24			5.07	
15%	34				5.73
20%	35				5.99
30%	35	4.38	4.38		
40%	38	3.89			
p-value		.100	.970	.192	.857

The results corroborate previous studies that verified the deterioration of the quality perceived by the consumer about the operation of the retailer (Kramer & Carroll, 2009). To some extent, this result is quite intuitive, since the mere existence of OOS in the presentation of the products indicates that there was some failure in some phase of the process.

Likewise, the findings of the experiment conducted indicated that the consumer infers that store prices are lower when OOS are present. Probably, social inference is aroused by OOS, causing evaluators to believe that OOS may be associated with a financial advantage perceived by other consumers who have been in the store previously.

To the extent that these conclusions are true, we can understand that social influence is the mechanism that can explain the relationship between OOS and the perception of low prices. To analyze this phenomenon, we conducted the second experiment of this research.

Study 2 - The mediating role of social influence

We can consider that social influence occurs when one's behavior is due to the behavior of others, that is, when one individual is influenced by another individual (Naylor, Lamberton, & Norton, 2011). However, it is important to recognize that the physical presence of the influencing individual is not necessary and may be only imaginary or, at least, presupposed (Berger & Heath, 2007).

Another well-known aspect is what Chernev and Carpenter (2001) and Zhang and Schwarz (2012) called social retail inference. For them, social inference involves observing and interpreting the behavior of other consumers who are in the store environment, associating this behavior with their own consumption decisions. Often individuals believe that other consumers' behaviors are rational and logical and that they result in a more satisfactory and advantageous buying experience (Chernev & Carpenter, 2001; Berger & Heath, 2007). Therefore, the choices made by some consumers may serve as sources of information for others (Naylor, Lamberton, & Norton, 2011; Zhang & Schwarz, 2012).

A gap not yet verified by other research is how OOS can serve as a source of social inference in the retail context. Since most consumer behaviors in a store are not directly observable (Ge, Messinger, & Li, 2009), the level of inventory of products may serve as a reference for others to indirectly infer about the behavior adopted by the majority. Thus, OOS may indicate to the evaluator an advantage - not directly observed - or the perception that the products marketed by the retailer have positive attributes, such as good prices and / or superior quality, increasing the value perception of the transaction. Therefore, we elaborate the following hypothesis:

H4 - Social influence will mediate the relationship between OOS and the perceived low price.

To test H4, we conducted a single factor design experiment in which we manipulated the OOS level of product presentation and measured how such manipulation influences the perception of low prices practiced by the retailer while controlling the social influence reported by the respondents.

Stimulus

By means of an initial pre-test, we asked three university students from an Engineering course of a Brazilian higher education institution (all men, $M_{\text{age}} = 23.2$ years) to indicate categories of products that were usually purchased directly by them in retail stores. A second group, composed of ten students (all men, $M_{\text{age}} = 23.7$ years), classified the categories indicated by the first group, using a 10-point scale, 1 = I never buy this type of product and 10 = I buy this type of product often.

Student's t-test for paired samples indicated that there was a significant difference between the two highest product categories ($M_{\text{food \& beverage}} = 9.1$ ($\sigma = .56$), $M_{\text{electronics}} = 7.7$ ($\sigma = .67$); $t_{(9)} = 4.118$, $p < .01$). With this result, the category of foods and beverages was chosen to be used in the experiment.

With the use of CorelDraw software, we developed two different layouts. The layouts simulated displays of a self-service store, in which the products were presented for free choice by consumers. In both simulations, products of the previously chosen category were presented. We manipulate the level of OOS presented in the stimuli. The manipulation occurred at two different levels (0% [In Stock] and 40% OOS), based on the amount of total items. (The manipulations can be seen in <https://goo.gl/7LW5eH>).

In order to measure the perceived quality, the purchase intention, and the perception of low prices practiced by the retailer, we use the same scales applied in Study 1.

To verify the efficiency of the manipulation, we used only one item (The supply of the products is perfect), whereas, in order to estimate the Social Inference, we use five items adapted from the Polley scale (1987) (People who visit this store are similar to me; I believe that the customers of this store think the same way I do; The consumers who frequent this store and I have a lot in common; The customers of this store have the taste similar to mine; Customers who frequent this store look very much like my best friends).

Both the manipulation check and the Social Inference were estimated using a 7-point scale, anchored at 1 = Strongly Disagree, and 7 = Strongly Agree.

Although it was not expected that the involvement of the sample with the category could influence the results, because the stimulus was randomly presented to the participants, we controlled this dimension through five items from the Personal Inventory II scale (Zaichkowsky, 1985), estimated using a semantic differential of 7 points (Unnecessary / Necessary, Essential / Non-essential, Irrelevant / Relevant, Important / Not important, Significant / Negligible).

Collection procedures

For Study 2, we followed the same data collection procedure used in Study 1. Only the initial text was slightly different, since it reported that the store being visited marketed food and beverages. Another difference was that the respondent was directed to one of the two stimuli (Beers In stock *versus* Beers 40% OOS) randomly and independently of their gender.

Results

The sample of this study was composed by 108 university students, all enrolled in the Civil Engineering course of a Brazilian higher education institution, of which 97 (89.9%) were men and 11 (10.1%) were women. The mean age of the sample was 23.6 years (Minimum = 20, Maximum = 37, $\sigma = 3.28$ years).

Regarding purchasing habits, many respondents reported they visit retail stores, at least twice a week ($n = 32$; 29.6%), or more than three times a week ($n = 31$; 28.7%).

Exposure to stimuli was relatively balanced, as 50 participants analyzed the stimulus with 0% OOS (46.3%), while 58 (53.7%) respondents evaluated the stimulus with 40% OOS.

The manipulation check indicated that the stimuli had the expected effect, since there was a significant difference between the perceived supply level between the two scenarios ($M_{\text{in stock}} = 6.46$, $M_{40\% \text{ OOS}} = 2.02$, $t_{(106)} = 31.284$, $p < .01$).

As expected, there was no significant difference in the sample's involvement with the evaluated product category ($M_{\text{in stock}} = 4.69$, $M_{40\% \text{ OOS}} = 4.60$, $t_{(106)} = .763$, $p = .410$ [n.s.]).

We observed a significant difference in the Perceived Quality ($\alpha = .753$), Low Price Perception ($\alpha = .801$), and did not identify a significant difference in the purchase intention ($\alpha = .689$) declared by the sample. The purchase intention was not influenced by the level of OOS stimulated ($M_{\text{in stock}} = 4.41$, $M_{40\% \text{ OOS}} = 4.04$, $t_{(106)} = 1.536$, $p = .128$ = n.s.). On the other hand, higher OOS levels negatively influenced the perceived quality of the retailer's services ($M_{\text{in stock}} = 5.56$, $M_{40\% \text{ OOS}} = 2.66$, $t_{(106)} = 22.48$, $p < .01$) and positively influenced the perception of low prices ($M_{\text{in stock}} = 2.55$, $M_{40\% \text{ OOS}} = 2.83$, $t_{(106)} = -2.03$, $p < .05$).

In order to test Hypothesis 4, we conducted the analysis of the mediation of social inference on the relationship between OOS and the perception of low prices practiced by the retailer. For this analysis, we used a dummy variable for the OOS level, assigning 0 for the In Stock stimulus and 1 for the stimulus with 40% OOS. For the mediator variable, we used the aggregate score of the five items of the Social Inference scale ($\alpha = .732$). The regressions were calculated using PROCESS for SPSS (Preacher & Hayes, 2008).

The regressions indicated a direct effect between OOS level and estimated social inference ($\beta = 3.534$, 95% CI [3.134, 3.934], $t = 17.515$, $p < .01$). They also indicated that there is no direct effect between the level of OOS and the perception of low prices practiced by the retailer ($\beta = -.398$, 95% CI [-.931, .135], $t = -1.479$, $p = .142$ = n.s.).

However, we identified a total effect mediated by social inference on the relationship between the OOS level and the perception of low prices ($\square = .287$, 95% CI [.007; .566], $t = 2.032$, $p < .05$). With this result, we conclude that social inference is one of the mechanisms that can explain the effect of the level of OOS in the perception of prices. That is, the more consumers in a commercial establishment believe that other customers have characteristics similar to them, the greater the effect of OOS on the perception of low prices.

Even if social inference is not the only mediator of this cognitive process, given the magnitude of the coefficient of determination of low price perception, it was significant. This indicates that social inference conveys the perception that others preferred the OOS products, either for a timely business opportunity, or because of the direct comparison with other options available at the store, affecting the processing of information and the final evaluation of individuals, especially in the retail environment.

It appears that social inference functions as a judgment heuristic, causing the consumer to make assignments about the scenario analyzed, without there being any real cognitive indicators for it. Indeed, in the stimulated context, in which personal interaction did not exist, consumers anchor their judgment about price motivated only by established social inference.

In addition, the results indicated that the OOS level has a direct effect on social inference. This finding partially explains the results of Study 1, in which we identified a positive relationship between the perceptions of low prices and the stimulated OOS level.

General Discussion

Through the three experiments conducted, we identified some phenomena related to the level of OOS perceived in the context of a self-service retailer.

In Study 1, in addition to the effects of OOS on the cognitive responses we also identified effects related to perceived quality of the retailer's operation, perception of the operator's

pricing strategy, and the consumer's stated intention to purchase. In Study 2, we identified one of the mental triggers that explain the perception of low prices resulting from the exposure of the evaluator to a higher level of OOS.

The results of these studies suggest that high levels of OOS negatively influence the perception of quality of the retailer's operation, while at the same time positively influence the perception of low prices practiced by the store. Even though previous studies have found similar results (Wu *et al.*, 2014), we have identified the effect of the simultaneous moderation of these constructs on the stated purchase intent. In fact, the positive perception of low prices practiced was canceled out by the low perception of quality. Thus, it is possible to assume that retailers' efforts to avoid OOS visibility are a wise decision.

We believe that the greatest theoretical contribution of this research is the identification of the mediating role of social inference between the perception of high level of OOS and the perception of low prices practiced. Even if social inference does not explain the perception of prices alone, the finding of full mediation is a contribution to the understanding of consumer behavior in this scenario. With this, we suggest that retailers stimulate the perception of social inference in their stores. Previous studies (Berger & Heath, 2007; Zhang & Schwarz, 2012) have already shown how some communication tools - posters, pamphlets, and banners, among others - can enhance social inference. In this way, momentary OOS at the appropriate levels can give rise to greater purchase intention.

Some considerations need to be made regarding the boundaries surrounding this research. One limitation of our study was the use of only one mediator between OOS level and purchase intent. In order to mitigate this limit, we recommend that other mediators (for example, the urgency of acquisition and the complexity of product attributes) be tested. Another restriction was the sampling strategy adopted. Even though experimental studies do not aim at the quest for external validity (Montgomery, 2008), the substantive context of the scenario - OOS in retail - needs further field studies. Of course, this is a challenge to overcome.

Even though the study of the OOS phenomenon, its motives, effects and influences, already has an impressive number of works, we believe that it is still not exhausted and can be kept as the theme for new empirical investigations in which the subject can be analyzed considering the variations in consumer behavior.

References

- AC Nilsen. (2017) *Spaceman Professional*. Disponível em: <http://www.nielsen.com/br>.
- Berger, J., & Heath, C. (2007). Where consumers diverge from others: Identity signaling and product domains. *Journal of Consumer Research*, 34(2), 121–134.
- Breugelmans, Els, Campo, K., & Gijsbrechts, E. (2006), Opportunities for Active Stock-out Management in Online Stores. *Journal of Retailing*, 82 (3), 215–28.
- Campo, K., Gijsbrechts, E., & Nisol, P. (2003). The impact of retailer stock-outs on whether, how much, and what to buy. *International Journal of Research in Marketing*, 20(3), 273–286.
- Cheema, A., & Kaikati, A. M. (2010). The effect of need for uniqueness on word of mouth. *Journal of Marketing Research*, 47(3), 553–563.
- Chernev, A., & Carpenter, G. S. (2001). The role of market efficiency intuitions in consumer choice: A case of compensatory inferences. *Journal of Marketing Research*, 38(3), 349-361.
- Cruz, G. (2016). Ruptura: por que faltam produtos nas prateleiras? Disponível em: <http://www.ilos.com.br>. Last access in 22.05.2016
- Dhar, R., & Simonson, I. (2003). The effect of forced choice on choice. *Journal of Marketing Research*, 40(2), 146–160.
- Emmelhainz, M. A., Stock, J. R., & Emmelhainz, L. W. (1991). Consumer responses to retail stock-outs. *Journal of Retailing*, 67(2), 138–147.
- Fitzsimons, G. J. (2000). Consumer response to stock-outs. *Journal of Consumer Research*, 27(2), 249–266.

- Ge, X., Messinger, P. R., & Li, J. (2009). Influence of soldout products on consumer choice. *Journal of Retailing*, 85(3), 274–287.
- Ghose, A., Ipeiritos, P. G., & Li, B. (2014). Examining the impact of ranking on consumer behavior and search engine revenue. *Management Science*, 60(7), 1632–1654.
- Gruen, T. W., Corsten, D.S., & Bharadwaj, S. (2002). *Retail Out-of-stocks: A Worldwide Examination of Extent, Causes and Consumer Responses*, Grocery Manufacturers of America.
- Ho, S. Y., & Bodoff, D. (2014). The effects of Web personalization on user attitude and behavior. *MIS quarterly*, 38(2), 497–520.
- Jing, Xiaoqing & Lewis, M. (2011). Stockouts in Online Retailing. *Journal of Marketing Research*, 48 (2), 342–54.
- Kramer, T., & Carroll, R. (2009). The effect of incidental out-of-stock options on preferences. *Marketing Letters*, 20(2), 197–208.
- Machado, C. P., & Tondolo, V. A. G. (2014). Perda por ruptura em gôndola: *Gestão da Produção, Operações e Sistemas*, 9(3), 15.
- Montgomery, D. C. (2008). Design and analysis of experiments. John Wiley & Sons.
- Morwitz, V. G., Steckel, J. H., & Gupta, A. (2007). When do purchase intentions predict sales?. *International Journal of Forecasting*, 23(3), 347–364.
- Naylor, R. W., Lamberton, C. P., & Norton, D.A. (2011). Seeing Ourselves in Others: Reviewer Ambiguity, Egocentric Anchoring. *Journal of Marketing Research*, 48 (3), 617–31.
- Parker, J. R., & Lehmann, D. R. (2011). When shelf-based scarcity impacts customer preferences. *Journal of Retailing*, 87(2), 142–155.
- Pizzi, Gabriele, & Scarpi, D. (2013). When Out-of-stock Products Backfire: Managing Disclosure Time and Justification Wording. *Journal of Retailing*, 89 (3), 352–9.
- Polley, R. B. (1987). The dimensions of social interaction. *Social Psychology*, 72–82.
- Preacher, K.J., & Hayes, A. F. (2008). Assessing and Comparing Indirect Effects in Multiple Mediator Models. *Behavior Research Methods*, 40(3), 879–91.
- Raman, A., DeHoratius, N., & Ton, Z. (2001). Execution: The missing link in retail operations. *California Management Review*, 43(3), 136–152.
- Rosenblum, P. (2014). Walmart's Out of Stock Problem. Available in: <https://goo.gl/u1pCbn>
- Ruvio, A. (2008). Unique like everybody else? The dual role of consumers' need for uniqueness. *Psychology & Marketing*, 25(5), 444–464.
- Sloot, L.M., Verhoef, P.C., & Franses, P. H. (2005). The Impact of Brand Equity on Consumer Stock-out Reactions. *Journal of Retailing*, 81 (1), 15–34.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, 77(2), 203–220.
- Van Herpen, E., Pieters, R., & Zeelenberg, M. (2009). When demand accelerates demand: Trailing the bandwagon. *Journal of Consumer Psychology*, 19(3), 302–312
- Van Woensel, et al. (2007). Consumer responses to shelf out-of-stocks of perishable products. *International Journal of Physical Distribution and Logistics Management*, 37(9), 704–718.
- Verbeke, W., Farris, P., & Thurik, R. (1998). Consumer response to the preferred brand out-of-stock situation. *European Journal of Marketing*, 32(11/12), 1008–1028.
- Wu, L. Y., Chen, K. Y., Chen, P. Y., & Cheng, S. L. (2014). Perceived value, transaction cost, and repurchase-intention in online shopping. *Journal of Business Research*, 67(1), 2768–2776.
- Zaichkowsky, J. L. (1985). Measuring the involvement construct. *Journal of Consumer Research*, 12(3), 341–352.
- Zhang, Y. C., & Schwarz, N. (2012). How and Why One Year Differs from 365 Days. *Journal of Consumer Research*, 39 (2), 248–59.
- Zinn, W., & Liu, P. C. (2001). Consumer response to retail stock-outs. *Journal of Business Logistics*, 22(1), 49–71.