Study of consumer response to stockout and its policy implication for inventory management

Madhukar Nagare, Pankaj Dutta (pdutta@iitb.ac.in)
Shailesh J. Mehta School of Management, Indian Institute of Technology, Bombay, Mumbai-400076, India

Abstract

Retail stockout rates remained high and unabated over decades and understanding of consumer response to stockout (CRS) presented by acronym SDL-(**S**ubstitute, **D**elay, or **L**eave) holds key in mitigating stockout effects. The response of substitution is desired by a retailer; therefore s/he needs additional insights for informed managerial decision making. Although problem of stockout is studied extensively abroad, there are rare studies reported from India. The purpose of this exit-survey based study is to identify CRS, its drivers especially of substitution and revenue loss estimation. The present study identifies response drivers of CRS that induces substitution and are controllable by a retailer. It would be helpful to a retailer in minimizing impact of stockout through managing CRS. Paper presents finding with regard to substitution within a product category and effects of continual stockouts and help in decision making with regard to product assortment Based on the survey, a method is illustrated to determine expected short term stockout cost.

Keywords: Consumer Response, Stockout, Substitution

1. Introduction

A retail stockout can be defined as temporary unavailability of a normally sold product on the designated shelf space (and sales floor) at the time of purchase. Retail stockout (hereafter referred as "stockout") adversely affects the revenue of both retailers and manufacturers and erodes customer loyalty to stores and brands. Unfortunately, stock out rates remained stubbornly high and stable over decades and the worldwide average level of o stockout in FMCG is about 8.3% (Gruen and Corsten, 2002); even online merchants face the similar problem. Furthermore, managing stockout problem is rather becoming more difficult due to product proliferation along with limited shelf space, frequent promotions, scrambled merchandising and shorter product life cycles (Vasconcellos and Sampaio, 2009). According to Gruen and Corsten (2003), 72% stockouts were attributed to faulty in-store ordering and replenishing practices and remaining 28% attributed to the supplies and planning problems in the supply chain.

Consequently, managing stockouts requires a combination of preventive and mitigative measures that would reduce the stockout instances and minimize stockout cost by managing CRS whenever stockout become unavoidable (Vasconcellos and Sampaio, 2009). Most commonly reported CRS in literature are: (1) substitute, (2) delay the purchase, (3) leave for another store, or (4) cancel the purchase (Corsten and Gruen, 2003). CRS holds key in managing stockout as it determines stockout cost as well as its allocation between manufacturer and retailer. The substitution with brand switching would result in minimal monetary loss to a retailer and maximum to manufacturer but purchase cancellation would result in revenue loss to both. As substitution is the favourable CRS from retailer perspective, therefore s/he needs additional insights into drivers particularly those that lead to high levels of substitution and that minimizes store switching, postponement or cancellation of purchases.

Phenomenon of stockout is studied widely with respect to measurement methodology, extent, cost and possible responses with independent explanatory variables and mechanisms. An important theme in literature is possible consumer response to stockout and according to Gruen and Corsten (2003), stockout result in 45 % substitution, 31 % leave the store and 14 % delay /cancellation of purchase. Researchers have used explorative methods for identifying the determinants of these responses and providing explanatory mechanisms. These determinants are grouped into four categories related to (i) Product (ii) Store (iii) Purchase situation and (iv) Consumer characteristics. Eliciting substitution response can be favoured by factors such as assortment and availability of acceptable substitutes, store loyalty, perception as discount store, purchased amount (basket purchase v/s item purchase or shopping trip), quality orientation, perceived risk in buying substitute (minimized with returns policy and reputation etc) and store service. Retailers would benefit by concentrating their efforts on these factors.

Estimating retail stockout cost with reasonable accuracy is highly subjective and difficult. Stockout cost has two broad components -short term and long term. Short term cost is usually a revenue loss and long term cost that include customer dissatisfaction, negative word-of-mouth, loss of customer loyalty (Fitzsimons, 2000; Zinn and Liu, 2001) and possibility of losing a customer permanently along with its lifetime purchases. A method of computing stockout cost devised and illustrated.

Although the CRS have been explored and studied extensively abroad (e.g. Corsten and Gruen, 2003), except the study of Rani et al (2008), there is hardly any study reported from India. This study is undertaken in Indian context with the following objectives:

- Identify the extent of consumer responses to stockout especially of substitution
- Identifying and confirm the response drivers of substitution controllable by a retailer
- Make recommendation with regard to product assortment
- Illustrate method for estimating expected short term stockout cost based on the study

The main thrust of this paper is to identify the response drivers of substitution that are controllable by a retailer and that will induce this behaviour to minimize stockout cost. It is mainly an applied study to derive lessons for retailers and therefore statistical rigour is avoided. The paper is

organized as follows. The Section 2 provides the necessary background & literature review on stock out, consumer responses, explanatory variables and mechanisms. Research methodology adopted for this study is explained in Section 3 which is followed by survey result discussion in section 4. The paper is concluded in section 5.

2. Literature Review

The literature on topic of stockout, its responses and consumer driven substitution is interwoven and is available in four streams related to (i) estimation of stockout level, cost, and lost sale (ii) CRS, its drivers and explanatory mechanisms (iii) substitution (iv) determination of base product demand using substitution rate. In this literature review, emphasis is on determinants of CRS.

Research has been focused on measurement and causes of retail stockout (Corsten and Gruen, 2004), understanding consumer behavioral response to retail stockout (Emmelhainz et al., 1991) and response drivers (Emmelhainz et al., 1991; Verbeke et al., 1998; Campo et al., 2000; Zinn and Liu, 2001; Sloot et al., 2005; Leela Rani et al, 2008; Sampaio et al., 2009) and computing stockout cost. As mentioned earlier, broad stockout responses are- substitute, delay, leave and cancel. Sloot et al (2005) state that severity of CRS is greater for stockout of entire brand (all items) is far more severe than item stockout of a brand as item substitution difficult in former case.

Stockout responses are explained in terms of explanatory variables and four categories explanatory variables are mentioned earlier and the exhaustive list of it is available literature (Sampaio and Machline, 2009).Based on prior studies, eight independent variables are selected that can have strong influence of substitution behaviour and controllable by a retailer. These variables are shown in Fig 1 and are discussed in Section 4 in detail along with results.
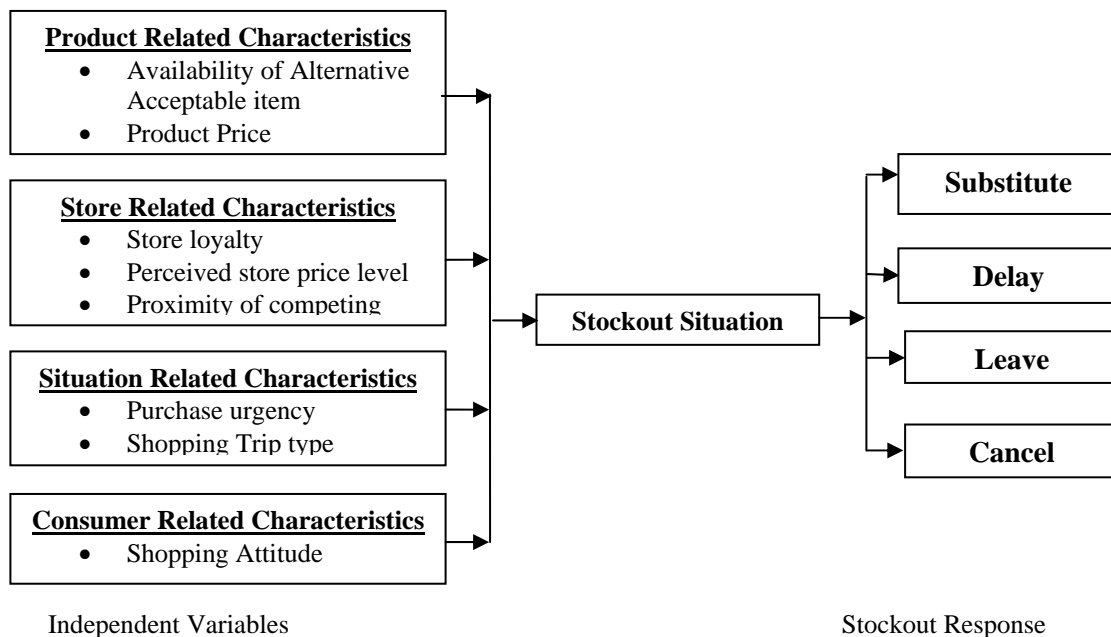

Fig.1. Independent and dependent variables used in current study

Explanatory Studies

In 1995, Corstjens and Corstjens provided the explanatory mechanisms for stockout responses in terms of trade-off between two switching costs: brand switching cost and the store switching cost. Rani et al. (2005) considered consumers' attitude towards retail store more important than consumer response as it has long term and consistent impact on consumer buying decision. Sloot et.al (2005) investigated the impact of brand equity and the hedonic level of the product on consumer stockout responses. Sampaio and Machline (2009) provide method to estimate the probability of a consumer leaving the store without purchase. Observation of narrow assortment face fewer stockouts is supported by Broniarczyk et al. (1998), shows that consumers' perceptions of assortment remain unaffected by pruning low-preference items and retaining same shelf space. Thus the number of SKU in a category can be trimmed without affecting assortment perceptions and, presumably, more satisfaction with the decision experience and fewer stockouts.

3. Research Methodology

The present study uses method of store front exit survey and research methodology section includes (1) Study context and scope (2) Measures (3) Survey method

3.1 The Study Context and Scope

The present study pertains to organized retail- medium sizes hypermarket and includes exit survey at store front of a hypermarket located in Mumbai (India's largest urban agglomeration) having size of 65,000 sq ft and carries about 42,000 SKUs with an enormous range of products with national, international and store brands under a single roof. It claims to have following value pricing with average price level lower than competing store by 15%. The present work limits its scope to study response drivers of substitution that are controllable by a retailer. It is an applied study and makes recommendation to retailer with regard to inventory management, product assortment and illustrates estimation of short term stockout cost based on survey result.

The survey questionnaire is designed on the basis of stockout scenario developed around a focal product of *hair care product –shampoo*. This product segment was chosen with considerations to – regular buying frequency, low involvement in buying, brand preference for suitability and liking, deep assortment with possibility of substitution, high rotation category and greater frequency of stockouts. Frequent stockouts are important in getting realistic response as consumers can vividly recall stockout situation.

3.2 Measures

To understand the CRS, the response drivers of certain decision *especially of substitution response* were identified. *Independent variables* were selected from the literature that likely to have strong influence on substitution behaviour and are given in Fig.1

3.3 Survey Method

Survey method assumes hypothetical situation of stock-out and obtain intended stockout responses. In this survey, respondents were intercepted and requested to visualize an experience of

true or hypothetical stockout on their present shopping trip at store front while leaving the hypermarket. The respondents were required to mark their response to the questions that were framed after exposing them to a stockout scenario developed around focal item shampoo. To check for realism and clarity of scenario cum questions, questionnaire was tested with 32 respondents prior to the survey and some corrections were carried out to remove the ambiguity.

The exit survey was conducted in the first two weeks of the month, with emphasis on weekends (as more than 40 % sales takes place on these days). During this period major shopping trips are expected to buy provisions for the entire month and stockouts are more likely. To assure an adequate sample size of stock out cases, 1400 consumers were surveyed. In the data screening process incomplete filled forms were excluded. After data screening 1319 cases (94.2 percent) were selected for further analyses.

4. Survey Analysis and Policy Implication

The study first probed the reasons for visiting the hypermarket and initiates the respondents with survey questions. The probable reasons and preference response in percent is given in Fig 2. Shoppers prefer to visit hypermarket for reason of access for browsing and comparing products and prices (85%) followed by one stop shopping (83%), broad assortment and choice (79%), pleasant atmosphere (76%), quality goods (71%), value pricing (68%) and unavailability of competing store (64%). Modern retail formats like hypermarket are relatively new to India that provides additional facilities and store attributes along with excitement that are not readily available with traditional formats. Reasons of salesperson services (53%), availability of store brand (37%) are found relatively low in importance.
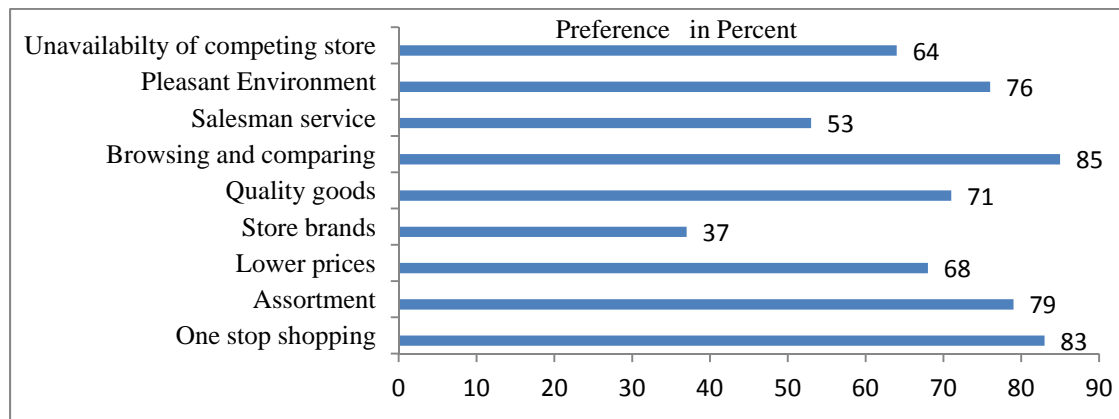

Fig. 2. Reasons for Visiting the Shop

4.1 General Response

General CRS means response without contingent to any independent variable. It is obtained through closed question -'What will you do if you do not find your preferred shampoo item in the store? The result shows that 59% favoured substitution, 14 % delay and 27% would leave the store to purchase the item of the first choice.

4.2 Availability of Acceptable Alternative Item and Store Assortment

Considering the broad but moderately deep assortment, more choices are provided to shoppers in terms of acceptable alternatives, CRS result presented in Fig 3 shows that 64 % consumer would prefer substitution, 23% would leave the store to buy the item on the same day and 13% would delay the purchasing till the next shopping trip.
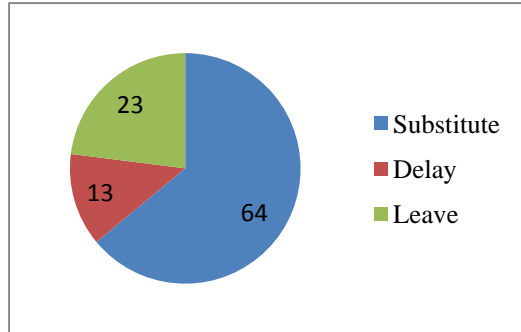

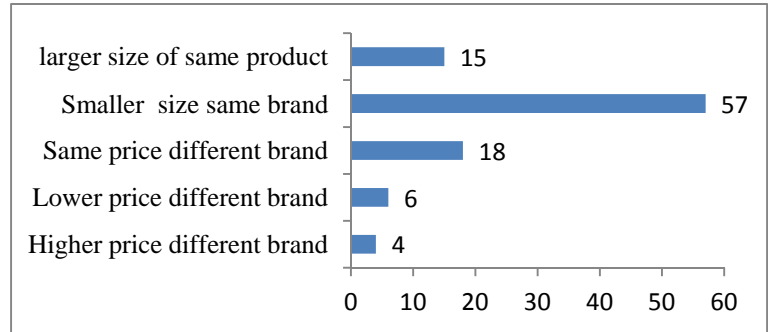Fig. 3. Consumer response to stockout   Fig. 4. Consumer preference for different items of substitution

The substitution response is probed further and found that substitution of variants and sizes within the brand is favored by overwhelming majority (72%) if the item of the first choice is out of stock and only 28% will try out items of other brand. Substitution responses within and outside the desired brand is presented in Fig 4. It can be seen that majority of consumers (57%) prefer to substitute smaller size items of the same brand and 15% of larger size, probably for budget constraint.

4.3 Store Loyalty

Consumers select and patronize store on the basis of their need, perceptions, images and attitudes formed towards store on the basis of experience and information and concentrate purchasing in one store. Store loyalty is influenced by factors such as merchandise quality, pricing, assortment, location convenience, salesclerk service, and general service (Mazursky and Jacoby, 1986). Reynolds *et al.* (1975) have suggested that store loyal tend to be less venturesome and prefer to stay with the store and switch brands or defer buying rather than switching store when confronted with stockout. Considering store loyalty to a hypermarket (variant/brand/price points), CRS results shows that 61 % consumer have shown inclination for substitution, 21% would prefer to leave the store to buy the item on the same day and 18% would delay the purchasing.

4.4 Perceived Store Price

Perceived overall store price level influences store patronage, store attitudes and store choice. Lower perceived store price inhibit store switching in stockout situation (Zinn and Liu, 2001).The store under consideration is a hypermarket that operates with economies of scale and scope can afford to sale at lower prices. It is perceived as a discounter that may result in large saving in basket buying. As expected about 82% consumers want to stay with the store either through substitution or delaying the purchasing and only 18% consumers wants to leave the store.

4.5 Store Service

Store service refers to general service, salesperson service, convenience in locating goods, returns, and credit policies. Salesperson service in locating missing item, suggesting alternative to stockout item and helping the consumer in making decision of buying substitute plays important role in CRS. Therefore, salesperson play important role in inducing substitution by facilitating decision making about alternative. Substitution level with salesperson service was 64 % and 18 % were willing to leave the store. It has been found that 37% consumer sought the help in locating missing item and buying alternative item and out of these 59% consumer substituted the item based on the advice offered by salesperson.

Table 1. Effect of competing store in proximity

Response	Proximity	Non- Proximity
Buy	18%	62%
Leave	70%	NIL
Delay	12%	38%

Table 2. Effect of purchase urgency

Response	Urgency	Non Urgency
Buy	57%	21%
Leave	39%	44%
Delay	4%	35%

4.6 Proximity of Competing Store

Availability of competing store within a travel time of less than ten minutes is likely to induce store switching. Effect of competing store in proximity (travel time less than 10 minutes) is seen from results provided in Table 1. It is intuitively expected that proximity of competing store would induce store switching. A majority of consumers (62%) prefers to substitute the product in the same store when competing store is not available nearby and tend to leave the store with availability to obtain their preferred item.

4.7 Purchase Urgency

Several studies have suggested that buying urgency (Campo et al. 2000; Emmelhainz et al. 1991; Zinn & Liu 2001) induces substitution or store switching to buy the needed item but rules out deferment of purchasing. The results obtained are shown in Table 2 and presented in Fig 10 clearly rule out purchase delay or deferment in case of urgency and induces behaviour of substitution (57%) or leave the store (39%) for buying the item of first choice.

4.8 Type of Shopping Trip

Shopping trips can be categorized into two types - major shopping trip and a fill-in shopping trip based on purchase amount, shopping frequency and level of planning. Large-scale retail formats are preferred by shoppers for major shopping trip for merchandise-related store attributes such as assortment, price and discounts or special offers. On the other hand small format stores such as convenience stores and small supermarkets are preferred for fill-in trips for reason of convenience and service that make the shopping trip easier and quicker to carry out (Rockney Walters et al., 2003). Purchase amount is used as proxy and Rs.250 is used as cut off for differencing the fill-in trip from major trip.

The effect of type of trip on CRS is provided in Table 3.The results clearly demonstrates that those are making major shopping trip prefer to substitute (78%) where as only 27% of those making fill in trip prefer to substitute. A consumer making a major shopping trip to a large format shop to buy a basket of consumption goods in large quantities for stock replenishment is unlikely to switch store for missing a few items and tend substitute or delay the purchase.

Table 3. Impact of shopping trip

Response	Fill-in shopping	Major shopping
Buy	27%	78%
Leave	39%	17%
Delay	34%	5%

Table 4. Impact of shopping attitude

Response	Fun Orientation	Task Orientation
Buy	45%	59%
Leave	36%	17%
Delay	19%	27%

4.9 Shopping Attitude

Shopping can be viewed as either dry task or fun depending upon the attitude of a shopper. Task oriented shopper is considered having negative attitude while fun-oriented shoppers as having positive attitude. Stockout response would be severe for task oriented shoppers. Consumers with a positive shopping attitude are more likely to switch stores in the case of an OOS because they value visiting different stores (Campo et al. 2000). The survey result tabulated in Table 4 shows that about 64% shoppers have task attitude and of these 59% would prefer substitution while those have fun orientation to shopping do not mind substitution (45%) or defer the purchase (24%) but greater proportion shows willingness to leave the store (36%).

4.10 Short-term Stockout Cost to a Retailer

Method of computing expected short term stockout cost to a retailer is illustrated with an example. Short term cost arises from two responses - cost of substitution and cost of consumer leaving the store and buying elsewhere. Delayed purchases would not have any significant impact on revenue stream except that of delayed receipt. There are three brands maintained by a retailer namely- Clinic Plus, Head and Shoulder and Sun Silk. Let us assume that a consumer arrives at a store with intention to buy shampoo SKU - Head & Shoulder's 200 ml bottle i.e. focal item of purchase. Brand-SKU and their prices are given in following Table 5.

Table 5. Brand- SKU size and respective prices

Brand	100ml	200ml	300ml
Clinic Plus	80	138	185
Head & Shoulders	85	140	200
Sun silk	90	145	205

Input parameters: Annual demand of this specific SKU = 7300 units, stock out level = 10% and net margin of the retailer = 5%. The substitution courses and expected cost of different substitution

courses is provided in Table 6. Thus, expected revenue loss in this scenario of stockout of first choice SKU to a retailer is about Rs. 22.2 per unit. As per the survey, about 59% people prefer substitution and about 27% will leave the store when faced with stockout situation.

Loss due to substitution = 7300 x 0.1 x 22.2 x 0.59 = Rs. 9561

Loss due to substitution leaving the Store = 7300x 0.1 x 140 x 0.27 = Rs. 27,594

Total Revenue Loss = Rs. 9561 + Rs. 27594 = Rs. 37,155

Net margin loss to retailer = Net margin x Total Revenue Loss =0.05 x 37,155 = Rs. 1858

Thus, annual expected net profit loss to the retailer due to substitution is Rs. 1858.

The net margin loss to the retailer from stockout of one SKU type of shampoo (brand Head and Shoulder of 140 ml size) is Rs. 1858 and there are 41 different SKU of shampoo. The total loss from shampoo category can be appreciated which can be turned into profit by response management.

Table 6. Computation of expected substitution cost per unit (in Rs)

i	Course of substitution	Probability	Revenue Difference	Expected Value
1.	Substitution of same sized item having higher price of different brand	0.05	(145-140)= 5	0.25
2.	Substitution of same sized item having lower price of different brand	0.05	(138-140)= -2	-0.1
3.	Substitution of same sized item having same price of different brand	0.28	(140-140)= 0	0
4.	Substitution of smaller sized item same brand	0.57	(85-140)= -55	-31.35
5.	Substitution of larger sized item same brand	0.15	(200-140)= 60	9
	Expected Monetary cost/unit			-22.2

5. Conclusion with Managerial Implications

The CRS of substitution is favourable to a retailer and therefore thrust of the paper is to study response drivers of substitution behaviour. The study uses quasi experiment method-exit survey at store front for obtaining CRS during their shopping trip. The results of SDL response are in conformance to intuitive expectation. It is found that substitution is positively related to (i) Availability of acceptable alternative item (ii) Perception as discount store (iii) Store service (iv) Major shopping trip/basket buying /higher level of planning (v) Store loyalty (vi) Greater purchase urgency (vii) Shopping attitude. It is negatively related to product price and proximity of competing store. It is also found that continual stockout for 2-3 times would lead to permanent store switch even by store loyal consumer.

As 72% of stock-outs are within control of a retailer, efforts should be directed to minimizes stockout instances and also mitigate the problem by inducing substitution within the store. Determinants of stockout responses related to product and store can be greatly influenced by a retailer and have significant impact on substitution. Further, a retailer can facilitate purchasing substitute available in the store through salesperson advice and services. Considering these factors, retailers should concentrate on store related controllable factors and facilitate decision making in favour of substitution. It is found that substitution within a brand is favored by a majority of consumers (72%) and consumer show preference to smaller size SKU within the brand. Further, consumers prefer SKU of competing brand with similar price points in case of brand switching. Therefore, retailer should maintain smaller size SKU of preferred brand and of competing brand of similar price.

References:

Broniarczyk, S. M., Hoyer, W. D., and McAlister, L. 1998. Consumers' perceptions of the assortment offered in a grocery category: the impact of item reduction. *Journal of Marketing Research*, 166-176.

Campo, K., Gijsbrechts, E., Nisol, P. 2000. Towards understanding consumer response to stock-outs. Journal of Retailing, 76(2), 219-242.

Corsten, D., and Gruen, T. 2003. Desperately seeking shelf availability: an examination of the extent, the causes, and the efforts to address retail out-of-stocks. International Journal of Retail & Distribution Management, 31(12), 605-617.

Corsten, D., and Gruen, T. (2004). Stock-outs cause walkouts. Harvard Business Review, 82(5), 26-28.

Corstjens, J., and Corstjens, M. 1995. Store Wars: The Battle for Mind-space and Shelf-space, Wiley-New York.

Emmelhainz, M. A., Stock, J. R., and Emmelhainz, L. W. 1991. Consumer responses to retail stock-outs. Journal of Retailing.

Fitzsimons, G. J. 2000. Consumer response to stockouts. Journal of Consumer Research, 27(2), 249-266.

Gruen, T.W. and Corsten, D. 2002. A worldwide look at causes and consumer responses of out-of-stocks, ECR Journal, the International Commerce Review, 2(2), 45-58.

Rani, L., and Velayudhan, S. K. 2008. Understanding consumer's attitude towards retail store in stockout situations. Asia Pacific Journal of Marketing and Logistics, 20(3), 259-275.

Sampaio, M. and Machline, C. 2009. Consumer response to stockout, POMS 20th Annual Conference, 1-4 May 2009. Orlando, Florida U.S.A .

Sloot, L. M., Verhoef, P. C., and Franses, P. H. 2005. The impact of brand equity and the hedonic level of products on consumer stock-out reactions. Journal of Retailing, 81(1), 15-34.

Thaler, R. 1985. Mental accounting and consumer choice. Marketing science, 4(3), 199-214.

Vasconcellos, L. H. R., and Sampaio, M. 2009. The stockouts study: an examination of the extent and the causes in the São Paulo supermarket sector. BAR. Brazilian Administration Review, 6(3), 263-279.

Verbeke, W., Farris, P., and Thurik, R. 1998. Consumer response to the preferred brand out-of-stock situation. European Journal of Marketing, 32(11/12), 1008-1028.

Walters, R. G., and Jamil, M. 2003. Exploring the relationships between shopping trip type, purchases of products on promotion, and shopping basket profit. Journal of Business Research, 56(1), 17-29.

Zinn, W., & Liu, P. C. (2001). Consumer response to retail stockouts. Journal of Business Logistics, 22(1), 49-71.