Omni-channel Operation Management Based on Consumer Emotional Feedback

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ABSTRACT

Omnichannel retailing becoming popular in retailing, researchers are investigating salient concepts that can determine the success of retailing model. The major consideration in the success of is the management of consumer disappointment. Consumers are often averse to facing disappointments, Consequently, modeling and understanding consumer aversion to disappointment will lend a key insight into the success of omnichannel retailing. This study investigates the impact of consumer disappointment aversion on the optimal pricing decisions of retailers with inventory constraints with or without return policy in an omnichannel environment. Retailer adoption of different pricing and return policies shapes success in omnichannel retailing. Our investigation provides guidance on how retailers can better manage pricing and return policies in an omnichannel environment.

Keywords: omnichannel; disappointment aversion; strategic pricing; channel selection

1. Introduction

With the advent of new technologies, omnichannel retailing, where customers easily move between online and offline stores within a single transaction, is increasingly becoming relevant ([3][12][33][37][55]) . In omnichannel retailing, customers face "an integrated sales experience that melds touch-and-feel information in the physical world with online content"--it is becoming "critical for retailers' success" where "existing retailers…need to create an omnichannel strategy and develop more omnichannel innovations" ([32]). An increasing number of retailers are integrating their online portals with traditionally established brick-and-mortar stores to enrich customer value proposition and improve operational

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efficiency ([12][16]). Industry leaders like SAP believe that it is necessary for organizations to adopt an omnichannel strategy--including integrated pricing and inventory sharing decisions−if they are to stay consistently competitive and successful in a demanding business landscape ([30]). For example, Wal-Mart now offers services that allows customers to order items online and pay physically at nearby stores.

One of the critical advantages of omnichannel retailing is that it provides consumers with a comprehensive shopping style through all possible shopping channels, enabling consumers to shop regardless of time, space, and location constraints ([2]). For example, in an omnichannel environment, consumers are able to purchase online or just browse a product online through websites or apps, and then proceed to the brick-and-mortar store to check out the product before making a final purchasing decision. Undoubtedly, the key to a successful omnichannel strategy is to enhance customer engagement, making it seamless for the customers to transact (including ordering and paying) and receive support from any channel at any time ([41]). Omnichannel strategies thus designed co-create business value by engaging both retailers and customers ([8]).

Due to the obvious advantages of omnichannel retailing–from both retailer and customer standpoints–there is an emerging area of scholarly research on this phenomenon. The research on omnichannel retailing primarily focuses on *three* major aspects: the demand side, the supply side, and strategic management of the channel itself ([5]). Of these focuses, the demand [i.e., consumer] side is notably underrepresented in research, with limited investigations on consumer issues that are relevant to this phenomenon; most of the research on omnichannel retailing has focused on logistical issues, especially how organizations transform to omnichannel retailing ([11]). For example, there has been limited research on how customers perceive return processes in omnichannel retailing ([52]). Such limitations undermine the salience of the customer angle in omnichannel retailing. This limitation is quite serious, given that the primary purpose of omnichannel retailing is to allow customers to switch seamlessly between online and offline channels – such as search in online channels and purchase transactions in an offline channel ([7]).

A review of contemporary IS research on omnichannel retailing (please see Appendix A) confirms our contention that more research is needed to understand the *consumer angle* of omnichannel retailing. IS research on omnichannel retailing typically considers issues that concerns retailers or their actions in an omnichannel context, such as showrooming ([2][16]), operational issues related to buying online and picking up in store ([13]), and factors affecting omnichannel capabilities ([32]). While these studies provide powerful insights into the omnichannel retailing phenomenon, a consistent omission in the IS literature is an explicit consideration of *consumer psychological issues* that arguably plays a key role in shaping the success of omnichannel retailing. We need research on this issue such that it complements existing findings from the retailer side and ensures that customers are attracted to omnichannel retailing and use it advantageously ([51]).

Our study addresses this need and analytically models consumer beliefs and perceptions in an omnichannel

environment. We contribute to the literature by positing that a critical, but relatively uninvestigated customer-related factor plays an important role in deciding the success of omnichannel retailing–the *management of consumer disappointment* ([18][28]). Disappointments can happen in multiple situations in omnichannel retailing and present critical challenges to successful omnichannel design. For example, disappointments could happen when customers buy online and pick up in store or vice versa, and consequently view discrepancies between their online and offline experiences ([13]). Discrepancies can also arise due to issues such as uncertainty with the value of the product (i.e. a differential value between channels), and uncertainty with the availability of the product (i.e. a product is available in one channel but not in the other) ([13]). The salience of these discrepancies−and consequent customer disappointment−is magnified in omnichannel retailing because online experiences lack the affordances of touching and feeling, thereby accentuating the likelihood of disappointment ([6]).

One of the most powerful lenses to investigate the management of consumer disappointment is disappointment aversion−an emerging and powerful concept in operations management, especially while designing retailer strategies. Disappointment aversion builds upon the idea that "agents are sensitive to deviations from their expectations, suffering a psychological loss when they receive less than expected and experiencing elation when they receive more" and "agents anticipate these losses and gains when deciding how to behave" ([14]). Recent literature highlights the salience of disappointment aversion in retailer operations. For example, Liu and Shum ([29]) show that in different price markup scenarios, firm profits have different interactions with consumers' disappointment aversion behavior. Other prominent academic discussions of disappointment aversion can be found in research on achieving supply chain coordination with risk averse consumers ([42]), the execution of a risk-free returns policy ([47]), and the procurement of information to explain consumer disappointment and how to avoid it ([44]).

Given that managing consumer behavior is a fundamental consideration in emerging operations management strategies ([48]), consumer disappointment aversion takes centerstage when formulating omnichannel design. Consumer disappointment aversion is crucial in deciding omnichannel retailer decisions related to pricing, inventory control, and timely response to consumers ([39][50]). Retailers need to eschew strategies which can create customer resentment, and therefore, modeling disappointment aversion is crucial in omnichannel retailing.

We problematize our study by noting that, in order to understand the impact of omnichannel design and operations, it is useful to study how the omnichannel retailers make strategic pricing and inventory decisions considering consumers' disappointment aversion behavior. Specifically, two distinct but related consumer issues are salient to alleviate consumer concerns (and thus, disappointment) in an omnichannel environment: pricing ([20][21][25][49]) and return policies ([24][34][52]). We therefore propose the following research question(s) to address the aforementioned research gaps:

RQ: How does disappointment aversion shape consumer behavior in omnichannel retailing? Specifically:

a. What are the optimal strategies for omnichannel retailers under different levels of consumers disappointment aversion behavior?
b. What are the effects of retailers' different policies of returned products on consumer disappointment aversion behavior?

The paper proceeds as follows. In the following section, we review the important concept of disappointment aversion, which feeds into the next section where we develop the analytical model that addresses our research question(s). Specifically, we model disappointment aversion by placing salience on the two prominent aspects (pricing and returns) of omnichannel retailing that relate to customer issues. Following our detailed development of the analytical model, we conclude with the contributions and future implications of the paper.

2. Literature Review: Disappointment Aversion and Consumer Behavior

According to Bell's disappointment theory ([1]), disappointment is a psychological reaction to an outcome that does not meet expectations. Conversely, if the outcome is better than the expectation, then a reaction of elation appears. Both disappointment and elation can affect consumer purchase decisions, making it necessary for organizations to factor in this crucial issue when considering strategies for success in omnichannel retailing ([23]). Notably, disappointment is perhaps one of the most powerful emotions crucial to marketing success ([22]) and thus it is logical to investigate its role in omnichannel retailing.

Disappointment aversion can be defined as the psychological feeling that arises in an agent's (here, consumer's) mind when the final outcome is different from prior expectations ([18]). Many studies have developed the idea of disappointment aversion ([1][17][26][27]) and have posited its salience in consumer behavior ([29]), especially as consumers are more susceptible to disappointment than elation ([38]):

> Disappointment at doing worse than expected can be a powerful emotion. This emotion may be particularly intense when the disappointed agent exerted effort in competing for a prize, thus raising her expectation of winning. Furthermore, a rational agent who anticipates possible disappointment will optimize taking into account the expected disappointment arising from her choice ([14]).

In fact, disappointment aversion has a decisively positive influence on retailer pricing, inventory management, and revenue; this is in contrast to elation seeking, which negatively influences the aforementioned metrics ([46]). A consumer who is disappointment averse is less prone to being disappointed and thus is often not negatively affected the retailer; by contrast a consumer who seeks elation can often be disappointed and exhibit negative reactions that can harm the retailer (ibid). Indeed, a retailer can benefit from modeling customer disappointment aversion and strategically use it to determine its policies and operations ([53]).

In an omnichannel environment, disappointment aversion becomes even more critical, as there could be discrepancies between how the retailer operates its online and offline channels, with the result that there could be a higher possibility of consumers being disappointed due to these discrepancies–such as due to stockouts and differential pricing ([6][35]). Omnichannel retailers often need to optimize their strategic decisions to provide customers with a seamless experience across channels and thus leverage the positive effects of customer disappointment aversion ([9]). The key to doing so is to manage uncertainty in omnichannel transactions, such that risk aversion is recursively multiplied ([15]). Uncertainty in an omnichannel environment arises from pricing ([18]) and return policies ([34]), justifying our focus on these aspects of omnichannel retailing in our study.

3. Model Description

3.1. Parameter Settings and Assumptions

In practice, there are a number of consumers and retailers in the supply chain model. For the basic research insights, our supply chain model consists of one retailer and a group of consumers. In this paper, we assume that a profit-aiming retailer sells a single brand product through two different channels, online and offline, at static prices p_1 and p_2, respectively. We also assume that the inventory always has sufficient capacity in both channels. Once the omnichannel firms decide their policy, consumers with uncertainty value *v* decide whether to purchase online or offline. Building upon prior research, we generally normalize the total market demand to 1. Besides, we assume that there is a proportion of α demand that has a high value *H* for the product, defined as high types, and the remaining consumers have a low value *L* for the product, defined as low types, and both online and offline consumers share the same proportion. Consumers are homogeneous and do not know their actual type ex-ante until they receive the product after purchasing online or checking the product offline to realize their value. As we know, consumers who purchase online are not able to touch the product or check its quality directly. Retailers have a return policy for the unfit product, or they can also declare in advance that no return is possible for the sold product. Therefore, those consumers who actually encounter low-type product but cannot avail of any return compensation, may switch to the offline channel–thereby considering the online channel as a second option. Therefore, under omnichannel retailing, a key trade-off for consumers with value uncertainty is to buy the product directly online with the uncertainty of no return compensation compared to buy the product online with guarantee of the low-type purchase. In our paper, we examine the concept of consumer disappointment, incorporate the low-value (online) disappointment aversion behavior into the consumer utility model, and examine consumer purchase and retailers' operational decisions.

3.2. Disappointment in utility theory

The model assumes that the total utility perceived by a consumer who faces uncertainty is the combination of economic surplus and psychological satisfaction, which can be expressed as follows:

Total utility = Economic payoff + psychological satisfaction

Recall that Du et al. ([6]) observed that disappointment is a psychological reaction caused by the comparison of the actual outcome to someone's prior expectation when making decisions under uncertainty. Bell's disappointment aversion behavior can be modeled as follows. When a consumer has a lottery, in which she/he tends to gain a good payoff *x* with a probability of *p* or a bad payoff *y*, which is lower than *x* , with a probability of *1-p*, we can easily obtain the expected economic payoff which is *px+(1-p)y*. As for the psychological satisfaction, we consider two situations, one is that when *y* occurs, the consumer's disappointment might reflect in a form of direct proportion to the difference between expectation and actual outcome:

$$\textbf{\textit{Disappointment}}=d(px+(1-p)y-y)=dp(x-y) \quad (1)$$

Conversely, when x occurs, namely the actual outcome is acceptable to the consumer, the consumer's disappointment can also reflect as a proportion of the difference between expectation and actual outcome:

$$\textbf{\textit{Elation}}= e(x-px-(1-p)y) = e(1-p)(x-y) \quad (2)$$

where e > 0 (or d > 0) is a constant reflecting the degree to which a unit of elation (or disappointment) affects the consumer. As mentioned above, we know that the psychological satisfaction can be expressed as:

$$\textbf{\textit{psychological satisfaction}}=p*\textbf{\textit{elation}}+(1-p)*\textbf{\textit{disappointment}}$$

Thus, the total expected utility can be expressed as:

$$U=px+(1-p)y-p(1-p)(d-e)(x-y) \quad (3)$$

We denote *g=d-e as the disappointment aversion level* ([29]). It is also assumed that the disappointment of unit loss always dominates the elation caused by unit elation in the same amount of economic payoff, which means *g>0.*

3.3 Model Analysis

There is a difference in benefit of retailers between online and offline channel. When retailers adopt a no return policy in online channel, they have no responsibility for the low type products; therefore they will not undertake the extra costs caused by return refund. Thus, the retailer's profit function in online channel can be expressed $\pi_1=p_1$, no matter what p_1 is. When consumers purchase offline, they can decide whether they will buy the product following their physical interaction with the product. Due to related products effect, besides the product that consumers plan to purchase, there will be some extra purchase when they go to the store, so we assume that there exists an additional profit *r* from every consumer who arrive at the store ([12]). And we can obtain the retailer's profit function in offline channel as follows:

$$\pi_2(p_2) = \begin{cases} \alpha p_2 + r\ , & L < p_2 \le H \\ p_2 + r\ , & p_2 \le L \end{cases} \quad (7)$$

[Details of Analysis can be supplied upon request]

4. Conclusion and Contributions

In this study, we have developed consumer disappointment aversion behavior model and applied it to omnichannel retailing. In the model, we not only consider the emotional feedback behavior of consumers based on the uncertainty of commodity quality and the situation of retailer's stock-out, but also include the effect of whether the retailer adopts return allowed policy on the purchase behavior of consumers. This study can help retailers, in omni-channel environment, make strategic channel selections between online and offline channels, choose the value of the goods, manage the inventory and optimize the price strategy.

This is a needed angle of research in omnichannel retailing, as established in the introductory sections. Understanding consumer disappointment aversion behavior holds an important key to design successful omnichannel strategies. From that perspective, the overall contribution of this study is that we propose the channel selection and pricing strategy for consumers with different emotional sensitivities. To the best of our knowledge, this has not been studied in the IS and related literatures.

There are three specific contributions of our study. The first is in addressing the need to understand the consumer aspects of omnichannel retailing by analytically modelling consumer beliefs and perceptions in an omnichannel environment. As demonstrated in the introductory sections, omnichannel research is often limited to investigations of retailer characteristics and strategies. In contrast, we focus on a key consumer characteristic--disappointment aversion--that helps us augment existing work in this area. Specially, in our model, we consider the emotional feedback behavior of consumers based on the uncertainty of product quality and the situation of retailer's stock-out. In addition, we also discuss the impact on the purchase behavior of consumers when a retailer adopts a "return allowed" policy. In an omnichannel environment, when retailers make strategic channel selections between online and offline channels, the value of the goods and the inventory of the retailers will have an impact on consumer sentiment and determine their consumption behavior, as well as the optimal pricing strategy for channel retailers. Our model analytically captures this phenomenon.

The second contribution of our study is in positing that, a critical but relatively uninvestigated customer-related factor, plays a role in deciding the success of omnichannel retailing -- *the management of consumer disappointment*. Our work is consistent with calls in current literature--scholars have suggested additional focus on the consumer aspect in omnichannel retailing, such as a better understanding of customer loyalty ([4]). Ultimately, the omnichannel operational model emphasizes the interaction and connection between channels and consumers ([45]) and therefore, customer beliefs and perceptions explain significant variance in degree of omnichannel use ([42]). Interestingly, while disappointment aversion has been well-studied in prior scholarly work--notably in research on human decision making in financial investments ([10][19][31]), asset pricing ([40]), and internet bidding ([43]). However, there is limited discussion on customers' disappointment aversion in the intersection of IT and operations management([54]). Our study addresses this void.

The third contribution is in developing the consumer emotional feedback behavior model and improving the retailer's profit function with consideration of consumers' disappointment aversion behavior. We find that profit earned from the offline channels is more than that in online channels because of special consumption when consumers come to the store, while ignoring consumer disappointment aversion. When retailers allow consumers to return low value products, offline channel selling is always better than selling in online channels. This is because retailers need to refund for the returned products and face return costs caused by handling and shipping. Actually, quite a few omnichannel retailers get accustomed to selling products online for a discount, but they sometimes ignore the disappointment aversion of consumers. Our study highlights the necessity to factor in disappointment aversion and shows how retailers can optimize their pricing and returns by leveraging this important psychological aspect of consumers.

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