

Value creation of in-store digital interfaces, an exploratory study in the grocery retail sector in São Paulo city

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Rogério Reis, Dimária Meirelles (Mackenzie Presbyterian University)

Abstract: The objective of this study is to analyze and characterize how digital interfaces create value in grocery retail stores in São Paulo city. The theoretical review navigated thru value, retail business model, touchpoints, digital transformation, and technology in retail constructs. This research is qualitative, based on the interpretative paradigm, exploratory and descriptive. Data were collected through direct observation in stores, websites, apps, and interviews. The research results show: (i) digital interfaces create value for customers through reducing purchase time, reducing purchase effort, and increasing purchase benefit while creating value for the retailer by increasing operational efficiency and/or revenue; (ii) how value is co-created between customers and retailers interdependently; (iii) the value co-creation closed cycle process; (iv) customers have cognitive, emotional and social costs to overcome to use digital interfaces, and the retailer has a role in facilitating the learning process. A conceptual model of how digital interfaces create value in grocery retail was developed.

Keywords: Value, business model, innovation, digital transformation, retail

Introduction

Digital transformation is enabling innovations that are changing the way we live, and the way companies do business. The grocery retail industry in Brazil, which answers for 7% of the GDP, is in the early stages of the journey of using technological innovation to improve customers' shopping experience, particularly grocery retail, through increasing shopping convenience in all its dimensions, such as purchase time and effort, purchase transaction itself (i.e., self-checkouts) and the purchase benefit (i.e., the monetary value of the purchase).

Within this context, retailers have some fundamental questions: How can digital innovations create value? Why are certain innovations embraced while others are not? How to make technological innovations financially sustainable?

The purpose of this study is to explain how the usage of digital interfaces creates value, in grocery retail stores. Based on the intertwin of value and customer journey literature, the proposition defended here in this paper is that digital interfaces in grocery retail stores provide the basis for value co-creation.

Customer value parameters, such as include convenience, cost advantages, and purchase decisions, were analyzed in a wide range of digital interfaces. As a result, the paper contributes to identifying and mapping each interface as well as determining the different types of value they add.

Theoretical Background

Value and Customer Experience

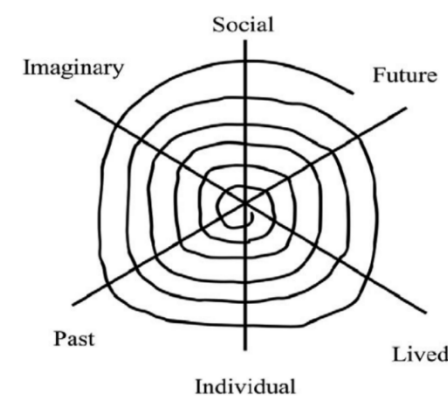
From the consumer's perspective, value is based on the expectations they believe they can receive from a product or service (Woodruff, 1997), expectations that are created before the product is used or the service is provided and are based on the consumer's needs, desires, expectations, and experiences.

The overall value of a product or service relies on the difference between the expectations created and what is received (Zeithaml, 1988). Priem (2007) suggests that the increase in consumer benefit will occur as there is an increase in knowledge or a reduction of the time used in the activities, due to the learning during past consumption experiences.

In retail, customers look to minimize the time and physical effort they dedicate to shopping (Seiders et al., 2005). Berry and Grewal (2002) decomposed convenience by identifying five dimensions: The convenience of decision relates to the time and effort required to decide to buy; the convenience of transaction that involves the tasks related to payment, such as standing in line; the convenience of benefit reflecting the expenditure of resources to obtain the product or service and the post-benefit convenience that refers to the time and effort required to resolve a service failure or additional post-purchase services.

Service customers individually and distinctively attribute value to the experience in an iterative, non-linear way, as the actual value of the experience is built on expectations created by previous understandings and imagined future experiences, embedded in the social context, and comparing the experience received with the expected experience, as described in figure 1 (Helkkula et al., 2012).

Figure 1- The hermeneutic spiral of individual and collective sense-making of value in the experience

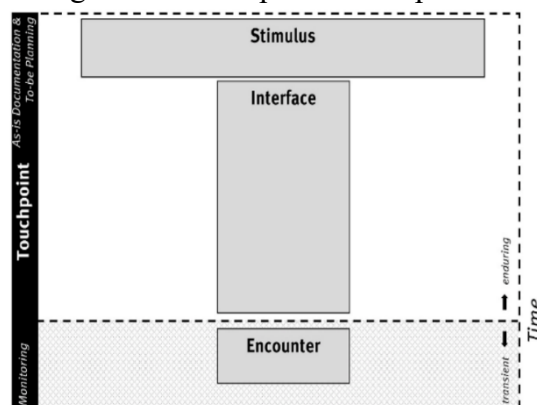


Note: (Helkkula et al., 2012, p. 63)

The customer experience in retail can be analyzed by touchpoints. They are any interactions between the service providers and the customer, physical or non-physical, active, passive, direct or indirect, where service providers offer encounters to customers (Dhebar, 2013; Kronqvist & Leinonen, 2019; Richardson, 2010).

The touchpoints are composed of three constructs: The stimulus, the interface, and the encounter (see Figure 2) (Barann et al., 2022).

Figure 2 - Touchpoint Concept



Note: Barann et al., 2022, p. 3

Customers, when shopping in supermarkets, have needs and expectations, seeking products and experiences. In the store are interfaces planned by the retailer to generate the experience at the touchpoints.

Touchpoints are perceived by any of the human senses (Bascur et al., 2019). It has an interface, which transmits and grants access, to the stimulus, which is mediated by a human, an analog object, or a technology located in a physical or digital sphere.

The customer interface is defined by how retailers structure the exchange process with the customers. The customer chooses a store expecting to find the products and experience he is seeking for. The touchpoint is a stimulus, designed by the retailer, that fulfills a specific function. When encountering a touchpoint, the customer enters in contact with the message from the retailer. Encounters are the exact moment or a time interval in which the customer gets in touch with the interface, that carries the stimulus.

Value Creation and Digital Transformation in Grocery Retail Business

As proposed by Bowman e Ambrosini (2000) value can be modified by increasing the use value or by reducing the exchange value (price). However, the most sustainable way to increase value is to increase the use value by innovation.

Value creation happens in the innovation process, an intentional effort to develop a new product or service that satisfies consumers' needs and desires better than the product or services available in the market (Zott, 2003). However, value is co-created during the interaction between the provider and the customer (Vargo et al., 2004; Vargo & Lusch, 2008), rather than being only added during a separate and non-interactive production and consumption process.

The value co-creation is realized and assessed in the social context of the simultaneous production and consumption process. Value can be also co-destroyed in the interaction between the provider and the customer when it goes in a negative direction (Echeverri & Skålén, 2011); this possibility should not be overlooked (Plé & Cáceres, 2010).

The proposition defended here in this paper is that digital interfaces provide the basis for value co-creation. During the customer journey, the interactions between customers and retailers provoke the customer experience, a personal and multilevel reaction from the customer. When a customer lives an excellent experience, it contributes to value creation (LaSalle & Britton, 2003)

The value expectation implies interdependence between retail format and assortment. Retailers segment customers into target customer groups, creating and developing business models to meet and exceed their needs for products and experiences. The retail format is the combination of elements of the retail mix, such as assortment, pricing strategy, location, and others (Levy et al., 2019). Since customers' needs are different, retailers offer various formats, and customers choose the one that best suits their needs. What differentiates the formats are their location, level of convenience, assortment, price, and shopping experience (Sorescu et al., 2011).

The main functions related to assortment in supermarkets are purchasing, stocking, and moving products. The part that handles the shopping experience has three interdependent dimensions: retail format, customer interface, and governance (Sorescu et al., 2011).

Traditional retailers can develop new services and new interfaces, offering more convenience to customers. The main interface decisions are assortment, price, store atmosphere, and product display, in online and offline stores.

Technological development is a powerful driver for innovation in retail business models (Sorescu et al., 2011). Digital transformation, at the organizational level (Dąbrowska et al., 2022) is about strategy, not technology (Rodgers, 2016). According to (Warner & Wäger, 2019) businesses must identify ways to integrate digital technologies to enable significant business changes, improve customer experience, streamline operations, integrating digital technologies and business processes in a digital economy (Liu et al., 2011).

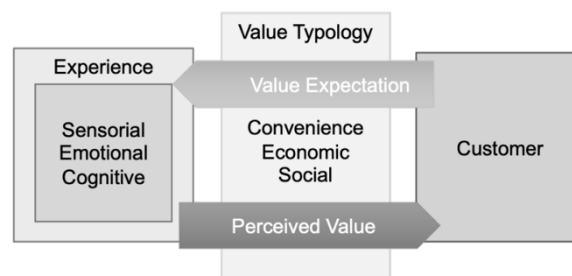
The retail industry has always used technology to generate competitive advantage, but it isn't always the early adopter, due to trying to capitalize on technology trends without appropriate business model evolution is a trap for many companies (Sorescu et al., 2011). Changes in retail have been occurring evolutionarily, in the beginning, technology adoption was focused on the value chain, nowadays, retailers have increased investments in customer experience, from in-store technologies (Grewal e Roggeveen, 2020) such as autonomous technologies (de Bellis & Venkataramani Johar, 2020), autonomous checkouts, virtual assistants, and free Wi-Fi in-store (D. Grewal et al., 2018), and mobile technologies (L. Grewal & Stephen, 2019).

Technology allows the development of digital convenience (Vyt et al., 2022) where digital interfaces, such as click and collect, reduce the time and effort of the traditional customer journey. In this concept, websites and mobile applications become the customer's digital interface with the store.

The integration and coordination between online and offline sales channels have grown in importance with the growth of multichannel and omnichannel retailers (Sorescu et al., 2011).

Technology in retail creates three types of customer value: convenience, allowing the customer to reduce his purchase time and effort; economic, allowing the customer to save money on the purchase and social value, allowing the customer to connect with others before, during, and after the purchase (D. Grewal e Roggeveen, 2020; Willems et al., 2017). Figure 3 represents the value creation process in the experience considering the value typology of technologies in retail.

Figure 3 - Value in the Experience with Digital Interfaces



Note: Grewal and Roggeveen, 2020; Holbrook, 2006; Willems et al., 2017 adapted by the author.

Conceptual Model: Digital Interfaces Value Co-creation Cycle in Grocery Retail

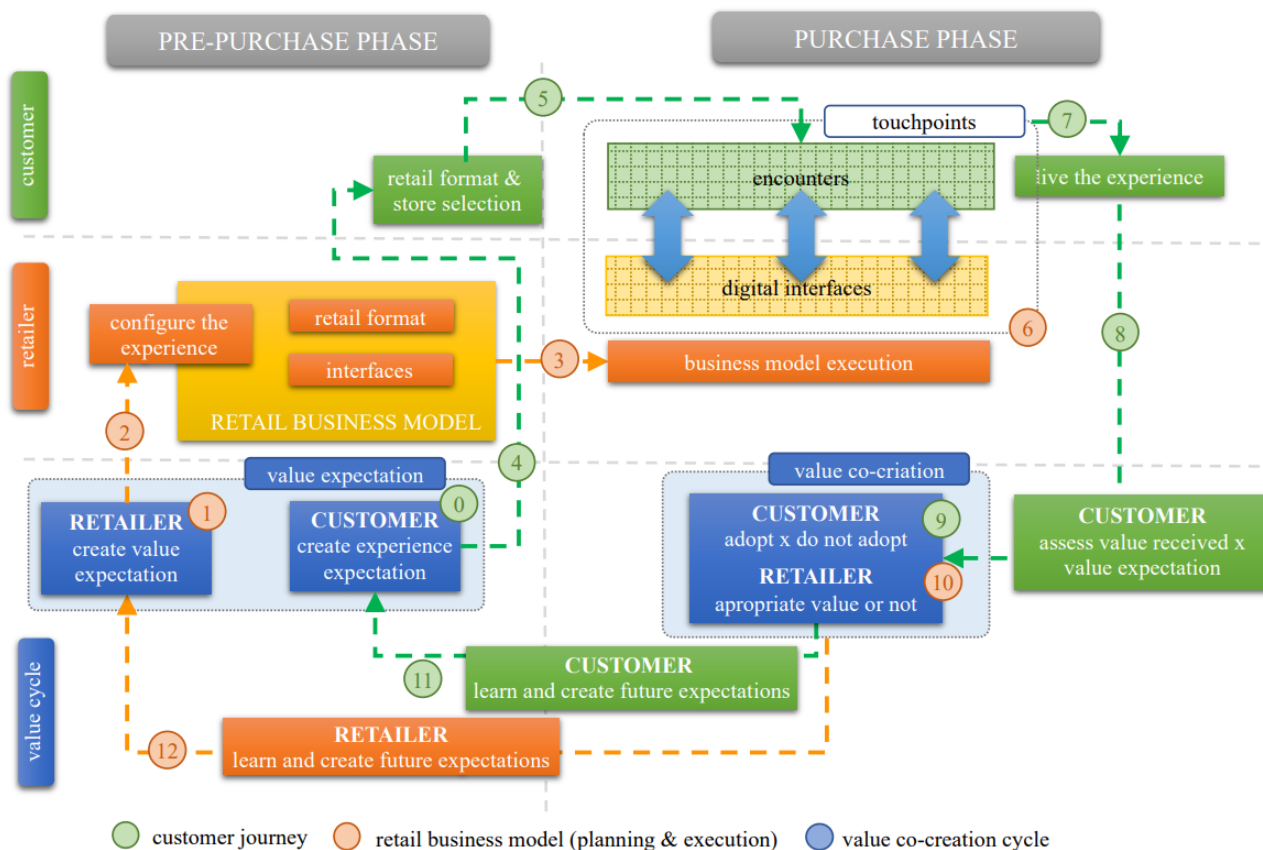
Customer value is in the experience that occurs at all touchpoints along the customer journey. The experience is multidimensional, with cognitive, sensorial, and behavioral aspects. The touchpoint is where customers encounter the interfaces planned and executed by retailers. The experience is cyclical and temporal.

At the customer journey pre-purchase stage, the customer creates his value expectations, based on what he needs to buy and the experiences he expects to have during the journey (0). In this stage, the retailer creates his value expectations (1) and configures the experience the customer is expecting to live, using the retail business model components (retail format, assortment, and interfaces) (2), that are going to be executed in the stores (3).

The customer chooses the format and store he believes would best meet his needs and expectations (4) where he has encounters with the interfaces (5). The interfaces are executed by the retailer in the touchpoints (6). The consumer lives the experience during the encounter (7) and then assesses the value received, comparing it to the value expected (8), and adopts the interface if, the value received is higher than the value expected (9). By adopting the customer gives value to the interface and the retailer appropriates the value created by customer interface adoption (10), in a co-creation process. Both customer (11) and retailer (12) learns from the process and incorporate the learnings into their future expectations, closing the cycle.

The value created by new technologies, as the case of digital interfaces, is measured by their adoption by customers, and the customer's decision to make use of it (Rogers, 2003). Decisions to adopt innovations are individual, being the result of characteristics and perceptions involving the innovation attributes, the learning costs to use the innovation, and the benefits that adopting the innovation provides (Marra et al., 2003). On the other hand, technological advancement enables retailers to capture customer data (i.e., what, how much, when, and how customers shop) (Inman e Nikolova, 2017; Shankar et al., 2011; van Ittersum et al., 2012), providing them access to valuable information to improve their decisions of how and where evolve their business model and personalization of customers experience.

Figure 4 - Digital Interfaces Value Co-Creation Cycle in Grocery Retail Conceptual Model



Methodological Procedures

The objective of this study is to analyze and characterize how digital interfaces create value in grocery retail stores in São Paulo city.

The Nature and Type of Research

This is an exploratory and descriptive research of qualitative nature. Exploratory because the objective is to survey the presence of elements, categorizing them, and descriptive because it seeks to understand the elements, through primary data (observation and interviews) and secondary data (news from the press). The exploratory study is grounded in the subjectivist ontology and constructivist epistemology, indicating the interpretivist research paradigm as the recommended approach to achieve the proposed objective of this study.

Data Collection and Data Analysis Techniques

A sample of 35 retailers operating in São Paulo city, accounting for a total of 1,039 stores was selected. The selection was intentional to cover all retail formats and sizes. To be part of the sample the retailer must have, at least, a website or an app. 47 stores were selected from the sample to be surveyed, an intentional selection to cover all retail formats and regions of the city.

The digital interfaces in stores (47 stores), functionalities in websites (35 websites), and apps (24 apps) were collected using the direct observation method, visiting stores, and navigating through all sites/apps functionalities.

The collected interfaces were evaluated by the dimensions of value, from the customer's and retailer's point of view as well as why customers adopt the digital interfaces. It was used the template analysis technique proposed by (King, 2004) to define the interfaces value dimensions and the cost and benefit of interfaces customer adoption. This is a thematic organization and analysis technique, where it is created an initial categories template, based on a pre-existing model in theory, and the template is developed, adding, eliminating, or reinterpreting categories as the data requires.

Results

The search in stores, websites, and apps revealed the interfaces retailers are using as part of their business model, i.e., a retailer decides to adopt.

Table 01 – digital interface adopted by retailers.

Channel	# digital interfaces
In-store	14
Websites	5
Apps	9 ¹

digital interfaces between the customer and the store.

The interfaces' value creation has been evaluated from the customer's perspective using the convenience template proposed by Berry and Grewal (2002) and Seiders et al. (2005) and from the retailer's perspective using the template proposed by Linzbach et al. (2019) and Willems et al. (2017).

Table 02 - Value creation drivers and definition, from the customer perspective

Customer Purchase Time	time required for a customer to perform an activity in the store.
Customer Purchase Effort	the physical effort required by the customer to perform an activity in the store.
Customer Purchase Benefit	purchase cost reduction, such as the purchase of products on promotion.
Other Customer Benefits ²	related to benefits that improve customer convenience, not related to purchase time, purchase effort, and purchase benefit (i.e., in-store wi-fi).

Table 03 - Value creation drivers and definition, from the retailer perspective

Retailer Operational Efficiency	operational resources cost efficiency
Retailer Revenue Increase	increase in the retailer's revenues.
Data ²	related to digital interfaces that allow retailers to collect customer data (i.e., wi-fi in-store wi-fi).

The interfaces were analyzed by the value drivers, based on observation during in-store visits and by experiencing the interfaces in stores, websites, and apps to find out how digital interfaces create value.

Table 04 – How digital interfaces create value.

Customer Perspective	Retail Perspective
<ul style="list-style-type: none"> • Reduce customer purchase time. • Reduce customer purchase effort. • Increase customer purchase benefit. • Increase other customer benefits. 	<ul style="list-style-type: none"> • Increase retailer operational efficiency. • Increase retailer revenue increase. • Collect, legally, customer data.

The effects on value, from the customer's use of the interfaces, were analyzed by value drivers, deepening the understanding of how value is created (table 05).

Table 05 – Value Creation Customer Digital Interface Adoption Analysis

Driver => Interface	Effect of the use of the digital interface on the value driver and on value													
	Customer								Retailer					
	Purchase Time		Purchase Effort		Purchase Benefit		Other Benefits		Cost Efficiency		Revenue Increase		Data	
	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value	Effect on Driver	Effect on Value
Self-checkout	reduce	increase	increase	decrease					increase	increase				
Click & Collect	reduce	increase	reduce	increase			increase	increase	reduce	decrease	increase	increase		
QR codes							increase	increase	increase	increase				
Digital price tag									increase	increase				
Bar code reader for price check (store)	reduce	increase	reduce	increase					increase	increase				
Bar code reader for price check (mobile)	reduce	increase	reduce	increase					increase	increase				
Receive store leaflet by WhatsApp / e-mail					increase	increase					increase	increase		
Access store leaflet on site/application	increase	decrease	increase	decrease	increase	increase					increase	increase		
Shopping List	reduce	increase									increase	increase		
Digital payment methods	reduce	increase							increase	increase				
Receive store leaflet by push notification	reduce	increase			increase	increase					increase	increase		
Offers activated on the site/app and received in store	increase	decrease	increase	decrease	increase	increase					increase	increase		
Face-to-face payment	reduce	increase	reduce	increase					increase	increase				
Food purchasing kiosk	reduce	increase	increase	decrease					increase	increase	increase	increase		
Assistant robot	reduce	increase			increase	increase	increase	increase	reduce	decrease	increase	increase		
Scan & Go	reduce	increase	reduce	increase					increase	increase				
Virtual Sommelier	increase	decrease	increase	decrease			increase	increase	increase	increase		increase		
Totem to activate promotions	increase	decrease	increase	decrease	increase	increase					increase	increase		
Totem to retail brand credit card	reduce	increase	reduce	increase			increase	increase	increase	increase				
Totem retail loyalty program	reduce	increase	increase	decrease	increase	increase	increase	increase			increase	increase		
Free Wi-Fi in the store							increase	increase					allow	increase

To understand why customers, adopt digital interfaces it was used the template proposed by Marra et al (2003).

Table 06 - Definition of customer costs and benefits to adopt a digital interface.

Cost Type	Cost Type Definition
Cognitive Costs	customer effort to learn and use the digital interface
Emotional Costs	customer's emotional reactions of learning and using the digital interface
Social Costs	effects on customer social relations of learning and using the digital interface.
Benefits of Use	customer benefits from using the digital interface

Discussion

The purpose of this study is to analyze and characterize how digital interfaces create value in retail grocery stores.

Value co-creation - an overview

Value is co-created between customers and retailers (Vargo et al., 2004; Vargo & Lusch, 2008), and this study confirm that, to be present in a store, a digital interface is creating value for both (see table 05).

From the customer's perspective, value is created in the total experience (Zeithaml, 1988), that is, even if one or more of the drivers decrease (Echeverri & Skålén, 2011; Plé & Cáceres, 2010) the value of the experience the total value of the experience value must be positive.

From the retailer's perspective, value is created when the customer uses the digital interface. To ensure the interface generates sufficient operating cost efficiency (total operating costs with the interface lower than total operating costs without the interface) and/or sufficient revenue to achieve a return on investment, a minimum number of clients using the interface is required.

When a customer utilizes the digital interface, value is created from the retailer's perspective. A minimum number of customers using the interface is necessary to guarantee the adequate generation of operating cost efficiency (total operating costs with the interface are lower than total operating costs without the interface) and/or sufficient revenue to deliver the planned return on investment.

Value Creation - customer's perspective detail

Customers have needs and expectations in their customer journey (Woodruff, 1997) and retailers create digital interfaces to meet them, thus seeking to create value for customers and themselves. The customer has to learn how to use the interface by making cognitive and emotional efforts Marra et al. (2003) and will have to overcome emotional costs (i.e., fear of making a mistake) and social costs (i.e., the shame of making a mistake) when using it. Once the customer has used the interface, experiencing not only the benefits but also the emotional and social aspects (D. Grewal & Roggeveen, 2020; Willems et al., 2017), the customer compares what was received with his expectations and if he considers that he got what he expected or even more (Zeithaml, 1988) he adopts the interface and incorporates the touchpoint into his repertoire of touchpoints in his customer journey and thus creating new expectations for the future (Helkkula et al., 2012). This is the cyclical nature of the value creation of digital interfaces from the customer's perspective.

Value Creation - retailer's perspective detail

The retailer's decision to adopt (incorporate) a digital interface into their business is a strategic decision in defining the retail format (Sorescu et al., 2011). These decisions are made to meet their target customers' needs and expectations (Woodruff, 1997) and to capture value, delivering value to them. The implementation of a new in-store digital interface requires investments in assets (e.g.: wifi antennas), recurring costs (e.g.: employee to accompany the assistant robot), maintenance expenses (e.g.: when some interface breaks and becomes unavailable), staff training (e.g.: employees who know how to operate the self-checkouts and can teach the customer how to operate it).

Once the interface is available in stores, the retailer monitors its adoption (the indicator that customers are valuing the interface) by checking: how customers are using the interface, the number of customers using it, the operational cost reduction, and/or revenue increase. The retailer adjusts and develops the interfaces to continue providing value considering the present and future customers' needs and expectations. This is the cyclical nature of value creation through digital interfaces from the retailer's perspective.

Costs and Benefits of Customer Adoption Analysis

Customers have different needs and expectations in their customer (Woodruff, 1997), which include different expectations on the digital interfaces' value dimensions. For example, some customers value purchase time more than purchase benefit, while others value purchase benefit more than purchase effort. The same customer values a dimension differently depending on their customer journey. These distinct customer needs and expectations motivate them, distinctly, to use a digital interface, since they believe the interface will improve some value dimensions, during the customer journey.

To get the benefits of using a digital interface, the customer must overcome some costs (Marra et al., 2003). The cognitive cost is related to the learning effort because the customer is not familiar with the interface, is not familiar with the technology, and may be inhibited by the machine. The customer faces emotional costs, related to his emotions during the cognitive process, such as the fear of trying or making mistakes. Along with emotional costs come social costs, related to the customer's relationship with others.

The differences in expectations on benefits and how each customer overcomes the costs contribute to the understanding of why some existing interfaces are more adopted than others.

Factors that Increase the Likelihood of a Digital Interface Adoption

The study identified the factors that increase the possibility of an interface being adopted (value creation) by customers and retailers.

Customer Perspective

From the customer perspective, the interfaces that have more possibilities of adoption are the interfaces that:

- Propose to reduce purchase time and effort or increase customer benefits, motivating the customer to consider adopting them.
- Easy to use, designed to minimize errors, thus reducing the customer's cognitive, emotional, and social costs.

Retailer Perspective

From the retailer perspective, the interfaces that have more possibilities of adoption are the interfaces that:

- Increase the retailer's operational efficiency or revenue.
- Designed to be easy and safe to use.
- Have high availability, either in-store or in-store quantity.

Conclusions

The purpose of this study is to analyze and characterize how digital interfaces create value in retail grocery stores. The exploratory research conducted allowed the construction of a model that has theoretical and practical contributions.

Theoretical Contribution

This study fills an identified gap in how digital interfaces create value in grocery retailing by proposing a conceptual model. The conceptual model proposed is processual, which means, is a sequence of individual and collective events, actions, and activities unfolding over time in context (Pettigrew, 1997). The model, as a process, considers the flow of events over time at the customer and retailer level; it considers encounters, where value is co-created or codestroyed, followed by the evaluation of the outcomes of the encounter and thus closing the loop and starting over.

The model also includes how and when, in the process, customers and retailers create their expectations and how and when they access the co-creation or co-destruction of value.

Contributions to Practice

The study identified the factors that increase the possibility of an interface being adopted by customers and retailers, using the value creation drivers and the customer costs of adoption. This is useful to retailers to access the touchpoints, in the customer journey, verifying the touchpoints that are eroding value and why. By doing that retailers can identify potential touchpoints, that can be improved by a digital interface and what to consider when designing the digital interface.

The study extends the view of value creation by incorporating the value drivers for customers and retailers and by incorporating the costs of adoption. This breadth gives retail entrepreneurs a broader view of how to access the value created by adopting technological innovation in their stores, allowing them to incorporate it, as a criterion, in their decision process to adopt a digital interface.

Study Limitations

This is an exploratory study, limited to a few retail companies in São Paulo city and one digital interface supplier. The sample expansion can contribute to the model evolution with new value drivers, new categories, or interfaces not covered by this study.

Suggestions for Future Research

The conceptual model is promising to comprehend the value co-creation process in grocery retailing through the use of digital interfaces. Future research can contribute to the model development such as expanding data collection beyond São Paulo city; evaluating if there is a correlation between retailer size and formats with the adoption of digital interfaces; evaluating if there are variations in the

adoption of digital interfaces according to different customer journeys and expand the study to other retail segments.

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