Interface Design for Evolving Consumers and Retail Contexts

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SUMMARY OF CHAPTER
The chapter provides a novel model for understanding retail success based on ease-of-use and repeated shopping experience as they elevate or attenuate consumer satisfaction. The chapter concludes with a discussion of what the future may hold for the retail-consumer interface and thoughts on how full-service retailers can compete in an increasingly self-service world.

MANAGERIAL IMPLICATIONS (GENERAL)
This chapter:
- Makes managers in retail business think about the attributes of their customer interface and the importance of creating an adequate balance between these attributes.
- Provides a thorough summary of the accumulated experiences in interface designs in retail business and highlights the accelerated innovations.

MANAGERIAL IMPLICATIONS (ORGANIZATIONAL)
- From an organizational perspective, managers must ensure that teams working on the interface design of technological systems are multidisciplinary. By multidisciplinary, we mean much more than technology experts and marketing and sales businesspeople.
- These teams must include experts in behavioral science who understand the complex behavior of customers and their experience.

MANAGERIAL IMPLICATIONS (STRATEGIC, TACTICAL, AND OPERATIONAL)
- Managers in retail must elaborate a strategy and a road map for their interface design as this is one of the most important strategic components for their business.
- From a tactical perspective, it is important to assess the value of any investment in technological innovations. Managers ought to ask themselves critical questions: What is the optimal investment in interface technologies (as a resource) compared to other investments? How should I have a balanced set of investments to enhance my business?
- From the operational perspective, managers need to understand how their customers perceive the current interface in light of the criteria elaborated in this chapter then proceed to immediate corrections, if any.

MANAGERIAL IMPLICATIONS (RISK ASSESSMENT)
- Early adoption of some interfaces could be risky as the technology readiness of the customers is not there yet.

1. INTRODUCTION: PIGGLY WIGGLY AND THE ADVENT OF SELF-SERVICE RETAIL

In 1916, a grocery store named Piggly Wiggly upended the traditional practice of retailing.[1] It was the first *self-service* grocery store in North America and likely the world. It was a pioneer in allowing

consumers to browse aisles of goods and pick items for themselves. Consumers no longer had to present their lists or give their orders to a store representative. Prices were visible on individual goods, and those prices were reduced as the self-service model generated savings with lower labor costs. Checkout stands were installed so that customers could now bring their goods to clerks, and goods were sold "cash-and-carry" with payment required at the time of purchase.

Aware that consumers needed to be convinced about this new format, Clarence Saunders, the founder of Piggly Wiggly, went all out. He hired a brass band to play in the lobby, handed out flowers and balloons to children, and had a "beauty contest" in which fake judges handed out gold coins to women entering the store when it opened.[2] While the self-service aspect of the store was front and center, Saunders was a sophisticated retailer who introduced other advances in more subtle ways. Foreshadowing the future of retail, his new interface carefully considered consumer self-efficacy,[3] satisfaction, time, and convenience. As a result, the retail-consumer interface was forever changed.

In this chapter, we review the evolution of the retail-consumer interface from Piggly Wiggly to Amazon's prototype Go stores. We explain why consumers tend to choose self-service shopping and how they can become locked into interfaces that they have more experience using. We propose a novel model for understanding retail success based on ease-of-use and repeated shopping experience – both of which have the potential to elevate or attenuate consumer satisfaction. The chapter concludes with a discussion of what the future may hold for the retail-consumer interface and our thoughts on how full-service retailers can compete in an increasingly self-service world.

The Evolving Retail-Consumer Interface. For many years, retailers refined and enhanced the model that Piggly Wiggly pioneered. The next major step forward came as technology advanced and firms developed self-service interfaces that further automated the customer experience. One early example comes from the banking industry with the Automated Teller Machine (ATM). For basic banking services, ATMs allowed customers to forgo interpersonal

interactions altogether. Such machines were leaders in introducing consumers to the potential of self-service technology (SST).

Self-checkout stands were another early SST with which many consumers are now familiar. Today, SST interfaces have become commonplace among grocery, hardware, and other retailers who wish to offer consumers the option of avoiding the traditional checkout process. More recently, SST has advanced to include shopping carts that can automatically scan items and automate grocery fulfillment.

In the 1990s, retail took its first steps towards the revolutionary retail-consumer interfaces made possible with the advent of e-commerce. Online shopping interfaces may give shoppers the impression of physical stores, but they offer substantially enhanced convenience via their ubiquitous accessibility and enormous selection of products.

Amazon.com, for example, started with books because the potential product selection vastly exceeded the space available in a bricks-and-mortar store, and even within a very large physical store searching for a particular title was difficult and inconvenient. Today, many retailers provide a hybrid interface to customers that offers both in-store selections and an "endless aisle" that allows consumers to browse products beyond the physical store and then make purchases for home delivery. Amazon was a leader in the early days of e-commerce interface design, and it continues to build on that innovative spirit in the design of physical stores that have no checkout stands at all. The company's Go stores offer "Just Walk Out Shopping" – an SST interface that tracks consumers as they grab goods from store shelves and then allows them to simply walk away from the store. Consumers are later charged through their Amazon accounts.

2. THE INTERFACES OF INTERMEDIARIES

E-commerce has wrought a great deal of disruption in the world of retail, but even SST is now being disrupted as new entrants move from product sales to service-based options. This includes companies such as Uber Eats, DoorDash, and InstaCart. These businesses

work with existing product sellers, bringing them into a new channel for online distribution and providing the complex logistical support required to quickly deliver goods to consumers. They are changing the retail interface from one built on a direct interaction between a consumer and a company into one that is mediated by a third party. While Amazon Go allows consumers to walk into a store and walk out with their goods without any service interaction, InstaCart allows anyone to purchase goods online from a partner retailer and then delivers those goods to the consumer's door. The only interpersonal interaction (if there is one at all) is between Insta-Cart's temporary "gig" worker and the consumer.

While the retail interface initially changed slowly after Piggy Wiggly, taking more than sixty years to introduce automated and technology-driven self-service options, today innovations are being introduced much more rapidly. Technology has been a disruptive force in retailing, opening doors to new and exciting opportunities while simultaneously closing other doors forever, which has been met with resistance for a variety of reasons.

The fundamental challenge for retailers, however, has not changed. At the core, success is driven by meeting the needs and desires of the customers the business wishes to serve. For example, it will continue to be important for retailers to offer the right mix of a comfortable shopping environment, product selection, and customer engagement. Although it will not be easy for retailers to anticipate the capabilities of future SSTs or predict the limitations of the next generation of consumer interfaces, a clear trend in the ongoing stream of innovations is a push to enhance ease-of-use.

3. BALANCING USEFULNESS AND EASE-OF-USE

There has always been a segment of "do it yourself" (DIY) consumers who like to jump in and take control. An enduring characteristic of this segment is their self-efficacy – that is, their "beliefs about their capabilities to exercise control over their own level of function and over events that affect their lives."[4] Essentially, greater self-efficacy increases the probability of SST adoption.

4. SELF-EFFICACY AND SELF-SERVICE TECHNOLOGY

In the context of SST interfaces, greater ability, role clarity, and motivation all tend to increase the probability that a consumer will try a self-service technology.[5] This increased preference for trial of SSTs is related to self-efficacy. This is likely an iterative process where consumers are learning and increasing their abilities and, as a result, improving on their past performance. Role clarity should also increase with practice, as knowing what to do to exercise control of the environment is a component of elevated self-efficacy. Higher levels of self-efficacy have also been shown to reduce anxiety related to using an SST.[6] Given the importance of self-efficacy in the adoption of SST, consideration should be given to how interface design affects consumer self-efficacy.

Starting from the basics, the technology acceptance model explains that usefulness and perceived ease-of-use are at the heart of the consumer's adoption decision process.[7] Both of these factors are also likely to impact consumer self-efficacy[8] – that is, both usefulness and perceived ease-of-use will have a positive effect on consumers' perceptions of their own ability and control over their environment. For example, as an interface is more useful, it should provide the consumer with greater control over the shopping experience. Similarly, as it is easier to use, it should have a positive effect on the consumer's perceptions of their own ability to accomplish their shopping goals. When discussing technology, an early example of capitalizing on perceived ease-of-use in interface design is the computer "desktop," which was designed to be analogous to an actual desktop. In doing so, Apple created an intuitive, useful, and easy-to-use graphical user interface, which led to its successful adoption on a wide scale and, ultimately, the birth of home computing.

5. LOCK-IN AND FEATURE FATIGUE

Ease-of-use has also been shown to increase customer loyalty. Specifically, practice makes shopping with a particular interface easier, and that makes it more difficult to switch to a store that the consumer

knows less well or is completely unfamiliar with.[9] This creates *lock-in*, where consumers choose not to use, or even consider using, other interfaces.[10] As a result, new interfaces that are easy to learn and easy to use can lock customers in and create powerful barriers to entry that drive competitive advantage.

In addition to ease-of-use, the technology acceptance model relies upon the usefulness of the interface.[11] Increased interface usefulness is likely to result in greater self-efficacy as consumers have increased control over their environment. For example, imagine comparing a home phone of the 1980s to a modern smartphone. While the home phone could accomplish many things – from connecting with friends to checking the weather to shopping for groceries – it was not nearly as useful as a modern smartphone. A consumer equipped with a smartphone will have far greater control over their environment, and they are likely to feel greater self-efficacy because they are more capable with this technology in hand. The more features that are added to the smartphone the more it can do and the more potentially useful it is.

However, adding additional features can also make it much more difficult to use. A traditional home phone could do less but was very easy to master compared to a modern smartphone. Thus, although consumers will want interfaces that provide as many capabilities as possible, there is likely a point where more usefulness starts to interfere with ease-of-use. Thompson et al.[12] called this "feature fatigue" and suggested that it can be difficult to balance an optimal number of features, and the corresponding increase in capabilities, with the right level of ease-of-use. As the retail-consumer interface evolves, this balance will continue to be critical to success.

Recommendations and Double Agents. One way to simplify an SST with many features is to include artificial intelligence that personalizes the experience for consumers. For example, a recommendation agent that suggests products to consumers may simplify the shopping process at an online store, making the SST both easier to use and more useful. There is also the potential for the retailer to influence consumers' preferences through the recommendation process. For example, Häubl and Murray[13] found that by focusing on particular features during the recommendation process, consumers

came to see those as the key features of the product, and ultimately those features determined the choices that they made. This preference for particular features persisted for consumers into future purchase occasions. Today's voice-activated assistants – such as Apple's Siri, Amazon's Alexa, Samsung's Bixby, and Google's Assistant – are likely to be even more effective as shopping interfaces that are not only easy to use and useful but also capable of influencing consumer decision-making. In the future, such assistants are likely to become even more useful and easier to use, thus making them an increasingly powerful part of the retail-consumer interface.

However, research has also demonstrated that while consumers enjoy using and can benefit from recommendation agents, they are not comfortable with shopping interfaces that appear to have a built-in bias. If the recommendation agent seems to be focused primarily on creating value for the retailer rather than truly assisting the consumer, it runs the risk of being perceived as a "double agent" – that is, an artificial intelligence that pretends to be on the side of the consumer when it really is working to generate sales for the business. This is a fine line to walk, as research has clearly shown that consumers are more likely to buy what is recommended by an assistive agent.[14] However, if the agent loses credibility as an assistant and is instead seen as a salesperson, the consumer is unlikely to trust its advice and may stop shopping with the retailer altogether.[15] Therefore, it is essential that the evolution of the retail-consumer interface be one that continues to build consumer trust and credibility, alongside ease-of-use and usefulness.

6. THE DILEMMA OF ADOPTION VERSUS SATISFACTION

Convenience, defined as perceived time and effort or ease-of-use, plays a special role in adoption decisions when it comes to the retail-consumer interface because it can be an antecedent of other important factors, such as usefulness, trustworthiness, and satisfaction.[16] Put another way, when an interface is easy to use, it is likely to make people feel more in control and capable of using it – thus increasing self-efficacy. Similarly, when an interface feels intuitive and simple,

it is also likely to be more useful and easier to use because it "just seems to work."[17] This will tend to enhance consumer satisfaction with an interface and increase consumers' usage intentions.[18]

Repetition is highly correlated with enhanced ease-of-use, such that people improve their performance over time and through practice with a particular interface.[19] This, in turn, tends to elevate self-efficacy, improving usefulness and the perceived trustworthiness of the interface. Further, when people do something repetitively, the gains made through usage continue to grow, which makes the benefit of early adoption more prevalent. With repeated use, habits tend to develop, which then further increase usage of the particular retail interface.[20] When we break down the factors of ease-of-use and repetition into a two-by-two matrix, both are necessary for widespread market adoption (Table 8.1: Adoption Matrix). Without both repeated experience and high perceived ease-of-use, a retail interface will – at best – be able to achieve adoption within niche segments.

Looking at Table 8.1, it is clear that retailers will tend to avoid interfaces characterized by low repetition and low ease-of-use. With low ease-of-use, there is a greater likelihood of increasing technology anxiety,[21] and without repetitive use, perceived usefulness is likely to decrease.[22] The high repetition, low ease-of-use quadrant is better but likely to lead to only segmented adoption. With high repetition, users will tend to increase their ability with the interface and even develop habits of use.[23] This is likely to increase self-efficacy and, to the extent that habits develop, drive continued use of the SST.[24] However, because initial ease-of-use is low, the SST will struggle to attract users and, therefore, adoption will be limited to segments of DIY consumers or other niches willing to put in the time to learn to use the interface.

If the interface is initially perceived as easy to use, then consumers will be more likely to adopt it.[25] Initial ease-of-use will increase convenience and control, reducing the time necessary for achieving the consumers' goals. For some of the early adopters, ease-of-use will be enough to convince them to try a technology, and it should contribute to higher technology readiness, even among skeptics.[26] However, ease-of-use without experience with the interface will also

Table 8.1. Adoption Matrix

	Low Repetition	High Repetition
High Ease-of-Use	Segmented Adoption (e.g., Sears catalog, Fuller Brush men, Tupperware parties)	Market Adoption (e.g., ATMs, Google Search, Mobile payments)
Low Ease-of-Use	Limited Adoption and/or Market Failure (e.g., Voice-assisted purchasing, Segway, Oculus VR)	Segmented Adoption (e.g., Computer programming, cryptocurrencies)

Source: Author

tend to lead to segmented adoption because repetition is the key to creating a loyal base of locked-in consumers. This larger market of consumers is interested in the convenience of an easy-to-use interface, but they also value familiarity and the efficiency that can be gained through experience. As mentioned above, repetitive use leads to greater self-efficacy, which further increases preference for the interface.[27] Together, ease-of-use combined with repetition will tend to drive market-wide adoption of a retail interface.

7. INTERFACE CHOICE AND CUSTOMER SATISFACTION

Prior research has demonstrated that satisfaction becomes critically important to the consumer after the initial trial and evaluation of an SST.[28] So, while adoption is the first stage of interface design, it is necessary to deliver on consumer satisfaction over the longer term. Satisfaction with the interface will depend on the technology readiness of the consumers,[29] which again relates to the ease-of-use and the repetition matrix outlined above. When the interface is easy to use, and the consumer has repeated experience with it, they are more likely to be highly satisfied.

The perceived quality of an SST is influenced by ease-of-use, performance, control, efficiency, and convenience.[30] Delivering each of those attributes is a challenge because when control or performance increases, ease-of-use and efficiency may decrease, which in turn can have a negative effect on consumer satisfaction. Consider that as

number of features increases, consumers are more likely to adopt an interface because it is perceived to be more useful and capable, but they may end up being less satisfied with the interface because it is less easy to use.[31] Alternatively, an interface that is adopted because it is easy to use may end up dissatisfying consumers because it is less capable than those of competitors. Put another way, the aspects of the SST retail-consumer interface that initially led to adoption may ultimately lead to dissatisfaction.

Consumers also want the ability to choose when they use an SST and when they receive a higher level of personal service. Interpersonal service interactions have been shown to be integral to increasing future purchase intentions.[32] Offering only one option and thereby restricting consumers' choice leads to a negative response, known as psychological reactance.[33] Without the freedom to choose a preferred level of service, consumers may feel that they are being treated poorly and even see the offered interface as less useful, being less satisfied if forced to adopt an SST when they do not have the option of a higher level of service.

Further, if the technology is complex, it will demand more time from the consumer for skill acquisition. Skill acquisition can also be especially hard if consumers are anxious due to others waiting or a lack of available staff.[34] The increased cost of time, combined with time pressure, will lead to abandonment of the technology or the firm.[35] This may lead consumers to pay for time-saving services, and using an SST or having to learn the SST could decrease satisfaction.

In designing the retail interface, it is important to consider perceived ease-of-use and the consumer's level of experience or familiarity with the interface while at the same time understanding the corresponding disadvantages. It is important for retailers to keep in mind that the design features of the SST interface that initially lead to adoption may ultimately lead to dissatisfaction. For example, consumers may adopt a self-service retail interface, but then become unhappy – and discontinue use – when they experience a transaction with little or no service. This dilemma is not simple to resolve, but addressing it is essential to the successful design of retail interfaces that consumers will be both likely to adopt and repeatedly use.

8. IMPLICATIONS OF EMERGING TECHNOLOGIES FOR PRECISION RETAILING

We fully expect that the retail-consumer interface will continue to evolve with technology – including emerging SST options, such as self-checkout shopping carts or Amazon Go-type stores. Amazon, for example, has begun to sell its technology to other retailers, which will increase the repetitive interactions consumers have with the Go interface. In the future, there are opportunities that Go-style stores have yet to capitalize on. Consider, for example, what Clarence Saunders had envisioned as the future of grocery retailing: a fully robotic store that eliminated human labor costs.[36] That vision was well ahead of the technological capabilities of his time, but today it is ever closer to being a reality. Ultimately, these advances have the potential to make retail-consumer interfaces easier to use than ever before.

At the same time, without the option of human interaction and without competing visions of the future of the consumer-retail interface, psychological reactance or similar negative responses might limit adoption of Amazon's SST.[37] One possible negative response is a backlash to cashless technology. It should be noted that some consumers may be "unbanked" and only have the option to pay with cash. A simple fix is to offer in-store personal assistance to those who want it but make the automated SST the default mode of operations – in contrast to the traditional model that makes personal assistance the default and SST an option. Ensuring a competitive market for future retail SST interfaces may take time but is likely inevitable as consumer demand draws new players into the marketplace. As an analogous example, consider the effect of Tesla's success on more traditional auto manufacturers, moving the industry rapidly towards full lines of electric vehicles. Start-ups have already begun to enter the SST interface space and are developing their own models to compete with Amazon.

Other possible developments in adaptive retail interfaces include the addition of augmented (AR) or virtual realities (VR). AR in particular could enhance the endless aisle, allowing stores to keep few

or no products on the physical shelves, employing automated fulfill-ment technologies in the back of the store while consumers add to their virtual carts in the front of the store. Using VR would go fur-ther and eliminate the physical aisle entirely. Along the same lines, wearables such as smart watches may open new avenues through which retailers can interface with consumers. Initially this may include location-based services and GPS-targeted promotions, but ultimately there is potential to use data collected by such devices to better understand customers and provide more personal, yet still automated, services, such as emotional analysis through smart speaker interactions to customize playlists and suggestions. Similar technology could create a retail-consumer interface that adapts to consumers' moods. Of course, this further highlights potential con-cerns around privacy and the use of data in the ongoing quest to improve the retail interface.

Although there is almost unlimited potential for the future of adaptive retail interfaces, even the emerging technologies discussed so far will need to be introduced slowly. As has been mentioned, the ease of using familiar interfaces can prevent consumers from upgrading to more useful alternatives as they begin to get locked-in. One strategy is the gradual introduction of new features to allow consumers time to develop their abilities and habitual behaviors. As self-efficacy increases, consumers are more likely to adopt new and innovative retail interfaces.

There are, of course, still opportunities for existing retail interfaces to evolve alongside emerging SST technologies. As discussed above, purchase intentions can be higher with greater interpersonal inter-action, which can be enhanced with the use of SST. This will become a necessary tool in adapting to a changed retail world. These inter-actions will need to focus on providing consumer solutions that are credible and trustworthy. The representatives will need to demon-strate expertise and provide opportunities for experiential shopping to the consumer. This will demand elevated emotional connections and excellent communication between the representative and con-sumer. It will also likely require a high-touch in-store experience that is complemented by a more automated SST alternative. Many higher price-point retailers, from lululemon to Hugo Boss to Tiffany,

have already adopted this strategy. In addition, it may be possible to connect SST consumer information to a consumer's social media interactions with a firm. Representatives could have an entire customer history available when a customer enters the store to make that customer feel as though they have a personal shopper.

The retail interface has come a long way since Piggly Wiggly. Some form of SST is nearly ubiquitous in today's retail-consumer interfaces. Consumers will continue to demand interfaces that are useful, easy to learn, and easy to use. Retailers will continue to innovate and compete to attract customers who become increasingly locked-in to incumbent interfaces. Finally, retailers will need to maintain their focus on consumer satisfaction. There is a risk that consumers reach a tipping point in the near future, whereby self-service simplicity makes many traditional retailers seem extraneous. This may have already happened to some as the continued growth of e-commerce upends traditional store models. We recommend that retailers with higher-service levels compete by driving superior service in-store while also offering consumers an SST alternative. In general, as consumers and retail contexts evolve, we expect interface designs will increasingly adopt a hybrid approach that combines highly automated, technology-driven interactions with an option for high-touch and human-mediated service.

NOTES

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