

# Cashierless Stores – the New Way to the Customer?

The check-out process is one of the biggest pain points in shopping. While Apple is the pioneer in cashierless shopping, several other corporations have initiated first concepts during the last months. Innovative, IoT-driven businesses like Amazon Go or Avec Box are trying to improve the process. The recently established concepts vary and a deeper understanding of the underlying functionality is still missing. Our qualitative desk research and store visits give a first overview of the design dimensions, challenges and opportunities for cashierless stores.

**Prof. Dr. Marcus Schögel, Severin Lienhard**

The first store providing an Internet of Things (IoT) shopping experience has recently been opened to the public. The Amazon Go store, using an app, cameras and sensors, provides IoT-based shopping that mainly aims to reduce queuing times at the cashier desks (Dougall, 2018; NZZ, 2018). Besides this US concept, a variety of cashierless stores is currently emerging worldwide, like “Habitat by Honestbee” in Singapore or the “Avec Box” in Switzerland (Valora, 2019). Currently, large sums are being invested in the expansion of these new cashierless concepts. Amazon plans to open 3,000 cashierless stores by 2021 (Soper, 2018). Practitioners suggest that tech companies are already offering their products and services to retailers for test runs (Capgemini, 2019). Therefore it can be concluded that this is just the beginning of a bigger trend.

The traditional check-out process plays a central role in retail. Currently, it is still mostly done through a combination of human contact with the cashier and machine-assisted services such as self-checkout stations or through electronic service solutions like pick-up stations (Fitzsimmons, 2003). Nowadays, a variety of new technologies that have never existed before enables retailers to establish cashierless concepts (Capgemini, 2019). In the present paper, cashierless concepts are defined as stores that abolish traditional physical cashier desks and apply the newest technology in their check-out process.

The general need of streamlining the paying process has existed for some time, as waiting at the check-out has always been perceived as one of the least satisfying parts of a shopping experience (Caballero, Lumpkin, Brown, Katsinas, & Werner, 1985; Kahneman, Wakker, & Sarin, 1997; Verhoef, Anto-

nides, & de Hoog, 2004; Scholz, 2017). To pay special attention to the check-out process also makes sense from the company’s perspective. First, the peak-end rule highlights the importance of the check-out because it states that what customers tend to remember most is the way an experience ended (Bourasoui, Eriksson, Mansjö, & Thiel, 2019). Second, automation in retail enables companies to save up to 81 % of the time currently needed for cashier activities (Begley, Hancock, Kilroy, & Kohli, 2019).

Therefore, it is an appropriate step for retail companies to work on the enhancement of the check-out process. Since retailers approach this problem in highly different ways, an investigation into the merits of these emerging solutions is necessary. The development on the part of the companies themselves as well as the strong media coverage of cashierless shops show the importance of the topic. Yet it remains an open question how exactly the existing concepts differ or what forms they take. Therefore, the following research questions are formulated:

- Which cashierless store concepts exist in the market?
- What are the purchasing phases in cashierless stores?

## Towards a Functional Understanding of Cashierless Concepts

To examine the different concepts in more detail and to answer the research questions, the form of a multiple case study was used, which is one of the most commonly applied qualitative research methods (Yazan, 2015). A multiple case study allows the researcher to discern differences between and within the cases (Yin, 2003; Baxter &

**Prof. Dr. Marcus Schögel**  
Director  
Institute of Marketing  
University of St. Gallen  
Marcus.schoegel@unisg.ch  
ifm.unisg.ch

**Severin Lienhard**  
Research Associate  
& Doctoral Student  
Institute of Marketing  
University of St. Gallen  
Severin.lienhard@unisg.ch  
ifm.unisg.ch

Jack, 2008). For the present article, desk research served as the first source for the evaluation, store visits by the research team as a second one. A wide range of literature was reviewed for all the concepts. In order to achieve a deeper insight and understanding, several stores such as Avec Box in Zurich, Amazon Go in the US, Habitat by HonestBee in Singapur and the Apple store in Zurich were visited by the research team. This allowed the research team to answer the questions regarding processes and procedures.

The various cashierless stores were categorized into four industries: consumer electronics (Apple Store, Saturn Express), convenience/kiosk (Amazon Go, Avec Box, Bingo Box, Migrolino), grocery stores (Habitat by HonestBee, Sam's Club Now, Hema Store, Albert Heijn) and merchandising (Alibaba Futuremart, TaoCafé).

In order to analyze the different store concepts, a set of criteria had to be developed. The entire purchase process in cashierless stores was defined based on the insights gained by the research team during their visits in the stores. In order to define this process, the article by Lemon and Verhoef (2016) was used as the basis. These two authors divided the purchase process into the stages pre-purchase, purchase and post-purchase. Through mystery shopping, the stages were specifically broken down for cashierless shops. The mystery shopping included: a) the purchase of a soft drink or some cheap gadget, b) an investigation of the applied technologies and the store design elements. Thus, the pre-purchase stage equaled check-in, purchase equaled product selection and post-purchase equaled check-out. In addition, the research team realized that quite often some app installation or customer card ownership was required in advance. Therefore,

this was added as a preparatory phase. To summarize, the first phase encompasses the actions that the customer must take before purchasing, while the second phase equals the check-in, meaning how the customer gets access to the store. In the third phase, the product selection is checked more closely and the final phase includes the check-out, with the focus on the process of paying and leaving the store. Over all phases, the proportion of user interaction to store interaction was examined. The technology used in each case was investigated as well. In addition, a fact sheet was created for each concept and related challenges were listed. Furthermore, the concepts were classified on a continuum on four scales:

- assortment: kiosk vs. department store,
- development stage: prototype vs. on the market,
- integration level: standalone vs. part of an experience,
- geographic spread: local vs. global.

Different sources per store concept were used in order to be able to apply the criteria listed above. The data analysis was conducted in three steps. First, the store concepts were evaluated individually according to the defined

### Management Summary

Cashierless stores are created all over the world in a variety of formats and in different industries; they make use of the newest technological developments to eliminate the traditional check-out process. For each of the four defined phases of the purchasing process (preparation, check-in, product selection, check-out), the available technologies can be combined and applied in different ways. The opportunities for stores range from cost reductions to higher convenience to a potential refocusing on the customer. Satisfying customer needs, however, remains the main objective.

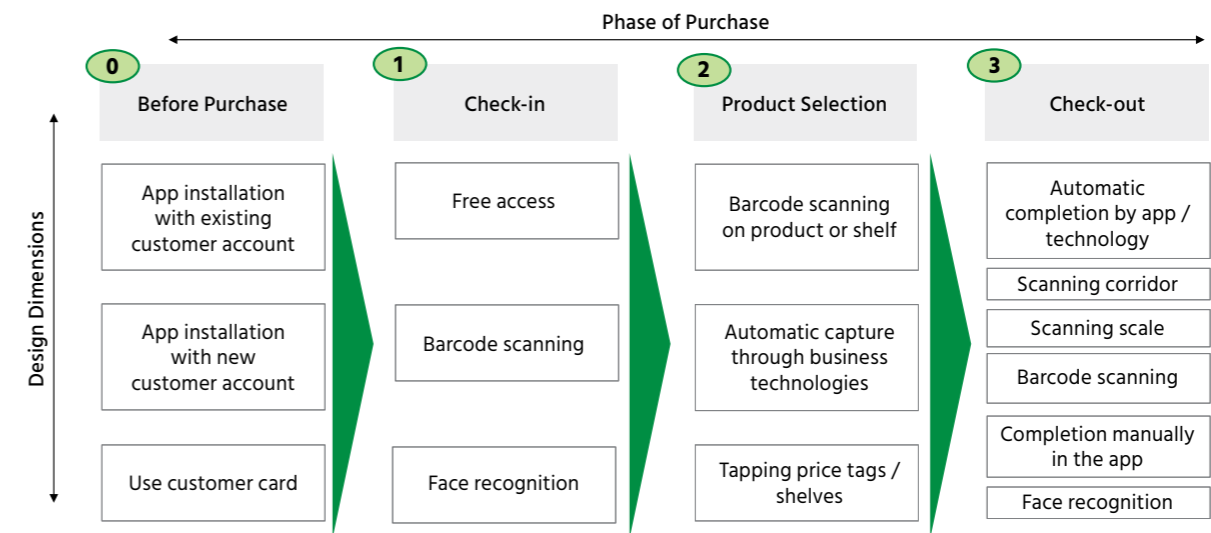
criteria. Second, the data were compared across concepts revealing differences and similarities. Finally, the key findings were summarized and brought together in table 1.

### Differences Between the Store Concepts

The cashierless shops of these four industries were established by different-sized companies, ranging from multinationals (Alibaba, Amazon, Valora) to SMEs (Migrolino) to start-ups (Bingo Box). Geographically, the spread extends from local (e.g. Saturn Express) to global (e.g. Apple Store). The formats also differ according to how well they are established on the market. Some have largely been rolled out, such as the Hema or Apple Store, others serve only as innovation labs (Sam's Club Now) or are in their first project stages (Saturn Express). Their product ranges also differ widely. Some focus on a rather small and specified product range (e.g. the Alibaba Futuremart), others are complete department stores (e.g. Hema Store).

When it comes to initiating a purchase, some of the concepts require the installation of an app in advance (e.g. Amazon Go, Habitat by HonestBee or the Avec Box). Others can be accessed without requiring an app

Fig. 1: Design Dimensions for Each Phase of the Purchase



Source: Schögel/Lienhard, 2019.

(like the Apple Store). After having fulfilled these requirements prior to the purchase, the customer has different ways of access to the store. One option is via barcode scanning (e.g. Amazon Go, Avec Box), another one is face recognition (Alibaba Futuremart). Some stores, however, are accessible without any barriers (e.g. Saturn Express, Apple Store).

As soon as the customer is in the store, product selection is the next step. Some concepts require the customer to scan a barcode (e.g. Avec Box) or tap a screen (Albert Heijn). Yet this task can also be skipped completely, as can be seen in the example of Amazon Go. Amazon's concepts eliminate the entire check-out process by using in-store technologies like computer vision, sensor fusion and deep learning so the purchase is automatically completed once the customer leaves the store (Pocket Lint, 2019). Other concepts use face recognition (Hema Store), comple-

tion of the transaction in an app (Avec Box), scanning corridors (Tao Café) or scanning scales (Bingo Box) in order to complete the purchase.

### Design Dimensions of Cashierless Stores

Technology is a game-changer in retailing (Grewal, Roggeveen, & Nordfält, 2017). This is in line with the findings regarding design dimensions of cashierless stores. At each stage of the purchase, the stores use a variety of technologies which can be combined in different ways. For example, before the purchase, most of the concepts make use of an application that has to be installed in advance. For check-in, the application can be used to open a door or barrier by scanning a barcode. Free access can also be provided, as in the Saturn Express store. As soon as the customer wants to select products, however, the app might become a ne-

cessity. In the Avec Box, for example, the customer has to scan the product's barcode (scan-and-go). In the Amazon Go store, on the other hand, customers do not have to use their smartphones at all, they can just grab what they want to buy and leave the store. For the check-out, face recognition is used at the Hema Store. At the TaoCafé you just walk out through scanning corridors and the purchase will be automatically completed. All these combinations highlight the opportunities that these technologies provide. The consumer shopping experience is revolutionized and the application of various design dimensions plays a great part in cashierless stores (Grewal et al., 2017).

### Advantages and Disadvantages of Cashierless Stores

The results of the present study show that cashierless shops have certain advantages and disadvantages. Financial

considerations play an important role. The investment in such a concept can be relatively high, depending on the selected design dimensions. Especially the well-known example of Amazon Go is mentioned again and again. It is controversial whether the advantages of this concept outweigh the costs (Grocery Dive, 2018). Many concepts, like Amazon Go, are based on an app. Research has shown, however, that the usage frequency of retail apps is relatively low (McKinsey, 2014). Therefore, it should be checked whether using an app is really target-oriented.

Another exciting aspect is the influence of missing cashiers on store design. Without cash registers, additional square metres become available which can be used for sales and thus increase turnover per square metre. At the same time, the opportunity for impulse purchasing around the check-out desk disappears. Therefore, the question arises whether the elimination of the check-out desk or automatic check-out will definitely increase the average shopping basket of the customer. A key benefit for retailers is that new data volumes are generated and can be used in a targeted manner. Manufacturers, on the other hand, are forced to ensure that their products are suitable for the respective concepts, by providing, for example, RFID chips on their products.

### Key Takeaways for Managers

#### Goals of the cashierless concept

From the retailer's point of view, there are a variety of objectives cashierless concepts can help achieve. Some of these goals translate into lower product costs and rapid expansion (Bingo-Box), higher investment in the experience (Hema, Habitat by Honestbee) or increasing customer centricity at the

### Main Propositions

1. Cashierless concepts allow the store to refocus on the individual customer.
2. New technology can only provide the foundation for cashierless stores; a compelling customer experience requires additional measures.
3. IoT enables stores to implement successful cashierless concepts and drive growth.
4. A cashierless store opens up new opportunities for the whole customer journey within a store.
5. The acceptance of cashierless stores within the company can pose one of the biggest challenges.

PoS (Saturn Express). Cashierless stores may provide increased convenience for the customer or enable the refocusing on customer needs. Without a cash register, more time can be spent advising the individual customer (seller can continuously stay with the customer). On the other hand, opening hours can be extended in the case of non-staffed shops.

#### Feasibility of cashierless formats

Depending on the combination of the design dimensions, feasibility can vary considerably. First of all, it has to be taken into account that big retailers, for instance Coop, nowadays own different formats that work in different ways, meet different customer needs, and have different sizes and assortments (Coop, 2019). At the same time, cashierless concepts require huge investments and do not automatically lead to a competitive advantage. Therefore, it is crucial for retailers to

Fig. 2: Selected Advantages and Disadvantages of Cashierless Stores

	Advantages	Disadvantages
Costs	Reduced labor costs	High implementation costs
Revenue	Higher earnings per m <sup>2</sup>	No impulse purchases at the cashier desk
Customer Experience	Check-out pain point is removed	Does not automatically address all customer needs
Retailer	Gathering (live) customer data	The more products are purchased the less time the check out takes up in percentage terms
Manufacturer	More space for products available in the store	Products must fit with the cashierless store system

Source: Schögel/Lienhard, 2019.

# ANZ

define why they want to launch cashierless formats. (Capgemini, 2019) As soon as the goal is clear, the companies can figure out which design dimensions best suit their stores. Simply programming an app in which the customer can scan the products and pay directly might already meet certain customer needs.

### Customer journey and customer experience in cashierless stores

Cashierless concepts have their own pre-purchase, purchase and post-purchase stages that represent the customer journey (Lemon & Verhoef, 2016). In order to improve the customer experience, the relevant touchpoints along the customer journey must be identified (Bouraoui et al., 2019). When a retailer is thinking about implementing a cashierless store, the design should aim to provide the most memorable experience possible (Capgemini, 2019). In order to achieve that, the design dimensions are a good starting point. Over all four phases (including the preparatory stage), the retail compa-

ny must figure out which dimension can lead to the best possible customer experience. It is important to understand that technology itself does not automatically meet customer needs (Capgemini, 2019). Rather, the customer journey has to be as satisfying as possible. Even if this means that the store has to provide a cash payment option.

### Impact of technology and opportunities for cashierless stores

IoT is transforming retail. In concepts like Amazon Go as well as in other concepts, cashiers are replaced (Paul, 2018). Computer vision, sensor fusion and deep learning technologies enable the automatic detection of products and the IoT Amazon Go shopping experience is completed by cameras, sensors, AI and its applications (Grewal et

IoT plays a key role in this new type of shopping experience.

### Lessons Learned

1. Cashierless shops offer the opportunity to improve the unsatisfactory check-out process and reduce labor costs in store.
2. The focus should be on the available technologies and on how to combine them for each format. Different paths can lead to the desired goal.
3. Take advantage of the simplifications of cashierless stores and invest, for example, in more time for advising the customer.
4. Meeting the customer needs remains the main priority, even though this may include accepting cash payments.
5. Keep the peak-end rule in mind: a memorable customer experience is not automatically created by just implementing cashierless store technology.

al., 2017; Dougall, 2018; Dogtown Media, 2018). Retailers increasingly rely on IoT to automate manual processes. IoT is currently driving the increase in cashierless stores all around the world (Trendforce One, 2019). The Amazon approach of radically removing the check-out is enabled by asking the right questions. Instead of just improving the check-out, Amazon eliminates it. Time will tell if the applied technology is appropriate. What really matters is the correct focus of a company, and this should be on technology (McKinsey, 2017).

### Success factors of cashierless stores


The topic of cashierless shops is strongly associated with the trend towards convenience (KPMG, 2018). And today's customers particularly value convenience (McKinsey, 2019). Therefore, simplicity of the concept, low entry barriers and a seamless customer experience are key success factors. For example, integration with existing customer accounts can significantly simplify initial registration. Accessibility, however, is not the only decisive factor; the overall customer benefit must be high, especially in comparison to already established concepts such as self-check-out and self-scanning, e.g. "passabene" by Coop or "subito" by Migros.

### Outlook

The development of cashierless stores is only just beginning. As established in the results and key takeaways of our research, retailers are in a process where they are considering launching cashierless stores but are still faced with questions regarding how to proceed. IoT plays a key role in this new type of shopping experience (Dougall,

2018). The design dimensions serve as a tool to create a cashierless store. But all companies must be aware that success does not only depend on the dimensions used but also on the overall customer experience.

This field provides many opportunities for future research. Generally, IoT in retailing is one of the emerging forces and presents a wide range of research gaps (Grewal et al., 2017). Giving up the cashier desk has an im-

act on store design, for example. The question arises how to use this empty space efficiently. And the new technologies that are used raise questions about adoption or optimal technology design. 

### Literature

Baxter, P. & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544–559.

Begley, S., Hancock, B., Kilroy, T., & Kohli, S. (2019). Automation in retail. Retrieved from <https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/Automation%20in%20retail%20An%20executive%20overview%20for%20getting%20ready/Automation-in-retail-An-executive-overview-for-getting-ready.ashx>.

Bouraoui, B., Eriksson, M., Mansjö, M., & Thiel, A. (2019). The ever-changing store. Retrieved from <https://www.mckinsey.com/industries/retail/our-insights/the-ever-changing-store-taking-an-agile-customer-centric-approach-to-format-redesign>.

Caballero, M. J., Lumpkin, J. R., Brown, D., Katsinas, R., & Werner, S. (1985). Waiting in line: a primary investigation. In D. M. Klein, & A. E. Smith, (Eds.) *Marketing: The Next Decade*, Proceedings of the Annual Meeting of the Southern Marketing Association (pp. 46–49). Florida Atlantic University: Boca Raton.

Capgemini (2019). Cashierless Stores: fail or fortune. Retrieved from <https://www.capgemini.com/gb-en/2019/03/cashier-less-stores-fail-or-fortune/>.

Dogtown Media (2018). Is Amazon Go the Future of Retail IoT? Retrieved from <https://www.dogtownmedia.com/amazon-go-future-retail-iot/>.

Dougall (2018). Amazon Go: Internet of Things shopping opens to the public. Retrieved from <https://www.cbronline.com/news/amazon-go-internet-of-things-retail>.

Fitzsimmons, J. A. (2003). Is self-service the future of services? In *Managing Service Quality: An International Journal*, 13(6), 443–444.

Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The future of retailing. *Journal of Retailing*, 93(1), 1–6.

Grocery Dive (2018). The benefits of Amazon Go may not outweigh the costs. Retrieved from <https://www.grocerydive.com/news/grocery--the-benefits-of-amazon-go-may-not-outweigh-the-costs-analysts-say/534268/>.

Kahneman, D., Wakker, P. P., & Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *The Quarterly Journal Of Economics*, 112(2), 375–406.

KPMG (2018). Retail Trends. Retrieved from <https://assets.kpmg/content/dam/kpmg/pl/pdf/2018/04/pl-Raport-KPMG-Disruptive-influences.pdf>.

Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, 80(6), 69–96.

McKinsey (2014). Busting mobile-shopping myths. Retrieved from <https://www.mckinsey.com/industries/retail/our-insights/busting-mobile-shopping-myths>.

McKinsey (2017). The future of grocery. Retrieved from <https://www.mckinsey.com/industries/retail/our-insights/the-future-of-grocery-in-store-and-online>.

McKinsey (2019). Perspectives on Consumer Goods. Retrieved from [https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/Perspectives%20on%20retail%20and%20consumer%20goods%20Number%207/Perspectives-on-Retail-and-Consumer-Goods\\_Issue-7.ashx](https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/Perspectives%20on%20retail%20and%20consumer%20goods%20Number%207/Perspectives-on-Retail-and-Consumer-Goods_Issue-7.ashx).

NZZ (2018). First Amazon supermarket without checkouts opens in Seattle. Retrieved from <https://www.nzz.ch/wirtschaft/erster-amazon-supermarkt-ohne-kassen-oeffnet-in-seattle-ld.1349685>

Paul, F. (2018). 6 ways IoT is transforming retail. Retrieved from <https://www.networkworld.com/article/3324484/6-ways-iot-is-transforming-retail.html>.

Pocket Lint (2019). What is Amazon Go, where is it, and how does it work? Retrieved from <https://www.pocket-lint.com/phones/news/amazon/139650-what-is-amazon-go-where-is-it-and-how-does-it-work>.

Scholz, H. (2017). Waiting times annoy the most. Retrieved from <https://zukunfdesinkaufens.de/studie-wartezeiten-an-der-kasse-sind-groesstes-aergernis-im-supermarkt/>.

Soper, S. (2018). Amazon plans to open 3000 cashierless stores. Retrieved from <https://www.bloomberg.com/news/articles/2018-09-19/amazon-is-said-to-plan-up-to-3-000-cashierless-stores-by-2021>.

Trendforce One (2019). The IoT will drive the growth of cashierless stores. Retrieved from <https://trendforce.one/en/the-iot-will-drive-the-growth-of-cashierless-stores/>.

Valora (2019). Press release. Retrieved from [https://e3.marco.ch/publish/valora/561\\_2367/20190404\\_avecBox\\_Medien.jpg](https://e3.marco.ch/publish/valora/561_2367/20190404_avecBox_Medien.jpg).

Verhoef, P. C., Antonides, G., & de Hoog, A. N. (2004). Service encounters as a sequence of events: the importance of peak experiences. *Journal of Service Research*, 7(1), 53–64.

Yazan, B. (2015). Three approaches to case study methods in education: Yin, Merriam, and Stake. *The Qualitative Report*, 20(2), 134–152.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

**Table 1: Characteristics of and Key Findings for the Examined Stores**

Industry	Company	Store	Required in Advance of the Purchase	Check-in	Product Selection / Recognition	Check-out	Key Findings	Selected Sources
Consumer Electronics	Apple	Apple Store	Apple-Store App (EasyPay)	Any time during opening hours (no barriers)	Barcode scanning or just take it out of the shelf	Completion of the purchase in the app or payment to an employee	<ul style="list-style-type: none"> <li>Customer experience has the highest priority</li> <li>The concept is established and rolled out in several countries</li> </ul>	Maclife (2008). No more cash registers. Retrieved from <a href="https://www.maclife.de/news/betriebssystem/andere/apple-ladengeschaefte-auch-kuenftig-keine-kassen-mehr">https://www.maclife.de/news/betriebssystem/andere/apple-ladengeschaefte-auch-kuenftig-keine-kassen-mehr</a> Itplatz (n.d.). How to buy stuff in the Apple Store without a checkout. Retrieved from <a href="http://www.itplatz.net/wie-man-sachen-im-apple-store-ohne-kasse-kauft/">http://www.itplatz.net/wie-man-sachen-im-apple-store-ohne-kasse-kauft/</a>
	Media Markt/ Saturn	Saturn Express	Saturn Express App (MishiPay Technology)	Any time during opening hours (no barriers)	Barcode scanning	Completion of the purchase in the app	<ul style="list-style-type: none"> <li>First cashierless store project of the company</li> <li>Focus is more on consulting and connection of online and offline</li> </ul>	Computer image (2018). Saturn Express. Retrieved from <a href="https://www.computerbild.de/artikel/cb-News-Internet-Saturn-Express-Check-Test-19720137.html">https://www.computerbild.de/artikel/cb-News-Internet-Saturn-Express-Check-Test-19720137.html</a> MediaMarkt/Saturn (2018). Saturn Express balance sheet. Retrieved from <a href="https://www.mediamaarktsaturn.com/press/press-releases/saturn-express-%E2%80%93-bilanz-zum-pilotprojekt-innsbruck-85-prozent-der-kunden">https://www.mediamaarktsaturn.com/press/press-releases/saturn-express-%E2%80%93-bilanz-zum-pilotprojekt-innsbruck-85-prozent-der-kunden</a>
Grocery Store	HonestBee Ltd.	Habitat by HonestBee	BeePay, digital in-app wallet	Barcode scanning opens the barriers	Just take the products, the company packages and recognizes the products	Store puts the purchase into a bag, customer scans the barcode and pays in the app	<ul style="list-style-type: none"> <li>Freshness is the key element in this grocery store</li> <li>A lot of pain points are transferred from the consumer to the company</li> </ul>	HonestBee (2019). What are the modes of payment in habitat by honestbee? Retrieved from <a href="https://honestbeehelp.sg.zendesk.com/hc/en-us/articles/360018051052-What-are-the-modes-of-payment-in-habitat-by-honestbee">https://honestbeehelp.sg.zendesk.com/hc/en-us/articles/360018051052-What-are-the-modes-of-payment-in-habitat-by-honestbee</a> Lim (2018). Habitat Honestbee Singapore – Is This High-Tech Supermarket Worth Visiting? Retrieved from <a href="https://blog.moneysmart.sg/shopping/habitat-honestbee-singapore-review/">https://blog.moneysmart.sg/shopping/habitat-honestbee-singapore-review/</a>
	Walmart	Sam's Club Now	Sam's Club Now membership & app installation	Any time during opening hours (no barriers)	Barcode scanning	Completion of the purchase in the app by scanning a QR code with the help of an employee	<ul style="list-style-type: none"> <li>The store serves as an innovation lab for Walmart, therefore a lot of different new features are tested</li> </ul>	Sam's Club (2018). Reimagining the Future of Retail. Retrieved from <a href="https://corporate.samsclub.com/blog/2018/10/29/sams-club-now-reimagining-the-future-of-retail">https://corporate.samsclub.com/blog/2018/10/29/sams-club-now-reimagining-the-future-of-retail</a> The Dallas Morning News (2018). Sam's Club Now. Retrieved from <a href="https://www.youtube.com/watch?v=juwul7Y0DvM">https://www.youtube.com/watch?v=juwul7Y0DvM</a>
	Alibaba	Hema Store	Hema Store app and Alipay	Any time during opening hours (no barriers)	Barcode scanning	Check-out station that allows you to pay on the mobile or by face recognition	<ul style="list-style-type: none"> <li>The store serves as a fulfilment centre and robot restaurant, completely digitalized grocery purchase</li> </ul>	CNBC (2018). Hema Store. Access at <a href="https://www.youtube.com/watch?v=UDlVWdwVZMg">https://www.youtube.com/watch?v=UDlVWdwVZMg</a> Vice News (n.d.). Alibaba's new store. Retrieved from <a href="https://video.vice.com/id_id/video/chinese-tech-giant-alibaba-goes-offline-with-new-supermarkets/5beb1836be407770a17813f5">https://video.vice.com/id_id/video/chinese-tech-giant-alibaba-goes-offline-with-new-supermarkets/5beb1836be407770a17813f5</a>
	Albert Heijn B.V.	Albert Heijn	Albert Heijn customer loyalty card or app	Any time during opening hours (no barriers)	Tapping at the shelf with customer card or via app	Just walk out (automatic)	<ul style="list-style-type: none"> <li>Tap'n'Go is the applied technology and can be used either by smartphone or by card</li> </ul>	Bandoim (2018). Cashierless Shopping. Retrieved from <a href="https://www.forbes.com/sites/lanabandoim/2018/09/26/cashierless-shopping-with-tap-to-go-technology-is-coming-to-more-grocery-stores/#554601425f05">https://www.forbes.com/sites/lanabandoim/2018/09/26/cashierless-shopping-with-tap-to-go-technology-is-coming-to-more-grocery-stores/#554601425f05</a> Elm (2019). Cashierless Checkout. Retrieved from <a href="https://www.stores-shops.de/technology/checkout/cashierless-einkauf-ohne-kasse/">https://www.stores-shops.de/technology/checkout/cashierless-einkauf-ohne-kasse/</a>
Convenience/ Kiosk	Amazon	Amazon Go	Amazon Go App	Barcode scanning opens the barriers	Store technology recognizes which products are bought	Just walk out (automatic)	<ul style="list-style-type: none"> <li>The store takes over a lot of tasks from the consumer</li> <li>Consumers can just select their products and walk out</li> </ul>	Hilpert (2018). Israelis compete with Amazon Go. Retrieved from <a href="https://www.handelszeitung.ch/unternehmen/kassenlos-israelis-wetteifern-mit-amazon-go">https://www.handelszeitung.ch/unternehmen/kassenlos-israelis-wetteifern-mit-amazon-go</a> Langer (2019). Queues were yesterday. Retrieved from <a href="https://www.nzz.ch/wirtschaft/warteschlangen-waren-gestern-ld.1442339">https://www.nzz.ch/wirtschaft/warteschlangen-waren-gestern-ld.1442339</a>
	Valora AG	Avec Box	Avec Box App (identity card necessary)	Barcode scanning opens the door of the store	Barcode scanning	Manually in the app	<ul style="list-style-type: none"> <li>First cashierless store project in Switzerland</li> <li>The customer opens the door, scans the barcodes of the products and manually completes the purchase</li> </ul>	Valora (2019). Media Release Avec Box. Retrieved from <a href="https://e3.marco.ch/publish/valora/561_2367/20190404_avecBox_Medien.jpg">https://e3.marco.ch/publish/valora/561_2367/20190404_avecBox_Medien.jpg</a> Avec (2019). Explanation Avec Box. Retrieved from <a href="https://handmade.avec.ch/de/#avecbox">https://handmade.avec.ch/de/#avecbox</a>
	Migrolino AG	Migrolino	-	-	-	-	<ul style="list-style-type: none"> <li>Main idea: Launching micro shops (50-80 m2) that are open 24/7</li> <li>Selling alcohol will be possible</li> </ul>	Blick (2019). Migrolino Opens the First Staff-free Store. Retrieved from <a href="https://www.blick.ch/news/wirtschaft/nach-valora-zieht-die-migros-nach-migrolino-lanciert-mikro-shops-ohne-personal-id15356417.html">https://www.blick.ch/news/wirtschaft/nach-valora-zieht-die-migros-nach-migrolino-lanciert-mikro-shops-ohne-personal-id15356417.html</a> Horizont (2019). Migrolino launches the unmanned shop. Retrieved from <a href="https://www.horizont.net/schweiz/nachrichten/migros-auch-migrolino-lanciert-personalfreier-shop-175279?utm_source=%2Fmeta%2Fnewsletter%2Fswiss&amp;utm_medium=newsletter&amp;utm_campaign=nl34743&amp;utm_term=70693a1075541206dd61999d79c0164f">https://www.horizont.net/schweiz/nachrichten/migros-auch-migrolino-lanciert-personalfreier-shop-175279?utm_source=%2Fmeta%2Fnewsletter%2Fswiss&amp;utm_medium=newsletter&amp;utm_campaign=nl34743&amp;utm_term=70693a1075541206dd61999d79c0164f</a>
	Bingo Box (Start-up)	Bingo Box	Bingo Box app (WeChat profile obligatory)	Barcode scanning opens the door of the store	Automatic RFID scanning on a desk	Place goods on scanner, scan QR code and pay, then an automatic door opens	<ul style="list-style-type: none"> <li>Unmanned concept in an automated container</li> <li>24/7 access with a specific app</li> </ul>	Retail Insight (2019). BingoBox. Retrieved from <a href="https://www.retail-insight-network.com/comment/bingobox-cashierless-stores/">https://www.retail-insight-network.com/comment/bingobox-cashierless-stores/</a> Sander (2018). Bingobox. Retrieved from <a href="https://www.youtube.com/watch?v=1gFKDweZ_jM">https://www.youtube.com/watch?v=1gFKDweZ_jM</a>
Merchandising	Alibaba	Alibaba Futuremart	App of Taobao, Tmall or Alipay	Face recognition or barcode scanning open barriers	RFID recognizes the products	Face recognition recognizes the customer, who can just walk out	<ul style="list-style-type: none"> <li>Test store of Alibaba, selling mostly merchandise</li> <li>Check-in and check-out make use of the newest technologies</li> </ul>	Brandchannel (2018). Alibaba. Retrieved from <a href="https://www.brandchannel.com/2018/04/23/alibaba_facial_recognition_shopping_china/">https://www.brandchannel.com/2018/04/23/alibaba_facial_recognition_shopping_china/</a> Altaviawatch (2018). Alibaba. Retrieved from <a href="http://www.altaviawatch.com/en/retail-innovations/alibabas-futuremart-high-tech-cashierless-store-china">http://www.altaviawatch.com/en/retail-innovations/alibabas-futuremart-high-tech-cashierless-store-china</a>
	Alibaba	Tao Café	Tao Café app	Barcode scanning opens the barriers	Store technology recognizes what the customer buys	Customer walks through a scanning corridor, automatic debiting in the app	<ul style="list-style-type: none"> <li>When ordering at the bar, the face recognition technology automatically deducts the amount from the underlying account</li> <li>Products bought are recognised when walking through a scanner</li> </ul>	CGTN (2017). TaoCafe. Retrieved from <a href="https://www.youtube.com/watch?v=p6hik-DMxRE">https://www.youtube.com/watch?v=p6hik-DMxRE</a> Synced (2017). Amazon Go vs Alibaba Tao Cafe. Retrieved from <a href="https://medium.com/syncedreview/amazon-go-vs-alibaba-cao-cafe-staffless-shop-showdown-3f3929393d62">https://medium.com/syncedreview/amazon-go-vs-alibaba-cao-cafe-staffless-shop-showdown-3f3929393d62</a>

Source: Schögel/Lienhard, 2019.