Amazon Go!
Cashierless Retail Analysis

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Abstract—The global technology giant known as Amazon.com Inc. is known for their “on-demand” shopping model and is now focusing on revolutionizing the convenience store experience. This new concept is known as Amazon Go and primarily focuses on cashierless convenience stores of the future. Amazon has been the leader of e-commerce on a global scale in recent years and this new convenience system can transition Amazon.com Inc. into a global retail giant. This emerging technology allows users to enter the store, pick items off the shelf, and then walk out of the store without having to interact with a cashier. Users are then charged via their Amazon Prime account. Throughout this research study will be analyzing the technology behind the new system as well as discussing the pros/cons of the intended system that is supposed to be dispatched to 200+ stores in spring 2019. The basic design of this study involves analyzing the trends of convenience store shopping and how the idea of the cashierless experience can improve the lives of Amazon’s core market; its customers. In recent years there has been a major trend centered around ease of access in regards to retail and this would be the ultimate improvement. The results of their most recent test markets have shown a rather positive response in terms of customer satisfaction. Whilst there are many positive outcomes to this business model, there are still improvements to be made to ensure the integrity/honesty of this cashierless system amongst the general population.

I. INTRODUCTION

Since their inception in 1994 Amazon has been on the cutting edge of innovation. Catapulting themselves from book retailer to the e-commerce company in the world change is nothing new to Amazon. Their goal has always been to make their customers lives easier. This started with streamlining books from multiple physical copies into one small device known as a Kindle. From the Kindle, Amazon began to offer all products, “Everything from A to Z” to their customers and with free 2-day shipping. Allowing customers to get all of their shopping done from the comfort of their home with just a click of the button. Amazon is now looking to simplify the shopping experience of those who are always on the run and have no time for shipping. In 2018 Amazon began rolling out their Amazon Go grocery stores. These offer the customer a streamlined approach to traditional grocery shopping. Amazon’s goal with this is to allow shoppers to walk in the store, choose their items, and leave without the interaction or wait time of a cashier. We found this concept intriguing and decided to analyze the technology used and how the cashierless experience can improve the lives of their customers.

II. TECHNOLOGY

A. The Shopping

Amazon is calling the technology they are using for these cashierless stores “just walk out technology”. It is a very simple system. Amazon is utilizing an Amazon Go app that will be linked to the customer’s Amazon Prime account. The app opens when passing through the entrance way of a store front and a QR code appears. This QR code is known as the customer’s unique key. The customer scans their “key” on the turnstile as they walk through. This will start their transaction. From here the customers trip is just like any other grocery store. They simply walk isle to isle selecting items and scanning each item as they place it into their bag. Each time a shopper scans an item it is also added to their virtual shopping cart, much like it would if they were shopping on Amazon.com. The Amazon Go app will also educate shoppers while they are shopping. For example, if a shopper would like nutritional information or recipies, after scanning an item the app will display a menu. This menu will display all nutritional information, cooking tutorials, and even provide the shopper with an inventory of the product they have at home. That technology will eliminate customers over buying, letting food go to waste, and wasting money.

B. Security

The security cameras are watching every move the customers make while they are in the store [6]. Cashierless grocery stores are automating the process of grocery shopping.
They are also using AI software, sensors, and microphones to tracking the customers shopping experience [7]. This is a possible privacy concern for the customers because this data is being used by the AI to add/remove items to a cart. Sensor detect items being picked up and put back, tracking items customers are interacting with. The software will give Amazon access to more user data. They will be able to target the consumers like never before. The AI has the potential of being spoofed. By not giving any sight to the cameras and putting weight on the sensor to simulate the weight of the product it is possible to trick the system into not knowing that an item has been taken. The only verification of the authenticity of the user is by scanning a QR code on the Amazon Go app. There is nothing stopping someone from using someone else’s account and running up the bill, leaving it for the original owner to figure out.

III. THE IMPACT

A. Competitors

In addition to Amazon Go, Walmart and Kroger have also been attempting to make the transition to include cashierless options in their stores. While Kroger has been expanding their Scan, Bag, Go app to include 400 more stores in 2018, Walmart has had little success with its Scan and Go application. Unlike Amazon, Walmart has had trouble getting their customers to engage with them digitally, especially since the application, or a scanner provided by Walmart in place of a phone, required users to scan their own items, adding additional steps to the shopping process [8]. For stores based on traditional brick and mortar stores, they may find some difficulty transitioning into the digital market where customers need to take extra steps in order to complete their shopping, whereas companies based in technologies may find it easier getting their customers to adapt, especially when the process is streamlined down to walking in, grabbing the product and leaving.

While Kroger and Walmart have decided to let customers scan their products, other similar companies are trying methods more similar to “Amazon Go!”. Standard Cognition, a tech company based out of San Francisco, has opened a store, known as Standard Market. Like Amazon Go, Standard Market observes customer behavior as well as keeping track of the items a customer adds to their shopping cart. By utilizing their own AI-based checkout method, the system is able to gauge interest in products by observing how long a customer looks at an item, which helps sellers know not only what items sell, but also what items don’t sell. Because of the nature of cashierless shopping, Standard Market attempts to curb theft by analyzing factors such as how fast a customer walks, how long their gate is, and where they are looking. Unlike Amazon, Standard Market doesn’t have a gate for entry, instead opting for an open door. The method likely has it’s appeals to customers, but security monitoring done by the system is key in making sure that products aren’t simply stolen from their shelves [9]. Without the use of RFID tags and weight sensors, the system at Standard Market is only able to use the cameras and behavioral analysis in order to determine theft, which may prove to be more difficult than a system designed to track products more carefully.

The system does however have its downsides compared to Amazon Go’s methods. The opening of the first Standard Market may have been a unique experience for shoppers, but many started to notice they weren’t being charged properly. While AI monitored shopping is an interesting concept, the truth is that the methods are still new and require testing. Some shoppers noticed that an item they had looked at but ultimately decided to put back had been charged, while others noticed that their last-minute decision to grab an item hadn’t been noticed by the system [9]. Amazon Go has the benefit of sensors that track if the products have been taken or returned to their shelves, so decisions made are easily reversible if the customer decides whether or not to purchase an item.

B. Test Markets

Amazon’s target market was the retail food sector, competing with companies such as Kroger, Costco, Meijers, Walmart, etc. The overhead required for this kind of technology is pretty significant and wasn’t developed by those companies because that type of competition simply wasn’t there. Amazon’s intentions became obvious once they acquired Whole Foods in 2017 for nearly $14 billion. Amazon didn’t have a brick-and-mortar base compared to the other retail food stores, so this acquisition allowed them to jumpstart their expansion into that sector. Amazon is considered one of the biggest tech giants in the industry so implementing their research of AI, machine learning, and cloud technologies will catapult them ahead of their competitors. The demographics they intend on targeting are everyday retail shoppers for groceries, household supplies, equipment, etc. Prime members can also take advantage of being a subscriber and earn discounts or points for shopping within the store, similar to Kroger cards or Costco memberships.

C. Projections

The test markets did well for Amazon. So well, that they have plans of introducing 3,000 in the next few years.

Some sources are estimating this will be the case by the year 2021 [3]. Amazon has had an amazing track record over the years. If that trend continues their stock prices will stay on the rise too. Over the past year, 2018, stock prices have risen 109% [4]. If the stocks keep going at that pace stock prices could hit $4,000. Not only are their stock prices doing well their revenues have done well and are projected to be as high as $356 billion by 2022 [5].
D. Customer Impact

Customers are already finding ways to ease their shopping experience in various ways. Shopping for groceries takes time, effort, and planning to get everything restocked at home. Most consumers are working many hours a week and would like to simplify that if they could. That’s why Kroger started their ClickList service that offers customers the option to order online for products they need ahead of time and then just stop by and have it loaded into their car. With Amazon Go, this allows shoppers to quickly go in and out without needing to wait in line to checkout or wait for a self-service station to open up. It also beats Kroger’s offering because that service is useful if you already know your weekly groceries and have a decent amount to order, otherwise it’s more time and cost efficient to go inside and buy.

Customers who have used it so far are enjoying how convenient and quick it is for in and out shopping. There are currently a dozen or so stores open and the customers that have tried it out so far are enjoying it and leaving very positive reviews. The current bustling conditions of the store is because of the touristy nature of the location, offering something very unique and not engineered before. Amazon Go’s impact will affect human jobs as retail jobs are still very common. As the years go on we will continue to see these in more metropolitan cities. Amazon has plans to expand to all fifty states by the year 2020. Once more stores open up, fewer cashiers are needed to run the registers, managers aren’t required, etc. We’ll see an economic impact as they struggle to find retail jobs, leaving more unemployed.

E. Pros & Cons of Cashierless

The new system will reduce the amount of time customers will need to shop, especially customers who don’t have a lot of time to shop. For example, if you stop at Kroger’s today to purchase a box of cereal you could potentially be in line for half an hour. The invention of Amazon GO allow customers to remove the cashier transaction and keep going.

Customers demand the companies with which they do business to continuously improve in the areas of:

- Speed of service
- Convenience
- Personalization
- Price

“Customers count speed of service as a key reason for doing business with certain companies” [1]. Service can never be too fast. In the real world, a premium is placed on companies who offer instant, accurate, and adaptive responsiveness to changing customer needs. Amazon is able to plan for the future and is able to grasp the continual need for change and are always looking into providing a faster service. Also, customers who spend time at any grocery store know how frustrating it can be at times to deal with other customers who struggle with self-checkout and jammed lines for cashiers.

In addition, going cashierless will help with shoplifting. “It is only after a few minutes after walking out of the store, when Amazon sends an electronic receipt for purchases [2]. Shoplifting at Amazon Go will be no easy task. For example, Nick Wingfield a technology correspondent in Seattle did a test. With permission from Amazon, he attempted to trick the store’s camera system by placing a shopping bag around a four-pack soa while it was still on shelf, placing it under his arm and walking out of the store. Amazon was still able to charge him for the soda. Without a cashier staring at customers at checkout the process will be quicker to purchase items and a point of contact will be eliminated.

However, in 2016 there were over 3.5 million cashiers in the United States. As the technology behind Amazon GO continues to spread cashier jobs will be at risk. Once cashiers are gone, financial savings for employers will increase. For the moment, Amazon says its technology will only adjust the role of employees; the say way automation has changed the role of warehouse workers. “We’ve just put associates on different kinds of tasks where we think it adds to the customer experience” [2] Ms. Puerini said. The tasks cashiers will now have include helping customers troubleshoot any technical issues and restocking shelves. Because there are no cashiers an employee will be needed to check I.D.s before customers are able to grab alcohol of the shelves.

Not to mention, shifting the power into the hands of technology comes with increased security risks and possible technological issues. A main security concern with going cashierless is being vulnerable to hackers. When entering a Amazon Go facility the entire payment process is managed by technology. Because the process is managed like these, hackers could looking into committing malicious acts.

Despite the different possible pros and cons that come with being a cashierless company, these technological advancements are a response to the customers need to reduce
shopping time and making the shopping experience more convenient.

Pros of Cashierless:

- There are no wages for cashiers; which takes away the risk of human error: monetary theft and till miscalculations.
- No wait times for customers; which allows consumers to save time on their shopping trips and go on with their day-to-day activities.
- Increased customer satisfaction with minimal interaction with actual employees.

Cons of cashierless:

- Currently in the beta stage of development and could be prone to miscalculations.
- The chance of facial recognition mistakes have been lowered; but can still be a factor in terms of mischarges and theft.
- Reflectors on clothing could mask what a customer is buying and attribute to mischarges.
- Requires a substantial amount of overhead to set up. and requires 4k cameras with a lot of storage for recording, processing power, and engineering.
- Only worth implementing with the idea that more more stores will be opening due to economies of scale.

IV. CONCLUSION

A. Summation

Innovation is something that companies constantly need to work on and offer to the consumers in order to stay relevant as an industry giant. Amazon is doing just that with Amazon Go, offering an extremely competitive entrance into the retail food sector. There are only a couple of downsides such as the possible impact to the job market, cost of implementation, and possible theft. The overhead required for this operation to work is very costly since you need a lot of engineers, programmers, and industry experts to develop a sophisticated system. However, the positives will outweigh the negatives in the eyes of many metropolitan chamber of commerce. These stores will increase traffic in shopping districts, tourist travel, and happier customers. After delving into the idea of the cashierless future via the channel known as Amazon Go, we can expect to see an exponential growth these types of stores/technology in the near future.

REFERENCES


