# The Amazon Go Concept: Implications, Applications, and Sustainability

Alex Polacco

Kayla Backes

*Amazon opened its first Amazon Go sans-checkout grocery store in Seattle, WA in early 2017. Having worked out the bugs, Amazon plans to fully open the store in early 2018. The experience is designed for those who do not like to stand in a checkout line. Amazon benefits by eliminating the cost of checkout personnel. Customers use an Amazon Go app and scan their I-phones on entering the store. Sophisticated technology tracks their purchases, allows them to exit the store without a physical check-out, and automatically charges their account. This paper explores implications, applications, and sustainability within the industry, and in other industries. Included are also the results of a survey conducted with management of six grocery stores in a city in the Midwest.*

**Reference** to this paper should be made as follows: Polacco, A. & Backes, K. (2018). The Amazon Go concept: Implications, applications, and sustainability. *Journal of Business and Management*, 24 (1), 80-93.

## Introduction

In early 2017, Amazon opened its sans-checkout grocery store, Amazon Go on a pilot basis. The experience is designed for those who don't like to stand in a checkout

line. Sophisticated technology tracks their purchases, allows them to exit the store without a physical checkout, and automatically charges their account. With lessons learned Amazon Go plans to open the store fully in early 2018.

In order to fully understand the implications of this new technological and operational model, we must first look at how the shopping process will shift with Amazon Go. We will examine the type of technology being used such as computer vision and weight sensors. Then will we explore the industries that are currently exploiting these innovations.

Once we have reviewed how the sans-checkout grocery store concept works, we will look closely at the impacts on the retail operational model. We will examine the evolution of self-checkout processes over time. Then, we will investigate the potential for sustainability within Amazon Go's supply chain.

We will delve into the effects on the community at large. Focus will be on the current employment landscape and how it may be impacted by this new technology. We will also touch on any sociocultural implications that may exist.

After we have discussed Amazon Go's potential impacts on the community, we will switch gears and consider the possibility of using this concept in other industries. We will take care to examine how similar technology is currently being used, and what industries will most likely be affected by these recent developments. For example, how the payment method could possibly impact banks and financial institutions.

Upon reviewing how this technology may influence the retail operational model, the community, and other industries, we will look at the specific threats and opportunities that may arise. Focus will be given to the work force, new industry standards, and concepts of trust. Once all of these topics have been covered, managers may better prepare themselves for the potential threats and opportunities that could lie ahead. We will also include the results of interviews conducted with managers of several grocery stores in the Midwest.

## Methodology and Research Questions

This study was conducted on current literature in the library and from online resources. The managers of six major retail and grocery stores were also interviewed:

1. Jon. *Assistant Manager* at St Cloud, MN Target on February 28, 2017.

2. Forsell, P. *Assistant Manager* at St Cloud, MN Walmart on February 28, 2017.

3.  Gruber, K. *GeneralManager* at St Cloud, MN Lund's & Byerlys on February 28, 2017.

4.  Lachmansingh, R. *Store Director* at St Cloud, MN Cash Wise on February 28, 2017.

5.  Rick. A. *Assistant Manager* at St Cloud, MN Walmart on February 28, 2017.

The managers were given the following information and asked the following questions: *In early 2017, Amazon plans on making their sans-checkout grocery store, Amazon Go, available to the public. The experience is designed for those who don't like to stand in a checkout line. Sophisticated technology will track their purchases, allow them to exit the store without a physical checkout, and automatically charge their account.*

Survey Questions:

1.  What would some of the pros and cons be in the adoption of this technology?

2.  Do you think it could benefit your chain of stores and your particular store?

3.  Do you believe that Amazon Go's new technology will be adopted by other food chains?

4.  Do you believe that this new technology is sustainable?

5.  What are the greater effects that you think this technology will have on their respective communities if implemented into food chains?

6.  Could this new concept make Amazon Go a major player in the grocery business in the future?

# Amazon Go Review

### *Shopping Process*

In order to shop at an Amazon Go store, the consumer must first create an Amazon account, have a smart phone, and download the Amazon Go app. Once these items are in place, the customer scans their Amazon Go app, located on their smartphone, upon entering the retail store. At this point, the customer is free to walk around the store, shop, and add and replace items to or from their virtual cart (Amazon Go Editorial Staff, 2017).

For Amazon Go to accomplish this paradigmatic shift in the operational model of retail shopping, it relies heavily on technological innovation. The technology Amazon Go uses automatically senses when an item is picked up, put back on the shelf, and tracks who committed the action. Once the customer is satisfied with the items

they have chosen, they simply walk out the door - no lines, no checkouts, and no waiting. The purchased items are charged to the customer's Amazon account and a receipt is sent to the Amazon Go app (Amazon Go Editorial Staff, 2017).

### *Technology Used*

Amazon Go uses what they call, "Just Walk Out Technology". This technology is responsible for keeping track of items taken from, and in some cases, returned to, the store's shelves. It also keeps track of the individual's virtual cart (Amazon Go Editorial Staff, 2017).

For this to be possible, Amazon uses technology similar to that of self-driving cars. The system relies heavily on sensor fusion, computer vision, and deep learning algorithms (Amazon Go Editorial Staff, 2017). While they have not revealed too much about their technological advancement, it appears that Amazon plans on making cameras central to their operational strategy. These cameras will track not only the products and their placement, but also the individuals who do the shopping (Swanson, 2016).

### *Industries with Similar Technologies*

Amazon states that the technology behind their cashier-less operating model is the same technology prevalent in driverless cars (Amazon Go Editorial Staff, 2017). However, the automotive industry isn't the only place that this type of technology is being used. Vision technology is also extensively used in manufacturing industries to assure quality, and to inspect, test, and sort parts (Dipert, 2017).

Computer vision and machine learning have become so prevalent across industries that it can even be seen in the scientific study of animal behavior. 3D Computer vision software has already been developed that scans the subject animal's behavior in order to try and measure the quality of life of the animal. It is capable of learning and differentiating normal behavior from abnormal behavior. This allows for an objective analysis of how the animal is coping in its captive environment (Barnard, Calderara, Pistocchi, Cucchiara, Podaliri-Vulpiani, Messori, et al. , 2017).

In addition to the automotive, manufacturing, and scientific industries, the hospitality industry is no stranger to the type of sensor technology potentially used by Amazon Go. A similar concept is used at some hotels that have condiments and drinks on the counter or in the refrigerator, known as a mini bar. These snack trays have motion sensors and electronic scales built in, that at times, may automatically charge the consumer if something is moved (Laasby, 2014).

# Survey Responses

*Q1: What would some of the pros and cons be in the adoption of this technology?*

*Pros cited by the respondents:*

All six respondents said that automatic self-service will save the customer time. Jon and Lachmansingh said that more interesting jobs would be created, while Sorenson, Gruber, Rick, Forsell, and Lachmansingh said that entry level jobs would be eliminated.  Sorenson, Gruber, and Rick said that product and coupon pricing would be more accurate. Rick felt that costs, product price, and safety costs would go down.

*Cons cited by the respondents:*

All six respondents said that the cashier-less service will eliminate staff-customer interpersonal communication and limit service levels. Jon felt that personal safety would be affected, while Rick said that a lot of jobs would be lost.

*Q2:  Do you think it could benefit your chain of stores or your particular store?*

Respondents had different opinions: Jon and Forsell said there would be more work but it would be more efficient. Sorenson had no comment.  Gruber said that there could be labor-savings, but it would help as it is hard to find employees these days. Lachmansingh said that only a couple of departments would take advantage, such as end of line cashiers.  Rick said that it could because Sam's Club and Amazon are big competitors, although he couldn't see adopting it very soon, and the closest technology currently used was the in-store scan and self-checkout.

*Q3:  Do you believe that Amazon Go's new technology will be adopted by other food chains?*

All respondents said – yes. Jon said that is the future and more customers will be served. Sorenson said it would take time to adopt.  Gruber, Forsell, and Rick said that the main driver will be savings in labor costs and time. Lachmansingh said that it will take time to follow up with this technology.

*Q4:  Do you believe that this new technology is sustainable?*

Jon said **-** yes. It will work perfectly with the new generation.  Sorenson said - sure. It will help in other parts of the store such as inventory.  Gruber said that more proof was needed that it works from a customer perspective. Lachmansingh said that he was not sure, and that more time was needed. Rick said that he needed to see it in action and that there is always someone who will try to hack the technology. Forsell said that time would tell.

### Q5:  What are the greater effects that you think this technology will have on their respective communities if implemented into food chains?

Jon said that small businesses cannot afford this technology.  Sorenson said that it will force others to adopt, and that it will save time and money.  Gruber said that time is important to everyone and that the average customer would be pleased because they will no longer wait in line to checkout.  Lachmansingh said that it would be an extension of how people do things at the moment. There are phones, laptops, tablet that can help to shop faster, cheaper, and delivered to their homes. They only need to visit stores to check the price and order the products.  Rick said that there would be time savings.

### Q6:  Could this new concept make Amazon Go a major player in the grocery business in the future?

Jon said that it would. Sorenson said – absolutely. Tracking will have to be adopted by the other food chains. Gruber said - absolutely. With this type of technology, customers will save a lot of time and money too. However, with good technology like that, someone will always try to do one better and will take advantage of it. Lachmansingh said **–**yes. With this technology, Amazon will fill customers' needs for faster checkout and time savings. Rick said that he thought so. Amazon was already a major player and with this technology they would take off to a new and different level. Forsell said – yes.

# Operational Evolution

### *Movement Towards Self-Checkout*

The Amazon Go concept is an evolution from the self-checkout operational model that is used at Walmart and other grocery stores. However, self-service in the retail arena has been evolving for over a hundred years. In 1916, Piggly-Wiggly made

the innovative decision to allow customers to explore the aisles of products without the assistance of an employee. Then, in 1992, some of the first self-checkouts debuted (NCR, 2014).

Since then, the self-checkout model has been widely accepted and immensely popular. According to a study conducted by computer and point-of-sale terminal company, NCR, those who use the self-checkout indicated that they appreciate the convenience and ease of use that it provides. One interesting note of those surveyed, was that they indicated that they still liked knowing an attendant was nearby to provide help if needed (NCR, 2014).

Paul Forsell, an Assistant Manager with a major retail and grocery store, estimated that roughly 20 to 30 percent of customers prefer self-checkout. The rest give preference to the traditional cashier check-out method. He indicated that while self-checkouts are popular, some people prefer to not have to deal with the technology themselves. In fact, Walmart's attempt to have customers in 200 stores pre-scan their purchases using their "Scan & Go" app failed when customers could not figure how to use it. Walmart discontinued the experiment (Anderson, 2014).

### Sustainability of Supply Chain

With all of this next generation innovation associated with Amazon Go, we must also look at any potential strides in supply chain sustainability that may also be occurring. It's no surprise that Amazon does have sustainability initiatives that span many of its different services and products. From Amazon Wind Farms in Texas, to its innovative approach to recycling energy of nearby data centers, it's clear to see that Amazon has been making great progress in its efforts to build upon the best energy and environmental practices. However, one initiative of particular relevance is the work being done with AmazonFresh, Amazon's grocery delivery service for Prime Members (Amazon Go Editorial Staff, 2017).

AmazonFresh's initiative with Feed America, a nonprofit organization tasked with feeding America's hungry through extensive national cooperation of food banks, has led AmazonFresh to donate food to these food banks from its distribution centers. While it is unclear if Amazon Go will incorporate a similar model as Amazon Fresh, the partnership with food banks appears to already exist and could potentially be duplicated. In addition, Amazon has stated that the efforts it makes towards energy and environmental practices are intended to be implemented throughout Amazon (Amazon Go Editorial Staff, 2017).

# Community Impact

## *Impact on Workforce*

According to the Bureau of Labor Statistics, in 2016, there were 2.7 million people identified as being employed by retail grocery stores, 856,850 of whom are employed as cashiers (Bureau of Labor Statistics, 2017). This number doesn't even reflect the 3.5 million cashiers that are employed across all industries, not just the retail grocery industry (Bureau of Labor Statistics, 2016). With so many people being employed in this industry, and in jobs that this disruptive technology may make obsolete, it follows that one may be curious how these individuals will be affected by Amazon Go and its cashier-less operational model.

While there could be an obvious adverse impact on cashiers, there could also be an increased demand for technical people to design, implement, and maintain this new technology. Supervisors and customer service personnel would be needed to answer questions, handle returns, and handle quality related issues. Security and anti-theft employees would also be needed to prevent shop-lifters (Rash, 2016). It appears that people will still be needed in retail, perhaps just in different capacities.

Forsell's take on this new technology appears to reinforce earlier theories. He indicated that if technology was implemented, it would free up the cashiers to perform other duties. He also alluded to the probable increase in demand for individuals with computer maintenance skills, and individuals to help in the validation of purchases prior to leaving the store.

## *Sociocultural Implications*

With all of this fear that Amazon Go's new "Just Walk Out Technology" will eliminate the jobs in retail stores, it should remain top of mind that humans are still emotional creatures. We are hard-wired to crave human interactions. An example of this can be seen in the increase in popularity of farmers' markets that provide a more personal experience (Merholz, 2011).

In addition, an Accenture study found that 77 percent of U.S. consumers would rather interact with a human than with a digital channel to solve service related issues (Davis, 2016). The desire towards personalization in retail shopping would almost inherently require a unique experience that, at this point, may only be possible through dynamic human interaction. At the end of the day, the consumer will decide what type of shopping experience will win out in the retail industry, not technology. Boyle reported that consumers are more concerned with shopping convenience and price, than wait time in a queue (Boyle, 2017).

# Impact on Other Industries

*Impact on Other Industries*

There are many industries that are likely to be impacted by the technology and operational model of Amazon Go. For starters, it is believed by some that Amazon intends to increase the number of Amazon Accounts. This could have many benefits besides data-collection; it could also increase the adoption rate of its Amazon Payments platform. If this is the case, it could greatly increase competition for payment platforms such as PayPal, Square, and Visa (Melville, 2017).

This sans-checkout model could be easily implemented across various retailers. While retailers and grocers more than likely don't have the funds available for research and development like Amazon does, if Amazon Go's technology were to be offered to the masses this could cause widespread change (Pasquarelli, 2016). As previously discussed, this could potentially cause increased profits, faster shopping experiences, and job role changes. This could mean instead of cashiers, we will have concierges, greeters, and sampler staff (Solomon, 2016). With a little creativity, one could also imagine similar models in non-retail settings such as libraries, check-ins at doctors' offices, and restaurants.

Walmart announced its adoption of no-checkout technology in December 2017. Dubbed Project Kepler, the technology and concept are similar to that of Amazon Go, and will be beta-tested in an incubator facility. Code Eight, a subsidiary of Walmart, is currently testing a personal shopping service targeting busy New York City moms. The service allows those women to make purchases through text messages (Del Rey, 2017).

In November 2016, leaked documents from Amazon showed its plans to open 2000 grocery stores with a "no line, no checkout" strategy, CA in early 2017. FutureProof Retail launched its first grocery line free checkout in November 2016 in San Luis Obispo, CA. It uses cloud computing, line free mobile technology (Line Free Checkout Provider FutureProof Retail Reacts to Amazon Go, 2016).

# Managerial Implications

The potential threats for retailers, grocers, and their employees, in the event of a widespread implementation of a technology similar to that of Amazon Go, are numerous. This technology threatens those working in cashier positions, gives rise to theft and fraudulent activity concerns among retailers, and could possibly widen the

competitive gap between small and large retailers with a potentially large investment. If Amazon were to expand their payment platform, this could create increased competition for companies like PayPal, Square, and Visa (Melville, 2017). In addition, if Amazon chooses to implement sustainability efforts into Amazon Go, like it has with its other business units, it could increase the sustainability standard among retailers (Amazon Go Editorial Staff, 2017).

With potential threats, come potential opportunities. The advent of Amazon Go and the evolution of the self-checkout bring many benefits for both the consumers and retailers alike. For consumers, the decrease in waiting time, and the ease of use are very attractive benefits. For retailers, the ability to reduce lines, relocate personnel resources, and gain the customers trust to provide quick service could prove to be profitable.

## Current Status

In November 2016, Amazon Go announced its plan to open its first store for beta testing in Feb-March 2017. The convenience store opened in March with employees simulating customers and service. Important technical and protocol information was obtained which showed that the store would not be ready to serve the public for a while. The system could only handle 20 customers at a time and had problems when the store was at capacity. It also had difficulty tracking merchandise moved to and from shelves (Lamm, 2017).

The technology crashed when the store was too crowded, and required quality control personnel to ensue people were being charged correctly (Boyle, 2017). The system worked well with standard scenarios, but failed when faced with atypical scenarios and distinguishing among similar shaped items, or identifying customers who change apparel such as caps or coats. By the end of March, it became apparent that formal opening to the public would have to be postponed indefinitely.

Although the beta test was necessary to glean information for improvement of the system, critics pointed out that using employees for simulating actual customers was neither credible nor valid due to the inherent bias (Hofbauer, 2017). The report also showed that sensors and algorithms inadequately captured couples or families with children who eat products or take items off the shelves.  Amazon Go has been using the feedback for focus groups to improve the system in how to handle returns, defective products, or customer service questions (Hofbauer, 2017).  In December 2017 Amazon Go announced that it would open to the public in early 2018.

In April 2017, Amazon acquired Whole Foods for $13.7 billion which demonstrated its presence as a major player in the grocery business (Bowman, 2017).

Bowman speculated that Amazon was motivated by its difficulties with Amazon Go, but considering the size and timing of the acquisition, it is more probable that the strategy was in the works for more than a few months. Bowman cited Whole Foods plan to hire 6000 more people, and concluded that Amazon will focus on traditional labor service rather than on Amazon Go's automated processes. It is more probable that Amazon embarked on the Whole Foods and Amazon Go ventures to seize the opportunities in the grocery business and to incrementally automate service processes through its Amazon Go pilot program.

## Conclusion

Amazon Go plans to fully open its checkout-free grocery shopping concept in early 2018. The strategy is an evolution from the self-checkout version that is used in many grocery chains today. Advanced technology and computer integrated inventory management systems enable the customer to take products off the shelves, put them in their carts, and leave the store without going through a checkout line. Besides the convenience to the customer, Amazon evidently plans to benefit through a reduction of checkout clerks. The cost of implementing, maintaining, and sustaining the system may offset or exceed cost-savings through reduction of checkout clerks. It is unclear as to whether the new concept will be adopted fully or partially by Whole Foods, other grocery chains, and similar industry applications.

## Acknowledgements

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# About the Authors

Alex Polacco*

> *Herberger Business School, St. Cloud State University,*
> *720 4th Ave S, St. Cloud, MN 56301, 320-308-3935,*
> *E-mail: apolacco@stcloudstate.edu*

Kayla Backes

> *MBA graduate, St. Cloud State University,*
> *720 4th Ave S, St. Cloud, MN 56301, 320-308-3935,*
> *E-mail: baka0707@stcloudstate.edu*

*Corresponding author

**Alex Polacco** (MBA, BSIE, CPIM, CSCP, CMOE, CQE, CQA), is a Professor of Management at St Cloud State University in Minnesota.  He has been teaching courses in Operations and Supply Chain Management for the past 12 years. Prior to that, he had worked in industry for 22 years as consultant, manager, and engineer. He was a member of the APICS Academic Committee from 2013-2016, and board-member of the Central Minnesota APICS chapter for 9 years.

**Kayla Backes** (BS Marketing, MBA) graduated from St. Cloud State University. Her work experience is in marketing analysis, and she is currently an instructor in marketing and management.