Consumer Behaviors of Drone Delivery

by

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Honors Thesis

Appalachian State University

Submitted to the College of Business
in partial fulfillment of the requirements for the degree of

Bachelor of Science

May 2017

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ABSTRACT

Drone delivery was first introduced to the world by Amazon's CEO Jeff Bezos on a 60 minutes episode. With the evolution of e-commerce and B2C delivery, Bezos had thought of a way to reduce the shipping time in an emerging market. He claimed that Amazon could deliver the product to the consumer quicker and more efficiently. Major players would follow suit by creating their own drone delivery service such as: DHL, Google, Dominos and UPS.

This paper will focus on consumers' perspectives of the future of drone delivery and analyze their willingness to adopt the service. An anonymous survey was conducted to see if there were consistent groupings of people that had similar viewpoints about drone delivery. The survey questions were based on a literature review regarding risks/insurance issues for commercial flight of drones and the diffusion of innovation theory.

A cluster analysis, using SAS software, resulted in 4 groups of people that were compared to the 5 groups from Roger's Adopter Category theory. The results suggested that almost 50% of the respondents would utilize a drone delivery service. That's a significant increase given the fact that most if not all of them have never utilized or even seen a drone delivery service.

INTRODUCTION

Drone delivery started to generate some excitement after a CBS television show aired in 2013. A 60 Minutes episode, featuring Amazon's CEO Jeff Bezos, would change the drone industry forever. Bezos unveiled a never seen before project Amazon had been working on for several years. Amazon was creating an alternate way to deliver packages via drones. Bezos called this new service Amazon Prime Air. In this episode, Bezos showed the world Amazon's new octocopters which will be the primary delivery vehicle behind this new service. Bezos claimed that Amazon would be able to deliver packages in under 30 minutes from its fulfillment center to the customer's place of residence. Companies would later follow suit in creating a fleet of drones for delivery such as: Google, DHL, UPS, Dominos and several others as well (Bamburry, 2015).

Drone delivery service is generating a significant amount of media attention because e-commerce is growing rapidly; so fast that a plethora of brick and mortar stores are paying the ultimate price. According to E-Marketer (2016), overall retail sales worldwide will be around $26.6 trillion with online retail sales to supersede $4 trillion by 2020. That means that ecommerce will account for almost 15% of the total retail market. The upward ticking trend of e-commerce entails more B2C transactions. Subsequently, people aren't going into brick and mortar stores as often but rather receiving packages in the mail adding to the attention of the costly last mile. Figure 1 shows the significant increase in retail stores closing in 2017. To date, about 3,000 have been closed so far, so the 9,000 listed in the chart is a projection for the year (Rupp, Coleman-Lochner, & Turner, 2017).

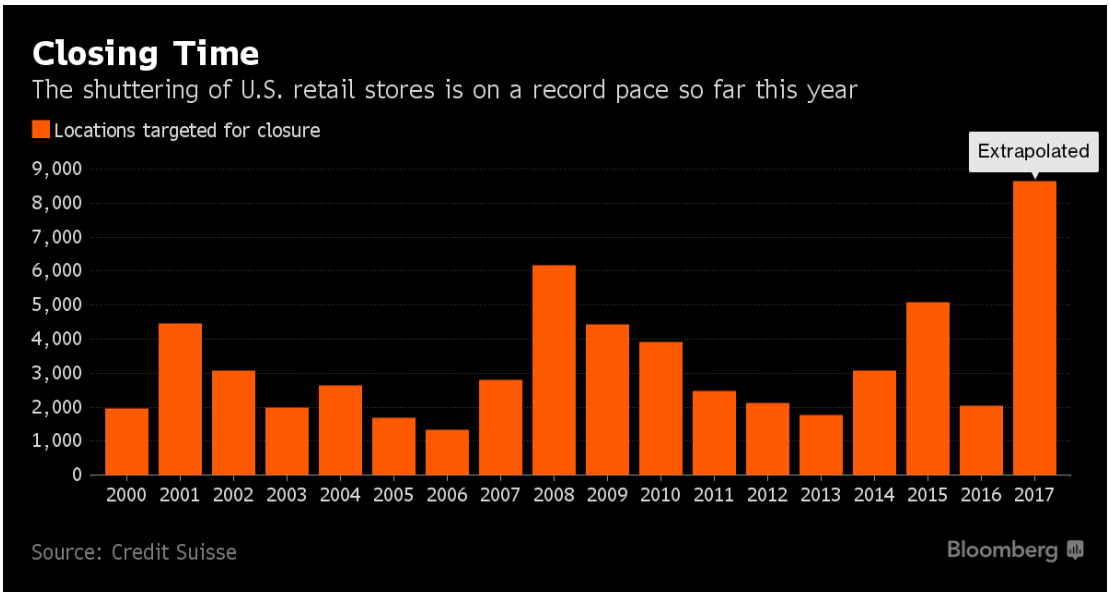

Figure 1

With the increasing trend of e-commerce, companies are looking to reduce the cost of shipping. The most expensive part of shipping is the last mile; on average, it comprises 28% of the cost of delivery (Pierce, 2013). Drones are thought to significantly reduce the cost of the last mile because of reduced labor and fuel costs as well as the provisions for more efficient modes of travel. The product that can be delivered to the customer faster will harm the environment less and potentially be a safer mode of transit.

Almost all the testing and trial runs of drone delivery are being done in Europe and Asia because of the strict regulations the Federal Aviation Administration (FAA) has imposed in the United States (Bamburry, 2015). The FAA loosened restrictions for commercial drone use in 2015, but still left it virtually impossible for Amazon and other companies to utilize drones to their full potential in delivery service.

One of the key takeaways from the new legislation is the visual line-of-sight (VLOS) mandate. VLOS ensures the pilot will only operate the drone as far as he or she can see. Everyone's vision is different, but the drone wouldn't legally be able to travel very far. It will

take time for the FAA to further loosen restrictions. However, if companies continue to have successful test runs overseas than the FAA will most likely continue reducing barriers to commercial drone flight (Bamburry, 2015).

Having said all of that, this paper will focus on consumers' perspectives of the future of drone delivery and their willingness to adopt this new service. An anonymous survey was conducted to see if there were consistent groupings of people that had similar viewpoints about drone delivery. The survey questions were based on a literature review regarding risks/insurance issues and the diffusion of innovation theory. My hypothesis was that the bulk of the responses would be from undergraduate students. Assuming that most of the undergraduates were millennials, and it was the researcher's belief that most would be on board with drone delivery because of the speed of delivery and the "coolness" factor.

The following describes the layout of the paper. The remainder of the paper will go as follows. The next section will be an in-depth literature review of perceived consumer risks, insurance plans to support drone manufactures and analyzing the diffusion of innovation theory in relation to the study. The third section describes how the survey was conducted. The fourth section is an analysis of survey results, grouping segments based on the cluster analysis. The fifth section highlights the limitations of the study and proposes suggestions for future research. The sixth section concludes the paper.

LITERATURE REVIEW

Risks

With the adoption of a new technology comes uncertainty and risks; drones (for delivery) are no exception to this rule. Consumers have voiced their concerns about the possibility of drone delivery: the landing spot of the package, privacy regarding drones flying over their

houses or themselves, hijacking, crashes and cyber-attacks releasing personal information (Draper, 2015).

The landing spot of the package is becoming more of a concern for consumers who live in urban areas (Draper, 2015). In all of the videos Amazon released, the packages were delivered to someone's home in either a suburban or rural area. Draper (2015) is concerned about those living in densely populated urban apartment complexes. Where does that pad go if you live in an apartment complex or something of that nature? David Pogue (2016) asked this very question in an interview with Amazon's vice president for global public policy Paul Misener. The dialogue is listed below:

Pogue: ***How do you solve the apartment-building problem?***

Misener: We're working on it. And again, it might be changing the design of the drones, so that they better serve that kind of an urban environment.

Pogue: ***Or maybe the apartment-building owners could designate, you know, a spot on the roof, or in the courtyard?***

Misener: That's entirely possible. We're thinking through those.

Essentially, Misener said that Amazon is still working on landing the drone at locations such as apartment complexes. It appears Pogue (2016) made a good suggestion though. Amazon will have to work with apartment complexes to designate a spot to land the delivery such as the roof. This is an ongoing issue that Amazon has yet to resolve.

Privacy concerns about drones flying over people and their houses have not dissipated but rather grown stronger (Draper, 2015). People are not comfortable with this technology flying

over their heads. One of the largest concerns is spying because most of the drones that will be used for commercial purposes have cameras attached to them. Pogue (2016) asked Misener about the possibility of civilians shooting down an Amazon drone for privacy concerns. Here is the dialogue:

Pogue: ***What if there's some guy with a shotgun who sees that I'm getting a TV and wants to shoot it down?***

Misener: I suppose they could shoot at trucks, too. We want to make the deliveries. And we believe that these Prime Air drones will be as normal as seeing a delivery truck driving down the street someday. So, the novelty will wear off.

Draper (2015) stated that drone crashes are inevitable because of the wide range of possibilities. Amazon as well as others are using sense and avoid technology so that their octocopters don't run into anything, but there's risk associated with the technology malfunctioning. Drones can crash into other aerial vehicles (not only other drones but commercial airplanes), buildings and birds (Draper, 2015). Additionally, there can be hazards after the crash. For example, the debri from the crash landing in someone's yard that small children run around in. Pogue (2016) asked Misener about drones disrupting commercial airlines. Here's what Misener had to say:

Pogue: ***And how will you keep these drones from interfering with air travel?***

Misener: Well, we've proposed to regulators around the world, including the FAA, a certain kind of an airspace design that would keep the drones separated from the aircraft.

We were thinking: Manned aircraft above 500 feet. Between 400 and 500 feet there'd be a no-fly zone — a safety buffer. Between 200 and 400 feet would be a transit zone, where drones could fly fairly quickly, horizontally. And then below 200 feet, that would be limited to certain operations. For us, it would be takeoff and landing. For others, it might be aerial photography. The realtors, for example, wouldn't need to fly above 200 feet to get a great shot of a house.

Cyber-attacks are another significant concern of both the public and the companies deploying delivery services (Draper, 2015). With the increasingly popularity of drones, government officials are considering the possibilities of cyber-attacks (McNeal, 2016). In fact, the Federal Trade Commission (FTC) summoned their Fall Technology Series on drones in October 2016. The FTC ran a demonstration to see if they could access the video feed, hijack or disable the drone's navigation, collect information about nearby connected devices or change the GPS signal (McNeal, 2016). To help illustrate the potential hazards from cyber-attacks, here is an interview Gregory McNeal (2016) had with the Chief Information Security officer at AirMap:

Greg: ***The drones in the FTC's demonstration were all under $200, and in the case of the Parrot AR, technology that is six years old. Are all drones vulnerable to these kind of attacks?***

Jared: Any device is a potential target for an attack, especially devices that send and receive data remotely. This is true for the smartphone in your pocket, the garage door opener in your car, and the laptop in your office. Drones are no different.

Like these other devices, drones can be targeted for software and system attacks. And because they fly, navigate, capture video, and are controlled remotely, drones are also potential targets for other kinds of attacks: command and control (C2) data link jamming and spoofing, in which a hacker blocks or falsifies the data link to disrupt or take control of the drone;

navigational sensor jamming and spoofing, which could also disrupt or take over navigation; and tapping the video or photo link, in which an attacker intercepts video and other data sent from the drone.

No device – whether it is a drone, smart car, phone, or computer – is 100% secure. The good news is that because drones are a nascent industry, we have an opportunity to work together to counter any potential risks that come with these connected devices. I'm glad the FTC is continuing this conversation – it allows us to surface solutions to potential problems and discuss what else we need to realize a future that makes drones a part of our everyday lives.

Insurance

As drones popularity increases in the marketplace, more insurance companies will consider underwriting policies catered to privacy, cyber-attack protection and aerial vehicle safety (Beyer, Dulo, & Wu 2014). AIG and the Lloyd's of London market are the main insurers for commercial drone usage because they are known for underwriting risky policies that have a high upside (Perlman, 2017). As data develops over the years in each of these risk factors, companies that decide to get on board with insuring commercial drone usage will utilize best practices behavior, provide good advice to operators, manage their own exposure, and price risks more accurately (Beyer, Dulo, & Wu 2014).

Aviation and cyber insurance underwriters are most likely the ones to battle for this up-and-coming field because underwriters must price both product liability and cybersecurity (Beyer, Dulo, & Wu 2014). FAA regulations and guidelines, new constitutional and privacy law cases, state and local attempts to manage and regulate drones as well as autonomy and operational component vulnerabilities form a cluster of forces which will affect how underwriters draft policies, underwrite premiums, and handle claims (Beyer, Dulo, & Wu 2014).

Listed below are questions from the form a company has to fill out in order to get product liability and cybersecurity coverage from AIG called AirGuard (AIG Liability for Drone Insurance, 2016). Essentially, the questionnaire is ensuring that the company applying for coverage is compliant with the new legislation put in place by the FAA.

1. The number of drones I have in each takeoff weight class are:
2. Would you like coverage for any physical damage that may occur to your drone(s), related payload, ground control equipment, or spare parts?
3. Provide make, model, year, registration # and value of UAS, removable equipment, ground control equipment and spare parts (serial # instead of registration # for latter 3)
4. Would you like coverage for physical damage due to war?
5. Are you planning on hiring any contractors or third party vendors to fly on your behalf?
6. How many hours do you expect the contractor(s)/vendor(s) to fly on your behalf?
7. What level of liability coverage will you require of them in order to fly for you?
8. Do you need War Liability coverage?
9. Will a visual observer be used for all unmanned aircraft operations conducted by, or on behalf of, the applicant?
10. Tell us about yourself (IE personal information)
11. Are you a broker?
12. Do you have a broker's key?
13. Business Info: location, history, years of business, purpose
14. When would you like your unmanned aircraft coverage to begin?
15. Does your company currently have unmanned aircraft coverage in place?

16. Please provide details on individual(s) who will be serving as pilot in command: Name, age, flying experience (years), certified pilot (Y/N), formal training (Y/N), Manufactured training (Y/N)
17. Have any of the above listed operators ever been cited or fined for a violation of an aviation regulation, been convicted of a felony, convicted of driving a motor vehicle under the influence of alcohol or narcotics, or of reckless driving, ever had his/her drivers' license suspended or revoked, or been treated for any chemical dependency?
18. Will any unmanned aircraft operated by, or on behalf of, the applicant be used for any commercial flights or projects where a charge will be made to others?
19. Will any unmanned aircraft operated by, or on behalf of, the applicant be properly registered (where required), and be flown by, or under the direct supervision of, a remote pilot in command who is properly certificated and rated for the flight involved, and who has the ability to immediately take direct control of the unmanned aircraft at all times while in flight?
20. Will all unmanned aircraft flights be made by, or on behalf of, the applicant be conducted within the visual line-of-sight of the remote pilot in command and the person manipulating the flight controls of the unmanned aircraft or visual observer?
21. Will all flights take place during daylight hours of civil twilight with appropriate collision lighting?
22. Will all unmanned aircraft flights be made by, or on behalf of, the applicant with the permission of the affected property owner(s) or their authorized representative(s), and avoid the overflight of individuals who are not directly involved in the operation of the unmanned aircraft?

23. Will authorization be obtained from Air Traffic Control (ATC), and/or the applicable controlling agency, prior to any unmanned aircraft flight by, or on behalf of, the applicant that is to be conducted within controlled airspace or other locations where such prior approval is required, including any operations within prohibited or restricted areas, or other areas identified in Notices to Airmen (NOTAMs)?
24. Has your company ever had a third party liability, or physical damage unmanned aircraft related loss or claim?
25. Does your company have a privacy policy in place as well as established procedures relative to the capture, use, storage, and destruction of images, video and other data collected by the aircraft?
26. Will any flights be conducted by or on behalf of, a party outside of the United States?

Diffusion of Innovation Theory

The process of adopting new innovations has been studied for over 35 years, and one of the most widely used and respected adoption models is described by Rogers in his book Diffusion of Innovations. Rogers' diffusion of innovation theory seemed most appropriate to analyze consumers' viewpoints of the future possibility of drone delivery. According to Rogers (2003), adoption is a choice of utilizing an innovation as the greatest course of action obtainable and rejection is a choice to not adopt an innovation (p. 177). Rogers (2003) describes diffusion as the method in which an innovation is communicated through channels over time among the members of a social system (p. 5). This definition established the four key components of the diffusion of innovations: innovation, communication channels, time, and social system.

Innovation

Rogers (2003) defined innovation as an idea, practice, or project that is perceived as new by an individual or other unit of adoption (p. 12). An innovation could have been invented a decades ago, but if people think of it as new, then it could be an innovation in their eyes. The "newness characteristic" of an adoption is closely related to the three steps (knowledge, persuasion, and decision) of the innovation-decision process that will be discussed later in this paper. Furthermore, Rogers believed there is a lack of diffusion research on technology clusters. For Rogers (2003), a technology cluster is made up of distinguishable elements of technology that are viewed as being closely interconnected (p. 14).

Doubt and hesitation are barriers to the adoption of innovations. Furthermore, an innovation's consequences may create doubt and hesitation: "Consequences are the changes that occur in an individual or a social system as a result of the adoption or rejection of an innovation" (Rogers, 2003, p. 436). To reduce the uncertainty of adopting the innovation, intrigued consumers should be educated about its advantages and disadvantages to make them aware of all of the possible consequences. Additionally, Rogers (2003) stated that consequences can be categorized as desirable versus undesirable, direct versus indirect, and anticipated versus unanticipated (p. 437).

Communication Channels

Another component of the diffusion of innovations process is communication channels. According to Rogers (2003), communication is a process in which participants develop and share information with each other so that they can come to a mutual understanding (p. 5). This communication takes place via channels between sources. Rogers (2003) claims that a source is

an individual or an institution that originates a message and a channel is the means by which a message gets from the source to the intended receiver (p. 204).

Rogers (2003) states that diffusion is a specific kind of communication and includes these communication elements: an innovation, two individuals or other units of adoption, and a communication channel (p.18). Mass media and interpersonal communication are two heavily utilized communication channels. Mass media channels utilize a mass medium such as TV, radio, or newspaper whereas interpersonal channels are comprised of a two-way communication between two or more individuals. However Rogers (2003) believes that diffusion is a very social process that involves interpersonal communication relationships (p. 19). Therefore, interpersonal channels are more relevant and significant to influence strong attitudes held by someone. In interpersonal channels, the communication may have a characteristic of homophily. "Homofily is when people who interact are comparable in various qualities such as beliefs, education and socioeconomic status" (Rogers, 2003, p. 307). Nonetheless, the diffusion of innovations mandates to some degree the idea of heterophily, which is having differing characteristics from someone else. One of the main issues in the innovations of diffusion process is that people don't share similar interests (Rogers, 2003, p. 19).

Time

Rogers (2003) claimed that the time factor is ignored in most behavioral research (p. 20). He states that incorporating the time factor in diffusion research illustrates one of its strengths. The innovation-diffusion process, adopter categorization, and rate of adoptions all include a time dimension. These aspects of Rogers' theory will be discussed later in more detail.

Social System

Rogers (2003) defined the social system as a set of interconnected pieces collaborating in joint problem solving to achieve a common goal (p. 23). Since diffusion of innovations takes place in the social system, it is influenced by the social structure of the social system. According to Rogers (2003), structure is the patterned assortments of the pieces in a system (p. 24). He goes on to say that the culture of the social system affects a person's innovativeness, which is one of the leading factors for categorizing adopters.

The Innovation Decision Process

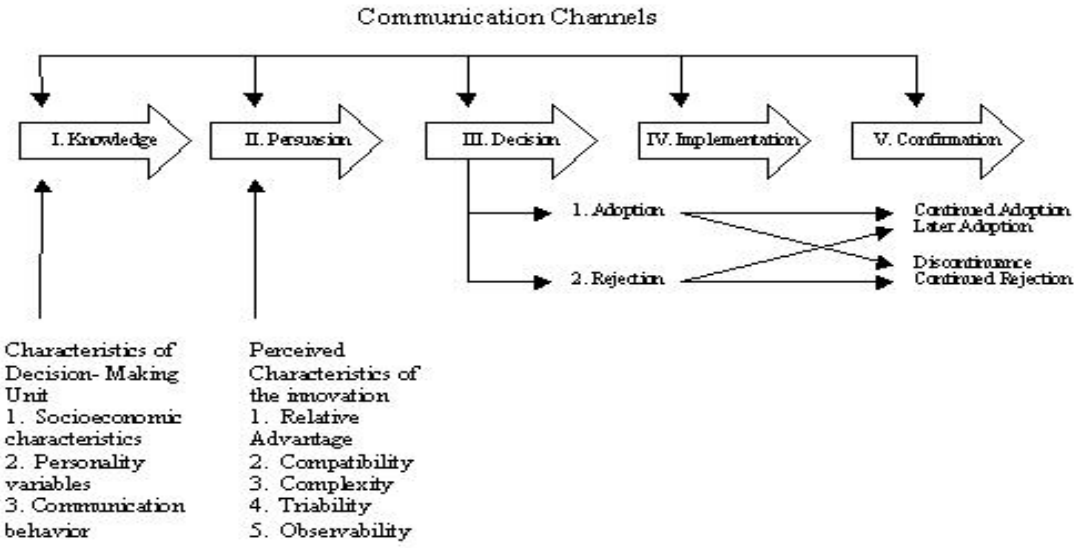

Figure 2: The Innovation Decision Process

Figure 2 illustrates Rogers's innovation-decision process. Rogers (2003) defined it as an information-seeking and information-processing activity, where a person is enthused to diminish doubt about the advantages and disadvantages of an innovation (p. 172). According to Rogers (2003), the innovation-decision process encompasses five steps: knowledge, persuasion, decision, implementation, and confirmation. These stages typically follow each other in a time-ordered manner. This process is shown in Figure 2.

The Knowledge Stage

The knowledge stage is the first phase in the innovation-decision process. This phase is where people learn about the innovations and pursue further data about it. Questions such as how, what and why are critical in the knowledge phase. Throughout this phase, "The individual attempts to determine what the innovation is and how and why it works (Rogers, 2003, p. 21). Rogers (2003) discusses three types of knowledge in-depth: awareness-knowledge, how-to-knowledge, and principles knowledge (p.171).

Awareness-knowledge portrays the knowledge of the innovation's existence. This type of knowledge can encourage the individual to learn more about the innovation and perhaps ultimately adopt it. Additionally, it may inspire an individual to dig deeper into the other two types of knowledge.

The other type of knowledge, how-to-knowledge, contains information about how to use an innovation correctly. Rogers (2003) saw this knowledge as an essential variable in the innovation-decision process (p.173). To increase the adoption chance of an innovation, an individual should have a sufficient level of how-to-knowledge prior to the trial of this innovation. Therefore, this knowledge becomes more vital for multifaceted innovations.

Principle knowledge encompasses the functioning wherewithal, unfolding how and why an innovation works. This knowledge isn't needed for an innovation to be adopted, but the mismanagement of the innovation could lead to its extinction.

The Persuasion Stage

The persuasion phase transpires when the person has a negative or positive perception of the innovation. However, Roger (2003) claims that, "The formation of a favorable or unfavorable

attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection" (Rogers, 2003, p. 176). The person develops his or her perception after receiving relevant data about the innovation, so the persuasion stage comes after the knowledge stage in this process. Moreover, Rogers (2003) argues that even though the knowledge stage is more intellectual, the persuasion stage is more sentimental. Therefore, the person is more emotionally in-tune with the innovation during the persuasion phase. The level of doubt regarding the innovation's functionality and the social bolstering from peers affect their perspective. People will still hunt for innovation evaluation data through the decision phase.

The Decision Stage

At the decision phase, the person decides to adopt or reject the innovation. While adoption denotes "full use of an innovation as the best course of action available," rejection entails "not to adopt an innovation" (Rogers, 2003, p. 177). If the company allows its innovation to be tested on a trial basis, it is usually adopted faster since most people first want to try it out and see if they like it.

Rejection is a possibility in every phase of the innovation-decision process. Rogers (2003) describes two forms of rejection: active and passive rejection. Active rejection takes place when somebody tries out an innovation and thinks about adopting it but decides not to. Passive rejection occurs if the innovation never crosses the person minds. Rogers (2003) stated that these two types of rejection have not been distinguished and studied enough in past diffusion research.

The Implementation Stage

An innovation is put into practice during this phase. However, Rogers (2003) states that an innovation conveys the "newness" in which some level of doubt is involved in diffusion (p. 6). Doubting the results of the innovation still can be an issue during this phase. Thus, the

implementer possibly will require technical aid from change agents to lessen the level of doubt. Furthermore, the innovation-decision process will end because "The innovation loses its distinctive quality as the separate identity of the new idea disappears" (Rogers, 2003, p. 180).

The Confirmation Stage

The confirmation phase is when the person is looking for support from family and friends that he or she made the right choice to alleviate cognitive dissonance. The person usually avoids negative connotations and pursues supportive ones that confirm their choice. Therefore, perspectives become extremely vital at this phase. Later adoption or discontinuance is contingent upon the support the person receives as well.

Attributes of Innovation and Rates of Adoption

Rogers (2003) labeled the innovation-diffusion process as an uncertainty reduction process, and he presented characteristics of innovations that help to diminish the doubt surrounding the innovation (p. 232). Characteristics of innovations encompass five qualities of innovations: relative advantage, compatibility, complexity, trialability, and observability. Rogers (2003) argued that people's viewpoints of these qualities could help estimate the rate of adoption (p. 219).

Rogers (2003) defined the rate of adoption as simply how quickly an innovation is adopted by members of a social system (p. 221). The amount of folks who adopted the innovation over time can be calculated as the rate of adoption of the innovation. The perceived characteristics of an innovation are forecasters of the rate of adoption. Rogers (2003) reported that 50-90% of the discrepancy in the rate of adoption of innovations is clarified by these five characteristics (p. 223). In accordance to these characteristics, the innovation-decision type (optional, collective, or authority), communication channels (mass media or interpersonal

channels), social system (norms or network interconnectedness), and change agents may increase the predictability of the rate of adoption of innovations.

Relative Advantage

Rogers (2003) described relative advantage as the level to which an innovation is improved from previous idea (p. 229). Cost and social status are the foundations of relative advantage. For example, while innovators, early adopters, and early majority are more attention seekers for adopting innovations, the late majority and laggards don't think of their status as importantly. Furthermore, Rogers classified innovations into preventive and incremental innovations. "A preventive innovation is a new idea that an individual adopts now event" (Rogers, 2003, p. 233). Preventive innovations typically have a sluggish rate of adoption, so their relative advantage is unknown. However, incremental innovations provide beneficial outcomes in a short period.

To surge the rate of adopting innovations and to make relative advantage more effective, financial incentives could be utilized to support the individuals of a social system. Incentives are elements of support and enthusiasm. Another motivating factor in the diffusion process is the compatibility attribute.

Compatibility

In some diffusion research, relative advantage and compatibility were viewed as similar; however, they vary conceptually. Rogers (2003) talks about compatibility as the level to which an innovation is thought of as consistent with the current standards, past familiarities, and needs of potential adopters (p. 15). If an innovation is compatible with an individual's needs, then doubt will inevitably decrease and the rate of adoption of the innovation will subsequently be

heightened. The name and purpose of the innovation should be clear and concise to the potential consumers. This is part of the complexity characteristic.

Complexity

According to Rogers (2003), complexity is the difficulty associated with comprehending and operating the innovation (p. 15). Rogers (2003) said that complexity is negatively correlated with the rate of adoption. Thus, excessive complexity of an innovation will discourage people to adopt it.

Trialability

For Rogers (2003), trialability is the degree to which an innovation may be tested for a short period of time, allowing the consumer to make a decision if he or she truly loves the product (p. 16). As opposed to complexity, trialability is positively correlated with the rate of adoption. The adoption rate will increase with the amount of time people are experimenting with the innovation.

Observability

The last characteristic of innovations is observability. Rogers (2003) defined observability as the visibility the results are to the public (p. 16). Social media wasn't as present in 2003 as it is today, but it appears that much of observability today occurs through these platforms. Like relative advantage, compatibility, and trialability, observability also is positively correlated with the rate of adoption of an innovation.

Rogers (2003) argued that innovations offering more relative advantage, compatibility, simplicity, trialability, and observability will be adopted faster than other innovations. Rogers does caution by stating, "Getting a new idea adopted, even when is has obvious advantages, is

difficult" (p. 1). Therefore, the obtainability of all of these variables of innovations speed up the innovation-diffusion process.

Adopter Categories

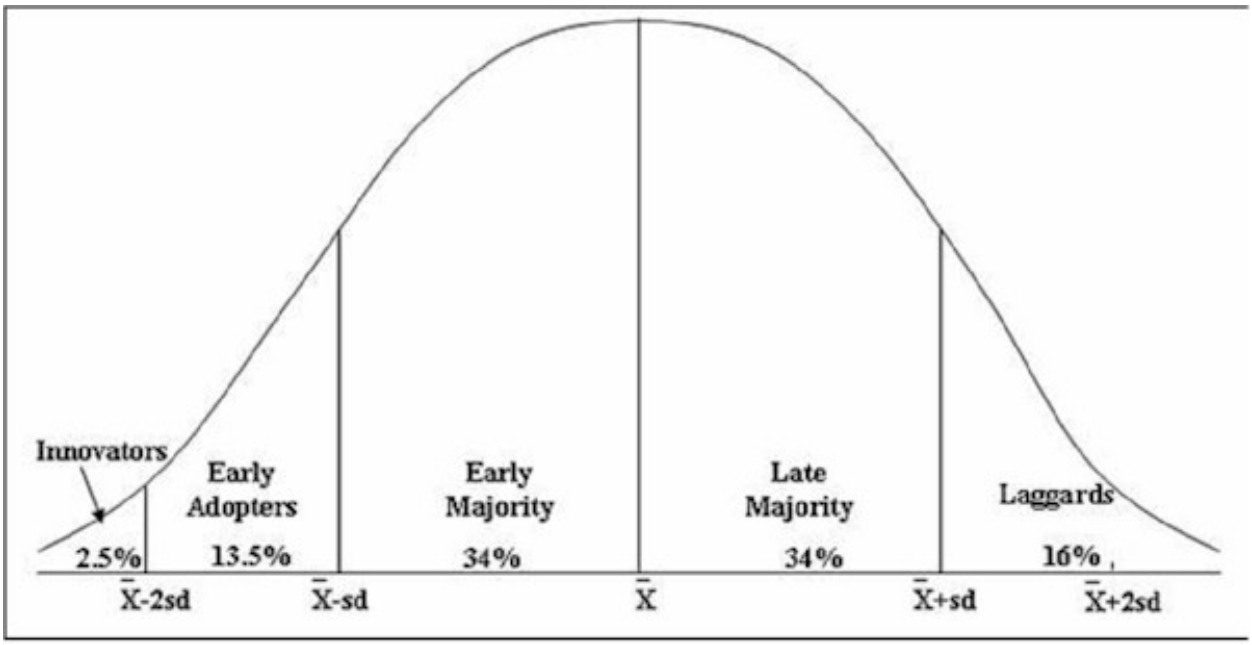

Figure 3: Adopter Categories

Rogers (2003) claimed the adopter categories are the groupings of members of a social system on the basis of innovative qualities (p. 22). This groupings contain: innovators, early adopters, early majority, late majority, and laggards. In each adopter category, people are comparable in terms of their innovative qualities: "Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system" (Rogers, 2003, p. 22). Rogers (2003) believed that innovativeness aided in comprehending the behavior in the innovation-decision process. Thus, he categorized the adopters based on innovativeness. Figure 3 displays the normal distribution of adoption rate of the world.

In this normal distribution, each category is defined using a standardized percentage of respondents. For instance, the area lying under the left side of the curve and two standard deviations below the mean includes innovators who adopt an innovation as the first 2.5% of the individuals in a system.

Innovators

For Rogers (2003), innovators were willing to try out products that were completely foreign to them (p. 17). Therefore, these individuals should be ready to deal with unprofitable and failed innovations. Also, Rogers (2003) noted that innovators are the gatekeepers bringing the innovation in from outside of the system (p. 18). They may not be trusted by other members of the social system because of their willingness to take significant financial and safety risks. Most of the people who are willing to take these significant risks, possess complex technical knowledge across a variety of industries.

In his book, *Lifestyle and Psychographics*, Wells (1974) describes this idea of new brand tries. “New brand triers often try out brands that aren’t familiar to them before their friends and neighbors do.” (Wells, 1974, p. 195). The characteristics of new brand triers are consistent with Rogers ideas about innovators in the fact that innovators don’t care if they have heard of the brand and/or product, if it’s appealing to them than they will make the purchase.

Early Adopters

Compared to innovators, early adopters are slightly more restricted with the boundaries of the social system. Rogers (2003) stated that since early adopters are more likely to hold leadership roles in the social system, other members come to them to get advice or information about the innovation (p.19). Therefore, as role models, early adopters’ viewpoints toward innovations are crucial for adoption purposes. Their evaluations about the innovation reach other

members of the social system through the interpersonal networks. Early adopters' leadership in adopting the innovation diminishes doubt about the innovation in the diffusion process. "Early adopters put their stamp of approval on a new idea by adopting it" (Rogers, 2003, p. 283).

Wells (1974) discusses a group of people called opinion leaders. He says, "Opinion leaders are those who are sought after for information regarding new trends rather than seeking out the information from others." (Wells, 1974, p. 195). This idea of an opinion leader is very consistent with the role models described in Rogers's definition of early adopters.

Early Majority

According to Rogers (2003), even though the early majority has a good interaction with other members of the social system, they do not have the leadership role that early adopters have (p. 21). However, their interpersonal networks are still vital in the innovation-diffusion process. As Figure 3 shows, the early majority adopts the innovation just before the other half of their peers. As Rogers (2003) mentioned, they are thoughtful and cautious in adopting an innovation and are neither the first nor the last to adopt it (p.22). Consequently, their innovation verdict typically is longer than that of innovators and early adopters.

Wells (1974) explains the concept of an information seeker. He claims that an information seeker is one who constantly asks their peers about new products and services that are trending on the market. Furthermore, information seekers generally watch a lot of advertisements which also influences their decision. Information seekers could very well by a synonym for the early majority.

Late Majority

Similar to the early majority, the late majority includes one-third of all members of the social system who wait until most of their peers adopt the innovation. Although they are

skeptical about the innovation and its outcomes, economic necessity and peer pressure may lead them to the adoption of the innovation. To lessen the uncertainty of the innovation, interpersonal networks of close peers should influence the late majority to adopt it. Then, "the late majority feel that it is safe to adopt" (Rogers, 2003, p. 284).

Laggards

As Rogers (2003) discusses the type of people who are laggards (p. 285). They are the most skeptical group of the five. As the most localized group of the social system, their interpersonal networks mainly consist of other members of the social system from the same category. Likewise, they do not possess a leadership role in society. Due of the scarce resources and the absence of awareness-knowledge of innovations, they first want to make sure that an innovation works before they adopt. Therefore, laggards tend to decide after looking at whether the innovation is successfully adopted by other members of the social system in the past. Due to all these characteristics, laggards' innovation-decision period is relatively long.

In addition to these five categories of adopters, Rogers (2003) further described his five categories of adopters in two main groups: earlier adopters and later adopters (p. 290). Earlier adopters consist of innovators, early adopters, and early majority, while late majority and laggards comprise later adopters. Rogers identifies the differences between these two groups in terms of socioeconomic status, personality variables, and communication behaviors, which usually are positively related to innovativeness. "The individuals or other units in a system who most need the benefits of a new idea (the less educated, less wealthy, and the like) are generally the last to adopt an innovation" (Rogers, 2003, p. 295).

RESEARCH METHODOLOGY

Based on the studies described in the literature review, I created a survey to see how people felt about the future possibility of drone delivery. Before answering the questions, three videos were provided displaying companies performing test deliveries utilizing drones (the videos weren't mandatory to watch but gave the participants some background about the industry). The survey was broken up into several sections: demographics, individualism (collectivism), rule and regulation structure, new brand trier, opinion leadership, information seeking, perceived ease of use, perceived usefulness, perceived risk of delivery and safety, pricing, using intention and an open ended sections for comments about drone delivery in general.

The survey was sent out via email to friends, family and fellow colleagues at Appalachian (some who I did not know). The survey was also posted on my Facebook page for my friends to take. The participants had to be 18 years or older in order to complete the survey. The information provided by the participants was anonymous. There were 123 people who completed the survey in full.

ANALYSIS OF RESULTS

The researcher ran a cluster analysis, using SAS software, to see if there were any groupings of people who shared similar perspectives. I used Roger's Adopter Category theory to segment the groups generated by the cluster analysis. The first parenthesized percentage is the one from Roger's Adopter Category theory and the second percentage is the percentage generated from my survey. The resulting groups totaled four, compared to Roger's five, so Segment 1 has two associated groups (late majority and laggards). Listed below are the results.

Innovators (2.5%) Segment 4 (8.0%)

I considered segment 4 to be innovators for several reasons. They are willing to pay $100-149 per year right off the bat, which was the highest of any group. This segment often tries new brands before their friends do (new brand triers). They share good and bad experiences with technology via social media platforms. They aren't afraid of the perceived risks involved in a drone delivery (hijacking, crashing and stolen privacy). They foresee themselves utilizing drone delivery service in their daily lives. Time utility (getting products quickly) is very important to them. They will buy a new brand and/or product that they have no prior knowledge of if it looks enticing to them. Segment 4 intends to use drone delivery service as soon as it is available to the general public. A comment left by a Segment 4 participant was, "I had never thought of drones delivery food! That would make Jimmy John's even faster!"

Early Adopters (13.5%) Segment 3 (22.8%)

Segment 3 won't be the first to utilize drone delivery service, but they won't be far behind the innovators. They are willing to pay $75-$99 per year. They find it easy to use drone delivery service to do what they want it to do. They agree that drone delivery service enhances their productivity. Segment 3 is well respected by their friends and family and are sought out for advice regarding new brands (opinion leaders). They feel apprehensive to try out new things. Segment 3 finds drone delivery service easy to use. A participant from Segment 3 said, "It seems like you can get what you need at a short wait time. I'll most likely use this when I want to watch a movie and I run out of popcorn."

Early Majority (34%) Segment 2 (28.5%): Segment 2 had 28 respondents and based on their responses most resembled the early majority section. They are willing to pay $10-$14 per month. Most seek out information from friends, family or through advertisements (information

seekers). Some are neutral and others agree that drone delivery service is easy to use. Most of Segment 2 believe that drones can deliver packages faster than trucks can. Most of them are not afraid of the associated risks related to drone delivery. A respondent from Segment 2 claimed, "I would really love life if the drone could deliver the pizza straight into my mouth!"

Late Majority (34%)/ Laggards (16%) Segment 1 (40.7%)

Segment 1 consisted of 50 people and was grouped into both the late majority and laggard section. Very few amount of people in this group were willing to pay per year, month or per individual order. There were mixed reviews on if drone technology would make their life easier. Most disagree or were neutral if drone delivery could be useful in daily activities. Most neutral if drone delivery service is easy to use. Most neutral on finding it easy for drone delivery service to do what it wants them to do. Most are extremely concerned about personal data being released, terrorists hijacking the drone, spying/privacy concerns and the drone being damaged in flight. A response from a participant in this group said, "Drone? You mean skeet shooting with prizes!"

The resulting groups from my survey were extremely similar with Roger's Adoption Category theory and fit Well's lifestyle dimensions. I personally think this is great news for the organizations who are trying to utilize drone delivery service in the future because an intrigued market already exists with hardly any money spent on advertising. The bulk of the "advertising" that has been individuals sharing videos of drones delivering packages via social media platforms. Therefore, if these organizations can successfully operate their fleet of drones to do what they say they're going to do, this may be an extremely lucrative and growing market.

LIMITATIONS AND FUTURE RESEARCH

Unfortunately, there were some limitations with the survey. The survey only received 123 responses, so it's a small sample size. Although the responses were anonymous, I'm going to predict that the majority of respondents were Appalachian State University students due to the the volume of Appalachian emails the survey was sent out to and consequently the high level of respondents who had a bachelor's degree. Additionally, the cluster analysis I ran didn't include the demographics (gender, age, living environment, degree obtained, and salary) from the survey because it created too many broad groups. Furthermore, the respondents have most likely have never had a drone delivery them a package and some didn't watch the videos, so they were answering questions based off of perceived speculation.

As the industry continues to grow and expand, more research will be done in this field. I recommend that the people conducting the research reach out to people of all four generations from all over the world. I also recommend that the researchers try their best to include demographics in their cluster analysis to get a better sense of the type of person who is willing to adopt drone delivery. I predict that within the next five years, companies will start to deploy this service regularly. If research is conducted at that time, more people will hopefully have been exposed to this service so their response is not a speculation but rather and informed opinion.

CONCLUSION

The concept of drone delivery started with an innovative idea from Amazon's CEO Jeff Bezos and it has taken off from there. The concept couldn't come at a better time because of the success of e-commerce leading to more B2C transactions. Drones will be able to save companies on the costly last mile and decrease the amount of transit time. It's not a matter of "if" this service will be available but rather "when".

After conducting a survey based on literature regarding risks/insurance as well as the diffusion of innovation theory, it appears that there is going to be a large market for this service. In fact, 50% of the respondents were willing to adopt drone delivery service without ever having experienced or maybe even seen it take place (comprised of innovators, early adopters and early majority). There's still some concern about the risks involved in the process, so drone manufactures, retailers, insurance companies and the government need to work hand-in-hand to safeguard against the perceived risks associated with this service.

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