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DRONE DELIVERY AN INNOVATION SOLUTION IN BUSINESS LOGISTICS

Nzegang SHUINJIO YANIQUE, Vytautas Magnus University, Agriculture Academy, Faculty of Bioeconomy Development, email: nzegang.shuinjio.yanique@vdu.lt

Summary

The logistics industry has undergone significant changes in recent years, thanks to the integration of technology in supply chain management. Drone delivery is a significant innovation in the industry, with the potential to revolutionize it. This article outlines the benefits and limitations of drone delivery, including improved accessibility, lower carbon emissions, limited payload capacity, restricted flight range, weather conditions, and technical issues. The research aims to identify the trends and effects of drone delivery as a solution and innovation in logistics, and the objectives are to assess the limitations and benefits of drone delivery as a solution and assess the framework and outcomes of drone delivery as an innovation in business logistics. The research method used in this article was a questionnaire distributed to a particular target group of people, particularly in the business logistics sector. SWOT analysis is also used to evaluate the strengths, weaknesses, opportunities, and threats of drone delivery as a solution and innovation in logistics. Concluding that drone delivery can offer significant advantages to businesses looking to improve their logistics operations, but there are still some challenges that need to be addressed.

Keywords: drone delivery, innovation, business logistics

Introduction

The logistics industry plays a critical role in the global economy, ensuring that goods are transported efficiently from suppliers to customers. Logistics does not only involve delivery of goods and services but activities like waste administration, product storage, workplace, stock management (Mohamed A et al., 2019). However, businesses have encountered various logistical challenges in recent years, such as rising fuel costs, increasing demand for faster delivery times, and external events like the COVID-19 pandemic and the Ukraine crisis. To overcome these challenges, companies have turned to technology to optimize their logistics operations.

One of the most significant technological innovations in recent years is drone delivery, which involves using unmanned aerial vehicles (UAVs) to transport goods from one location to another. These are aerial vehicles which have no human operators on board, usually controlled by an operator from the ground, either by a human pilot or using a computerised planned programme or artificial intelligence (AI). The first registered drone delivery was conducted in 2013 by Amazon, when their CEO Mr. Jeff Bezos made the announcement (Amazon, 2016) and since then, the use of drones in logistics has become increasingly popular. The drone market is expected to reach USD 43 billion by 2024 (Drone Industry Insights, 2019), with the potential to revolutionize the industry and create over 10,000 new jobs with its present market estimated at USD 27 billion.

This article aims to explore drone delivery as a solution to logistical challenges in the transport and delivery domain. It provides an overview of the research goal, methods, research object, and a summary and conclusion of the subject matter. By investigating this emerging technology, the article sheds light on how drone delivery can make logistics operations more efficient, faster, and cost-effective.

Research aim: To identify the trends/effect of drone delivery as a solution and innovation in logistics.

The following objectives have been set to achieve the aim:

1. To assess the limitation and benefits of drone delivery as a solution
2. To assess the framework and outcomes of drone (UAV) delivery as innovation in business logistics.

Research objects and methods

For the most part, research objectives are succinct statements of what the researcher wants to accomplish with the study. These 4 pages, also act as instructions for the study team, contain thorough explanations of the objectives that a researcher hopes to accomplish during the project. Before starting, a research goal must be formulated in consideration of the time available, the requirements for the research infrastructure, and other resources, among other things. When you choose a research aim, get ready for your research by being familiar with all of the most recent developments in your field of study and identifying any knowledge gaps that need to be filled. You will be better equipped as a result to establish reasonable goals for your research project.

The research object for this article was looking at UAVs (drone) delivery as an innovations and solution in business logistics.

The research method used in this article was questionnaires to a particular target group of people especially in business logistic sector. This questionnaire carried particular questions by asking respondents a sequence of well-organized questions; questionnaires are used in research to gather meaningful data. The nature of these instruments allows for the use of both written and spoken questions; as a result, typed questions were developed and provided to respondents. Quantitative or qualitative questionnaires may be used, and they may be distributed, over the phone, online or in person. Thus, the qualitative approach was employed and carried out online.

Also SWOT analysis was made use, to have a better understanding on UAVs as a solution innovation in logistics. SWOT analysis together with the analysis of primary and secondary documents and journal were analysed. Written or spoken questions can be used with these tools; because the format is similar to an interview, typed questions were created and distributed to respondents. These tools are especially helpful for evaluating the actions, preferences, intentions, attitudes, and viewpoints of subjects.

Research results and discussion

In this paper, SWOT analysis was conducted using previously published works in the same research area. Additionally, a questionnaire was utilized to effectively examine quantitative data, which revealed insights into contemporary sustainable transportation and expertise in drone delivery. The study emphasized the benefits of improving logistics via drone delivery in a sustainable manner and highlighted the advantages to the economy and environment. The author's conclusions were based on the results of the questionnaire and analysis of existing literature to determine potential outcomes and implications.

SWOT analysis is a tool used to evaluate the strengths, weaknesses, opportunities, and threats of a particular business or technology. After consulting other existing literature texts in the case of drone delivery as an innovation and solution in logistics, the SWOT analysis are presented as follows:

Strengths. Improved accessibility: Drones can deliver to remote and hard-to-reach areas, providing improved accessibility for customers and businesses.

Environmentally friendly: Drone delivery has lower carbon emissions compared to traditional delivery methods.

Weaknesses. Limited payload capacity: Drones have limited payload capacity, which means they may not be suitable for larger and heavier packages. For example, to be eligible for Amazon Prime Air's 30-minute drone delivery, the item must weigh less than 5 pounds (2.26 kg) and have a small enough size to fit into the cargo box carried by the drone, according to Jeff Wilke, the former CEO of Amazon Worldwide Consumer (Wilke, 2019).

Restricted flight range: Drones can only fly for a limited distance due to battery limitations, which could restrict their use in areas where longer distances need to be covered.

Weather conditions: Drones may not be able to fly in adverse weather conditions such as heavy rain, snow, or high winds, which could cause significant delays or cancellations.

Technical issues: Drones may experience technical issues during flight, such as navigation problems or system failures, which could result in lost packages or accidents.

Opportunitie. Increased demand: With the rise of e-commerce, there is an increasing demand for faster and more efficient delivery methods, making drone delivery an attractive solution.

New markets: Drone delivery can open up new markets and opportunities, particularly in hard-to-reach areas.

Technological advancements: Advancements in drone technology could lead to improved payload capacity, longer flight ranges, and better battery life, making drones more efficient and reliable.

Partnerships: Drone delivery companies can partner with businesses such as supermarkets, pharmacies, and restaurants to offer their customers faster and more convenient delivery options.

Threats. Security and privacy concerns: Drones flying over residential areas could raise security and privacy concerns for residents.

Competition: Traditional delivery methods such as trucks and vans still dominate the logistics industry, and drone delivery could face competition from emerging technologies such as autonomous vehicles.

Public perception: The public's perception of drones could be a potential threat to the industry, particularly if drones are seen as a nuisance or threat to public safety.

Overall, the SWOT analysis suggests that drone delivery has several strengths and opportunities as an innovation and solution in logistics. However, there are also significant challenges and threats that need to be addressed, particularly around regulations, security, and public perception.

Also, the survey carried out was done online by sharing links through various social media platforms like WhatsApp, Messenger as it was the quickest way to reach out to all participants. The questionnaire consisted of a total of 8 questions, and the questions focused on the know-how and social background factors of the participants, such as their age, marital status, and know-how etc (see to Table 1). The author's views in this study were based on the findings of the survey, which were used to identify the potential limitations and benefits.

The survey questionnaire contained several questions, with the majority being open-ended in order to allow respondents to freely express themselves rather than being restricted to predetermined answers. Once all surveys were completed, the responses were combined and analysed to draw conclusions about the problems, attitudes, and new solutions provided by respondents. The author took into account that all suggestions needed to be environmentally friendly, long-term, and cost-effective. During the empirical research on drone delivery in business logistics, it was discovered that authors of similar articles also utilized surveys, including questionnaires, SWOT, and PESTLE analyses.

The questionnaires used by these authors had many similarities to the one used in this study, including questions about demographics, knowledge on drones and drone delivery in logistics, and types of solutions suggested. Innovation is a crucial aspect of trade competition in all sectors of the economy, including logistics, and based on these findings, this paper discusses the current state, limitations, and benefits of drone delivery as an innovative solution in business logistics.

Table1. The aim of the questionnaire's question groups.

INQUIRY GROUP	GROUP'S GOAL	QUESTION NUM
Age	To know the age group of the respondents on the subject matter	1
Family status	To know if these respondents are married with kids or single	1
Know-how on drones delivery	How much knowledge do they have on drone delivery	2
Logistic involvement	Do they face difficulties and help logistic improve/increase their technological innovations	2
Reaction	How will they react or the effects of drone delivery	2

Current State of Drone Delivery Technology. The use of drones for delivery has become increasingly popular since the COVID-19 pandemic and the resulting lockdowns. This technology offers a faster and more efficient way to deliver goods without adding to road congestion. Currently, over 2,000 commercial drone deliveries are taking place every day worldwide, with the number of actual deliveries growing as opposed to just test flights. Though currently limited to small packages like prepared food and convenience items, the potential for drone delivery extends to a variety of consumer and business-to-business use cases, including transporting medical samples and drugs.

Last-mile delivery is an expensive market, accounting for almost half of the total shipping cost and projected to reach €50 billion by 2028. However, the use of drones for delivery has the potential to offer an efficient and cost-effective solution. Research has shown that drone delivery in urban areas will soon be cost-competitive with human-operated delivery. However, current regulations in most countries limit drone operators to monitoring only one drone at a time, with a visual observer required to monitor the airspace. Labour costs currently represent up to 90% of the total cost of drone delivery. For drone delivery to be more cost-competitive, operators must focus on operating drones instead of just monitoring airspace, and the number of drones per operator must increase significantly. Autonomous drone flight, unmanned traffic management systems, and sense-and-avoid solutions are necessary advancements for operators to manage up to 20 drones in a densely used airspace.

As technology advancements progress and regulations evolve to allow for larger numbers of drones per operator, the potential cost advantage of drone delivery will grow. Additionally, drone delivery is more environmentally friendly than traditional gasoline-powered vehicles, emitting fewer CO2 emissions. As a result, the use of drones for delivery offers a promising solution for last-mile delivery that has the potential to become a cost-effective and efficient delivery method while reducing carbon emissions. Delivering a one-pound kebab with a two-ton vehicle can hinder companies from reaching their emissions goals. By using more efficient means of delivery, such as drones, companies can increase their chances of meeting their emissions targets.

While drone delivery has been the subject of much hype in recent years, the technology is still in its early stages.

There are a number of technical limitations that need to be addressed before drone delivery can become a mainstream logistics solution. One of the main limitations is the range of UAVs. Most drones can only travel a limited distance before needing to recharge or refuel, which limits their potential applications.

Another limitation is payload capacity. Most UAVs can only carry small packages, which mean that they may not be suitable for transporting larger items (Seidakhmetov et al. 2022). This can be a significant limitation for businesses that need to transport heavy or bulky goods.

In addition to these technical limitations, there are also safety concerns that need to be addressed. For example, drones flying in urban areas can pose a risk to public safety if they malfunction or collide with other objects (Seidakhmetov et al. 2022). There is also the risk of drones being used for malicious purposes, such as smuggling or surveillance.

Regulatory Environment for Drone Delivery

The regulatory environment for drone delivery is still evolving, and businesses need to be aware of the rules and regulations that govern the use of UAVs for commercial purposes. In the United States, drone delivery is regulated by the FAA, which has established rules for the use of UAVs for commercial purposes.

To obtain permission to use UAVs for commercial purposes, businesses need to obtain a Part 107 waiver from the FAA. This waiver allows businesses to operate UAVs for commercial purposes, subject to certain conditions and limitations. These conditions include restrictions on the altitude and distance that UAVs can fly, as well as requirements for operator certification and maintenance (Federal Aviation Administration).

Limitations and Benefits of Drone Delivery in Business Logistics. While innovations and solutions such as drone delivery have the potential to improve logistics operations, there are also general limitations that need to be considered. One of the main limitations is the cost of implementing new technology. Implementing new technology can be expensive, and businesses need to carefully weigh the costs and benefits of any new solution.

Another limitation is the need for skilled labour to operate and maintain new technology. While drone delivery may be more efficient than traditional delivery methods, it still requires skilled operators who are trained in operating and maintaining UAVs. This means that businesses need to invest in training programs and ensure that they have a pool of skilled labour available.

In addition to these limitations, there are also regulatory hurdles that need to be overcome. For example, in the United States, drone delivery is regulated by the Federal Aviation Administration (FAA), which has strict rules regarding

the use of UAVs for commercial purposes. These regulations can be a barrier to entry for businesses looking to implement drone delivery.

Despite these challenges, drone delivery offers a number of benefits that can make it a valuable solution for businesses. One of the main benefits is speed. Drone delivery can be much faster than traditional delivery methods, as UAVs can fly directly to the delivery location without being affected by traffic or other obstacles (Yoo, Chankov, 2018).

Another benefit is cost savings. While the initial investment in drone delivery technology may be high, the long-term cost savings can be significant. UAVs can operate for longer periods of time than traditional delivery vehicles, and they require less maintenance and fuel.

Drone delivery can also improve customer satisfaction. By providing faster delivery times and more precise delivery locations, businesses can improve the overall customer experience. This can lead to increased customer loyalty and repeat business.

Conclusion

1. In conclusion, drone delivery has the potential to be a game-changer in the logistics industry. It offers a number of benefits, including faster delivery times, cost savings, and improved customer satisfaction. However, there are also general limitations and technical limitations that need to be addressed before drone delivery can become a mainstream solution.

2. The logistics industry is facing various challenges, such as rising fuel costs, increasing demand for faster delivery times, and external events like the COVID-19 pandemic and the Ukraine crisis. To overcome these challenges, companies are turning to technology to optimize their logistics operations, and drone delivery is one of the most significant technological innovations in recent years. The results of the research showed that drone delivery has several strengths, including improved accessibility and being environmentally friendly, but also some weaknesses, such as limited payload capacity, restricted flight range, and technical issues. Despite these limitations, drone delivery has the potential to make logistics operations more efficient, faster, and cost-effective.

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