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Sivil Havacılık Şirketlerinin İnsansız Hava Aracı Stratejileri

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Araştırma Makalesi

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Özet

İnsansız hava araçları (İHA) savaşın seyrini değiştirmek ve zafiyetleri ortadan kaldırmak için geliştirilmiştir. Başlangıçta istihbarat, keşif ve gözetleme amacıyla kullanılan İHA'ların hizmet kapasitesi, teknolojik gelişmelerin yanı sıra doğal ve beşeri faktörlerden kaynaklanan ihtiyaçlar nedeniyle genişlemiştir. Gelişen pazarların taleplerini karşılamak ve verimliliği artırmak için sivil havacılık şirketleri İHA'lar geliştirmeye başlamıştır. Gelişmekte olan pazarların taleplerini karşılamak ve verimliliği artırmak için sivil havacılık şirketleri İHA'lar geliştirmeye başladı. Başlangıçta İHA'ların işlevsel yük taşıma kapasitesinin artırılmasına odaklanılırken, farklı sektörlerin ilgi göstermeye başlamasıyla birlikte insansız hava araçları diğer endüstriler tarafından da tasarlanmaya başlandı. COVID-19 pandemisi, özellikle ilaçların hızlı ve temassız dağıtımının gerekli olduğu durumlarda veya sokağa çıkma yasağı kısıtlamalarının ihlallerinin denetlenmesi veya karantinadaki vatandaşların izlenmesi sırasında İHA'lara olan talebin artmasına neden olmuştur. Bu çalışma, sivil havacılık alanında faaliyet gösteren şirketlerin İHA'lara yönelik yatırım ve faaliyetlerini analiz etmektedir. Çalışmada Türk Hava Yolları, Boeing ve Henan SunHawk firmalarının İnsansız Hava Aracı stratejileri İçerik Analizi ve Tematik Analiz yöntemleri kullanılarak analiz edilmiştir. Çalışma, Türk Hava Yolları, Boeing ve Henan SunHawk şirketlerinin İnsansız Hava Aracı stratejilerini İçerik Analizi ve Tematik Analiz yöntemlerini kullanarak analiz etmiştir. İçeriğe herhangi bir ek unsur eklenmemiştir. Çalışma, Türk Hava Yolları, Boeing ve Henan SunHawk şirketlerinin İHA stratejilerini İçerik Analizi ve Tematik Analiz yöntemlerini kullanarak analiz etmiştir. Metin, açık ve özlü dil kullanımı, mantıksal yapı, resmi dil ve doğru kelime seçimi gibi istenen özelliklere uyacak şekilde revize edilmiştir. Metinde dilbilgisi hataları, yazım yanlışları, imla ve noktalama hataları bulunmamaktadır. Araştırma bulgularına dayanarak, İHA teknolojilerinin son 25 yılda hem hükümetler hem de özel şirketler tarafından etkin bir şekilde kullanıldığı açıktır. Çalışma ayrıca önümüzdeki 25 yıl içinde İHA'ların daha geniş bir sektör yelpazesinde kullanımında önemli bir artış olacağını öngörmektedir. Güçlü Yönler, Zayıf Yönler, Fırsatlar ve Tehditler (SWOT) analizi, İHA'ların mevcut potansiyelini gelecekteki yapıları ve yeni teknolojilerin şirket politikaları üzerindeki etkisi açısından değerlendiriyor. İHA'ların yüksek teknoloji ürünleri olarak kırılganlığı nedeniyle siber saldırılara karşı önlemler de tartışılmaktadır.

Anahtar Kelimeler: İHA, sivil havacılık, Covid 19, şirketler.

Unmanned Aerial Vehicle Strategies of Civil Aviation Companies

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Research Article

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Abstract

Unmanned aerial vehicles (UAVs) were developed to alter the course of warfare and eliminate vulnerabilities. Initially used for intelligence, reconnaissance, and surveillance, their service capacity has expanded due to technological advancements and evolving needs arising from natural and human factors. To meet the demands of emerging markets and increase efficiency, civil aviation companies have begun developing UAVs. To meet the demands of emerging markets and increase efficiency, civil aviation companies have begun developing UAVs. Initially, the focus was on increasing the functional load-carrying capacity of UAVs, but as different sectors began to express interest, unmanned aerial vehicles were designed by other industries. The COVID-19 pandemic has increased demand for UAVs, particularly for the rapid and contactless distribution of medicines required when inspecting for violations of curfew restrictions or monitoring citizens in quarantine. This study analyses the investments and activities of companies operating in civil aviation for UAVs. The study analyzed the Unmanned Aerial Vehicle strategies of Turkish Airlines, Boeing, and Henan SunHawk companies using Content Analysis and Thematic Analysis methods. The study analyzed the Unmanned Aerial Vehicle strategies of Turkish Airlines, Boeing, and Henan SunHawk companies using Content Analysis and Thematic Analysis methods. No additional aspects have been added to the content. The study analyzed the UAV strategies of Turkish Airlines, Boeing, and Henan SunHawk companies using Content Analysis and Thematic Analysis methods. The text has been revised to adhere to the desired characteristics, including clear and concise language, logical structure, formal register, and precise word choice. The text is free from grammatical, spelling, and punctuation errors. Based on the research findings, it is evident that both governments and private companies have effectively utilized UAV technologies over the past 25 years. The study also predicts a significant increase in the use of UAVs in the next 25 years across a wider range of sectors. The Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis evaluates the current potential of UAVs in terms of their future structure and the impact of new technologies on company policies. Precautions against cyber-attacks are also discussed due to the vulnerability of UAVs as high-tech products.

Keywords: UAV, civil aviation, Covid 19, companies.

1. Introduction

UAVs were originally developed for military purposes in the 20th century. Since then, they have found applications in the 21st century, including organ transportation, cargo delivery, intelligence gathering, surveillance and reconnaissance, firefighting, and border security. The development of the Internet has been a driving force behind technological advancements, including the emergence of the Internet of Things (IoT). This has facilitated cyberspace expansion, providing excellent features for objects (Liu et al., 2020). UAVs are frequently used in civil aviation and other sectors due to recent technological advancements. They are highly mobile, cost-effective, and have flexible deployment options and advanced technical structures. Government agencies and private companies worldwide actively produce UAVs. The availability of UAV models that cater to various sectors globally has led national and international civil aviation companies to incorporate them into their policies. UAVs are now extensively used for drug delivery, humanitarian intervention, first aid, organ transplants, and cargo transportation, making them indispensable for companies working with UAVs. Although our study primarily focuses on the contribution of civil aviation companies to UAV projects and their future investments and projects, our main questions concern the physical, human, and biological factors that have influenced changes in UAV policies following the global epidemic. Additionally, we aim to investigate the reasons behind the recent increase in support for UAV projects and new project studies in the last quarter.

The main purpose of our study is to analyse the opportunities and challenges arising from the transformation of the UAV sector in the light of technological developments, and to evaluate the strategies of states and companies in overcoming the challenges through a SWOT analysis. The SWOT analysis analysed the UAV policies, investments and technology transfers of the reference civil aviation companies, and in this context the future policies of the companies were highlighted. The findings of the SWOT analysis were determined through content and document analysis. This included statements, news and academic studies, as well as the mission and vision of the companies.

1. Literature Review

1.1. Historical Development and Technological Innovation of UAVs

UAVs have primarily been developed for military purposes, taking advantage of technological advancements. The U.K. initiated the first UAV studies 1920 in Iraq, India, Egypt, and Ireland to monitor and control uprisings. The first UAVs, the Larynx and Ram, were developed in this context (Satia, 2014; Kindervater, 2016). After World War II, the U.S. administration recognized the significance of UAVs and began studying and developing them. They integrated technological advancements into photographic and radar systems (Kindervater, 2016). The technology race that began during the Cold War led to the development of UAVs for espionage and intelligence activities. In this context, Lockheed Martin developed the Lockheed Aquila UAV in 1970. However, the project was eventually abandoned due to the failure to achieve the desired performance and increased accidents (Demirkıran, 2010). Technological developments that were insufficient at the time have since led to the birth of a new field. The Israeli Scout and Pioneer were the first examples of medium and long-range UAVs (Demirkıran, 2010).

As per the definition provided by the U.S. Federal Aviation Administration, a UAV is an aircraft that autonomously follows a predetermined flight path without a human pilot (Ekmekcioğlu & Yıldız, 2018). The term 'unpiloted aircraft' refers to an aircraft that operates without a pilot-in-command and is controlled remotely or from another location, as defined in 'Doc 9854' published by the Global Air Traffic Management Operational Concept. This definition is by Article 8 of the Convention on International Civil Aviation (ICAO, 2015), which specifies that such aircraft are flown without a responsible pilot and are controlled remotely or from another location. A UAV is an aircraft that can autonomously travel to a designated location and return without needing a Global Positioning System (GPS) --controlled pilot on board (Kahveci & Can, 2017). While this is the general definition, reports also highlight some limitations. The lack of specificity is due to UAVs' varying technological capabilities and structural designs today. UAVs are classified based on their weight, helpful load capacity, wing and fuselage, flight control systems, and intended use, in addition to their current definitions. The ICAO circular divides this classification into two main classes: automatic and remote-controlled (Kahveci & Can, 2017).

UAVs are classified based on their weight and range. They are categorized as micro, light, medium, heavy, and heavy (Ariomandi et al., 2006). Additionally, they can be classified as nano, micro, mini, lightweight, small, tactical, MALE, HALE, rich, and very heavy, divided into ten categories (Singhal et al., 2018). UAVs are divided into three categories: pilotless target aircraft used for training and unmanned combat aircraft for intelligence, surveillance, and reconnaissance purposes (Keane & Carr, 2013).

The history of UAVs may date back to the 1400s, as evidenced by Leonardo da Vinci's aerial gyroscope drawing (Demirkiran, 2010). However, the modern development of UAVs began in 1888 when Louis Brennan proposed remotely flying and firing torpedoes with cable assistance (Cuerno-Rejado et al., 2016). Although René Lorin, a French officer, conceived the idea of a jet-propelled bomb that could be flown using radio signals in 1908, the technology of the time was inadequate, and it could not be implemented due to the circumstances of World War II (Cuerno-Rejado et al., 2016).

In 1911, shortly after the introduction of manned flights, Elmer Sperry, the inventor of the gyroscope, conducted studies on the application of radio control in aircraft. He received financial support from the U.S. Navy and conducted 58 flight tests between August 31 and October 4, 1913. These tests formed the basis of UAVs (Keane & Carr, 2013). While the United States is not the only country developing UAVs, England has also employed UAV systems as a cost-effective measure to prevent mass uprisings and attacks in Iraq, which it occupied in the 1920s, and later in other Middle Eastern countries. This led England to increase investment in UAV systems (Satia, 2014). However, worldwide investments in UAVs were interrupted by the onset of World War II (Yetgin & Bastug, 2021).

Following the end of the Second World War, due to the threat posed by Soviet Russia and their attempts to export communism, the United States underwent a significant shift in their use of UAVs. Using this information for intelligence activities, they began collecting data from UAVs, including photographic images, radar cross-sections, and electronic signals. This marked the beginning of a new era (Kinderwater, 2016). To counter the growing Soviet submarine force between 1950 and 1960, the USA began actively using UAVs after the U-2 spy plane was shot down on Soviet territory in 1960 (Keane & Carr, 2013). Ryan Aeronautical Company (Figure 1) produced UAVs for the U.S. Army until the 1990s. Teledyne acquired Ryan Aeronautical in 1968, and the company merged with Allegheny-Ludlum Corporation in 1996 before being acquired by Northrop Grumman Corporation in 1999 (OAC, 2022).

Satellites are increasingly being used to control UAVs, leading to the emergence of long-endurance (HALE - High Altitude Long Endurance) and medium-endurance (MALE - Medium Altitude Long Endurance) UAVs (Yetgin & Baştuğ, 2021). UAVs have become indispensable in military and intelligence activities throughout their historical development. Unmanned aerial vehicles (UAVs), advanced technological products, have been increasingly used in various fields such as commerce, society, economy, culture and art. Their scope has expanded significantly, particularly due to the social needs arising from COVID-19, such as cargo services, emergency drug delivery, disease prevention and surveillance. As a result, civil aviation companies have entered the UAV market and expanded their service offerings.

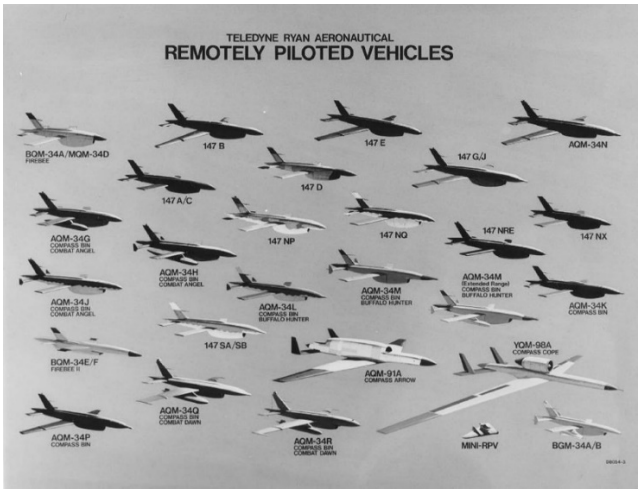

Figure 1. UAVs manufactured by Ryan Aeronautical (Source[1]).

1.2. UAV Policies of Companies Operating in the Field of Civil Aviation

The growing importance of UAVs in strategic positions has led national and international companies to develop new action plans and strategies to meet their needs and compete in the global UAV market. The COVID-19 pandemic has further highlighted the importance of UAVs in recent years. The pandemic has had negative economic repercussions in Turkey and worldwide. Despite the coexistence of certain sectors, such as transportation, cargo services, and the pharmaceutical industry, the COVID-19 pandemic has significantly impacted many industries and companies, including civil aviation and aircraft manufacturing. Commercial aviation activities decreased by 40%, and aviation travel activities decreased by 36% (Şen & Bütüm, 2021). To mitigate the effects of COVID-19, several airlines have implemented cost-cutting measures such as salary cuts and layoffs. For example, Canadian Airlines put 15,000 employees on leave and temporarily laid off 1,300 managers; American Airlines helped pilots retire early; British Airlines cut pilots' salaries by 50%; and Qatar Airways laid off 200 employees (Şen & Büyük, 2021). The COVID-19 pandemic has had a detrimental impact on civil and commercial aviation activities and the development of aviation technologies. UAVs have been increasingly used for contactless and efficient cargo distribution, medical equipment and medicines

[1] https://www.flickr.com/photos/13476480@N07/30925677595/

transportation, and social distance monitoring, largely due to the surge in online shopping during the pandemic. Companies have also introduced new products and prototypes in response to these challenges. The research analyzed the technology investments in unmanned aerial vehicles made by Turkish Airlines, Boeing, and Henan SunHawk, which were selected as samples, and the results were discussed.

Turkish Airlines

The aviation industry must closely follow technological advancements and has turned to innovative solutions to alleviate the economic challenges caused by the COVID-19 pandemic. One such solution is the use of UAVs for transport. Turkish Airlines has also introduced Esinti (Figure 1) to mitigate the economic impact of COVID-19 and expand its transport network by taking advantage of technological advances. Manufactured by Turkish Airlines, Esinti has a functional payload of 80 kg and is designed for cargo and air taxi transport (Havauzay, 2022). The aircraft is expected to be actively used in cargo transportation, emergency medicine delivery, firefighting, and airport runway security.

Boeing

Founded 1916 in the USA, Boeing has become a leading manufacturer of commercial aeroplanes, defence products, and space systems for over 150 systems in over 150 countries (Boeing, 2022). Like other civil aviation and aircraft manufacturing industries, Boeing was severely affected by the Covid-19 pandemic. Despite the challenges faced by the company following the 737 Max accidents and the impact of COVID-19, more than 12,000 employees, including 6,770 volunteers, chose to leave their jobs in the U.S. (Euronews, 2020). Boeing manufactures aircraft for both civil aviation and the U.S. military, as well as military aircraft, missiles and space technology. Boeing Defense, Space and Security and Insitu, a subsidiary of Boeing, produces civil and military UAVs. Insitu, which typically produces multirole UAVs for the U.S. Army, has also developed aerial refuelling tanker UAVs (see Figure 2) to demonstrate the versatility and range of applications of UAVs. 2019 the Boeing MQ-25 tanker UAV completed a 2.5-hour test flight, enhancing military operational capabilities (Bayindir, 2021). The Boeing Company is using UAVs to maintain communication channels and transmit television broadcasts that natural disasters may disrupt by incorporating narrowband communication relays into the UAVs that reactivate communication systems that may have collapsed as a result of natural disasters, thus preventing communication disruptions (Tuna et al., 2012). The Boeing Company is currently developing small experimental UAV projects to address issues related to power line security, oil pipeline security, forest health, and border security monitoring (Mathews et al., 2007).

Henan SunHawk Aviation Industry Co.

The production of civil and military aircraft, space technologies and UAVs in China has grown rapidly. Private Chinese Aerospace Defense Companies, a book published by the China Institute of Aerospace Studies, is an in-depth study of the companies operating in this field. The book explains the relationship of these companies with the Communist Party of China (CPC) and the People's Liberation Army of China (PLA) (Hull et al., 2021). Henan SunHawk Company is a major Chinese aviation and UAV company that designs, develops and sells cargo, long-range unmanned aerial vehicles and propeller-driven aircraft (Hull et al., 2021). While the company focuses primarily on combat UAVs for military use, it also develops new products to meet the needs of various sectors. The Zephyr S-50 UAV (Figure 3) is a product developed for crop protection and agricultural spraying tailored to the needs of the sector (Sunhawk, 2022). The table below shows pictures of the vehicles mentioned in these companies' unmanned aerial strategies.

Beijing Lingkong Tianxing Technology is one of the companies developing unmanned aircraft strategies for civil aviation. In response to the COVID-19 pandemic, various campaigns and innovative approaches have been implemented to mitigate the significant damage caused to the industry. Among these investments is the hypersonic spaceplane project developed by Beijing Lingkong Tianxing Technology. In this project (Zhen, 2021), Beijing Lingkong Tianxing has raised over $46.3 million in the third round of its search for investors, securing 300 million yuan (Jones, 2021), and has been described by Chinese state media as a crucial symbol of China's rise from a space power to a super space power. The project aims to develop a 12-seat civilian aircraft capable of travelling from Shanghai to New York in just two hours at a speed of one mile per second (CNN Turk, 2022).

Table 1. UAVs in Sectors.

Picture explanation	Picture
Picture 1. Turkish Airlines Technical Company Aircraft Produced By: Esinti [2]	
Picture 2. The refueling Unmanned Aerial Vehicle produced by the Boeing Company[3]	
Picture 3. Zephyr S-50 Unmanned Aerial Vehicle produced by Henan SUNHAWK[4]	

*Source: Created by the auther.

2. Methodology

Thematic analysis was applied to Turkish Airlines, Boeing, and Henan SunHawk Aviation Industry companies in our research. We used the thematic analysis method to identify theme groups in qualitative data and applied the SWOT analysis method to these themes. Thematic analysis is a useful method for analyzing and interpreting qualitative data (Clarke & Braun, 2017). In simpler terms, the thematic analysis method is a technique that bridges quantitative and qualitative data (Terry et al., 2017).

The selected companies are large in terms of global market share, have similar growth and development policies, and face similar internationalisation and sustainability issues. Furthermore, we selected companies from Europe, America, and Asia to investigate whether regional factors influence their policies. Our research is based on official statements, corporate policies, academic studies, and news analyses of the companies. We evaluated and analysed this information using content analysis methods to draw conclusions.

[2] https://www.havauzay.org/thy-teknik-a-s-yeni-hava-araci-esintiyi-tanitti.html.
[3] https://www.savunmasanayist.com/mq-25-stingray-tanker-iha/.
[4] https://en.sunhawk.cc/product/1.html.

2.1. SWOT Analysis Created by Thematic Analysis

The issues and research findings related to UAV projects and future strategies of the sampled international civil aviation companies were identified through the SWOT analysis.

The SWOT analysis revealed the sectoral strengths, weaknesses, opportunities, and threats of Unmanned aerial vehicles in Civil Aviation. The practical implications of these themes are presented below.

Table 2. Civil Aviation Companies Themes by SWOT.

Strengths	Weaknesses	Opportunities	Threads
Staff education	Insufficient R&D culture	Formation of new market areas	Increasing external dependence on parts
R&D (Research and Development) opportunity	Spare parts problem	Few competitors	Infiltration of technological information and cyber attack
Wide range of products	Political problems	Mass production possibility	Economic instability
Education and occupational health and safety	Meteorological problems		

*Source: Created by the auther.

2.2. Practical Implications of Findings

In the research, a SWOT analysis was carried out. The results were obtained from Turkish Airlines, Boeing and Henan SunHawk companies. These companies were chosen because they are large companies operating in the global arena, and the findings are generally valid for other companies, although there are many civil aviation companies operating on a large and small scale. Table 3 shows the practical implications of the findings on the strengths of unmanned aerial vehicles.

Table 4 presents the practical implications of the findings on the weaknesses of unmanned aerial vehicles.

Table 5 presents the practical implications of the findings for the opportunities of unmanned aerial vehicles.

Table 6 presents the practical implications of the findings for unmanned aerial vehicles. These findings are general and applicable to both military and civilian companies utilizing UAVs.

The SWOT analysis evaluated the research findings as a theme, and the results and discussion were presented.

Table 3. Strengths.

No	Thema	Definition
1	Staff education	Like other aerial vehicles, unmanned aerial vehicles are controlled from the command centre. This situation allows for the training of a large number of personnel. The presence of adequate test centres leads to an increase in the number of Unmanned Aerial Vehicle operators. The provision of operator courses, including commercial and individual, leads to an increase in the population of Unmanned Aerial Vehicles, as well as to the rise in the area of use of Unmanned Aerial Vehicles.
2	R&D (Research and Development) opportunity	Unmanned Aerial Vehicles, which have emerged with high technological knowledge, are constantly being modernized and cause new areas of use. Initially produced for military and intelligence purposes, unmanned aerial vehicles are now made for humanitarian aid, transportation, cargo, agriculture, and education. The increasing diversity here allows the development of Unmanned aerial vehicles by current requirements and the integration of new technologies.
3	Wide range of products	Nowadays, Unmanned aerial vehicles are actively used in many fields, such as military, intelligence, transportation, cargo and logistics support, agriculture, humanitarian aid, border security, migration monitoring, and monitoring and prevention of natural and human disasters. The development process, which started with the aim of carrying out military and intelligence activities, has led to the development of the product range for different sectors and the changing areas of use of these tools.
4	Education and occupational health and safety	Unmanned aerial Vehicles training is given in two main categories: theoretical and practical. Technically, the training efficiency is high because the safety distance between Unmanned aerial vehicles and the operator in controlling Unmanned aerial vehicles is healthy and in compliance with occupational health and safety procedures.

Source: Created by the auther.

Table 4. Weakness.

No	Thema	Definition
1	Insufficient R&D culture	Unmanned Aerial Vehicles, which have actively entered our lives in the last quarter century, have emerged as a specific technological product and have developed along with developing technological opportunities. However, the general impression on the people's axis is that Unmanned aerial vehicles are used only for military and surveillance elements. Today, while Unmanned aerial Vehicles even carry out activities such as commercial transportation, the general impression is that this situation will be impossible. This situation negatively impacts the development of unmanned aerial vehicles.
2	Spare parts problem	When companies develop Unmanned Aerial Vehicles projects, they do it by using their resources, including a certain proportion. Other critical technological parts (engine, shaft, radar, sensor, etc.) can collect some or all of them from different producers. Any accident after the companies start mass production of Unmanned aerial Vehicles will likely disrupt the supply chain due to Crimea, the lack of spare parts they received from a different company during their maintenance or the cessation of production.
3	Political problems	Due to governments' policies, each company's approach may be different. The most significant reason behind this difference is political interest. In this case, the process of governments to companies may remain politically solid or weak.
4	Meteorological problems	Unmanned aerial vehicles mostly find their positions by communicating with ground control systems and satellites and creating navigation routes. Most commercial Unmanned aerial Vehicles are frequently affected by meteorological elements due to their navigation at high altitudes. To avoid being affected by these elements, companies are trying to take several security measures by instantly tracking current meteorological data and transferring it to the artificial intelligence of Unmanned Aerial Vehicles. However, being able to intervene in the elements that change immediately stands before us as a problem that needs to be solved even with the current technological knowledge.

Source: Created by the auther.

Table 5. Opportunities.

No	Thema	Definition
1	Formation of new market areas	The diversification of the areas of use of Unmanned aerial vehicles and the lack of many manufacturers in the global market allows companies to export a lot, and the high demand for Unmanned aerial vehicles in different areas in different regions leads to the emergence of new markets.
2	Few competitors	Considering that the technology of Unmanned aerial Vehicles is just developing, companies are primarily supporting companies that are already manufacturing by providing financing, as well as the fact that there are not many companies that directly manufacture globally, which causes the Market share not to be divided into too many segments.
3	Mass production possibility	Due to their size, unmanned aerial vehicles can go into mass production faster because they do not have complicated structures like other aircraft. Because you do not need large and numerous hangars where other aircraft are produced, more than one vehicle can be made in a single structure. Unmanned aerial vehicles used in different fields allow the production process, which is already fast, to be produced more efficiently and in large numbers.

Source: Created by the auther.

Table 6. Threads.

No	Thema	Definition
1	Increasing external dependence on parts	Companies may experience supply problems because they supply parts from different companies from outside during the mass production of Unmanned aerial VehiclesJul. In addition, the political and economic embargoes imposed on the states where the companies belong cause Jul-tain manufacturing Unmanned aerial vehicles to experience difficulties procuring parts.
2	Infiltration of technological information and cyber attack	Unmanned Aerial Vehicles, because they are high-tech products and are controlled remotely, can be defined as the most open-air vehicles for cyber attacks. Especially in the recent period, the realization of control via satellites instead of the ground command centre to create more range puts it in a position open to cyber attacks. As it is highly likely that direct cyber attacks against Unmanned aerial vehicles will be carried out and their source codes will be seized, there is a risk that trade secrets may be taken through cyber attacks against manufacturer companies. Companies' future-oriented Unmanned Aerial Vehicle projects and prototype information are seized, causing companies to experience significant commercial losses.
3	Economic instability	Companies want economic stability to exist in the countries where they operate. The manufacturing company wants financial stability for foreign and domestic investors to contribute to their companies and for healthy exports to be realized.

Source: Created by the auther.

3. Conclusion and Evaluation

Due to technological advances and the needs of states, as well as the desires and opinions of non-state actors, structural changes have been made to UAVs. Both states and companies have implemented these changes with the advent of Industry 4.0. Due to their low cost and fast response time, UAVs are now used for various purposes, including migration monitoring, firefighting, border security, agriculture and cargo transport. UAVs have become essential in the fight against the COVID-19 epidemic, particularly in tasks such as drug delivery, public compliance monitoring and early intervention. The impact of COVID-19 on public transport and the need for non-contact delivery has led to increased investment by civil aviation companies in unmanned aerial vehicles for civil transport purposes, resulting in new missions.

As governments tailor their UAVs to their specific needs, companies have also begun developing unmanned aerial vehicles for various sectors, recognizing the potential opportunities in this area. Civil aviation companies and related industries are also entering the unmanned aerial vehicle market and continuously improving their production facilities and services. The growth trend of UAVs is expected to increase due to the opportunities presented by Turkish Airlines, Boeing, and Henan SunHawk companies. These opportunities include creating new market areas, scarcity of competitors, and the possibility of mass production. Additionally, the companies offer personnel training, R&D opportunities, a wide product range, and strengths in training and occupational health and safety.

UAVs are expected to be widely used in the next 25 years in diverse areas such as health, tourism, agriculture, migration, transport, and intervention in social events. They will likely be actively deployed. The increasing use of unmanned aerial vehicles in various sectors is leading to increased investment by information and technology companies, as well as civil aviation companies, which will result in the allocation of significant resources to develop UAV technologies. UAVs are expected to become increasingly common in certain areas of our lives within the next quarter of a century.

Author contributions

All authors have contributed with maximum contribution.

Conflicts of interest

There are no conflicts of interest in any part of the research paper.

Statement of Research and Publication Ethics

For this type of study formal consent is not required.

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