Chapter 6
Evolution of Unmanned Aerial Systems and Inconsistencies Between Strategies, Concepts, and Technology

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ABSTRACT

Unmanned aerial systems (UAS) are undoubtedly a rising value that marked the 21st century in the aviation industry. Recently, both the high and precise technology used in aviation and the rapid development of artificial intelligence have enabled these remotely controlled aircrafts to find widespread use in the civilian field. Even these smart technologies and artificial intelligence transformed the UAS into different forms like flying swarm in the airspace and Urban Air Mobility (UAM) which comprises passenger and cargo transportation without pilot in metropolitan cities. In this chapter, the technological evolution of UAS is examined in the historical process, the components that make up UAS are explained, and UAS classification considering various characteristics with different aspects is detailed. Finally, issues resulting from strategies, concepts, and regulations falling behind evolving UAS technologies with aviation management perspective are discussed.

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1. INTRODUCTION

One of the greatest discoveries of the 20th century is undoubtedly unmanned systems. Studies in the fields of automation and artificial intelligence led to the development of unmanned systems. Unmanned Aerial Vehicles (UAVs) play a crucial role in the world of unmanned systems. UAVs are being studied in both the natural and social sciences as a result of their recent popularity and advancements.

Although UAVs describe an aircraft that flies without humans on board, a UAV is not an object that can fly on its own. In order for the UAV to fly, it requires a systematic approach and human-intensive operational work. This reveals the teamwork, task responsibilities and authorities of the people who will take part in the system. Ultimately, a team that can perform harmonious tasks is needed. Depending on the size of the UAVs and the nature of the operational work, different numbers of people must be included in the task teams of UAS. This number can range from one to tens of individuals. While a hobbyist or mini-class UAV used for any purpose may just require one person, larger UAV flight operations require a large team. Because of this, UAS operations necessitate a lot of coordination from humans even though it is referred to as an "Unmanned" system. The human factor sensitivity that applies to manned aircraft also applies to UAS.

Understanding and learning UAS are based on an interdisciplinary manner. UAS are utilized in a variety of contexts and advance daily in lockstep with changes in technology, strategy, and needs. The production phase of the aircraft, ground control station, and ground data terminal in these systems requires the contribution of many engineering fields, such as aerospace, electronics, mechanical, mechatronic, material, and industrial engineering. However, disciplines like strategy, business, management, law, and meteorology are also included in the application phase. Understanding UAS requires a synergistic system management approach. A separate research must be conducted to examine the technical challenge of choosing the location where UAS will be deployed and used.

The history of UAV means the history of aviation and dates back to before the discovery of manned aircraft. However, it failed to attract the attention of International Civil Aviation Organization (ICAO) until 2005 since UAV is not considered in an aircraft category. Therefore, UAS has not taken seriously enough until recently. ICAO did not even want to