A NEW WAY OF DOING BUSINESS DURING THE COVID-19 PANDEMIC: AN EXAMPLE OF THE DACUM ANALYSIS

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Case study
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Abstract

This study aims to analyze the way of doing business caused by the COVID-19 pandemic in an educational organization that trains Unmanned Aerial Vehicle (UAV) pilots using DACUM (Developing A CurriculUM) analysis. A focus group was adopted as the data collection method. As a result of this empirical study, the duties, tasks, knowledge, skills, and behaviors expected from the team were determined, including the equipment needed for the continuity of the team's activities. This empirical study provides theoretical and practical contributions to the literature on the analysis of business processes, the elaboration of DACUM analysis as a business analysis method, and the determination of how the COVID-19 has changed the way an organization does business.

Keywords: *job analysis, Developing A CurriculUM (DACUM) analysis, Unmanned Aerial Vehicles (UAV), COVID-19*

1. INTRODUCTION

Coronavirus, first detected in a seafood market in Wuhan, China, in December 2019, spread worldwide, leading to the global pandemic being declared and named COVID-19 (Yetiz, 2021; Lai et al., 2020; Kılıç, 2020; BBC, 2020). Restrictions led to a decline in the global economy, and many industries had to either slow down or stop their activities (Gashi and Havolli, 2021; Zigman et al., 2021; Kohlscheen, 2020; Szlezak et al., 2020). Companies, on the other hand, turned to changes in their organizational structures and business methods to mitigate the effects of the COVID-19 crisis (Öge and Çetin, 2020; Şen and Batı, 2020).

Organizations conduct a job analysis to collect and analyze information about the characteristics, components, and requirements of the business they operate and reconstruct their way of doing business (Brannick and Levine, 2002; Harvey and Wilson, 2000; Morgeson et al., 2019; Joh et al., 2015; Clifford, 1994).

The job analysis as a systematic process has two primary forms: a job-oriented (strategic) and an employee-oriented (functional) one (Abessolo et al., 2017; Pattisahusiwa, 2013; Cucina et al., 2012; Subba, 2010; Sharma, 2010; Sarma, 2007). Developing a CurriculUM (DACUM) analysis as a job analysis method serves both purposes and can be defined as the process

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of dividing a job into duties, discovering the relationships between the duties, and determining the knowledge, skills, and abilities an employee needs to have to perform those duties (Hye-eun and Choong, 2018; Heo, 2010).

As to incorporate the assessment of the COVID-19 economic impact, this study aims to cover the topic of the transformations of company operations by using an example of the DACUM analysis in the Unmanned Aerial Vehicle (UAV) Pilot Training Program. This is one of the training programs performed under the authority of Turkey's Directorate General of Civil Aviation (DGCA). In this context, the main problem of this study was formulated as follows: "How to analyze the business practices in an educational institution that trains UAV pilots by using the DACUM analysis after the changes that occurred because of COVID-19?" The sub-problems to be answered are as follows:

- What are the duties of the UAV team?
- What are the tasks of the UAV team within the scope of its defined duties?
- What knowledge and skills should the UAV team possess?
- What are the behaviors of the UAV team?
- What are the tools and equipment used by the UAV team?
- What are the duties and tasks differentiated by COVID-19?

The method used to answer these questions was the qualitative research method, and the study design used was the holistic single-case design. This study was conducted within the Aviation Application and Research Center, established at a state university, where the study's author is employed. The universe of this research consisted of eight actors working in the Aviation Application and Research Center, i.e., the UAV team. Since three of these were trainers and exempt from operational activities, the remaining five actors constituted the sample of this study. This number was sufficient for this study to reach complete saturation (Yıldırım and Şimşek, 2013). Therefore, the unit of analysis of the research was the UAV training management team. Data were collected through a brainstorming-based focus group interview, and the collected data were analyzed using content analysis.

In reviewing the extant literature, it was found that academic studies aiming to empirically demonstrate how COVID-19, whose sectoral and organizational consequences remain to be clarified, has changed the way organizations do business, are not yet sufficiently developed. This empirical study demonstrates how COVID-19 changed how a job is performed by using the DACUM analysis.

In the context of the previously mentioned objective, this study offers some valuable fundamental contributions to the relevant literature in theoretical and practical terms. First, this study analyzes the business processes of an educational institution that trains UAV pilots. The knowledge, skills, and behaviors expected of the team members were identified, as well as the necessary equipment to execute the business processes. This provision makes a theoretical contribution to the field by explaining the job analysis process. It also makes a practical contribution by revealing the process of creating a qualification framework for an educational institution that trains UAV pilots. In addition, this study conceptually details the DACUM analysis, a low-cost, effective, and innovative job analysis

method based on the consensus and a synergic process (Norton and Moser, 2013; Norton, 1997; Adams et al., 2017).

2. LITERATURE REVIEW

2.1 COVID-19 and its organizational effects

The worldwide spread of the virus has led to the declaration of a global pandemic. For an epidemic to be considered a pandemic, there must be a virus that humanity has not yet known, which can be easily transmitted from person to person and cause many deaths. There should be no available cure for the disease caused (WHO, 2020). Given that the coronavirus has these characteristics, on February 11, 2020, the World Health Organization named the disease caused by coronavirus COVID-19 and declared the beginning of a pandemic.

COVID-19 has threatened the economy and economic development and affected the human population globally (Lai et al., 2020; IMF, 2020). Nation-states have implemented practices such as quarantine, curfews, border closures, travel restrictions, suspension of education, flexible working, home-based work, and incentive packages to prevent the spread of the coronavirus and protect their economies (Yetiz, 2021; Kilic, 2020). These restrictions have led to a downturn in the global economy, and many industries have had to either slow down or stop their activities (Gashi and Havolli, 2021; Zigman et al., 2021; Kohlscheen, 2020; Szlezak et al., 2020).

Studies show that not all sectors are equally affected by the COVID-19 crisis in activity and production. Wholesale, retail, manufacturing, real estate, accommodation, food services, arts, entertainment, recreation, sports, transportation, storage, and communication were highly affected. Construction, finance, insurance, mining, and quarrying were moderately affected; agriculture, forestry, and fishing were low to moderately affected. Health care, social services, education, public administration, defense, and civil service sectors were less affected by the COVID-19 crisis. However, it is foreseeable that the crisis will severely affect the health, education, social services, public services, and management sectors, which are crucial in terms of their areas of activity (Kara, 2020).

Organizations affected by the COVID-19 crisis turned to changes in their organizational structures and business operations to mitigate its effects (Gashi and Havolli, 2021; Öge and Çetin, 2020; Şen and Batı, 2020). These changes mainly occurred in digital transformation; hence many institutions and organizations have put digitalization on their agenda. This situation has made digital transformation a necessity, changing the strategic directions, business practices, and values of organizations, creating new business and educational models, and triggering coordinated and profound changes in the workforce, culture, and technology (Gashi and Havolli, 2021; Brooks and McCormack, 2020).

During the COVID-19 crisis, it was observed that the use of digital communication tools has increased, especially in organizations operating in areas such as education, health, and banking. These organizations have moved to online meetings instead of face-to-face meetings to prevent the spread of the virus, and they have expanded the use of digital activities (Hasanat et al., 2020). On the other hand, depending on the type of products and services they offer, some organizations have turned to online shopping, used payment methods such

as credit cards and electronic money instead of cash, educational institutions have shifted to online learning, and banks have established remote sales teams, manufacturers have turned to digital plans, and markets have inclined to online ordering and delivery (Canatan and İpek, 2021; Baig et al., 2020).

The innovation triggered by the rapid development of technology has led individuals to integrate innovative tools into business operations. In contrast, restrictions brought by COVID-19 have made the usage of these tools even more widespread (Canatan and İpek, 2021). Indeed, while this crisis is assessed as a time of danger, uncertainty, and destructive instability, it can also be considered by the rise of digital technologies, microenterprises, resource-intensive forms of communication, and outsourcing practices. It seems that sectors, institutions, and organizations apt to digitalization in their activities and that have accepted digitalization are less affected by this crisis or are turning the crisis into an opportunity.

To prevent the coronavirus's global spread, educational institutions suspended face-to-face teaching (Doghonadze et al., 2020; Gupta and Goplani, 2020), but various teaching approaches were provided to ensure continuity. Distance education (remote education) applications (such as live lessons and online courses) appeared on the agenda of (Bozkurt, 2020). Distance education is a teaching method consisting of interconnected elements with various forms of communication and learning materials for a specific purpose (Rapanta et al., 2020; Bozkurt, 2020; Moore and Kearsley, 2012). It has become a globally used method because it is independent of time and place, allows the use of various technologies, and educational materials can be configured and updated in an electronic environment and accessed at any time of the day (Yamamoto and Altun, 2020). It has been clearly shown how important this method is in the COVID-19 period.

2.2 DACUM analysis as a job analysis method

Human resource management is considered a comprehensive process that ranges from identifying employee needs to regulating employee capacity (Thom, 2001). In this context, human resource management is defined as the strategic positioning of employees and the determination of jobs to achieve a competitive advantage by combining various structural, cultural, and management techniques (Osibanjo and Adenji, 2012). As the definition indicates, human resource management creates systems that enable employees to transfer their skills, knowledge, abilities, and behaviors (Jaškiene and Buciuniene, 2021). The prerequisite for the effective creation of such systems and the establishment of their standards is the implementation of job analysis studies.

In its most general definition, job analysis is a systematic process of discovering the nature of a job (Pattisahusiwa, 2013; Cucina et al., 2012). This process involves gathering, analyzing, and restructuring information about the job's characteristics, components, and requirements (Brannick and Levine, 2002; Harvey and Wilson, 2000; Morgeson et al., 2019; Joh et al., 2015; Clifford, 1994). Schneider and Konz (1989), who conducted one of the most comprehensive studies on this topic, emphasized that a systematic job analysis is conducted in eight stages and defined a procedure they called *multimethod job analysis*. The processes involved in the authors' procedure are:

- Gathering information on available jobs
- Identifying job duties and creating duty sets
- Developing and administering task surveys
- Performing statistical analysis of responses to task surveys
- Conducting identification of knowledge, skills, and talents
- Developing and administering knowledge, skills, and talent surveys
- Gathering information about future processes
- Revising duties and sets of duties and knowledge, skills, and abilities in the light of processes that are anticipated to change.

When Schneider and Konz's (1989) *multimethod job analysis procedure* and the relevant literature are reviewed together, it is found that job analyses are divided into two main categories: job-oriented *(strategic job analysis)* and employee-oriented *(functional job analysis)* job analyses (Abessolo et al., 2017; Pattisahusiwa, 2013; Cucina et al., 2012; Subba, 2010; Sharma, 2010; Sarma, 2007). Job-oriented analyses, which focus on the job itself, are conducted to define a new job, reorganize an existing job, and obtain information about current tasks. Employee-oriented analyses highlight employee qualifications, competencies, knowledge, and skills and identify the characteristics, experience, education level, and special skills required to perform the job.

The review of relevant literature indicates that job analysis is conducted using various methods, such as the task inventory method (Wyse and Babcock, 2018), the position analysis method (Abessolo et al., 2017), the critical incident method (Raymond, 2010), the Fleishman job analysis questionnaire (Fleishman and Reilly, 1992), the functional job analysis method (Raymond, 2010), the job items method, and the job components inventory method (Morgeson et al., 2019). In a job analysis using these methods, data are collected through techniques such as interviews (Pynes, 2009), technical interviews (Decenzo and Robbins, 2010), questionnaires (Gómez et al., 2004), observation (Decenzo and Robbins, 2010), keeping a diary (Decenzo and Robbins, 2010), and mixed methods (Pynes, 2009).

The DACUM analysis, which is a job analysis method, is the process of dividing a job into duties, discovering the relationships between duties, and determining the knowledge, skills, and abilities that an employee needs to have to perform those duties (Hye-eun and Choong, 2018; Heo, 2010). DACUM is considered one of the best tools to analyze specialized and professional jobs. This approach provides organizations with precise and detailed information about employee roles and responsibilities, job processes, job systems, duties, and assignments. In addition, the DACUM analysis analyzes occupations at the managerial, professional, technical, skilled, and semi-skilled levels, conceptualizes future jobs, and clarifies the subdivisions of an occupation (Norton, 2008; De Onna, 2002; Adams, 1975). This way, the knowledge, skills, behavioral qualities, and tools can be identified as required to create competency-based training programs and successfully perform a particular job. In addition, the DACUM analysis can also be used to identify employee concerns about that job.

The DACUM analysis is employed to develop new programs, reevaluate existing

programs, classify jobs, examine all aspects of an occupation, produce a highly skilled workforce, develop human resources, secure and collect necessary information about employee duties, responsibilities, and roles (Norton, 1997; Willett and Hermann, 1989). This analysis ensures that a job is defined realistically (Norton, 1997) and makes it easy to understand what is going on in the job. It also enables managers to make logical decisions about job restructuring.

Dixon and Stricklin (2014) point to three main advantages of using the DACUM analysis to evaluate business needs: cost-effective, agile, and practical. The authors noted that the DACUM analysis is widely accepted by many human resource strategists and professional behavior analysts because of these advantages. They emphasized that these strategists and analysts often revise job-based strategies using DACUM. In their study, Wijanarka (2014) stated that DACUM is an effective and appropriate job analysis method organizations can use to develop professional training, analyze work processes, and structure individual duties. Similarly, Halbrooks (2003) indicated that the DACUM analysis is a curriculum development and revision tool that can be effectively implemented in practice.

In contrast, Soon et al. (2008) stated that the DACUM analysis encompasses three levels: individual, organizational, and professional. At the individual level, the researchers noted, individuals define the characteristics of professional training by assessing their qualifications or expertise to identify their training needs. The organizational level is based on analyzing organizational needs, and periodic assessments of organizational structures and training are conducted. At the professional level, professional training needs are defined by human resource strategists based on knowledge, skills, and learning.

Examination of the relevant literature reveals that the DACUM analysis is based on three logical premises comprising its philosophy (Norton and Moser, 2013; Norton, 1997; Adams et al., 2017). These are:

- Expert employees who do a job/profession describe that job more accurately than anyone else.
- The most effective way to fully describe a job/profession is to describe the tasks performed by skilled workers.
- To perform a job/profession properly, it is necessary to use the knowledge, skills, behaviors, and tools required. Knowledge, skills, behaviors, and tools are not tasks but are the necessary parameters for successful job execution. For this reason, it is essential to identify the parameters specified in the DACUM analysis.

To produce a high-quality DACUM analysis, each process step should be carefully executed. The establishment of a DACUM committee consisting of at least five and no more than twelve experts in the field and the assistance of a trained DACUM facilitator is essential to the DACUM analysis (Finch and Crunkilton, 1999; Norton, 1997). When forming the DACUM committee, one should act regardless of age or seniority (Kang et al., 2012). The person leading the DACUM workshop is the DACUM facilitator, who guides participants through the process of synergy building, brainstorming, consensus building, and validation to develop the competency profile (Finch and Crunkilton, 1999).

In light of this information, the principles of the DACUM workshop can be summarized as follows (Düzgünçınar and Günbayı, 2020; Kang, 2012):

- A DACUM committee should be established, and a DACUM facilitator should be selected,
- The workshop should be held in a comfortable environment with only participants and the facilitator present,
- No reference sources such as laws or in-house regulations should be used during the workshop,
- Participants should be able to express their thoughts freely, first individually and then in group work, regardless of seniority or age,
- Duties and tasks should be recorded after all participants have agreed.

The main output of a DACUM workshop is the DACUM chart (Samsudin et al., 2020; Dixon and Stricklin, 2014). This schema consists of duties and associated tasks, as shown in Figure 1. Generally, a job consists of about 8-12 duties, which consist of about 50-200 tasks. A duty comprises a verb, a statement of the work to be done. This concept is a specific unit of the job that clearly defines the task in terms of performance and expresses a single verb and an observable work process. In other words, tasks are a set of operations performed in each duty. In addition to the DACUM chart, schemas such as knowledge, skills, behaviors, tools, materials, and concerns about the future can also be created.

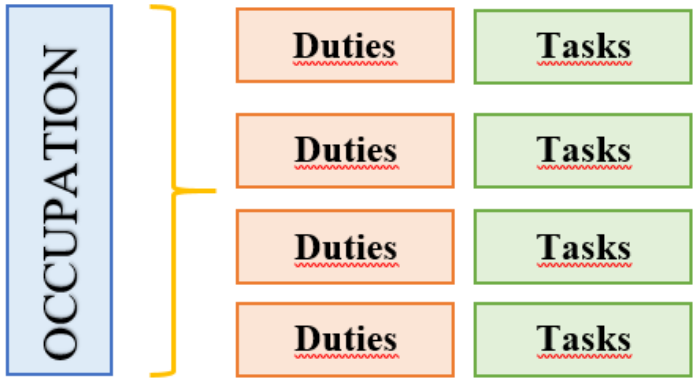

Figure 1. DACUM chart (Samsudin et al., 2020)

Hidari et al. (2021) aimed to present a model for empowering female supervisors in planning training for internal auditors. In their study, they conducted a Delphi analysis, an interpretive structural analysis, and a DACUM analysis with participants consisting of internal auditors from companies listed on the Tehran Stock Exchange (Iran). They concluded that companies could be improved by developing human resource strategies, especially for female auditors, and by developing individual, professional, and social development strategies for the professional training of internal auditors. Dixon et al. (2021) analyzed the competencies required for an entry-level position

in the Department of Nez Perce Fisheries Resource Management using DACUM. As a result of their study, 48 competencies were identified that are required to successfully perform as a fishery technician and improve the quality of work life.

Guo et al. (2021) used a DACUM analysis to examine how improving teachers' professional quality and competencies would affect the Sustainable Development Goals. The researchers found that the structure of teachers' professional quality is linked to 17 sustainable development goals and that improving teachers' professional quality and competence is vital to achieving the sustainable development goals. Heimlich et al. (2021) examined the process of creating an evidence-based professional learning competency framework for individuals working in informal science learning based on the DACUM analysis. They presented a model of duties, competencies, qualifications, and skills.

Samsudin et al. (2021) conducted a study to investigate the application of the DACUM chart in the Food Industry Technology Study Program (GETP) learning plan and assess the relationship between this chart and GETP learning plans. They concluded that the DACUM chart is 69.45% related to the GETP and that the DACUM chart should be redesigned to meet the minimum standards. In their study, Kang et al. (2012) conducted a DACUM analysis to perform a job analysis of clinical research coordinators in an institution conducting clinical research. As a result of the study, they defined 12 duties representing their importance, difficulty, and frequency, as well as 78 tasks and roles of coordinators. Based on the analysis, they also proposed developing a training program that addresses the importance, difficulty, and frequency of coordinators' work. Bragin et al. (2016) used a DACUM analysis to determine how to formalize social work practices in a country in crisis and identify the requirements for an effective and sustainable profession.

When these studies are evaluated holistically, it can be seen that the DACUM analysis is used for the development of all types of human resources, the identification of competencies and skills, the formation of various training programs, the creation of job descriptions, and the restructuring of the job in various organizational structures, such as in companies, industry, educational institutions, and public institutions.

3. DACUM ANALYSIS IN AN ORGANIZATIONAL CONTEXT

Based on the information presented in the previous section, a field study conducted in an organization that provides UAV training is included in this part of the study.

A qualitative research method was used to achieve the established study objective. Qualitative research is a method that allows for an in-depth investigation of all dimensions of the problems sought (Silverman, 2005; Dey, 1993). It is a powerful study method that uncovers why, how, and under what circumstances social phenomena occur.

Table 1. An overview of the research method

Research Process	
Research Pattern	Holistic single-state pattern
Analysis Unit of the Study	Eight actors
Research Universe	Five actors
Research Sample	UAV team members
Data Collection Method	Focus Group Discussion
Data Collection Tool	Brainstorming based DACUM
Data Analysis	Content analysis

As shown in Table 1, this study uses a holistic single case design as the research design. Case studies allow us to holistically examine factors such as processes, events, and individuals associated with a situation and understand how these factors affect that situation and how they are affected by the situation (Yıldırım and Şimşek, 2013). In case studies, the case serves as the basic unit of analysis (Yin, 2017). Conducting the study in a single organization positions the study as a single holistic case study. There is only one situation within the scope of the study, and this single situation is holistically assessed.

Case studies are conducted for explanatory, descriptive, and exploratory purposes (Yin, 2017). This case study has an exploratory function, allowing all aspects of duties and tasks to be uncovered. This study was conducted within the Aviation Application and Study Center, located at a state university where the researcher works. The rationale for choosing such a research context can be explained as follows: UAVs, also known as multirotor helicopters, are devices used for reconnaissance and remote sensing in complex environments where ground robots may fail or malfunction (Baca et al., 2021). Their flight characteristics, ability to hover, flexibility, ability to carry sensors, and low cost make them perfect for such environments (Baca et al., 2021; Eisenbeiss, 2004). UAVs are primarily used in military applications for environmental monitoring, recognition, mine clearance, and detection (Eisenbeiss, 2004). UAVs, whose development is strongly motivated by military applications, are now also being used outside the military domain. In this context, UAVs are used in agricultural areas, archaeological and constructional excavation sites, in such areas as health, security, and logistics, road maintenance, dam control, detection of the environment, observations, determination of the source of destruction in nature, detection and monitoring of animal populations. They are also used in the transportation of essential medicines, blood, and anti-toxins, crime scene investigations, searching and finding missing persons, monitoring and detecting severe accidents on highways, forest fires, and in and out of inaccessible areas (Baca et al., 2021; Turan et al., 2020; Roche et al., 2014; Eisenbeiss, 2004).

UAVs are divided into four categories based on their maximum takeoff weight (64). 1) UAV0: 500 gr – 4 kg, 2) UAV1: 4 kg - 25 kg, 3) UAV2: 25 kg - 150 kg, 4) UAV3: UAVs weighing 150 kg (inclusive) and above. A remote pilot operates these UAVs, and the UAV pilot plans the flight operation. This operation requires extensive training. UAV pilot training is offered all over the world by government-approved

educational institutions. This study was conducted within the Aviation Application and Research Center, authorized by the DGCA authority in Turkey, to offer UAV training. This center was established in 2017 as a part of a state university to conduct research, practices, projects, and training studies on economic, technological, scientific, medical, legal, social, and all other related subjects for the regular and safe functioning and healthy development of national and international aviation services, including training of UAV pilots.

Due to the COVID -19 outbreak in December 2019, the DGCA started the digital transformation process and updated its legislation in November 2020, so approved training institutions could deliver UAV training remotely[1]. According to this legislation, theoretical training can be carried out online, and practical training can be conducted in person, provided that it is under pandemic conditions. Therefore, the delivery of the in-person training program and the delivery of the online training program became differentiated. This study aimed to describe these different approaches in detail.

In the said center, UAV training is conducted by a team of eight people. Three of the eight people were trainers, and the remaining five performed operational activities. Therefore, the universe of this research consisted of eight actors working in this UAV team. The study sample consisted of five actors who formed the universe, other than the trainers of the UAV team and performed operational activities. This number was sufficient to achieve a complete saturation of the study (Yıldırım and Şimşek, 2013). The sample of the study was based on criterion sampling (Yıldırım and Şimşek, 2013), one of the methods of purposive sampling (Maxwell, 1996; Patton, 1987). Individuals who had personally experienced the situation and could share their experiences constitute the unit of analysis in this study. Therefore, the actors whose opinions about UAV training and operational activities were obtained constitute this study's analysis unit (data sources). To conduct an appropriate job analysis, it is considered appropriate to interview the people who do the job themselves about how it is done and what is done. Thus, in this study, the focus is on the actors responsible for performing their implementation duties and performing the actions themselves.

This study used a brainstorming-based focus group interview as the data collection method. A focus group interview is gathering a group of individuals to express their views about the study problem based on their own experiences (Powell et al., 1996). A qualified data set can be obtained through the interaction that takes place during this discussion (Patton, 2002; Morgan, 1997). Since the focus group interview overlapped with the DACUM philosophy, it was deemed appropriate to use this data collection method. Content analysis was employed to analyze the data collected.

The DACUM analysis was conducted in a workshop attended by the involved actors. The meeting room of the building where the Aviation Application and Research Center operates was prepared for the workshop. Since the researcher is a member of the UAV team, they participated in the workshop both as a DACUM facilitator and as a participant. The DACUM facilitator seated the participants in a U-shape to engage them in discussion and briefed them on the DACUM process (Fig. 2). The DACUM facilitator first asked what the duties were, had each participant name a duty, and wrote the said duties on the whiteboard.

[1] See: https://iha.shgm.gov.tr (April 25, 2021)

The participants were further asked what the tasks were under the determined duties. After the duties and tasks were specified, they were asked about the knowledge, skills, and behaviors needed to perform the specified tasks and work similarly, as well as the tools, equipment, and materials needed. In this process, the DACUM facilitator acted under the following principles:

- He treated the participants equally despite their title and age.
- The workshop was held in an environment where the participants felt comfortable.
- No references, such as laws or regulations, were used during the workshop.
- The answers given during the interview, which lasted two days and 7.5 hours, including breaks, were noted in detail and systematically after a consensus was reached.

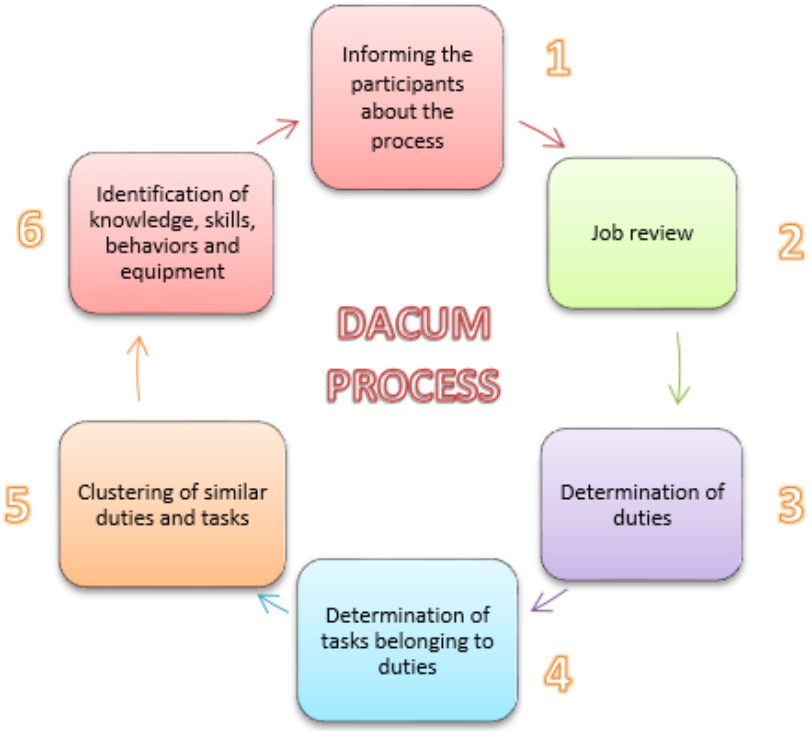

Figure 2. DACUM workshop process

As a result of the first meeting of the DACUM analysis, it was found that six duties and a total of 48 tasks under these duties were performed. Afterward, the duties and tasks performed were reviewed and rearranged through another meeting with the participants. The criteria of credibility, transferability, consistency, and confirmability were used to meet the suitability criteria of the present study (Lincoln et al., 2011; Krefting, 1991).

3.1 Findings

The duties of the UAV team, the tasks within the established duties, the knowledge

and skills that the team needs to have, the behaviors, the tools and equipment used, and the duties and tasks that changed during the COVID-19 process were identified. The UAV team's duties and tasks during each mission are listed in the DACUM analysis table (Table 2).

Table 2. UAV team DACUM analysis

DUTIES	TASKS
A. Perform course reinforcing exercises	**A.1.** Promote the course. **A.2.** Establish protocols with relevant institutions. **A.3.** Procure and update the necessary machines, devices, and equipment. **A.4.** Prepare and deliver promotional products. **A.5.** Follow the relevant regulations and make necessary updates. **A.6.** Follow technological changes and trends and make necessary updates. **A.7.** Create an archive.
B. Prepare for the course	**B.1.** Determine the training date. **B.2.** Publish the text of the approved training announcement on the website and on social media accounts. **B.3.** Receive pre-registrations via the website. **B.4.** Collect registration documents from the trainees online. **B.5.** Compare registration forms, submitted registration documents, and bank accounts. **B.6.** Check if the trainees' documents are missing. **B.7.** Communicate with the trainees who have missing documents to address deficiencies. **B.8.** Create the final record list. **B.9.** Archive the final trainee registration documents in a digital environment. **B.10.** Create a GSM communication group for the relevant course semester. **B.11.** Add the trainees, trainers, and UAV team to the GSM contact group. **B.12.** Prepare an informational text for the trainees. **B.13.** Inform the trainees, trainers, and the UAV team by sending the trainee information text via the GSM communication group. **B.14.** Prepare the trainee participation list, which includes the trainee's first name and surname, GSM number, and e-mail address information. **B.15.** Ensure that trainers prepare and/or update the curriculum and materials for relevant course semester. **B.16.** Establish the online education class of the relevant course semester through the appropriate webinar program. **B.17.** Add semester trainees, trainers, UAV team, and SHGM representative to the established online education class. **B.18.** Send the prepared trainee participant list, the curriculum of the relevant semester, and the link to the online education class to the DGCA. **B.19.** Notify the top institution management and the provincial Police Department of the application training date and obtain the necessary permissions. **B.20.** Obtain the necessary permissions from the general police authority to allow the trainees to participate in the practical training that coincides with the curfew period. **B.21.** Prepare the university stadium for the practical training session. **B.22.** Prepare a reminder text for COVID-19 measures.

C. Provide online training	**C.1.** Start the online training on the specified date. **C.2.** Verify that trainees can connect to the Online Education Class. **C.3.** Provide technical assistance to the trainees who are unable to connect to the class. **C.4.** Obtain trainees' log records at the end of each lesson. **C.5.** Record the lessons.
D. Provide practical training	**D.1.** Collect trainees at the specified date and place for practical training. **D.2.** Check the tools to be used during the lesson. **D.3.** Distribute masks, gloves, and disinfectants to trainees, trainers, and the UAV team as part of the actions from the COVID-19 measures. **D.4.** Distribute promotional vests to trainees to wear during the course. **D.5.** Read the reminder text regarding pandemic measures to the trainees, trainers, and the UAV team of the relevant semester. **D.6.** Have the trainees sign the Practice Training Attendance List prior to practice. **D.7.** Collect the promotional vests worn at the end of the course.
E. Perform accounting transactions	**E.1.** Refunds for those who canceled their participation in the course. **E.2.** Issue invoices for paying trainees. **E.3.** Prepare the accounting transaction slip, payment order document, bank payment copy, payrolls, contribution margin sheet, additional payment distribution sheet, accounting transaction slip delivery, and receipt sheet to be submitted to the higher institution unit. **E.4.** Prepare the official payment order, trainers and managers overtime pay plan, and bank payment plan documents to be delivered to the bank. **E.5.** Have the prepared documents approved and signed by the UAV team expenditure officer and the execution officer. **E.6.** Deliver the signed documents to the higher institution unit and the bank. **E.7.** Confirm the transfer of payments to the accounts by contacting the bank.
F. Print the certificates	**F.1.** Determine the certificate numbers of the trainees who completed the course. **F.2.** Prepare the printing trainee information list, including the trainee identity number, name and surname, photograph, certificate number, and driver's license type. **F.3.** Send the list with the information about the trainees to the printing company in digital form. **F.4.** Permit the printing company to print certificates and drivers' licenses. **F.5.** Check the certificates and licenses coming from the printing company. **F.6.** Correct certificates and driver's licenses that are printed incorrectly.
G. Finalize the process	**G.1.** Identify trainees who attended the online and practice training and those who did not. **G.2.** Prepare the list of trainees eligible to receive a certificate and driver's license by participating in the online training and practice training. **G.3.** Send the certificate and driver's license attendance list to the DGCA. **G.4.** Prepare a delivery file consisting of the certificate, driver's license, and invoice for each of the trainees who are eligible to receive the certificate and driver's license. **G.5.** Deliver the certificates and driver's licenses to their owners against signature. **G.6.** Assist the trainees in submitting driver's licenses to the DGCA. **G.7.** Enter the required information into the alumni database. **G.8.** Post videos and photos on social media during the training.

The DACUM analysis identified seven duties: course review, course preparation, online training, practice training, accounting, printing, and final processing. Depending on these seven duties, 62 tasks were determined to have been performed.

This study examined the knowledge and skills that the UAV team needs to possess, the behaviors of the UAV team, and the tools and equipment used by the UAV team. The results are presented in Table 3.

Table 3. Knowledge, skills, and behaviors required by the UAV team, tools, equipment, and materials used by the team

MAIN THEMES	SUB-THEMES
The knowledge that the UAV team should have	1. Management knowledge, 2. Technical information, 3. Knowledge of law and legislation, 4. Foreign language knowledge, 5. Knowledge of computer applications, 6. Information on financial matters, 7. UAV information, 8. System information of DIMIS, KBS, MYS, and EBYS.
Skills the UAV team should have	1. Time management skills, 2. Stress management skills, 3. Operational competence skills, 4. Representation skills, 5. Solution-orientation, 6. Plannedness, 7. Ability to be proactive, 8. Public relations skills, 9. Communication skills, 10. Ability to empathize, 11. Be technically strong, 12. Ability to use UAV, 13. Ability to process images captured by UAV.
Behaviors of the UAV team	1. Safety-oriented behavior, 2. Strategic behavior, 3. Patient behavior, 4. Professional behavior, 5. Ethical behavior, 6. Friendly behavior, 7. Compliant behavior.
Tools, equipment, and materials used by the UAV team	1. Drone, 2. Drone controller, 3. Drone battery, 4. Computer, 5. Tablet Computer, 6. Radio 7. Cell phone, 8. Office phone, 9. Consumables.

The results indicated that the UAV team should have eight types of knowledge, including management knowledge, technical knowledge, legal and regulatory knowledge, and foreign language knowledge. In addition, the UAV team should have skills such as time and stress management, representation, solution orientation,

planning, public relations, communication, empathy, and technical strength. The behaviors of the UAV team were questioned, and it was found that behavioral traits such as being safety-oriented, strategic, and patient were expected from the team. When examining the tools, equipment, and materials needed by the UAV team to conduct their activities, it was determined that tools and materials, such as drones, drone controllers, drone batteries, computers, tablet computers, and radios, were essential.

Table 4. Duties and tasks changed by the COVID-19 pandemic

DIFFERENT DUTIES	DIFFERENT TASKS
Conduct exercises to reinforce the course	• Procure and update necessary machinery, equipment, and equipment. • Follow the relevant regulations and make the necessary updates. • Create an archive.
Prepare for the course	• Create a GSM communication group for the relevant course semester. • Ensure trainers prepare and update the curriculum and materials for the relevant course semester. • Set up the online education class for the relevant course semester through the appropriate webinar program. • Add the semester's trainees, trainers, the UAV team, and an SHGM representative to the online education class setup. • Send the prepared trainee participant list, the curriculum for the relevant semester, and the online education class link to the DGCA. • Obtain the necessary permissions from the general law enforcement agency to allow the trainees to participate in the practical training following the curfew. • Prepare a reminder text for pandemic measures.
Provide online training	• Commence the online training on the specified date. • Verify that the trainees can connect to the online education class. • Provide technical assistance to the trainees who cannot join the class. • Get the trainees' log records at the end of each lesson. • Record lessons.
Provide practice training	• Distribute masks, gloves, and disinfectants to the trainees, trainers, and the UAV team as part of the COVID-19 measures

In this study, what duties and tasks changed by the COVID-19 were examined (Table 4). As a result of the study, it was found that the duties of course reinforcement, course preparation, online training, and practical training were differentiated, and the necessary tasks also differed among these duties.

4. DISCUSSION

The DGCA is the deciding and regulating authority for UAV pilot training in Turkey. Organizations authorized by this supreme authority provide the necessary training and must strictly adhere to the DGCA legislation. The trainees who complete the training are eligible to obtain the commercial UAV pilot license and radio certificate approved by the DGCA. With COVID -19 requiring a break from face-to-face training, the DGCA has differentiated its training processes and paved the way for its authorized organizations to conduct the theoretical parts of UAV training on the online platform.

By using the DACUM analysis, this study clarified all the work details by creating a list of knowledge, skills, behavioral characteristics, tools, equipment, and materials required by high-performing employees. It then detailed which phases of the UAV training process changed due to the COVID-19 pandemic. The DACUM analysis identified seven duties: course reinforcement, course preparation, online training, practice training, accounting, printing, and final processing. These tasks were consistent with the training priorities of organizations that train UAV pilots.

It was found that 62 tasks were performed depending on the seven duties specified. When the above tasks are evaluated together with the duties, it is found that most of the tasks are defined as "course preparations." This indicates that the preparation processes are elaborative and that their tasks must be carefully dwelled upon to conduct training appropriately. Similarly, it shows that the duty with the fewest tasks is to provide online training. The UAV team performs few tasks in this duty because the UAV team turns the training process over to the trainers. In this training process, the trainers teach courses on topics within their expertise. The UAV team members responsible for operations are involved in these courses to address potential technical issues.

It was determined that the UAV team must possess system-related information such as management, engineering, law and legislation, computer, finance, foreign languages, etc. There is an obligation to comply with the DGCA regulations, requiring the UAV team to know the relevant laws and legislation and follow the updates closely. The international nature of this course also necessitates foreign language skills. UAVs are complex devices, and the team needs relevant technical knowledge. Accounting for contribution payments to the institution, trainee payments, payments to the team, and necessary purchases require knowledge of financial matters. On the other hand, management information is considered one other mandatory information for the effective management of the unit.

Results showed that skills such as time and stress management, representation, solution orientation, planning, public relations, communication, empathy, and technical strength are the skills that the UAV team needs to possess, as the UAV team is expected to have communication and empathy skills to guide the trainees properly. To ensure the course's sustainability, the team must be able to provide good public relations. The ability to organize in the process, manage stress and time effectively, be proactive and plan for the solution of potential problems are necessary skills for the team. In addition, the team should be equipped with the skills to use UAVs, the main objects of the training, and to process the captured images.

Using drones requires following the law and not violating safety. The awareness of following the rules and not violating safety is taught to the trainees during the training. Therefore, it was found that one of the basic behaviors expected of the UAV team is to be safety oriented, and the other is to act ethically. It was found that the compatibility of the team with each other, with the trainees and all related entities, acting according to the plan, strategic behavior, and professional behavior are the characteristic behavioral traits.

The drone, the radio, and the auxiliary parts of the drone, such as the remote control, the tablet computer, the spare battery, and the smartphone, are the essential tools

the UAV team needs to provide appropriate training. Consumables, including promotional items, office phones, and computers essential for online education, are other tools, materials, and items considered necessary for the training organization. With the answer to this question, it is possible to effectively plan the resources allocated for tools, equipment, and materials needed for training.

As a result of the study, it was found that the duties of course reinforcement, course preparation, online training, and practical training, as well as the necessary tasks within these duties, were changed. At this point, the study results on the jobs differentiated by COVID-19 indicate the following changes;

- With the COVID-19 pandemic, the theoretical training, which previously took place in person, was moved to the online platform.
- The legislation, curriculum, and course content were updated as deemed appropriate by the supreme authority (DGCA) to make the transition.
- Infrastructural preparations were then completed, such as setting up the required online training courses, involving all stakeholders in these courses, and providing the necessary technical support.
- The necessary permits were obtained from the relevant authorities on the days of the practical training that coincided with the curfew to ensure that the trainees, trainers, and the officers in charge of the operation complied with the requirements.
- It was ensured that the online training logs were maintained and lessons were recorded and reported to a higher authority.

5. CONCLUSION

Academic studies empirically demonstrating how the COVID-19 pandemic has changed the way organizations perform their work have not been developed enough. This empirical study used an analysis conducted in an educational institution using the DACUM analysis to demonstrate how the pandemic has changed the way work is done. As a result of the research, seven duties and 62 tasks under these duties were determined, and a DACUM analysis table was created. It was also identified that eight types of knowledge, thirteen skills, seven behavioral characteristics, and nine tools, equipment, and materials were used.

This study has made some contributions to the related literature, both theoretically and practically. First, this study analyzed the work processes of an educational institution that trains UAV pilots. It identified the knowledge, skills, and behaviors expected of team members and the equipment needed to perform the work processes. This determination makes a theoretical contribution to the field by explaining a process of job analysis and, in practical terms, the process of creating a qualification framework for an educational institution that trains UAV pilots. In addition, this study conceptually detailed the DACUM analysis, a job analysis method, and explained its process step by step through an empirical study. In this way, the DACUM analysis, a low-cost, effective, and innovative job analysis method that is based on consensus and can reveal all the details of a job by creating a synergy process (Norton and Moser, 2013; Norton, 1997; Adams et al., 2017), is conceptually discussed. When studies dealing

with the DACUM analysis are evaluated holistically, it can be seen that the DACUM analysis is used to develop all types of human resources in various organizational structures such as companies, industries, educational institutions, and public institutions, to identify competencies and skills, to develop various training programs, to create job descriptions, and to revise the job. It is a job analysis method that can be used for various purposes, such as structuring and analyzing work processes and systems. Finally, this study has shown how the COVID -19 pandemic has changed how an educational institution performs its work.

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NOVI NAČIN POSLOVANJA U DOBA COVID-19: PRIMJER DACUM ANALIZE

Sažetak

U ovom se radu analiza način poslovanja uslijed pandemije COVID-19, u organizaciji koja se bavi osposobljavanjem operatora bespilotnih letjelica korištenjem analize DACUM (Developing A CurriculUM). Podaci su prikupljeni metodom fokus grupa. Kao empirijski rezultat rada, određene su dužnosti, zadaci, znanja, vještine i ponašanje, koji se očekuju od tima, kao i od opreme, potrebne za osiguranje kontinuiteta aktivnosti. Ovaj rad pruža teorijski i praktičan doprinos literaturi analize poslovnih procesa, elaboraciji analize DACUM kao metodi poslovne analize, kao i raspravi kako je COVID-19 promijenio način poslovanja.

Ključne riječi: *analiza posla, analiza Developing A CurriculUM (DACUM), bespilotne letjelice, COVID-19*