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DIGITAL TRANSFORMATION IN CIVIL AVIATION

(Presented by Türkiye)

EXECUTIVE SUMMARY

In the 21st Century, one of the sectors most affected by technological developments worldwide is undoubtedly civil aviation sector. Among these technological developments, the most significant are “artificial intelligence” and “digital transformation.” Turkish Civil Aviation Authority (CAA), integrated these technological advancements into its systems. In this context, Turkish CAA implemented the “Digital Transformation in Civil Aviation Project”. The project consists of three main components: the “Corporate Transformation Model,” “Smart and Functional Systems in Aviation,” and the “Digital Training System.”

It is aimed to integrate the technological innovations of this era into civil aviation ecosystem, realize the digital transformation in aviation, and contribute positively to Turkish and global civil aviation by establishing a fairer, more accountable, and safer structure. In this regard, Turkish CAA seeks the support of the International Civil Aviation Organization (ICAO) and would be pleased to welcome all interested Member States to join “Digital Transformation in Civil Aviation Project”.

<i>Strategic Goals:</i>	This information paper relates to Strategic Goal <i>No Country Left Behind</i> .
<i>Financial implications:</i>	-
<i>References:</i>	Annex1 — <i>Personnel Licensing</i> Annex-19 — <i>Safety Management</i> Training Development Guide Competency-Based Training Methodology - (Doc 9941) Doc 9841, <i>Manual on the Approval of Training Organizations</i>

1. INTRODUCTION

1.1 Institutions and organizations in civil aviation sector must transform themselves to keep pace with the technological advancements required by the modern era. In this regard, Turkish Civil Aviation Authority (CAA) attaches great importance to digital transformation in civil aviation and aims to introduce a new project which will contribute to the digital transformation of civil aviation sector, starting with

Turkish civil aviation, then expanding to the European and North Atlantic Region (NAT), and eventually to the entire world by obtaining the support of the International Civil Aviation Organization (ICAO).

1.2 The objective of the Turkish CAA digital transformation project is to transform and standardize civil aviation by equipping it with a digital infrastructure in light of today's technology. In doing so, it is aimed to prevent member states from lagging behind in aviation technology ("no country left behind on digitalization") and to maximize safety in global civil aviation by ensuring standardization.

2. ABOUT THE PROJECT

2.1 The Turkish CAA digital transformation project consists of the following three main components:

- a) corporate transformation model (CTM ORG/ERP);
- b) smart and functional systems in aviation (CTM); and
- c) digital training system (TRAINING CERTIFICATE).

2.2 Corporate transformation model (CTM ORG/ERP)

2.2.1 The corporate transformation model (CTM) is a system in which fundamental elements of institutionalization—such as organizational structures, job titles and descriptions, the training required for personnel holding each title, and personnel task planning—are organized and managed in a fair and transparent manner through a digital platform. When creating this system, all tasks are first identified using an inductive approach, starting from the work and processes carried out within institutions. These tasks are then grouped according to their similarities and consolidated under job titles. The titles are grouped by their fields to form units, and the units are grouped to create management levels, thereby establishing the organizational structures of institutions.

2.2.2 The CTM is implemented through a digital platform (CTM ORG), which is accessible to all institutional personnel. In this system, the training that each job title requires or needs to be refreshed is defined within the platform, and personnel are ensured to successfully complete these training. In this way, it is aimed to maximize employees' adaptation to their roles and their qualifications.

2.2.3 With the CTM, institutions can both shape their organizational structures to operate within a more transparent, fair, and standardized system, and carry out tasks and processes more quickly and efficiently, without bureaucratic delays, in line with current technologies. This model is actively used by the Turkish Civil Aviation Authority and during the ICAO USOAP CMA audit conducted in Türkiye in 2024, this platform was utilized and received positive feedback from ICAO auditors during the inspection process.

2.2.4 Turkish CAA's goal is to first integrate the CTM into the Turkish civil aviation sector and then, with the support of ICAO, into global civil aviation, thereby ensuring that no country is left behind and that all Member States provide aviation services in line with the requirements of the modern era with higher safety standards.

2.3 Smart and functional systems in aviation (CTM)

2.3.1 Smart and functional systems in aviation are based on enabling civil aviation authorities to carry out their core functions of regulation and oversight through a single system (CTM) on a digital platform in a fast, effective, and safe manner.

2.3.2 With the CTM module, during inspections conducted by civil aviation authorities, technical inspectors upload any nonconformities they observe—along with supporting evidence (photographs, video recordings, documents, etc.)—into the system. This ensures that inspections are carried out using a competency-based approach and eliminates any potential doubts that may arise during the inspection process. In addition, through the CTM module, civil aviation authorities can open draft regulations for industry consultation via a single system, allowing feedback to be quickly conveyed to the authority and taken into consideration. This prevents bureaucracy and saves time.

2.4 Digital training system (Training certificate)

2.4.1 Especially with the current advancements in artificial intelligence, the aviation sector, which is closely related to technology, is rapidly affected by these developments. As in every sector, training is an indispensable factor in aviation. Therefore, revising the training offered in the aviation sector in line with technological advancements is inevitable.

2.4.2 Turkish CAA places the highest importance on training in aviation, and within this scope, it restructures civil aviation training in accordance with technological developments.

2.4.3 At the forefront of Turkish CAA's efforts to shape civil aviation training system is establishing a training system centered on technology and equipped with a digital infrastructure, and centralizing this system under the leadership of the Turkish CAA to ensure that the entire sector benefits equally from up-to-date training at high standards. For this purpose, an analysis of the training needed in civil aviation sector was first conducted. Then, with the support of the sector, training documents were updated and converted into e-books. These e-books were then turned into scenarios through storyboard software developed by programmers, and finally digitized to create next-generation training containing short videos, texts, audio, and interactive elements.

2.4.4 The produced training is offered to civil aviation professionals and individuals aspiring to pursue a career in aviation through the CTM ORG platform. Participants who complete these training in accordance with the requirements set by the Authority and pass the relevant assessments and exams are entitled to receive certificates approved by the CAA. With these certificates, individuals can enter the sector or steer their civil aviation careers in the direction they desire. Thus, not only is authority-approved standardization ensured in civil aviation training, but educational opportunities are also made equally accessible to the public.

2.4.5 In this next-generation training system planned to be implemented by the Turkish CAA, the structure includes a centrally approved training organization (ATO) established by the Authority, and all approved training are offered to the sector through this central ATO. All other training-related organizations in the sector act as training resource providers (TRP) affiliated with the central ATO, contributing to the creation of training documents and question sets, and providing physical/spatial support in the delivery of training. In this system, the role of instructors is defined as joining the instructor pool created by the Authority to contribute to the system and providing instruction to trainees at TRP locations.

2.4.6 The exams to be implemented within this training system are also based on a digital foundation. Trainees can take theoretical exams in online exam rooms equipped with computers and cameras, under the supervision of invigilators, with question sets created specifically for each candidate. For practical training, hands-on exams are recorded on camera to prevent potential errors and ensure competency-based training is conducted.

2.4.7 Through this training system, a fully digital, accessible, transparent, and measurable structure is established, ensuring that education—a fundamental human right—is offered to everyone equally at high standards and assessments are conducted fairly. With the support of ICAO, this system will expand worldwide, making a significant contribution to global civil aviation.

3. CONCLUSION

3.1 The technological revolutions of the 21st century have spread to the Civil Aviation Sector, as they have to every sector. In fact, the Civil Aviation sector is among the most affected industries by technological advancements worldwide. Among these technological developments, the most significant are undoubtedly “artificial intelligence” and “digital transformation.” Turkish CAA continues its works by integrating these technological advancements into its systems.

3.2 Turkish CAA, after intensive efforts, has completed the necessary infrastructure work and launched the digital transformation project in Civil Aviation and it is progressing on this path with confidence. Main goal is to implement digital transformation in aviation by integrating the technological innovations of the era into civil aviation ecosystem and to create a fairer, accountable, and safe structure, thereby contributing positively to both Türkiye and global civil aviation.

3.3 Digital transformation project in Civil Aviation consists of three main components:

- a) corporate transformation model;
- b) intelligent and useful systems in aviation; and
- c) digital training system.

3.4 With the support of ICAO, Turkish CAA intends to extend this project to other Member States, thereby contributing to the enhancement of safety and standardization at the highest level in civil aviation.

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