



MODERN TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE USAGE IN THE AIRLINE'S OPERATIONAL CONTROL CENTRE

Tomáš Chalás
Air Transport Department
University of Žilina
Univerzitná 8215/1
010 26 Žilina

Michal Pazourek
ABS Jets, a.s.
K Letišti 549 – Hangár C
Praha 6 - Ruzyně
160 00 Praha

Abstract

This article briefly describes the way of work of flight operations dispatchers with the development of the new technology and shows new available solutions on the market. This research includes the development of the responsibilities and job description of a flight dispatcher. The article describes the way of work and abilities of artificial intelligence as a new advancement of modern technology. Gained knowledge is then applied in the SWOT analysis, based on the observation in the operations control centre in the ABS Jets airline, discussions conducted with flight dispatchers on duty and an expert from Avcon Jet AG. Options and methodology for the implementation of simple artificial intelligence tools and the scope of activities are suggested, based on the state described. For the research of possible usage, the tests were conducted on the paid version of AI Assistant Microsoft Copilot (version 1.5.3, as of 27th of March 2025). The tests were based on the OFPs, evaluated by the AI Assistant with simulated erroneously planned flights. After a series of tests, outcomes are evaluated and compared with the defined desirable outcome. Consequently, the thesis describes potential solutions for weaknesses and opportunities based on the SWOT Analysis by implementing artificial intelligence in the other activities connected with the operations of a business jet operator.

Keywords

OCC, Dispatcher, Copilot, Artificial Intelligence, Flight Planning

1. Introduction

The world and the new modern technologies are evolving at a very high pace. New software and a new solution to everyday problems just enters the market. The aviation industry is not an exception. In this research, the focus was laid to describe the way of work of the flight operations dispatcher's, their responsibility, the SWOT analysis of the state of the selected observed OCC. Based on this, the suggestions were made and a solution from the AI assistant tested.

Operations Control Centre can be easily defined as the pulsing hearth or the brain of the whole airline. Such a centre is working independently from the other parts of the airline. The operations control centres are not mentioned and defined as airline's department by EASA, ICAO or FAA. However, all the regulatory bodies defined the activities, that must be conducted and are usually done by the OCCs. Based on SKYBrary, the Operations Control Centre is the facility, that plans, monitors, coordinates and manages various aspects of an airline's day-to-day activities. The main task is to ensure, that operations run smoothly, efficiently and safely.

Each OCC is as different as the operations of each aircraft operator. It is based on the volume of traffic, size of the fleet, it covers and other factors. Whereas bigger airlines as Lufthansa, British Airways or KLM can have OCCs staffed by more than 10 dispatchers one-time, doing specifically one part of the main job description of the flight dispatcher, and running 24/7, smaller airlines, can just have one person appointed, providing all the services necessary to the airline. Even, smaller airlines and aircraft operators can outsource these services and have them provided by different providers.

1.1. Flight Dispatcher

Job description of the flight dispatcher is defined by ICAO Annex 6 as a person, who is designated by the operator to engage in control and supervises the flight operations. Such personnel must be suitably qualified, under the ICAO Annex 1 and the state's local rules and norms. In general, the flight dispatcher is responsible for these main tasks:

Flight preparation – Flight dispatcher is responsible for making all the necessary arrangements before the flight

Flight planning – Preparation of the Operational Flight Plan, checking the weather and operational information necessary to plan the flight.

Flight monitoring – Flight dispatcher checks regularly the state of the flight, its location and the evolution of the conditions en-route. In case the flight should be landed, the flight dispatcher checks this information with receiving of Movement message or through the communication with the pilot.

Operational Control – In Europe, it is not common to share the Operational Control with the pilot. In case, the company allows sharing the responsibility, both the pilot and the flight dispatcher can make operational decisions regarding the flight. Otherwise, the responsibility is laid only on the pilot in command.

1.2. Artificial Intelligence

Artificial intelligence is a technology, that allows computers or machines to replicate human behaviour in terms of learning, comprehension, solving problems, creativity and autonomy. Such a system than can identify objects, understand and

respond to human language. EASA defines Artificial Intelligence as: “Technology, that can, for a given set of human-defined objectives, generate outputs, such as content, predictions, recommendations or decisions influencing the environment, they interact with.

1.2.1. *Types of artificial intelligence*

AI can be divided into various approaches and subcategories:

Machine learning – One of the earliest developed types of AI, developed in 1950s. Based on creation of the models and training different algorithms to make predictions based on data, without being explicitly programmed for such a task. Machine learning models are based on neural networks, which are very similar to human brains, in the way, how nodes of the neural network communicate with each other.

Logic and knowledge-based (LKB) approaches – These approaches can be described as computer programs that use a knowledge base to solve typical problems. Their main task is to support humans in the decision-making process.

Statistical approaches – Use of different series of predetermined equations to find out how to fit the data. Such approaches include Bayesian estimation, search and optimization methods

Hybrid AI – Introduce the combination of various technologies and methods to enhance the abilities of AI in terms of performance, versatility and problem solving. Compared to other methods, such a system can offer more interpretable and scalable solutions, accurate insights and increased operational efficiency.

Generative AI – Is the newest developed and advanced of all the AI types. It can create original content such as texts, images, videos, audio or software code. Such type of artificial intelligence works in 3 phases

- **Training** – creation of the base-foundation model and training for wide variety of tasks
- **Tuning** – adjustment to the user’s usual prompts and requests
- **Generation, evaluation and more tuning** – creation of the feedback loop

As **benefits of generative AI**, it can be mentioned: content creation and answer to the user demands, enhanced creativity, dynamic personalization and constant availability

Drawbacks of using generative AI include:

- Hallucinations and inaccurate outputs
- Inconsistent outputs
- Bias
- Lack of explainability and metrics
- Threats to security, privacy and intellectual property
- Deepfakes

1.3. *EU Legal framework*

In 2024, the European Union was the first to issue comprehensive rules for using AI in the real world. The regulation EU 2024/1689 addresses all the risks, ensures harmonised rules and safe usage across the member states. The regulation established a risk-based approach towards the AI. Basis for the regulatory framework was firstly published in the report on Ethics Guidelines on Artificial Intelligence. The 7 key ethical requirements for trustworthy Ai include:

- Human Agency and oversight
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability

These guidelines are non-binding and do not create any legal obligation. However, they are still the basis for the EU AI Act and the approach of EASA towards the usage of AI.

1.3.1. *Risk Categories*

Risk of using AI was separated into 4 different categories, according to the level of approval of using AI in the industry. Such categories are:

Unacceptable risk areas – Use of AI, which is prohibited at all costs and considered harmful. These include, manipulation techniques, social judging of people, biometric categorization, real-time remote biometric identification, individual predictive policing, recognition of emotions and untargeted scrapping of the internet or CCTV.

High-risk cases are cases that might pose a serious risk to health, safety or other functional rights. These include AI components in the critical infrastructure or education institutions, safety components of products, tools for employment, biometrics, essential private and public services, law enforcement, immigration and border control, justice and democratic processes.

Such systems can be operated in case they perform very narrow procedural tasks, improve the result of the human decision made before, do not influence human decisions and do purely preparatory work. In case such systems are used in these cases, AI systems must then satisfy conditions based on the regulation of the EU AI Act. The deployer of the high-risk AI systems is also responsible for operating the AI according to the already published instructions, registered as the operator of the AI in the database and other important conditions.

Transparency risk cases – it is necessary to know, what AI is doing and how it is used. The EU AI Act ensures that such a risk is treated, and the human user is informed how the information is kept. The content created by AI must be clearly identified, visually labelled and text published.

Minimal or no-risk cases – Includes common cases of using the AI in the video games or spam filters.

2. Methodology and mission

Main goal and mission of the research was to identify the spots and possible ways to implement artificial intelligence in the operation of the airline. The spots were identified in decreasing the number of errors in the flight planning phase and optimising the time spent on daily tasks of the airline's OCC. The partial goals were set to:

- Describe the current situation at the OCC
- Describe in general the way of work of the flight dispatchers today
- Investigate the types of artificial intelligence and its regulatory framework valid in the EU

Sources of information used consisted of:

- Research performed on the internet regarding the history and current situation at the OCC
- The author's observations and experience during the shift at the OCC
- Study of the company's Operations Manual and Internal norms of the company
- Study of the materials published on the internet, explaining the artificial intelligence and regulatory framework adopted by the European Commission and EASA.

In the practical part of the research the partial goals were established:

- Conduct the SWOT analysis of the OCC of the company, identify the opportunities and threats, and present the results of the evaluation
- Create a plan and suggestions for the implementation of AI in the field of OCC.
- Propose steps to efficiently implement such a solution

As the sources for practical part of the research, these methods were used:

- Visits at the OCC of ABS Jets during the high-peak season
- Discussions with multiple flight-dispatchers on duty
- Synthesis of the facts using the SWOT Analysis
- Discussion of the findings of the SWOT analysis with the expert from different business jet operator – Avcon Jet AG

Based on the analysis conducted, the suggestions for solutions were made.

3. Discussion and OCC situation

Before analysing the state of the observed OCC, main assumptions about the OCC of the business jet operator were made:

- OCC is preparing and administering business and general aviation flights
- High variability of traffic in terms of destinations, number of flights per week, time of operation and fleet
- OCC is staffed with a maximum 3-4 people on the day shift (relatively small)
- Flight dispatchers on shift have different seniority and experience
- Tasks of the flight dispatchers are not separated, taking care of the whole flight, from the first request to the successful landing of the flight at the destination.

3.1.1. *SWOT Analysis outcomes*

SWOT analysis of the OCC was focused on the flow of the processes, work and identification of the strengths and weaknesses inside the OCC environment. Visits at the OCC of ABS Jets, as the main source of information were conducted in the high-peak season in summer, 2024. The outcomes of the SWOT Analysis were later discussed and supplemented with the views of Mr. Norbert Pavlisin, from Avcon Jet AG, to cover the reality of the flight dispatchers at the business jet operators OCC as accurately to the reality as possible.

As the strength of the OCC were identified

- Business model based on providing OCC services for 3rd party customers (with their own aircraft and crew)
- Developed shift and seniority structure
- Usage of different flight planning software
- Good database of the previously conducted flights and operational control system

As weaknesses were identified:

- High usage of paper and relying on information in the paper folders
- Technologically old locally developed operations control software
- Flight monitoring is not prioritized compared to flight planning
- Communication and high flow of information, which might lead to human errors

As opportunities for future development of the OCC were identified

- Substitution of paper sheets with tablets
- Optimization of the time of flight preparations

- Using AI in the OCC e-mail communication with other stakeholders
- Creating the system for approval of airports based on the relevant available information

As the threats for the airline's OCC currently were identified:

- High investment costs for necessary software upgrades
- Security and novelty of artificial intelligence
- People's turnover in the flight dispatcher positions

3.2. Proposals for solutions

According to the SWOT Analysis, the possible proposals were suggested and partly tested. Based on the analysis, it can be concluded that possible improvements are possible in optimizing the time of flight preparations and in decreasing the number of errors made by the flight dispatchers. Assumptions for the targeted OCC were made:

- OCCs which want to find a short or mid-term solution (for 3-5 years)
- Does not have a high budget to invest in the planning software
- Are seeking optimization of the processes before the beginning of the high-peak season
- Have flight-dispatchers at the beginning of their career with minimal experience (graduates from the university)
- OCCs dealing with high variability of traffic (in terms of destinations, aircraft fleet)

3.2.1. Application of an AI assistant

As the AI assistants are rolling out, offering help in all the everyday life domains, various chatbots can be helpful in terms of identifying the errors and speeding up the processes inside the OCC without the necessity of a big investment, high integration and access to the confidential parts of the airlines. Therefore, the AI assistant was selected to be checked.

The selected AI assistant for the test is the solution from Microsoft – Copilot 365. Main reason for the choice included:

- **Integration within the Microsoft Office environment**
- **Security**, which can be administered and adjusted to the company IT policy and restrict the AI to be share and learn from the user's prompts
- **Low investment costs**
- **Advanced AI model algorithm** – Copilot is powered by the same engine architecture as ChatGPT – GPT-4

Descriptions of the test on the Microsoft Copilot:

To examine the usability of such a tool in real life, Copilot received for analysis in total 10 operational flight plans, from that, 5 were correctly planned and 5 contained mistakes. Those mistakes consisted of:

- The destination and alternate airports are too far
- Captain of the flight was not appointed in the flight
- The fuel was negative
- Direct was used instead of the route
- Flight was scheduled inside the military zone

Tests were made on the untrained model, with deleted history and paid version of Microsoft Copilot (version 1.5.3, released on 27th of March 2025).

After **first reading of the flight plans**, Copilot was able to read and identify most of the data correctly. These data included: flight information, route information, fuel and mass data, weather and wind data, climb and descent data, list of airports en route and remarks. After first reading, Copilot did not show any mistake made. Some small differences in the outputs were noticed (style of the report, distribution of the data in the categories)

In the **first check for mistakes**, Copilot was asked to check the OFPs for errors made, before the plan could be submitted. Copilot identified and verified the plans based on the criteria: Route verification, fuel calculation, weather data, mass & balance calculations, compliance with regulations. The criteria selected by Copilot slightly varied from one OFP to another OFP. After this run, Copilot evaluated **4 out of 10 flights correctly (3 of them were correct, 1 erroneous plan contained underfuel), 4 flights were given recommendations to be checked further, 1 flight was mistakenly evaluated as correct and 1 flight was identified as correctly planned, but needs further check for the current feasibility.**

In the second run, Copilot was prompted to perform suggested recommendations and check the measures. After this verification, **1 more flight plan was correctly evaluated as correct, 3 flights were evaluated incorrectly, as Copilot made a mistake in the fuel calculation, and did not identify the correct issue.**

In the third prompt run, Copilot was in case of the remaining, incorrectly evaluated flight plans guided to make the correction.

The outcome of the flight plan, containing only DCT instead of the route, **was evaluated as questionable**, since the Copilot stated, that this is permissible for a short flight, as the used flight plan (Biggin Hill to London City). After talks with the experienced flight dispatcher, such a plan can be used in some cases, however, in this state, it might not be accepted from Eurocontrol system)

The flight plan, containing alternate airport far from the destination airport, was evaluated after correcting wrong fuel calculations as correct. However, the outcome of the system did

not suggest, the flight dispatcher to change the alternate airport. After asking the Copilot for better alternates, Copilot provided satisfactory results. Therefore, the outcome was evaluated still as undesirable.

In the flight plan, without the appointed captain of the flight, Copilot did mistakes in the fuel calculations, as it did not count with discretionary fuel, persuading the user, that its calculations are still correct. Copilot did not deduce the pilot written in the second line of the block, and assumed the abbreviation CC as the Captain, instead of the cabin crew. Therefore, the flight was evaluated as not correct.

While checking the feasibility of the flight based on the current conditions, the weather information METAR, TAF and NOTAM were compared with the actual data from Windy.com. From the provided data by it can be concluded, that Copilot cannot evaluate the conditions, cannot provide the correct and valid METAR, TAF and NOTAM information for all the flights tested. Therefore, also the flight into the military zone was evaluated by Copilot as feasible and the desirable outcome not reached.

As a summary, 5 of the flight plans were identified and checked correctly by the Copilot (4 of them were correctly planned and 1 contained mistake in the underfuel). 4 other flights were evaluated wrongly by the Copilot, resulting from making mistakes in fuel calculations and misreading and misinterpreting the data from the OFP. 1 outcome of the flight plan (containing DCT instead of the route), was evaluated as questionable.

4. Conclusion

As **benefits** of using the Copilot, can be stated:

- **Microsoft Copilot can provide a good review of the flight:** As after submitting the flight plan, data read and provided by Copilot were satisfactory. Copilot can still make mistake, so this data must be read with caution.
- **Good suggestions on alternate airports:** After analysing the OFPs from Copilot, suggestions provided by the Copilot were satisfactory, which was proved in two cases.

Common bottlenecks in the usage of Copilot

- **Variability and inconsistency of the outputs** – Copilot provided for every OFP slightly different outputs, with different selected criteria for the route verification.
- **Incorrect reading from the Flight Plan** – 2 flight plans were not properly read by the Copilot, in the section of fuel calculations.
- **Errors in fuel calculations** – In two cases, Copilot did not correctly include discretionary fuel in the total fuel calculation, indicating mistakes in the fuel calculations.
- **Incorrect searching for and processing information, with frequent changes in time** – Copilot cannot work well with data that frequently changes in time. These include weather reports, NOTAMs and other important information for planning the flight.

- **Common habits and company standard procedures are not assumed** – Information which are not written in the OFP and Copilot does not know about them, are not taken into consideration. That includes assumptions about the character of the airline operations (state, civil, military), flight crew composition (Captains are in the crew lists written on the first line, First officers in the second line and CC states for Cabin crew).

Therefore, it can be stated, that the current state of the development Copilot cannot fully replace the experience of the flight dispatcher and his learning process. Therefore, the company should consider whether to implement such a solution in its OCC environment. However, Copilot can give satisfactory suggestions and advice to flight dispatchers in the process of flight planning. The experience of the flight dispatcher and the check of current valid information should not be omitted.

Before introducing such a solution into the workplace, the company should consider introduction of the AI norm which would address the employees:

- **Allowed AI Tools**
- **Scope of activities, where AI can be applied** (suggestions to the flight plan, translating the e-mails)
- **Labelling of the documents and communication, where AI was used.**
- **Creating the process of making employees aware** (training, signing the norm...)
- **Validating process and period** – how often and when the norm should be updated

Overall, it can be concluded that the flight dispatcher's way of work will change in a few years with the development of technology. Artificial intelligence provides promising results in the future, but AI must undergo multiple years of development and training. Its current possible role in the environment of the operations control centre can be defined as an advisor, giving suggestions to flight dispatchers and making their decision-making process faster and easier. It would be appropriate to check the current results of the research and compare them with different AI models developed after some time, based on the same methodology and reevaluate the outcomes of the models.

References:

- [1] **SKYBrary**, Operations Control Centre (OCC) Available at: <https://skybrary.aero/articles/operations-control-centre-occ>
- [2] **CHALÁS, Tomáš**, 2023, Analýza operačného oddelenia leteckej spoločnosti – Bakalárska práca, Žilinská univerzita v Žiline, Fakulta prevádzky a ekonomiky dopravy a spojov, Katedra leteckej dopravy
- [3] **ABS Jets**, OCC Manual, 14/09/2020
- [4] **EASA**, Artificial Intelligence Roadmap 2.0, 05/2023
- [5] **ANDRÉ Antoine-Alexandre**, **European Commission DG CNECT**, The AI Act and its impact on the aviation sector - presentation Available at:

<https://www.eurocontrol.int/sites/default/files/2024-04/20240429-flyai-forum-session-2-andre.pdf>

[5] **IBM**, What is machine learning? 22/09/2021, Available at: <https://www.ibm.com/think/topics/machine-learning>

[6] **Regulation (EU) 2024/1689** – EU AI Act, 13/06/2024

[7] **Microsoft**, website of Microsoft Copilot, 18/04/2025
Available at: <https://www.microsoft.com/sk-sk/microsoft-copilot/organizations>