Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 187 (2017) 46 – 52

Procedia Engineering

www.elsevier.com/locate/procedia

10th International Scientific Conference Transbaltica 2017:
Transportation Science and Technology

Assessment of Business Aviation OCCs' Capacity Issues

Michal Pazourek*, Vojtěch Václavík

Jan Perner Transport Faculty, University of Pardubice, Czech Republic

Abstract

Flying used to be a phenomenon of big airliners. It is now an ever-growing reality to see air carriers operating small aircraft too. Business jets are today frequent visitors to worldwide airspaces and airports. By gradual upgrades of the equipment (both aircraft and infrastructure) the character of business aviation changes significantly its nature. From the perspective of flight preparation and flight planning these flights range between the most complicated ones. In the business aviation community little attention is often paid to the importance of dimensioning their operation control centers (OCC). This paper shows typical capacity issues and available solutions to help optimize the OCCs capacity setup.

Peer-review under responsibility of the organizing committee of the 10th International Scientific Conference Transbaltica 2017

Keywords: operations, business aviation, OCC, capacity, dispatcher

1. Introduction

Business aviation comes along the development of civil aviation from its very beginning. It has been growing steadily and now reaches an important role in the lives of companies and countries' economies all around the world. The understanding of Business Aviation is essential. Unfortunately, different levels of it can be seen across the industry. OCC are critical units in structures of operators. They are usually proportionally structured to the size of the company. Within big companies a high degree of subdivision to smaller units specialising in a certain area may be seen. On the other hand, business aviation operators tend to have a lower degree of specialisation and their tasks

* Corresponding author.
E-mail address: michal.pazourek@upce.cz

Peer-review under responsibility of the organizing committee of the 10th International Scientific Conference Transbaltica 2017
doi:10.1016/j.proeng.2017.04.348

are more variable and challenging. According to Helmut Lehr [1] this is due to non-presence of specialised supporting units such as customer or fuel departments. To run an OCC, it is essential for the operator to get well aware of procedures in separate countries, airports and also get to know the operated aircraft into detail. This requires a lot of learning time. Correctly setup processes and adequate authorities across the department are vital. Unfortunately, it is not rare that operators run highly risky OCC departments with inexperienced personnel whose decisions may put their operating crew, aircraft or even whole companies involved in flight operations in danger. The result of a research performed by Andreas Cordes [2] shows that 85% of operators with less than 10 aircraft units in their fleet do not require licensed personnel to perform OCC duties and only 48% of operators operating between 11 and 25 aircraft actually do [2]. This is a clear sign of lacking understanding of the OCC importance across the industry. Capacity dimensioning is another important task. If the OCC is under-dimensioned, the dispatchers will be exposed to overload. They will almost certainly commit errors or not finish their jobs satisfactorily and on time. In the opposite case, the dispatchers will have a lot time without any activity and will lose the ability to perform duties. They will consequently commit errors as well. There are already general solutions in place used to solve capacity issues. Probably the most common ones are national working time limits regulations. They limit the number of hours spent in work and prescribe a rest between two consequent work shifts. Unfortunately, they are very simple and often one step behind the current state of the industry. This is where more detailed approaches are necessary.

This paper deals with analysis of OCC critical activities and has for aim to find out if their effects can be reduced by application of tailored capacity planning principles.

2. Business Aviation Operations

Business Aviation division may be considered according to aircraft size, capacity or range, regularity of service, passengers' status or legal status. For the purposes of this article "on the demand operations of aircraft in VIP configuration with increased comfort and extra on board services" definition [3] will be used. Business aviation forms a specific part of Air Transportation comprising every category of aircraft ranging from small turbo-props to heavy jets. The aircraft range criterion is also becoming less important in definition of what is Business Aviation as long-haul biz-jets are in regular use with endurance reaching 13 hours and more. The community of operators ranges from the very small ones with one or two aircraft to large fleets. Some of the passengers use this kind of transportation for business, others for leisure. Business Aviation flights are operated in lower numbers because they are solely based on demand. There may be more frequent destinations; however, the character of Business Aviation is predominantly random. Unlike airlines operations characterized by a timetable, the operation of Business Aviation does not have a regular character. The typical traffic peaks as we know them from regular operations are not so extreme. Evenly distributed times of operations can be seen. The typical character of operation is point-to-point with a great deal of positioning flights. This is the opposite of airlines where very few positioning flights are made throughout the year and their operation is mostly of a hub-and-spoke character. The coverage depends on the range of fleet but is generally not limited to certain geographical areas [3]. Business Aviation brings to its users flexibility with schedule changes and cancellations and allows the option to operate to smaller airports where no scheduled services are operated.

2.1. Business Aviation OCCs

The OCC concept must respect the individual specifics of the operator. All OCCs have one common goal, effective information distribution before the flight, during the flight and after the flight. The three phases are also called, pre-flight, in-flight and post-flight phase. Unfortunately, the practice shows that, especially within smaller operators, the post-flight phase does not get enough attention or is not performed at all. The reason to this is, by authors' experience, an insufficient understanding of the post-flight analysis importance for operations safety. The flow of information is both, internal-within the company, and external with other companies (providers) and authorities. OCCs do not only perform flight planning tasks, as is often thought. They also carry out a variety of administrative and supporting tasks. The support and quick action of OCCs can save a lot of money and time to

operating crew and is absolutely indispensable for complicated operations. The centres are equipped with hardware and software solutions to be in touch with the latest information such as weather or operational limitations.

Even though the OCC work is being simplified with new technologies, it remains a complex activity requiring a high degree of knowledge and organisation. OCC skills in small departments are based on experience and by learning from errors rather than on adequate training. Time pressure is often present and low flexibility to make any changes exists.

2.2. OCC Personnel

OCC personnel can have several forms and names. The most common name it bears is a flight dispatcher. Some operators divide the flight dispatchers among navigation dispatchers responsible for routings preparation or optimisation, and administrative dispatchers responsible for ground services arrangements, over-flight and landing permissions. Another common division is between flight planners, flight schedulers and flight followers [4].

A good level of the OCC personnel is a key to successful operational control. It is common that the understanding of the positions is very different in various countries. In one place the requirements and public perception of the job can be very high, whereas in other places the OCC personnel can be seen as a supporting team of low importance. The level of knowledge of the personnel can also be different. Helmut Lehr considers educated and trained dispatchers to be theoretical pilots without flight experience. In some areas he positions dispatchers even higher than pilots because they have a deep knowledge of several areas and airplanes at the same time and can be a source of important information from areas that pilots typically do not know into detail [4].

Business aviation OCCs are in addition to standard activities exposed to a variety of non-standard tasks. These tasks may be difficult to predict and when they appear they can be very time demanding. Business Aviation OCCs are usually small in size. According to the research performed by Ondřej Zima [5], one dispatcher on duty is common for operators with up to 5 aircraft and 2 dispatchers for larger operators. This brings disadvantages such as low substitution possibilities or lack of supporting departments. Very few companies have a robust system to withstand non-standard situations. The authors' opinion is that OCC of business aviation operators is a critical unit for their correct functioning. Compared to other operations, there are business aviation specific activities. The results obtained from personal experience from working in the sector are listed in the Table 1.

Table 1. Business Aviation OCC's Characteristics.

Phase	Task
Pre-flight	Frequent changes to schedules and cancellations of flights
	Complicated information flow and high level of information search
	Frequent multi-tasking
	Approaches allowing combination of demand by several customers
	Periods of extremely low and high number volumes of work
	Dealing with non-described situations
	Dealing with requests not related to operational control
	Pressure on cost-driven selections (on detriment of quality)
	Comfort optimizing solutions required
	Different requirements for different customers
	Decisions making leading to lose-lose situations
	High geographical coverage
In-flight	Re-planning in flight due to a changed request
	Operations changes initiated by discussion with the operating crew
Post-flight	Influence of services selection by passengers experience

3. Business Aviation OCC Limitations

There is a long list of situations where OCC dispatchers reach their limits. This may be caused by the level of the personnel, inadequately defined processes or the character of the situation. The area has been explored by IOSA with the goal to identify possible operation problems with regard to OCC. An overview of the problems has been provided by A. Cordes [2] and additional problems description was analyzed by Lukáš Řasa [6]. He defined the dangers and limitations with regard to a risk of error commitment. Very often the error cause is a human being. A human error is defined as an incorrect execution of a particular task, which then triggers a series of subsequent reactions in the execution of other tasks resulting in improper task execution [7], in extreme cases in an incident/accident. Many operational errors occur on a daily basis. The Federal Aviation Administration (FAA) suggests continual collection of data on operation errors. They are believed to follow three possible paths where the majority of them are minor errors not reported and sometimes not even noticed. The other two groups are errors which are reported and corrected to limit their future occurrence to maximum extent and errors which are so severe that their immediate negative effect can be seen [7]. This area is well described in literature sources especially with regard to pilots. The same application can be used on OCCs.

3.1. Limiting Factors Research

The tasks performed by OCC are variable and demanding. In addition, there are factors having a direct effect on the quality of OCC activities. As mentioned earlier, the time periods of high and low workload may be frequent and to adequately dimension the department is complicated. For operators with a known schedule (at least some part of it), it is easier to calculate the adequate OCC size to satisfy the operation. For irregular operators, the question of dimensioning the OCC accordingly can be done by a first guess method or by analyzing historical data, preferably for a comparable attributes such as period of year or presence of events with higher demand for air transportation. The task is much more complicated for irregular traffic because the flights are created randomly and often without a predictable pattern. For a lot of operators the resources to adjust size of their OCCs are limited and the dispatchers are left alone with the growing number of tasks. To manage the size of the team can bring cost benefits. A flexible approach may be necessary to cover these challenges. To demonstrate some capacity issues an observation has been performed with a real business aviation operator during several randomly selected 12hr-duties (day and night) on different days of a week. The dispatchers were asked to monitor and record they personal feeling of levels of performance, stress and fatigue. These factors and their description are listed in the Table 2. To better characterize the results, their graphical representation is provided in Fig. 1 with the aim to show how different parameters change in time. A more detailed description of the results is provided in subchapter 3.2.

Table 2. Duty workload description.

Parameter	Description
Level of Performance	Subjective feeling to perform and solve unexpected tasks
Level of Stress	Subjective feeling of pressure experienced when performing tasks
Level of Fatigue	Subjective feeling of being tired

In the second round the dispatchers were asked to identify the reasons of high and low peaks of the described factors. They have identified the below listed causes:

- Aircraft knowledge and inadequate planning with respect to performance;
- Health or physical conditions preventing from fully performing duty;
- Slowly working or faulty hardware and software;
- Increased number of never experienced situations;
- Comparing different scenarios (positioning flights and technical landings);
- Schedule and aircraft position incertitude;
- Area and airports knowledge/experience;

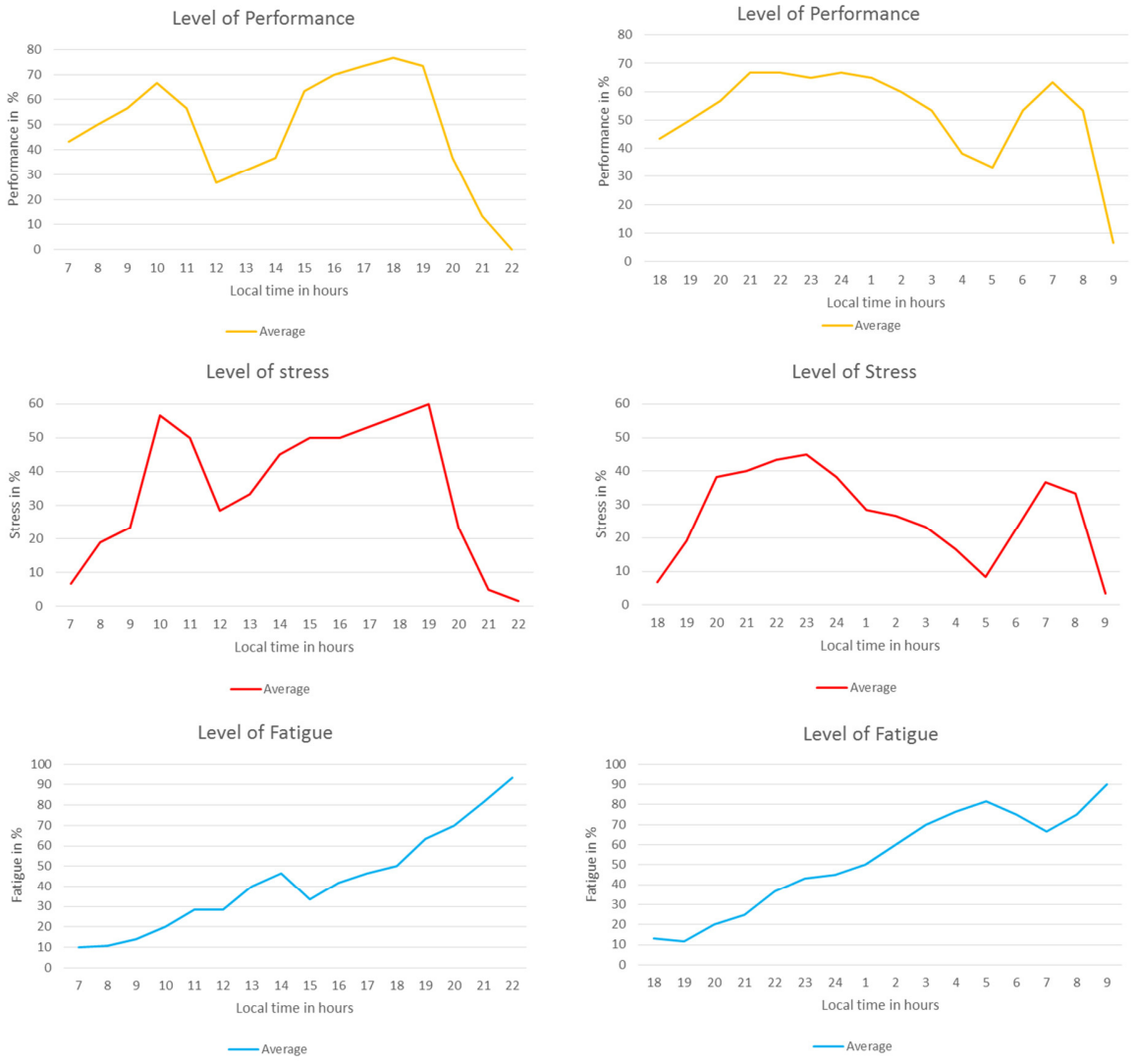

Fig. 1. Duty workload measurements.

- Inadequate transfer and recording of information;
- Limited time for full analysis of new destinations;
- Need for immediate action with short notice given;
- Relation between OCC and operating crew;
- Correction of errors in flight documentation;
- Little awareness of weather;
- Multitasking and irregular work distribution;
- Other departments pressure (can be money driven);
- Work conditions, ergonomics;
- Pressure to satisfy passengers, avoid penalties;
- High portion of changes;
- Special operations (winter, military etc.);

- Inadequate atmosphere among the OCC members;
- Low number of personnel on duty.

3.2. Results Interpretation

As apparent from the first group of graphs, characterizing the development of dispatchers' performance during their duties, there are significant irregularities caused by constantly changing demands. In general, it is possible to follow a similar trend in the early phases of both day and night duties, when, based on transmission of current state of work and all necessary information from the previous shifts, dispatchers continue the preparing and pre-flight planning. It is obvious that there are phases of duties when the dispatchers' performance decreases and grows again rapidly, mostly due to sudden changes and new customers' requirements. In the end of duties there is significant decrease of performance caused by transmission of shifts and thus responsibility to other dispatchers.

The second group of graphs representing the average development of level of stress is very similar to the first one. It is probably caused by close links between both observed factors. However, more pronounced transitions between the phases are noticeable during duties. The reason of the phenomenon is sudden increase of psychic load when an unexpected change or crisis situation happens and, on the other hand, a significant decrease of stress after resolving such a situation.

In the third group of graphs there is a perceptible increase of fatigue during the ongoing duty. The rate of this undoubtedly depends on the current demand of shift and it is very important to react in time to avoid adverse effects on dispatchers' performance and attention. There are significant fluctuations in both diagrams, namely a slight drop of overall fatigue thanks to regular rest periods during the day shifts and similar phenomenon in the early morning before the end of duties. It is also obvious that the level of fatigue increases considerably faster during the night shifts compared to the day shifts. This is caused by higher demands on the dispatcher due to natural biorhythms and human habits.

The number and variability of the identified factors show that in-depth understanding of OCC activities is very important for a successfully functioning operator. Even though business aviation operators and their OCCs are very often overlooked and their job considered less important compared to their airlines counterparts, the opposite is true. OCC personnel of such operators must often face a higher load to cope with. Business Aviation OCC and their dispatchers are exposed to the same kind of work as fire-fighters. They may spend a lot of time waiting without knowing when the high workload will come in the form of new flights creation or changes to previously known schedules. To act perfectly when the action comes is indispensable. The probability to commit an error is higher and this is also why a special attention should be paid to business aviation OCC personnel. Training and adequate capacity dimensioning and duty planning are among a few options to do so. It is of an extreme value to describe the system and understand its limits. There is a constant need for observation and adjustments in case of any, even minor changes. A correct description can help to get rid of processes duplicities and therefore supports their simplification. The authors identified the magnitude of the low and high peaks and the factors contributing to them. The following factors were recognized as directly related to capacity management:

- Comparing different scenarios (positioning flights and technical landings);
- Inadequate transfer and recording of information;
- Limited time for full analysis of new destinations;
- Need for immediate action with short notice given;
- Multitasking and irregular work distribution;
- Pressure to satisfy passengers, avoid penalties;
- High portion of changes;
- Low number of personnel on duty.

4. Conclusions

It can be seen that the many of the identified issues can be successfully solved by adequate and dedicated capacity planning. An important step towards a better system capacity planning is based on measuring and

modeling. The modeling must consider scenarios with different number of dispatchers performing duties and in the second instance improved duty assignments. Knowledge obtained from this process will help to avoid over dimensioning of the OCC, low-utilization of dispatchers and additional salary costs. The modeling phase will require a proposal of the below parameters:

- Number of flights per day;
- Duty daily staff composition;
- OCC hierarchical structure;
- Flight preparation duration per flight;
- Number of occurred updates per flight;
- Frequency of city pair per period;
- Geographical area of departure/arrival airports;
- Level of services complexity.

As a further research step, boundary conditions and tailored variables representing duty/day/flight complexity levels are to be created to build up the model.

References

[1] H. Lehr, Scheduling and Dispatch in Business Aviation, in: BA Meetup Conference presentation, London. 2010.
[2] A. Cordes, Job profile and training requirements for European Flight Dispatchers, City University London. Available from Internet: http://eufalda.org/wp-content/uploads/2016/11/Dispatch-Study.pdf
[3] M. Pazourek, Business Aviation in Europe, Perner's Contacts 5(6) (2011) 236–243.
[4] C. Wall, Aircraft Dispatchers. Working Behind the Scenes. Available from Internet: http://www.avweb.com/news/careers/182995-1.html?redirected=1
[5] O. Zima, Flight Planning – Pilot versus professional provider, Czech Technical University Prague, Prague. 2015.
[6] L. Rasa, Enhancing Safety at Operations Control Centre, Czech Technical University Prague, Prague. 2015.
[7] K. L. McFadden, E. R. Towell, Aviation human factors: a framework for the new millennium, Journal of Air Transport Management 5 (1999) 177–184.