COMPARISON OF BASIC CHARACTERISTICS OF THE PASSENGER HANDLING PROCESS AT VARIOUS WAYS OF PROCESSING

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The aim of this article is to compares the characteristics of the passenger handling process. In the first part, all various ways of passenger handling are described. The next section briefly explains what queuing theory expresses The last section deals with the mutual comparison of the observed data of check-in process based on calculations of queuing theory. In this section are compared occupation probability of check-in counters, the average waiting time by queuing passengers and the average number of passengers in a queue for check-in process.

K e y w o r d s. check-in, passengers, check-in counters, queue

1 INTRODUCTION

Each airline is trying to meet the needs of passengers, but also tries to minimize cost and maximize profit. That is why the check-in process is constantly developed and modernized. In the late 90 `s the process of checking-in was realized mainly by two ways. At present it is realized in various ways after the development of IT technologies. And so by this day each passenger can choose the way that best suits his needs.

2 VARIOUS TYPES OF PASSENGER HANDLING

The air transport process is a difficult process which each passenger must undergo while travelling by aircraft. At the check-in counters employee checks your flight ticket, ID card and weighs your baggage. There are various types of check-in methods. It differs according to different criteria and factors. One of the biggest differences is if the flight is conducted at domestic or international routes.

The passenger handling process is a complex process aimed to ensure that only authorized personnel could board the aircraft. There are various types of check-in. **Common check-in** – this type allows to check-in at the counter of the designated airline. Check-in counters are evenly busy. **Flight check-in** or **dedicated check-in** allows passengers to check-in with one or more check-in counters which are designed for specific flight or more flight of one company. **Express check-in** is determined for passengers without checked baggage. **Telephone check-in** is typical for business passengers without checked baggage. Nowadays they can give checked baggage at the drop off luggage counter. Check-in by mobile phone requires Internet connection. At first you must connect to website and identify yourself. Than you receive a confirmation SMS which identifies you on the airport. By **Gate check**-in passengers can check-in before entering the area of the airport, but it is restricted by safety regulations. **Web check-in** is the process in which passengers confirm their presence on a flight via the internet and typically print their own boarding passes. Depending on the carrier and the specific flight, passengers may also enter details such as meal options and baggage quantities and select their preferred seating. In recent years the airlines have started using innovative Check-in Technologies - **Self check-in**. It is an check-in application which provides our passenger's getting their boarding passes through kiosk machines. These machines have been designed to enable check-in by touching the screens with the help of the simple menu. Check-in process starts with placing the Miles&Smiles card or any credit/debit card to the reader also by means of entering electronic ticket or reservation number by choice. If passenger has checked baggage he will pass it at drop off luggage counter.

At most airports Departure Control Systems - DCS are used. These systems ensure seamless communication with other systems involved in reservation process. These systems are continuously refreshing data about passengers who have a reservation for the specific flight and are awaited at the check-in counters, have checked-in before and already have their boarding passes.

Thanks to the data transfer between these systems on the enroute airports passengers can be instantly handled for their final destination airports. The passengers are than able to change their flights without checking-in again and again.

3 QUEUING THEORY

To get the characteristics of the check-in process, we used calculations according to the queuing theory.

Queueing theory is the mathematical study of waiting lines, or *queues*. The theory enables mathematical analysis of several related processes, including arriving at the (back of the) queue, waiting in the queue (essentially a storage process), and being served at the front of the queue. The theory permits the derivation and calculation of several performance measures including the average waiting time in the queue or the system, the expected number waiting or receiving service, and the probability of encountering the system in certain states, such as empty, full, having an available server or having to wait a certain time to be served.

Mathematical model of the queuing theory

There are two main types of the queuing models. The model with losses of customer and the system with waiting. The first type is the easiest, but not the most common for the aeronautical transport. Despite this fact we will discuss this system, because in case of telephone check-in the phone line is a queue where no people are waiting is created because if the line is busy the further process is rejected. The system with waiting is more common for the air transport, as all requests entering the system will be served and therefore none of them will be rejected.

Based on queuing theory, we compared various ways of check-in process.

4 COMPARISON OF VARIOUS WAYS OF PROCESSING

We need to create a model situation to compare methods of check-in. Our model situation will be as follows. We will calculate with three flights made in same time. All of them will have the same time available for the check-in process. In common the check-in process starts two hours prior to flight and ends half an hour before it. So the length of the check-in process is 90 minutes. But there is an option for the airline companies to change the rules of the check-in process.

In this case there are 346 requests for check-in except the method of flight check-in. For that case the passengers were divided into 3 separate flights, 74 passengers for the first flight, 114 passengers for the second flight and 158 passengers for the third one. The average time of check-in via flight chceck-in and common check-in lasts 90 seconds. The average time for self check-in is 120 seconds, and telephone chceck-in lasts 140 seconds in average. To be able to compare telephone chceck-in with the other methods evenly we will take in count two different situations. In the first case we will calculate with same length of the check-in process as for the other methods. The length of the check-in process will be 90 minutes. In the second case we will calculate with 6 telephone lines for check–in as there will be 6 check in desks for the other methods. By this condition we calculated that the telephone check-in process will last 180 minutes.

The flight check-in will require 7 check-in desks for 346 passengers, but the common check-in needs only 6 check-in desks for the same time and ammount of passengers. We can say that it is more efficient for airline companies to use the common check-in method, by which they can save money and energies used by another check in desk. It is also advantageous because of the capacity of the airport to use less check-in desks. The ammount of self check-in kiosks needed for serving 346 passengers would be 8. Although the ammount of the kiosks needed for this method is the highest, it is favourable because these machines save energy, costs of workers, they are in service non-stop and passengers checking in by this method feel that they went through the process faster.
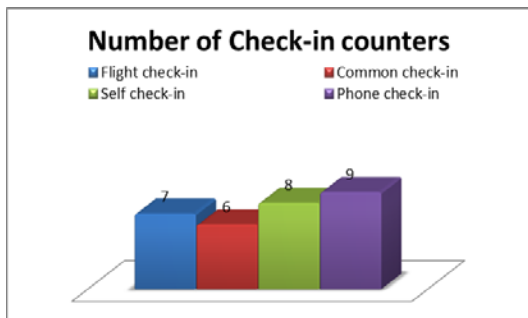
Figure 1 Number of Check-in counters

Figure 2 Average number of passengers in a queue

The highest probability for finding a free check-in desk is at the flight with 74 passengers. The probability is more by 20 percents than with the other flights. This means that the check-in desk are not used continuously and they have long idle times. That fact is not favourable for the airline company. In the cases of other flights is the probability of finding a free check-in desk around 3 percents which is quite a low number. This number shows us that the check-in desks and the telephone lines are fully loaded during the time of check-in. This is an efficient usage of workforce and time of the airline companies.

The highest probability for creation of a queue is with the common check-in. the probability with this method is 91 percents. The probability is little lower with the flight check-in for a flight with 114 passengers. In this case the probability is lower by 0, 2 %. The reason for that fact is, it is enough to use 2 check-in desks for this method. As we use 2 check-in desks the creation of a queue at the flight with 74 passengers will be lower. In comparison with the other methods the probability will be lower by 30 percents. The probability of a rejected service during the telephone check-in is lower if we use 6 lines during 180 minutes, than if we use 9 lines for 90 minutes.

The probability of occupancy of the desk is closely connected to the average number of passengers in a queue. For the flight with 158 passengers the average number of passengers in a queue is 6. More than 20 passengers will stand in a queue for the common and the self check-in.
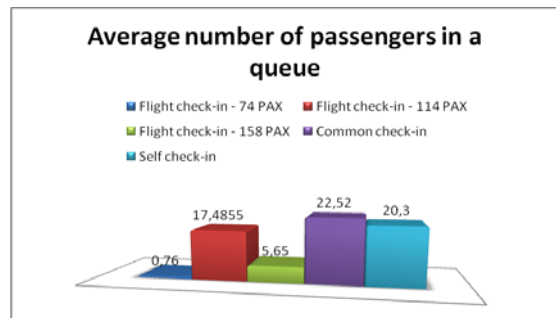
On the other side the longest time spent by check-in is with the method of flight check-in for the flight with 114 passengers. The average time what a passenger stands in a queue is 14 minutes. If we use the same method for check-in for the flight with 158 passengers the average waiting time will be 3 minutes, and for the flight with 74 passengers the waiting time will be less than a minute. The average number of passengers standing in queue is one. The waiting time with the common check in used is 5 to 6 minutes.
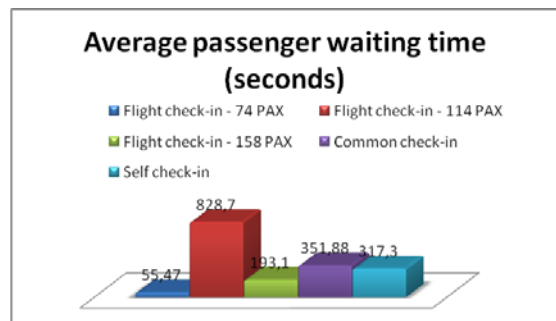

Figure 3 Average passenger waiting time

The lowest coefficient of check-in desk usage is for the flight with 74 passengers. As we mentioned before in this case the check-in desk have long idle times. The highest coefficient of a queue is reached by using self check-in method. By using this method the occupancy of the system is more than 96 percent. Check-in desk used for common check-in and flight check-in have lower occupancy. The occupancy of the telephone lines is higher by 14 percent if we use 9 lines for check-in in duration of 90 minutes, than if we use 6 lines in duration of 180 minutes.

The lowest idle time is reached by using the method of self check-in. The flight check-in for the flight with 114 passengers has approximately the same idle times. The longest idle time appears by using the flight check-in method for the flight with 74 passengers, and the telephone check-in with 6 telephone lines where the idle time is more than 35 percent. The long idle times are inefficient and disadvantageous for the airline companies.

Figure 4 Idle time of check-in counters

5 CONCLUSION

I compared ways of check-in based on this model situation. In case when these conditions are actual, the most used are self check-in kiosks and check-in counters of common check-in. The check-in desks of flight check-in with 74 passengers are used least but in this type the probability that a passenger stands in queue is the lowest and the queue is the shortest too. To compare the two methods by the model situation the flight check-in will require 7 check-in desks for 346 passengers, but the common check-in needs only 6 check-in desks for the same time and ammount of passengers. We see from those numbers that it is more efficient for airline companies to use the common check-in method. In the same situation if we use the telephone check-in this method would require 9 telephone lines. Although the number of the phone lines is quite high there will be short idle time.

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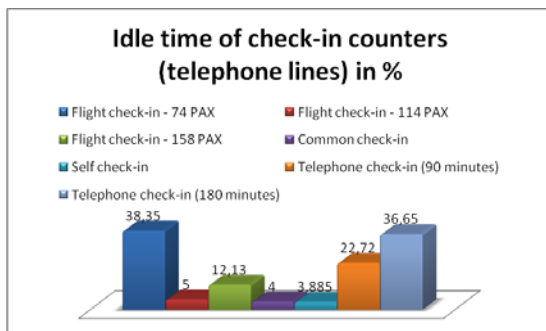[3]   BAČÍK, Ján – JEZNÝ, Martin: Modelovanie činnosti letectva. Košice: TYPOPRESS, 2011. ISBN 978-80-8129-010-7.

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