Abstract

Name: José Francisco Romero Pérez

Topic: Optimization of air passenger processes using the example of registration of luggage

Thesis Advisors: Prof. Dr.-Ing. Manfred Boltze
Dipl.-Betriebswirtin (FH) Esther Nitsche (Fraport AG)
Dr.-Ing. Nadine Roth
Dipl.-Ing. Dipl.-Wirtsch.-Ing. Axel Willert (Fraport AG)

Optimizing airport capacity is a challenge for airport operators and authorities as well as airlines, since the forecast clearly indicates that air passenger numbers will continue to grow. The augmentation of passengers is especially visible at the airport terminals.

This master thesis formulates approaches to optimize the luggage registration process in order to alleviate existing congestions in the check-in halls. The approaches for the optimization of the luggage registration process are based on the circumstances at the Frankfurt airport, since this thesis was written in collaboration with the Frankfurt airport operator. Nevertheless, the result of the optimization might be used at different airports - adapted to their respective situation.

In order to have a structure, different optimization methods will be analyzed. The research results indicate that a qualitative optimization method is the most appropriate method to optimize the luggage registration process at airports. The methodology proposed in the “innovative process optimization” model to achieve an optimized baggage registration process. It enhances the DMAIC-Cycle with some elements of the quality improvement framework “six sigma” as well as basics of the theory of constraints. Furthermore, it adds some components of the theory of inventor´s problems solving.

According to the selected methodology, there are five steps to optimize a process; these are Define, Measure, Analyze, Improve and Control. In a first step, the optimizing goal is defined. Then the stakeholders and their interests are described. Especially the interests of the passengers, the airlines and the airport operator regarding the luggage registration process will be analyzed. After that the measure and analyze phase will be started. This two optimization phases provide information for the following optimization steps. The analysis consists of examining the execution of the baggage registration process. The answer to the questions, which elements for the process execution relevant are and how these process elements interact, will be documented. Simultaneously, during the measure phase the cost of the baggage registration process are quantified as well as the number of staff members needed when registering air passengers. In addition to that, relevant statistics regarding the number of luggage pieces will be calculated. Furthermore, the optimization parameter “area productivity” as well as the theoretical and practical capacity of the passenger dispatching areas will be defined. Once the process information is compiled, the luggage registration process will be modeled using ARIS and UML. Since the model information is abstracted, it is easier to design new process execution alternatives.

The difficulties to optimize the process are identified using the basics of the theory of constraints. A posteriori the areas of improvements on the process are defined and after that six luggage registration alternatives will be described. Four of them are on-airport approaches and two more are off-airport optimization alternatives. These six ideas are named: common use baggage drop-off, semi-automated baggage drop off, dual-automated baggage drop-off, automated baggage drop-off, baggage drop-off at home and baggage drop-off at main-stations. The different alternatives can be developed for only one airline or an airline alliance (dedicated) or for all airport-based airlines (common use). Subsequent to the specification of the six alternatives, they will be evaluated in order to recommend an action plan, which leads to an optimized usage of the existing airport capacity in the check-in halls.

José Francisco Romero Pérez

July 2010