
Abstract of the Diploma thesis

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Title: **Air cargo service in the interplay with production and logistic**

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As a result of globalization, the growing division of labour and increasing specialization, the volume of the freight traffic rises constantly. Due to this development the transport systems more and more reach their capacity limits.

Freight traffic optimization is very complex and extends to the areas of logistics and production. Thus, production, logistic and traffic influence each other. Decisions are made in each individual area; though the effects on the other two areas are largely unknown. Therefore, the whole system has to be considered. Currently only the subsystems are optimized. If the transport systems reach their capacity limits, further growth of production and logistic processes will be inhibited.

These interactions between freight traffic, production and logistic have not yet been investigated extensively. The thesis deals with the consideration of three areas: production, logistic and freight traffic. The focus is hereby particularly on air cargo service. The aims of this thesis can be formulated as follows:

- Identification and description of the interactions between production, logistic and air cargo service,
- Assessment of the suggestibility of the interactions by the parties of the air cargo service,
- Development of recommendations for a general approach towards other modes of transport.

This diploma thesis provides a first basis for the German project "Dynamic and seamless integration of production, logistic and traffic" (Dynamo PLV). Within the framework of Dynamo PLV, an integrated production-, logistic- and transport model is to be developed. This model should enable to prognosticate the effects of decisions and actions in the field of freight traffic.

This dissertation, using the example of air cargo service, demonstrates that the approach is suitable for the identification of the interactions between freight traffic, production and logistic.

This thesis reaches the following partial results:

- Indication of the air cargo service mega trends,
- Identification of the involved parties in air cargo service systems,
- Identification and structuring of the relevant parameters which are influenced by decisions in production and logistic,
- Identification and structuring of the influencing factors,
- Assessment of the suggestibility of the parameters of the influencing factors,

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- Investigation of the relation between the influencing factors and the involved parties.

First an extensive literature review is conducted, whose results will then be outlined. Based on the literature review, the relevant basics of air cargo, logistic and production are described.

The development of air cargo service is summarized and the mega-trends, which are responsible for this development, are identified. The mega-trends are “growth”, “globalization”, “deregulation of markets”, “alteration of freight structure”, "innovations", "cooperation" and “concentration at the major hub airports”.

The main part of this work deals with the identification and description of the interactions between air cargo service, production and logistic. First, the parties of the system are identified through a system analysis. The main parties are the production company, the distribution company, the airline, the air cargo policy and the customer. They and the other parties are described subsequently. Second, the general aims of the air cargo service are evaluated: increase of productivity, economic efficiency and environmental compatibility as well as improvement of security. Third, the views of the main parties of the air cargo system in regard to these aims are described. Afterwards the conflicting objectives are derived.

In the course of this dissertation with the help of this system analysis and a further process analysis, the parameters of air cargo services, which are influenced by decisions in production and logistic, are developed and described. With the view of recommendations for further modes of traffic, the parameters are subdivided in:

- General parameters can be applied to all modes of traffic.
- Specific parameters are specific to the modes of traffic.

The identified parameters and their descriptions can be found in the subsequent part of this thesis.

The influencing factors, which affect these parameters, are identified. They are divided due to their decision horizons and their reference in:

- Strategic influencing factors are effective on a long-term.
- Tactical influencing factors are on a medium-term.
- Operational influencing factors are on a short-term.

The identified factors and their descriptions can be found in the subsequent part of this thesis.

The identified parameters of the air cargo service and the identified influencing factors are connected. The suggestibility is estimated (Table 9, p. 49) and there is in explanation report in Annex I.

Afterwards the interactions are represented. They are divided into interactions between the air cargo service and the production on the one side, and interactions between the air cargo service and logistic on the other side. The interactions are described, which are caused by the decisions in production or rather logistic (production-induced and logistic-induced interactions). The interactions are analysed for each influencing factor. Additionally, the suggestibility of the parameters by the parties is estimated.

Finally, general methodological strengths and weaknesses of the approach are highlighted. Further improvements of the approach are recommended. On the basis of the findings of previous chapters, a general approach to the consideration of other modes of traffic is recommended. In general, the presented method can be transferred to other modes of traffic. Furthermore it will be evaluated, which parts of this work can be also applied to other modes of traffic and which parts have to be reworked.

The conclusion is defined in the following scientific findings:

- There have been just a few scientific studies on interactions between air cargo service, production and logistic.
- The shipper, the freight forwarders, the airlines and the receivers are not the only involved parties. Accordingly, other parties affect the air cargo service system with their decisions.
- The assessment makes it possible to formulate statements about the factors, which affect the parameters of the air cargo services.
- The decisions in production and logistic can generate significant traffic impacts. These interactions have effects on all three disciplines.
- To identify the interactions for other modes of traffic, parts of this dissertation, e.g. general parameters, can directly be transferred.

Overall, this dissertation shows that there is a need to move the topic "Interaction between freight traffic, production and logistic" in the focus of science.

Based on the knowledge and the experience which is gained during this dissertation, this thesis demonstrates that there are still gaps in some areas. As these gaps are outside the aims of this thesis and therefore they could not be clarified. Accordingly, the development and verification of this dissertation have a big potential. The needs of research can be summarized as follows:

- The assessment of the suggestibility of the parameters should be verified.
- An expansion of the number of parameters should be checked. In the view of the modelling, the result accuracy should be evaluated and set against the needed effort.
- In terms of modelling, the refinement of the factors should be reviewed.
- The nuance of the influencing factors compared to each other should be seriously considered.

The identified interactions in this dissertation are important for the development of the model within the framework of the project Dynamo PLV. As the freight traffic will further increase in the future, it will sooner or later lead to capacity constraints.

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Dezember 2010