

## OPERATION RISK MANAGEMENT: A CASE STUDY OF BAGGAGE LOGISTIC TECHNOLOGY AT MUNICH AIRPORT

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### Abstract

This research aims to analyze the baggage handling system which is considered as one of the major problems confronted by international airports around the world. The research used Munich Airport's baggage handling system as a case study to analyze risk management control measure as well as, to measure the level of passengers' satisfaction regarding baggage logistic process. The study employed both quantitative and qualitative research methods. Questionnaires and interviews were used as an instrument of the study in Munich Airport. The results reveal that technology failure risk and employee risk were the common risks in the baggage handling process. The findings of this research may be of significance to conduct further studies in baggage logistic process of airports in ASEAN region.

**Keywords:** Baggage handling, Operational risk, Risk management, Logistic technology, Aviation industry

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## Introduction

The paper studies the activities that were commenced by Munich Airport to develop the baggage handling system, precisely the operation management side which deals with both human errors and system malfunctions. The study is centered on the framework of baggage logistic system and different problems in the operational aspects while dealing with overall baggage handling process.

This research study is done on the basis of similar kind of study research which was done before on baggage handling related technology. The research conducted by Ascó, Atkin & Burke (2011) on “Airport Baggage Sorting Station Allocation Problem”, and the thesis research conducted by Gomes de Matos (2009) on, “Implementation of new baggage logistic technology at Heathrow Airport, Terminal 5” are some of the previous research work taken into consideration to understand the research area in depth.

As referred by Mr. Alice Joyce, Chairman IATA Board of Governor, 2012-2013 (IATA, 2013: 6), the number of air passengers is increasing ever year worldwide. Nearly three billion people and forty seven million metric tons of cargo were transported safely by air in 2012. That activity supported some 57 million jobs and \$2.2 trillion in economic activity – about 3.5% of worldwide gross domestic product. It also suggests that the number of luggage have conjointly increased a lot. It leads to new challenges the businesses are facing: Traffic rising and baggage volumes beyond never

before, stricter security laws, price pressures increasing year-by-year, etc. as a result of these factors, baggage handling system is reaching its critical point, throughout and after the flights. For this reason the bag identification should be correct, reliable and economical.

According to the Annual Report of Munich Airport (Munich Airport, 2012), Munich International Airport is the main hub for Lufthansa and Star Alliance group airline operators. The airport began its operations in the year 1992 and has two identical runways 08R/26L and 08L/26R, both concrete paved and 13,123ft (4,000m) long. The airport started expanded rapidly as soon it first opened. The reason behind was largely because the German airline Lufthansa chooses Munich as a center of its operations. In mid of 2003, a second terminal in Munich Airport came into operation with a capacity of 25 million passengers a year.

Operation Handling Department, Munich Airport stated that, “Passengers perceive baggage handling as a serious contributor to airport and airline quality and with increasing competition within the air transport industry there is a continuous pressure to enhance the luggage handling method. Considering this fact, Munich Airports Authority is in implementation phase to expand its baggage handling system.” Siemens has received an order to expand the existing baggage handling system at Terminal 2 of Munich Airport from the Terminal 2 Company. The sorting capacity of the baggage handling system and the storage capacity of the early bag store system are to be increased by around

30 percent after completion at the end of 2015. Operation Manager further stated that, “the reason for the capacity expansion is the growing number of passengers passing through Munich Airport (Second largest airport in Germany).”

### Background Problem

The annual report of International Air Transport Association, IATA (2013) states that, “the air transportation ship nearly three billion bags per year and the cost of mishandled bags is about US \$ 2.09 billion per year. This cost does not include delayed flight costs because of other reasons like, baggage problems, refund to the gate parking costs because of baggage delayed flights etc.” IATA estimates that the cost to process a bag is US\$ 10 per journey. This estimation includes the costs for each baggage system, the messaging, the electricity, maintenance, ground equipment and staffing needed to move a bag through an airport.

**Table 1** Trend of Mishandling Bag

	Year 2012	YoY Trends	Year 2013
Total Passengers (Billions)	2.98	(+) 5.1%	3.13
Total Bags Mishandled (Millions)	26.3	(-) 17.2%	21.8

**Source:** SITA (2014)

From Table 1, it shows that in the year 2013, the total numbers of bags mishandled was 21.8 million. Though, it is an encouraging

progress as compared to the year 2012 where 26.3 million bags had been mishandled. But still the baggage mishandling problem is one of the major problems faced by almost every airport around the world. Also, as according to the SITA (2014) Baggage Report, looking at the detail reason behind baggage mishandling problem in the year 2013, delayed bags comprises 81.20%, damaged/pilfered bags accounts 15.50% and the remaining 3.30% for lost/stolen bags.

**Table 2** Reasons for Delayed Bags (2013)

Reasons	Percentage
Transfer mishandling	45%
Failure to load	16%
Ticketing error/Bag switch/ Security/Others	15%
Loading error	8%
Airport/Customs/Weather/ Space-weight restriction	8%
Tagging error	5%
Arrival mishandling	3%

**Source:** SITA (2014)

When passengers and their luggage are moving from one aircraft to another and from one carrier to another, delays and disruptions along with increasing air traffic place greater stress on baggage operation. Transfer bag mishandling is therefore the main reason for baggage delays. However the considerable investment the air transport industry has made

to tackle this problem is paying off. According to the SITA, Baggage report 2014, which is also shown in Table 2 above, transfer bags accounts for 45% of all delayed bags files, in real term 9.78 million transfer bags were mishandled in 2013.

According to Mr. Wolfgang Pfeiffer - Operation Manager (Baggage Handling Department), "Munich Airport has been effectively trying to minimize the baggage handling problem by using various technologies, operation and logistics management concepts. However, for some reasons the outcome of the baggage handling system is not as effective as it should be. A brief interaction with Ms. Stroessner Denise, Aviation Consultant – Munich Airport Consulting Wing, did show that IT upgrades without testing environment on running machines is one of the drawback for inefficient functioning of the baggage handling technology in Munich Airport".

The research was therefore, "to thoroughly examine the baggage logistic technology and identify the effective solution to address the baggage handling problems faced by the passenger using the Munich Airport."

## Objectives

The objectives of this study are:

- To Study by what means the risk management theory can be functional in baggage handling process in Munich Airport.
- To identify the baggage handling problems faced by the passenger who use the Munich Airport.
- To study the passengers level of satisfaction of baggage logistic process of Munich Airport.

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## Methods

The research tries to link the theoretical aspect of risk management with the practical aspect of baggage logistic system in the Munich airport. To make the research findings more valid, the researcher referred previous literature study and findings on the area of operational risk management in aviation, specifically in baggage logistic technology. Both the primary and secondary research methods were used. The findings were analyzed using both qualitative and quantitative methods. Different graphs and tables were formulated for quantitative analysis whereas the qualitative analyses were linked with the theory.

A case study approach is followed in this research so as to recognize detail factors which contributes to the baggage logistic technology at Munich Airport. Gathering preliminary data was the first objective of the study. This was accomplished through a series of three (3) meetings occurring between October 2014 and December 2014. The objectives of the study and desired outcomes were established early in the meeting process. The researcher attended meeting with Operation Manager - Baggage Technology to obtain support for the research. At the meeting, the process was explained, the objectives stated, and the potential use of the results discussed.

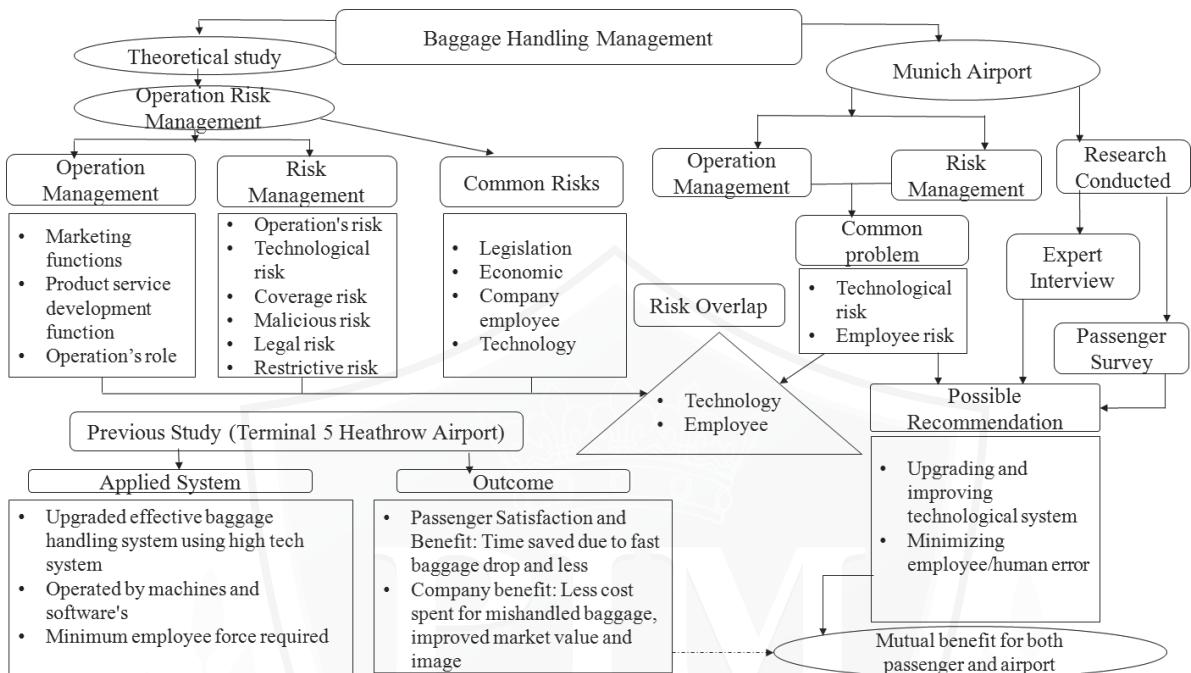
The study is a survey in the form of cross sectional study in which data is collected

one across a population through sampling. Identical questionnaires were used to assess the baggage logistic technology. A questionnaire was developed using some, but not all, of the face-to-face interview questions. The questionnaire then are distributed to the passengers using the Munich Airport both in Terminal 1 and Terminal 2 both in arrival and departure gate as well as in MAC (Munich Airport Center) area of Munich Airport. Some of the questions provided data that the organization needed, and since this information is not relevant to the outcome of the assessment, it will not be made a part of the report. Questions were framed so that they could be answered easily. The parameters as like security of the baggage, speed of baggage handling, problems with lost or delayed baggage and customer service for baggage related queries were used to determine about experience the passengers had using Munich Airport. A total of 127 questionnaires were produced and were distributed to the passengers at Munich Airport.

An interview schedule to gather information

on the subject from the Department Manager of Munich Airport is also used to ascertain management's view on the issues of Baggage Logistic technology. Interviews conducted for this research study in Munich Airport is typically qualitative. The researcher conducted 2 face-to-face interviews, one with the Operation Manager – Baggage Handling Department and other with the Aviation Management Consultant of Munich Airport. Attempts to schedule the other interviews were unsuccessful because the time limit. The purpose of these interview is to analyze and investigate the risks and process related to baggage logistic system and also if the passengers noticed any difference with the new system. Prior to the interview, a sample of questions was emailed. This enabled the experts to be somewhat familiar with the type of questions to expect during the interview process. A variety of questions were asked, but the majority revolved around baggage logistic technology, operation management and risk management.

## Results and Discussion



**Figure 1** Interrelationship of research framework and case study regarding baggage handling management

Figure 1 is an approach towards understanding the interrelationship between theoretical study and the case study including both expert interview and passenger survey.

Exploring the scenario at the Munich Airport (Figure 1), the baggage handling management system follows the similar universal baggage handling management system consisting of operation management and operational risk management. On comparatively analyzing the common risk problems perceived in both universal and Munich Airport a possible overlap of problems is clearly noticeable. Technological risk and employee risk fall under this overlap zone highlighting its probability of standing out

to be one of the most commonly occurring risk management problems.

A research study was conducted at Munich Airport focusing on baggage handling management with relevance to this study. The research included of expert interview and passenger survey as an analytical tool. An expert interview was conducted in order to investigate the operation risks involved and the operational processes related to baggage handling management system whereas, passenger survey was conducted so as to investigate the satisfaction level of the passengers regarding baggage handling system at Munich Airport. The study demonstrated that an improved efficient and

effective technological upgrade could be a possible approach for resolving the baggage handling management risks and increasing passenger satisfaction with mutual benefit to both the passenger and Munich airport creating a win-win scenario (Figure 1).

At Heathrow Airport Terminal 5, a similar research study was conducted regarding operation risk in implementing new baggage logistic technology. An effective and efficient process of a new baggage system operational management was introduced in order to deal with the majorly occurring risks. Upon the completion of the study the results indicated that the new system was highly efficient to tackle the previously occurring major issues related to baggage handling management. The study also revealed that an efficient baggage system can bring some benefits not only to the customers and but also many benefits to companies as Terminal 5 was using a high tech baggage system operated by machines and software's and requiring employee to perform the tasks by the airport. Apart from such positive results an additional benefit was also observed among the passengers, as the use of the fast bag drop resulted in easy check-in hours before the flight and less time spent in queues compared to normal system (Figure 1).

Therefore, on comparing both the research studies conducted at Heathrow Airport and Munich Airport it would not be irrelevant to consider the fact that upgrading and improving the technological system related to baggage

system operational management could turn out to be beneficial for handling the commonly faced risk management problems related to baggage handling. On the other hand the use of machine operated system as well as software's to conduct baggage management minimizing the number of employees required to overlook the operations could result in decrease of risks associated with human error thus increasing the probability of lesser issues relevant to baggage handling. Hence, both the customer/passenger and the airport companies could have a positive profit from this process.

### Results from Questionnaire Survey

**Table 3** Common Problem with Baggage Handling at Munich Airport

One-Sample Statistics				
Factors	N	Mean	Std. Deviation	Std. Error Mean
Bag Switch	127	3.29	1.17	0.10
Delays	127	3.58	1.42	0.12
Lost	127	2.17	0.85	0.05
Damage	127	2.25	0.94	0.05

Table 3 illustrates clearly that delays is most frequent problem among all of the baggage problems. It has got the highest mean score of 3.58.

**Table 4** Unique factors in Baggage handling system at Munich Airport

Factors	N	Mean	Std. Deviation	Std. Error Mean
Hi-Tech	127	3.55	1.28	0.11
Less Problem with baggage	127	2.69	0.87	0.07
Security of Baggage	127	3.36	1.30	0.12
Others (customer service)	127	2.15	1.39	0.12

Table 4 shows that the most of the passengers found the Hi-tech system used in baggage handling in Munich Airport as unique as compared with other airports. It has got the highest mean score of 3.55. Also speed of getting the baggage got score of 3.41 which shows that passengers are happy with the speed of getting their baggage. On the other side, less problem with baggage delivery got score of 3.36 followed by others factors such as personalized service by the airport staffs while the baggage is misplaced or damaged.

## Conclusions

It can be concluded from the research study that the delays of receiving the baggage is most frequent problem among all of the baggage problems in Munich Airport. Sometimes the passenger using the Terminal 1 has complained of delays in getting their baggage during arrivals.

Also, the passenger believes that security of their baggage is considered as most important and they have rarely faced any security problem with their baggage while using Munich Airport. Most of the passengers found the Hi-tech systems used in baggage handling in the Airport are unique in-comparison to other airports. Munich airport has installed hi-tech modern technology as well as they are equipped with the capacity to deliver the best baggage handling service which differentiates them from any other airports. Also, the airport claims that they give high priority to their baggage logistic system because it is one of the important and most common criteria judged by passengers around the world.

From the Interview with Mr. Wolfgang Pfeiffer - Operation Manager (Baggage Handling Department) and Ms. Stroessner Denise, Aviation Consultant – Munich Airport Consulting Wing, it can be concluded that the main risks associated with the baggage system in Munich Airport are the risk of technology failure and employee risk/human error. The risk of technology failure is unpredictable and might make a lot of damage. Munich airport is concerned about both the risks and is trying to adopt various measures such as backup plan for technology failures and frequent simulation trainings to baggage handling unit to minimize the errors as possible.

The study shows that an efficient baggage system is always a benefit to customers and the airports. The baggage system in Munich airport also has benefited both the customer

and the airport itself. The automated baggage handling system in the terminal 2 is operated both by the machines and the software so they do not require extra employee to handle the baggage job. Whereas, the passengers are benefitted as they will be able to check in their baggage beforehand by using the self-check-in Kiosk. The use of Kiosk helps the passenger to minimize the unnecessary queuing time from

the normal check-in procedure. The study concluded that an improved efficient and effective technological upgrade could be a possible approach for resolving the baggage handling management risks and increasing passenger satisfaction with mutual benefit to both the passenger and Munich airport creating a win-win scenario.

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