AN ANALYSIS OF MISSING SHIPMENT PROBLEM:
A CASE STUDY AT THAILAND’S SUVARNABHUMI AIRPORT

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ABSTRACT
Air shipment has become a growing solution for international shipments. However, due to lack of visibility, sometimes cargo can be lost or get damaged before reaching the destination. Problems in air cargo logistics system range from damaged cargo, miss-routing, missing cargo, or missing documents.

This study identifies and analyzes the possible factors that can contribute to the missing air cargo problem. The exporting process at the new Suvarnaphumi Airport in Thailand is used as a case study. This study examines the operation process starting from the Cargo Terminal, going through customs formality and inspection process, to being put on standby before being exported. The flow of cargo and operation process is analyzed. A Root Cause Analysis (RCA) is applied to identify hidden factors which can affect the performance of operation process.

The result of this analysis shows the vulnerable links in the air cargo management system. The findings from this study can serve as an initial step for the industry to improve the process at the air cargo terminal in order to reduce to risk of missing shipment.

KEY WORDS
Air Cargo, Missing Shipment, Root Cause Analysis, Thai Airport

1. Introduction

The air freight business began in the early 1950s, as a by-product of the airlines’ passengers business. Only in the mid-1970s did the business become independent and profit-oriented [1]. There are several factors that companies choose airfreight mode to transport their cargo. These factors include value of the cargo, urgency of the demand, weight of the consignment, vulnerability of the cargo, flexibility and frequency of the air shipment, etc.

The demand for air-cargo shipment has steadily increased over the years. TIACA (The International Air Cargo Association) predicts that the volume of global airfreight shipment will grow 6.5 percent annually. The Intra-Asia shipment alone will grow 9 percent per annum. TIACA also predicts that the world airfreight industry is expected to more than triple in the next 20 years. Airfreight shipping is increasing primarily because of the shorter lifecycle of products, the general trend towards global markets, the need for express cargo shipping from business worldwide, and the fluctuating currency that has increased the demand for goods from overseas [2].

The air cargo industry’s value chain includes many players such as airlines, customs, ground services, air cargo forwarders, brokers, domestic transportation, air cargo terminals, distribution centers and integrated international express services [1]. Of these, the air cargo terminals, usually operated by the country’s authority, are the central entities that link other players together.

Competition in the air cargo industry has intensified recently, especially in the Asia-Pacific region. As for Thailand, the new international airport in Bangkok (Suwannaphum Airport) started operations in September 2006. At the initial stage, Suvarnabhumi Airport will accommodate up to 45 million passengers a year, 76 flights an hour and over 3 million metric tons of cargo per annum. When the airport is fully developed, it will accommodate up to 100 million passengers a year, 112 flights an hour, and more than 6 million metric tons of cargo per annum [3].

With this scale of operations, the problem of missing cargo is expected to become increasingly critical. The information from the Thai Airways International during October 2006 till January 2007 shows that the total import shipments from worldwide was 624,174 shipments while there were totally 2,206 shipments missing or 0.35% missing when compared with the total import shipments.
Since air cargo shipment costs significantly higher than other modes, the customers set high expectation on reliability, accessibility, prompt and error-free operations. Therefore, missing cargo problem, though does not happen very often, can cause damages to the company’s reputation and business. Poor visibility and accessibility to terminal operations are disadvantages of air carriers. Once occurs, it is unpredictable when and where the missing cargo will be found. It might be lost or disappeared from the loop due to poor operations either at the loading port or the destination port. It can take days, weeks or even months to identify the missing cargo. The claiming process to air carrier for the full cargo’s value is complicated and time consuming.

This paper studies the operating processes at loading terminal by using the new Thailand International Airport as a case study. The possible causes that lead to poor operational performance and missing cargo will be analyzed by applying Root Cause Analysis (RCA) methodology. The result of this analysis shows the vulnerable links in the air cargo management system. A new methodology is proposed to reduce the risks in airport cargo system. This new methodology is aimed to increase the air cargo service provider’s ability to manage their performance.

2. Literature Review

There are quite a few studies on the air cargo industry. Ingrid Lobo and Mohamed Zairi (1999) [4], [5], [6] study the competition in the airfreight industry. The study gives a list of performance indicators that can be used to benchmark the competitiveness in the air cargo industry. The series of papers from the same authors also analyze the changing demand and supply of the industry. The life cycles of airfreight customers’ products have become shorter and shorter (e.g. in the case of cellular phones, it takes just two months before any given model is succeeded by a new one). At the same time the market has become more global due to the Internet. Airlines/freight forwarder partnership has not been able to keep up and the integrators have been profiting a great deal more from this environment.

The study also identifies the need for improvement in service quality from airlines to carrier/forwarder. These areas include fewer mistakes, better space utilization, improved reliability, greater control over shipments, improved inventory control, improved management information, and a revolutionized communications in the air cargo handling community.

A study by Wirtz et.al. [7] highlights the positive correlation between the profits and service excellence of airlines. They study the case of Singapore Airlines from the senior management perspective. The four criteria commonly used to measure the service excellence of airlines are Customer Service, Performance, Value and Information Technology [8].

The value of e-commerce to air cargo industry is examined by Leung et.al.[9]. They propose a framework for a logistics e-commerce community network. The study shows that the information technology facilitates tracking and tracing, and minimizes unnecessary travel and inventory costs, thus achieving supply chain management at the industry level. The study provides an implementation scenario for the air cargo industry in Hong Kong.

Forster et. al. [10] examines electronic integration in logistics supply chain using the non-integrated US-international air cargo industry as a case study. The authors investigate the impact of electronic integration has on interorganizational task performance.

Another group of studies concentrate on the routing problem in the air cargo industry. For example, Ohashi et al.[11] applies an aggregate form of multinomial logit model to identify the critical factors influencing air cargo transshipment route choice decisions. The study is based on a unique data set of 760 air cargo transshipment routings to/from the Northeast Asian region in 2000. The analysis focuses on the trade-off between monetary cost and time cost while considering other variables relevant for choice of transshipment airport. The results show that choice of air cargo transshipment hub is more sensitive to time cost than the monetary costs such as landing fees and line-haul price. Therefore, the study suggests that it is important to reduce air cargo connecting time at an airport via adequate investment in capacity and automation even by increasing landing and other airport charges.
The competition in the air cargo industry is analyzed by Zondag [12]. The study examines the whole value chain of the air cargo industry and concludes that the traditional airline cargo market in general is losing the battle over the air cargo industry from the integrated express market.

Another related group of studies investigate the efficiency and performance of airports and terminals. Humphrey et. al. [13] studies the performance indicators of airports. The study gathers significant indicators that can be used to compare airports around the world. Chen et. al. [14] applies a Balanced Scorecard (BSC) framework for air cargo terminal design to achieve efficiency in operations.

Han et. al. [1] examines the demand of cargo terminal. The paper analyzes the difference requirements among airlines, air-freight forwarders, and airport warehouses in Taiwan airport cargo terminal users. The results revealed that the most important service requirement were electronic document exchange management capability, commitment fulfillment, crises management capability, loading and unloading/conditions, and damage compensation service.

From the literature, there are very few studies concentrate on the missing shipment. The total annual value of missing shipment is estimated to be THB 230 millions up to THB 370 millions if there are 0.35 percent of missing shipments annually at the Thailand International Airport. Therefore, we focus our study to the missing shipment at the air cargo terminal.

3. Cargo Processing Operations

The air cargo process at the Suvarnabhumi airport was studied and drawn as shown in the Figure 1 below. The process starts from a customer sending a booking request to a freight forwarder. Then the freight forwarder passes the booking request to the airline of choice. The airline must coordinate with the Unit Load Device (ULD) Center to reserve pallets. This request must be passed to the Ground Service Handling companies. In Thailand, only Thai Airways (TG) and Bangkok Flight Service (BFS) are authorized as Ground Service Handling companies at the cargo terminals.

After the booking process is confirmed, the cargo is delivered to the air cargo terminal for customs inspection. Once passed, the cargo is moved to the waiting area at the loading terminal. It is important to point out that the document must be checked at each stage and can be lost along the process. There are 19 steps in total from sending the booking request to the point where the cargo is loaded to the passenger flight. When the document is misplaced or lost by one of the parties taking part in these air cargo processing operations, the cargo can be misplaced or get shipped to a wrong destination, causing the tracing process to be very difficult.

4. Root Cause Analysis (RCA) of Missing Cargo

This study has identified many factors along the current export process that can contribute to the missing cargo problem. All factors are listed and grouped into 4 categories. They are (1) Loading area, (2) Characteristics of shipment, (3) Human error, and (4) Internal practice process of carriers. Each of these factors is investigated in detail below.

4.1. Loading Area
After the loading area has been examined, the possible variables have been listed under factor of Loading Area. The main variables are as follow:

- **Mixed Import-Export Loading Area.** There are only limited weighing machines and gates in operations at the cargo terminal. Most of the time, there are not only export shipments but also import shipments waiting for the completion of shipment process at the terminal as well. Therefore, both storage area and loading/unloading area are shared among import and export shipments. Therefore, the waiting time for both export and import shipment can generate the congestion to the loading/unloading area at the cargo terminal.

- **Peak Time Traffic.** There can be many flights coming or departing simultaneously during the operating hours. The congestion problem arises when exporting shipments continue arriving at the cargo terminal and the unloading area at the same time. Since the Import and Export shipments share the same roof, the shipments can be mixed up if it is loosely pack.

- **Quota Area.** Because of the limited area, each carrier has quota on area to loading and unloading the pallets inside the terminal. When there is congestion of traffic during peak time, the quota area cannot be well-organized. Due to limited available space to support all shipments during peak time, sometimes staffs of the Ground Service Handling Company may put the cargo in the wrong place or close to the area of other carriers. This can lead to the missing cargo problem as well.
4.2. Characteristics of Shipment

Sometimes the characteristics of shipment itself can easily lead to the missing cargo problem. These characteristics include the followings.

- **Ungrouped or Un-palletized shipment.** Sometimes the shipment is not packed or wrapped as one unit or put together in the same area or cart while it is waiting for the weighting process or the loading on a pallet. This is because some shipments can be small and are comprised of only few boxes. This kind of shipment can be easily mixed up with other loose shipments during loading or unloading process. This can lead to missing shipment. However, by wrapping the pallet, the problem can partially be resolved.

![Figure 1: The Shipment Processing Operations](image-url)
• **Partial or Short-shipment.** When facing with big shipment and limited capacity, carrier will break or split the shipment and ship to destination as partial shipments. Sometimes, carrier will coordinate and request to join space with their alliance airlines. In this case, the whole or parts of the shipment will be moved and shipped by alliance carrier. This can lead to a missing shipment problem if the coordination between airlines is not well synchronized.

4.3. **Human Error**

Human errors play a significant role in the missing cargo problem. Since most operations at the air cargo terminal are controlled by human staffs, the human error can occur anywhere in the process. The causes of human error can arise from the following factors.

• **No training.** For most of the crews at the terminal, there is no training provided before they start their jobs. Therefore, when things do not go as planned, the staffs do not know certainly what they should do to solve the problem.

• **Low experience.** Because of high employee turnover rate at the terminal, some staffs of the Ground Service Handling Company are new or have less experience on operating process.

• **Low education.** Some of the staffs operating the machines at the terminal do not finish the basic education.

• **No motivation.** Some staffs at terminal or staffs from shipping companies are hired based on wage per day. Therefore, these staffs may not responsive to the job that they were assigned. This could lead to the problem of missing cargo due to lack of motivation to perform well in the job.

4.4. **Internal Practice Process of air carriers**

Sometimes the problem of missing cargo can stem from the internal procedure of each air cargo carrier. These practices are as follows.

• **Short shipment.** As mentioned earlier in the characteristics of shipment, if the shipment is too big, it is possible that air cargo carrier splits or breaks the shipment and ships it as partial. To ship as partial, all might be shipped with the same carrier while some were shipped with alliance carrier. To ship as partial or change the carrier, sometimes, the number of air way bill is changed and carrier did not inform customer about the split shipment and new air way bill number, so, misunderstanding might occur between the origin and destination stations.

• **Shift to other carrier.** As mentioned in the previous variables, when shipment is too large and cannot be carried within one flight, it will be moved and shipped by the alliance carriers, sometimes in urgency. With lack of complete coordination, the alliance carrier at the destination can misplace the shipment.

• **Lack of IT capability.** Some cases, the proper shipment information or shipment status is not keyed-in on time. Since the information technology that have been used between carriers, terminals, and ground service handling are different and need to communicate with various parties for each shipment. Moreover, it is very high cost for airlines to invest and implement a new information system. Therefore, the information about shipments or changes can be delayed or lost. Sometimes, it is recorded and communication only between origin offices and origin terminal but not destination. When shipment arrives at destination, nobody is aware of the shipment because the number of the air waybill is changed. On the other hand, customer wills trace for the shipment with old reference number. This can contribute to the missing cargo problem.
5. Conclusion

In fact, the damage does not only include the value of the missing cargo, but also other spending on other process for the shipment such as international freight charge, local charge at origin, and sometimes, the penalty due to the delay of delivery within a specific period. Therefore, the problem of missing cargo causes everyone to lose a significant part of their potential profits.

This study examines the shipment process that involves the whole value chain of air cargo. These parties include airlines, customs, ground services, air cargo forwarders, brokers, domestic transportation, and air cargo terminal operators. The causes of missing cargo are then identified through the Root Cause Analysis (RCA) methodology.

The results reveal that four main factors contribute to the missing shipment problem. They are (1) Small loading area, (2) Characteristics of shipment, (3) Human error, and (4) Internal practice process of carriers. It also finds that Information Technology can play a key role in reducing the number of missing cargo.

The findings from this study can serve as an initial step for the industry to improve the process at the air cargo terminal in order to reduce to risk of missing shipment. An extension to this study would be to investigate deeper the use of information technology by each party in the value chain or air cargo industry and study the impact of new technology such as RFID to the process efficiency and accuracy.

References

[8] www.aircargoworld.com