PROJECT SEMESTER REPORT

Data Quality Initiative – A Step Towards Digitalization

by

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Computer Science & Engineering Department

Thapar Institute of Engineering and Technology,

Patiala

In Partial Fulfilment of the Requirements for the Degree of

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Data Quality Initiative – A Step Towards Digitalization

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ABSTRACT

More than 50% of global trade in air traffic relies on paper systems in 2017. A shipment can yield as many as 30 paper papers and may further rely on human activity for other processes like tracking and tracing. The solution to this issue is E-AWB – Electronic Air Waybill short. E-AWB shall replace all paper copies of documentation between a shipping company (freight forwarding service) and airline (airline). These records are classified into four types of air freight papers: customs records, shipping documents, business documents and other relevant documents. Electronic shipping protection declaration (ECSD) and MAWB (Master Air Waybill), HAWB (House Air Waybill), are the most significant forms of e-AWBs. The IATA rules and international air conventions apply in compliance with the legal agreement MAWB. HAWB is a forwarder's internal text, defining the terms and conditions of the forwarder. If the shipper and carrier established an EDI (Electronic Data Exchange) channel and chose a supporting document format or using web e-AWB platforms or software, it is possible to implement E-AWB. Freight forwarders, airlines and airports also work more with outdated programs such as EDI or rely on paper procedures, a drawback to the complete adoption of the e-AWB. A switch to an e-AWB does not extend the reach, however.

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I consider myself fortunate to get an opportunity to work in a dynamic organization like **Lufthansa Cargo AG** which provided me a great opportunity towards technical learnings and professional development. I am grateful to have met highly skilled people, who led me through the internship period at this organization.

Bearing in mind, I am using this opportunity to express my deepest gratitude and special thanks to my mentor **Mr. Saket Gupta** who in spite of being extraordinarily busy with his duties took time out to hear, guide and keep me on the correct path and allowing me to carry out my projects during the entire training.

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Lastly, I would thank my family and friends for their unyielding love and encouragement who always wanted the best for me and I admire their determination and efforts.

I perceive this opportunity as a big foundation milestone in my career development. I will strive to use the gained skills and knowledge in the best possible way and will continue to work on their improvement in order to attain desired career objectives.

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This is to certify that Mansi, Roll No. 401603019, a student of B.E.-M.B.A. at Thapar Institute of Engineering and Technology, Patiala, has done excellent work during the tenure of her internship.

Best regards

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To whosoever it may concern,

This is to certify that Mansi, Roll No. 401603019, a student of B.E.-M.B.A. at Thapar Institute of Engineering and Technology, Patiala, has joined our organization Lufthansa Cargo AG at Delhi on 2nd January 2020 as an intern for her 6-month internship semester.
Her internship will get over on 1st July 2020. Till date she has completed 24 weeks of her internship and was found regular for the same with good grasping of new topics.

Best regards

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1. COMPANY PROFILE

Figure 1.1.: Lufthansa Cargo Logo

Lufthansa Cargo AG is a German freight company and a wholly-owned Lufthansa subsidiary. Head of Lufthansa's main hub, Frankfurt Airport, operates worldwide air freight and logistics services. The organization also has access to freight capacities of the Lufthansa Group 350 passenger aircraft in addition to the service of specialist cargo aircraft.[1]

Lufthansa Cargo is one of the world's largest air freight firms with a turnover of 2,5 billion euros and 8,9 billion revenue tonne-kilometre-long sales in 2019. The group, which currently employs around 4,500 people worldwide, is a wholesale subsidiary of Deutsche Lufthansa AG. The airport-to-airport sector is the subject of Lufthansa Cargo. The cargo carrier has its own freighters' fleet, the belly capacities of passenger airplane run by the German Airlines Lufthansa, Austrian Airlines, Brussels Airlines, Eurowings and Sun Express and an extensive network of road feeder services in more than 100 countries. The majority of the freight business is shipped via Frankfurt Airport. Lufthansa Cargo is a wholly-owned subsidiary of Lufthansa AG and a logistics specialist of the Lufthansa Group.

The New Delhi division of Lufthansa Cargo AG is part of the region “North, North East, South India, Pakistan and Dhaka (Bangladesh)” and is one of eight regional Lufthansa Cargo AG regions. Given below is a map of the organization.

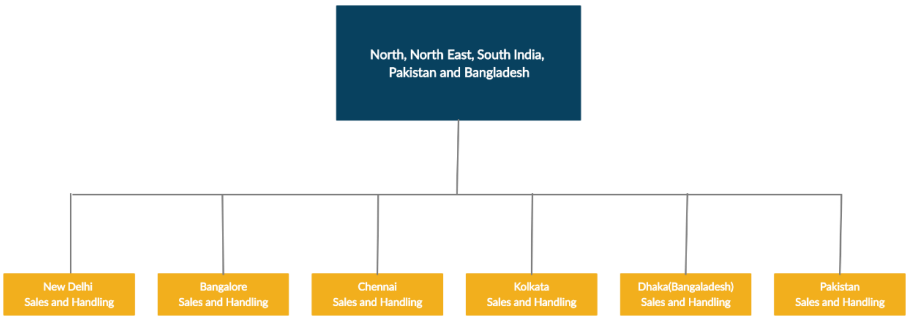

Figure 1.2. Map of distribution of Lufthansa Organization

I was given the opportunity to participate in the office "North & North East India" that oversees the

processes of sales, handling and government for all of the locations mentioned and referred to in the chart. Within this office there are primarily three central departments:

1. Commercial – Manages all distribution processes.

2. Handling – Controls the aspects of freight processing.

3. Government Affairs – Takes the link with public authorities and traffic rights.

Apart from this, Lufthansa has around 281 destinations worldwide which are reached using various aircrafts including, but not limited to Boeing, Airbus and bellies of various pax flights.

Figure 1.3. Major destinations of Lufthansa Cargo across the globe

2. INTRODUCTION

2.1. Project Overview

More than 50% of global trade in air traffic relied on paper systems in 2018. A shipment can yield as many as 30 paper papers and yet relies on human activity for other processes like track and trace. e-Freight is an industry-wide initiative designed to create an end-to-end paperless delivery mechanism for air freight made available across the regulatory system, digital electronic communications and high-quality data e-Freight. The program, with the goal of accelerating the transition in the fields of digitization, accessibility and protection, comprises six projects [2]:

• E-Freight and e-AWBs	• ONE Record
• Interactive Cargo	• Smart Facility
• ACID	• EPIC

2.2. Problem Statement

The information of cargo transported by air is sensitive. However, in the era of digitalization, the industry still relies on paper for data storage and transmission purpose. International Air Transport Association decided to digitalize the process as a measure assess the potential impact of new technologies on the air cargo supply chain. This significant breakthrough in the industry brings air freight into an age where automated systems are the standard and paper systems are the exception. The e-AWB Agreement aims to replace the paper Air Waybill with a single e-AWB.

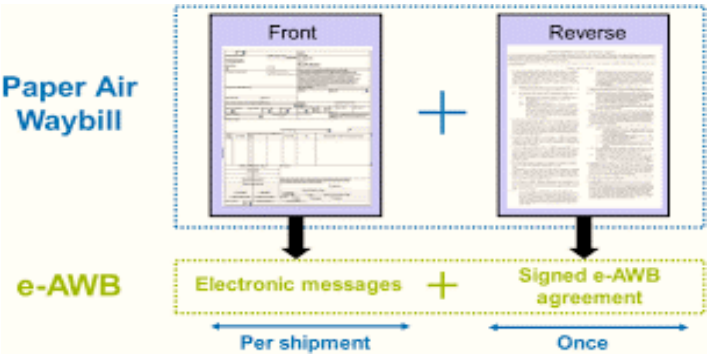

Figure 2.1. Paper AWB to e-AWB comparison

A single standard agreement between airlines and freight forwarders can enter into with the IATA and begin e-AWB with all other parties to the agreement, as designated by IATA Resolution 672. Multilateral e-AWB agreements are signed once. Parties that signed IATA Resolution 672 are allowed e-AWBs with all other Parties, forming a "multilateral" e-AWB Deal, i.e. airline with all the participating forwarders and freight forwarder for all airlines involved.

Figure 2.2. The Multi e-AWB Agreement [3]

2.3. Scope of the Project

If freight is delivered by air, there is always lots of detail about the cargo. However, the global air cargo market still relies heavily on paper for the transmission of information, leaving the air cargo supply chain vulnerable to data processing vulnerabilities, inadequate coverage and lack of shared data standards. In an attempt to encourage digitalization in the air freight industry and to make it entirely dependent on the paperless mechanism and intelligent data sharing, the International Air Transport Association is doing its best to incorporate e-AWB.

Papers have also been a significant part of every industry's operating phase, in particular in the field of clearance. The air freight business is still no different, but the need for so many papers makes the

present digital era strange. Handling of paper not only reduces the movement of air freight, but also raises the global carbon footprint. While companies are expected to deter and control paper usage, there is also no brilliant integrated effort by the government in India.

Even the IATA (International Air Transport Association) has ordered e-AWB years ago to minimize the paperwork of the international air cargo industry, but the actual implementation is yet to be seen in order to get rid of the pouch and make it an e-AWB compliant industry. e-AWB is currently only allowed on viable trade routes. However, also under the appropriate legislative context, the paper AWB bill can be requested by local authorities.[4]

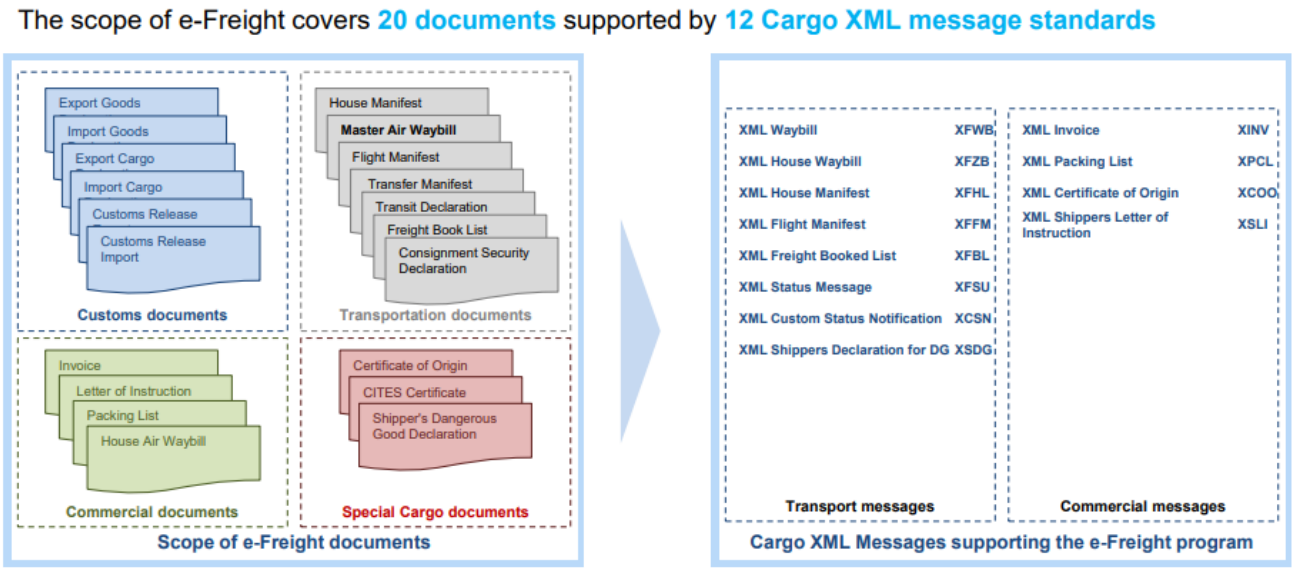

Figure 2.3. Scope of e-Freight [5]

2.4. Project Role

Air cargo shall be preceded by e-Air Waybills (e-AWB) to be called e-freight. The Air Waybill (AWB) is an air freight paper which is used by the forwarder (the group carrying the goods) and the carriers / airlines as freight contracts. The e-AWB is a digital AWB master version that removes the need for printing and document archiving for paper formats. By implementing e-AWB, the air logistics industry can further streamline and enhance operational efficiencies.

Electronic data exchange e-AWBs are exchanged between the sender and carrier using EDI. The

forwarder must first ensure that EDI messages are exchanged on the appropriate formats in order to send e-AWB to an airline. The e-AWB solution allows forwarders to conveniently connect to multiple airlines. Once the forwarder signs the IATA Multilateral e-AWB agreement, data discrepancy is traced and removed to make the forwarder and e-freight client.[6]

Advantages of e-AWB:

Improvement of precision. The details obtained from the e-AWB comes directly from a forwarder or airfreight handler. Last-minute data modifications can be made in real time by agents until cargo arrives at the station.

Price management. Since e-AWB is a paperless system, customer handling and storing costs and shipping costs from forwarder to airline, from warehouse to flight can be that as well.

Growth in efficiency. E-AWB removes the need for repetitive data entry, manual analysis of AWB and device data, and manual record filing and storage. All parties can quickly access accurate information and move freight, eliminating waiting times, as scheduled.

Faster processing and transmission. The total cycle time of e-AWB can be reduced by up to 24 hours. This allows customs clearance procedures to be speeded up and transfers and carrier information to be sent and obtained before the delivery of the cargo.

3. BACKGROUND

3.1. Background Study

Major technology progress has had a significant effect on all facets of our everyday lives and it will continue to do so. In all industries, be it agriculture, development or the services sector, technology is rising every day. The use of technology often grows to a much larger basis in our everyday lives with the advance of technology. Technology transforms our lives sometimes to make life safer, safer and healthier for us. In the fields of medicine, infrastructure, electronics, agriculture, motor vehicles, communication etc. progress has been achieved. This progress in digitalization and electronics has led to huge opportunities in various other fields, such as medicine, car and more.

We have airplanes in the 21st century. Tea, food, clothing, phones, mail and everything you can carry now and in less than a week these items will be shipped from anywhere in the country. Each year, the global flight freight traffic increased: it was estimated that nearly 64 million tons of cargo was carried by commercial airlines in 2019, and the number is forecast to grow in 2020. There exists a connection of digitalization if you carry freight via airliner or if you want to start up a company.

3.2. Study about Air Waybills

An airwaybill (AWB) is an accompanying paper that contains precise details and permits the recording of items transported by a foreign air messenger. The bill consists of several copies to record it for any individual involved in the shipping. One form of loading bill is an air waybill (AWB), which is often referred to as the air transport bill. An AWB does however have a similar purpose to ocean loading letters, but an AWB in unnegotiable form is given, which means that less security is available from an AWB relative to loading letters.

An AWB (Air Waybill) is used as a transfer of merchandise between the shipper and the carrier by an airline (the carrier) and as a carriage arrangement. This is a legally binding document by statute. The AWB is an enforceable contract because the consignment is signed by the shipper (or agent of the

shipper) and the courier (or agent of the courier). The air waybill also contained the name and address of the shipper, the name and address of the consignor, the airport code of origin for three countries, the airport code of three destinations, the customs value of the shipment reported, the quantity of products, the gross weight and the description of the goods and any specific orders. An AWB shall also include the terms, conditions, including its liability limitations, its policies for lawsuits, the product specifications and the relevant charges of the carrier as defined in the contract. [7]

3.2.1. Functions of an Air waybill

The air waybill offers a variety of features, including:

- Evidence that an airline has received the good
- Contact details for both the parties.
- Carriage deal between the airline and the shipper
- Cost of goods
- Customs statement
- Brand overview
- Manual for product storage and procurement
- Shipment monitoring

3.2.2. Format and features of the Air waybill

An AWB is usually a single page document that includes essential material. The bill is designed and circulated by the IATA and is used for transportation at home and abroad. The paper itself is released in eight color collections, the original being three versions. A copy of the issuing company is the first original (green). The second is the duplicate of the receiver (pink). The copy of the shipper is the third (blue). The fourth copy is brown and is used for obtaining and sending evidence. The remaining four are void. Airways paper should include the top-left quadrant detail for the shipper, consignee, handler, departure airport and destination airport.

The right top quadrant will include the airline data – either in the form of written and prepopulated text

and logos or in manual mode. Further detail on the declared freight value and declaration value for custom is given in the top right column. The center, including the number of parts, the gross amount, the chargeable weight, overall charges and also the type and quantity of the product, is displayed on the quality of the shipment. The bottom of the air waybill shall contain the extra fees and costs, the region to be signed and the date/time and place of execution of the shipper or handler.[8]

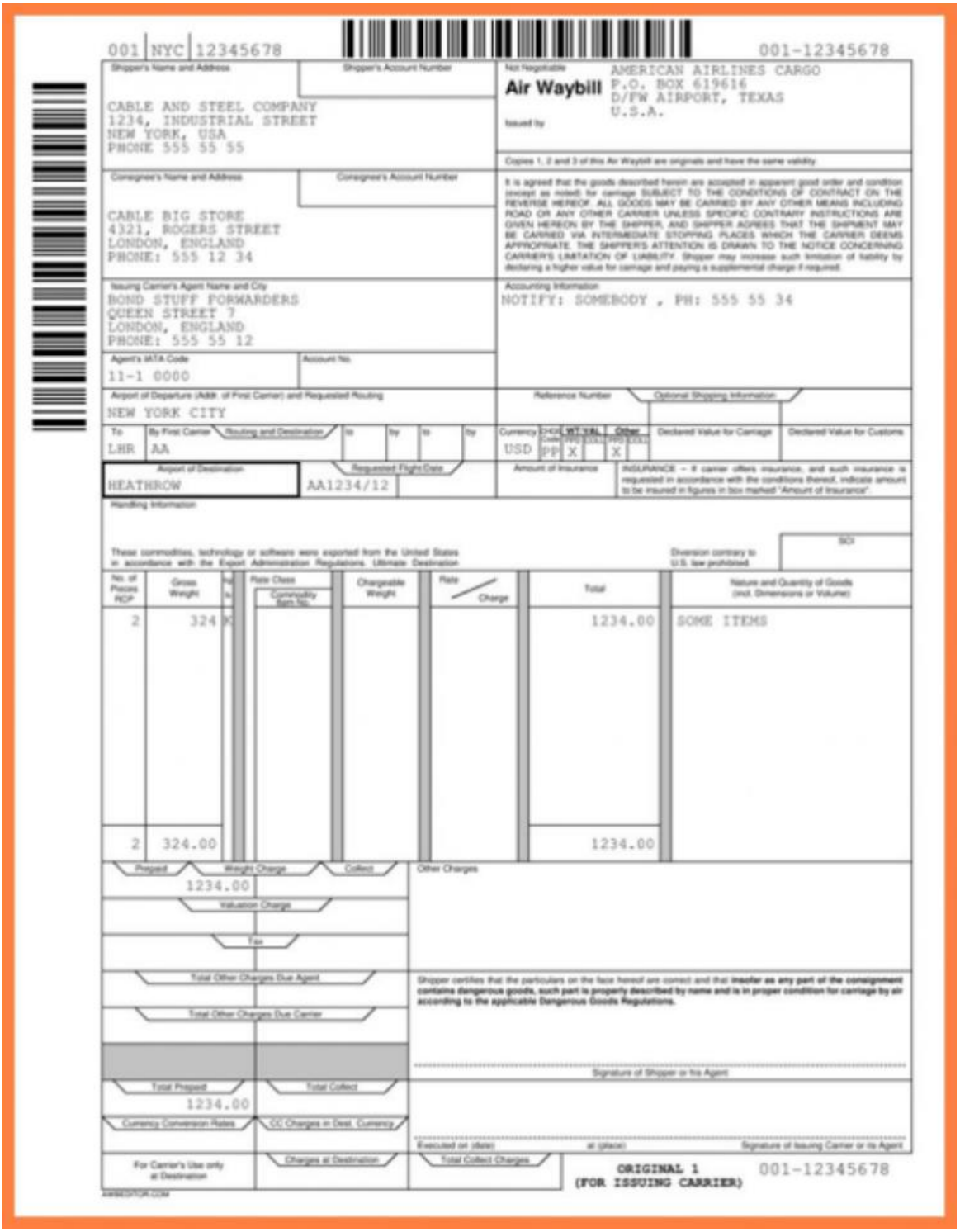

Figure 3.1. Sample Air waybill

3.3. Need for digitalization

Carriage of cargo by air is intensive information. However, much of the industry also depends on paper. If there are already electronic processes, they have many limitations (poor data quality, incomplete coverage, absence of common data standards, the use of heritage technologies and standards). The IATA aims to achieve an integrated air freight market, which relies on paperless systems and smart data sharing, enabling its customers to benefit from creative and value-added services. In order to update the air cargo standards, drive change in industrial projects and explore new technology for their possible impact and usage in the supply chain of air cargos, IATA works with the Cargo Operations and Technology Board (COTB) and its subgroups.

IATA announced that it will become the default air carriage contract on the enabled commercial lanes for all air cargo shipments, effective 1 January 2019. IATA has announced this contract. The Lufthansa Cargo AG has a shared ambition to digitalize the supply chain and aggressive targets to expand e-AWB penetration, as a market pioneer and a forerunner in bringing in innovation. According to the recommended SOP of IATA, all carriers have to perform a quality control of data content which transfers to the operating application of the carrier. These data will eventually replace AWB copying of documents, which constitutes the contract between the shipper and the carrier.

3.4. Airfreight Surcharge

Lufthansa Cargo introduced the "Airfreight Surcharge [9]" (ASC) as of winter 2015 (Effective 25th October 2015). The ex-used fuel and security charge, excluding government regulated countries such as Japan, Hong Kong, Brazil and Columbia, has become obsolete with the implementation of this air freighter charge. Only the FSC is retained in Columbia, a security fee is not allowed. No supplements are generally permitted in Brazil. The "Airfreight Overload" reflects the volatility of significant components of externally-led cost (fuel, money, cost dependence on flight, security). Therefore, the composition is completely different and cannot be compared with the former fuel and safe supplement. The new "Airfreight Supplement" composition is however expected to be more stable than the old fuel and security supplement. We monitor the development of components of the air freight surcharge in accordance with an internal methodology. If prices are increased, Lufthansa Cargo updates the ASC and notifies its clients in due course. The air freight charges are increased or decreased in 0,05, €but are translated into local currency. The surcharge for air freight is dependent on the chargeable weight of the product. The ASC is charged as relevant to the date of issue of the Air waybill.

3.5. Long Term Contracts

- **SRS (Standard Rate Sheet):** This refers to the standard rate sheet, issued usually for the entire market. It is generally issued for 2 different seasons, Winter and Summer Season.
- **SRA (Special Rate Agreement)**: Specific customer and enterprise rate sheets are published and generally concessions are available at SRS rates. Only for specific and individual O&Ds, products and interruptions. For the same duration of validity as SRS, however, SRAs may typically be updated and tested at all times. The target customer (CWT / Month) should be given SRAs and user monitoring should be carried out.
- **Spot Rate:** Targeted price management mechanism used to reach a target price drop in order to meet short-term acquisitions targets. It should be put into practice to ensure that an offer that is available can be fully sold at short notice, but can also be used as an up-sales tool when demand exceeds the capacity offer and increasing revenues and profitability can be guaranteed by selling more than standard published prices.

3.6. Speeds offered by Lufthansa Cargo

There are 2 types of speed services offered by Lufthansa Cargo. Study of these speeds is necessary to determine the customer base and requirements in Lufthansa Cargo. It also provides an insight into the marketing and operational activities of the airline. It also enhances the information about the type of cargo delivery and speed service required by the customer. It enables the airline to determine the frequency of the flight and capacity required by the customers. There are two basic type of speed provided by Lufthansa Cargo to its customers. [10] They are as follows:

- td.Pro
- td.Flash

A brief description of these services has been given below:

- Td.Pro : td.Pro is the prior choice for customers looking for airport-to-airport shipments gives a good basis for a smooth supplier chain across the full size or weight of the Lufthansa Cargo network. It is a cost efficient and consistent operation with identical timeframes for regular freight.
    - This is open for all type of customers in the Lufthansa Group Network without constraint.

- Products to be transported under this category travel in a clearly defined time of travel, with both coercion, flight and transit times in mind.
- Adequate care is taken to transport the cargo via the customer's routing choice.
- Predictable and secure for the supply chain: freight is ready at its accepted time to pick up at its destination i.e. at the LAT (Latest Acceptance Time).
- It is more commercial than td.Flash transport.
- Complete airport-to-airport mapping and seamless processes to transport the cargo within an adequate time and best possible condition.

Figure 3.2 td.Pro by Lufthansa Cargo

- **td.Flash:** It provides a short term guaranteed capacity access. The quick airport-to-airport shipment service secures your supply chain, and this is true for shipments up to 2 tons shortly before departure. It is for air freight that is of high priority and needs to be transported at its destination, whether it is repair, telecommunications or pharmacy. It provides a quick transport from airport to airport.
    - Fast acceptance and availability are provided i.e. cargo is accepted up to 90 minutes prior to departure and 2 hours following arrival, depending on local conditions.
    - The Frankfurt, Munich, Vienna and Brussels Hubs are fast transit times.
    - Passenger and passenger aircraft and vehicle travel (RFS) are also used when necessary.
    - Last entry, first exit: the cargo transported via td.Flash is loaded near the door of the aircraft.

- Fast loading, desirably loose or using separate container or pallets is used for the products transported via td. Flash.
- Dedicated mobile teams track transit transport on the Frankfurt hub and cover up to 40 minutes of delays in flight.

Figure 3.3. td.Flash by Lufthansa Cargo

3.7. Products offered by Lufthansa Cargo

There are various products offered by Lufthansa Cargo to its customers for transport of cargo. Study of these products is necessary to determine the type of customer base Lufthansa deals with and to gain an insight into the operations of this organization. The knowledge of the services offered by Lufthansa are essential to gain an insight into the marketing and operational activities of the airline. This helps gain a better information about the type of customers dealt with and know the operational activities of the organization. These various products or services offered by Lufthansa pertain to the kind of cargo to be transported. This helps determine the kind of transport required and the necessary conditions required for the cargo to remain intact.[11] The various products offered by Lufthansa Cargo to their customers include the following:

- Active Temp Control (Cool)
- Dangerous
- Vulnerables
- Live Animals
- Emergency
- Passive Temperature Support (Cool)
- Valuables
- Perishables
- Courier
- Airmail

A brief description of these products has been given below:

- **Active Temp Control:** Allows cargoes to arrive ideally cooled with compatible coolers or compatible temperatures: thanks to different holds at the Pharma Hub in Frankfurt, Europe's largest hub for critical weather freight, with aggressive temperature regulation and streamlined handling processes.
    - Temperature control between -20°C and 30°C with stable temperatures is provided.
    - Specific procedures of clearance are followed, optimum apron time is given, and the cargo is stored in a temperature regulated storage.
    - Transportation to aircraft type areas is done in temperature-controlled freight areas.
    - The largest temperature-controlled logistics center in Europe is the state-of-the-art, Frankfurt Pharma Hub with specially trained personnel.
    - Transport of temperature sensitive dangerous goods from airport to airport with appropriate temperature controls under IATA Regulations Dangerous Goods to provide an adequate and reliable transport of Active Temperature Control Cargo.
    - Route Feeder service is provided for all shipments by refrigerated truck.

Figure 3.4. Active Cool by Lufthansa Cargo

- **Passive Temp Support**: The delivery of pharma safety goods, medical materials, pharmaceutical materials and higher-tech products is done in a more segregated method. The Pharma Hub Frankfurt – Europe 's main center for temperature-sensitive freight with its state-of-the-art technologies for passive temperature help highly uses this support.
    - Passive temperature support is provided across Lufthansa Cargo's entire network.
    - Time optimization, storage in secured, temperature-controlled environments are

few of the measures taken for cargo transported via Passive Temperature Support.

- Transport of cargo is done in temperature-controlled cargo bays, if possible, depending on the size of aircraft.
- Large European temperature-controlled logistics center: The state-of-the-art, Pharma Hub Frankfurt is certified, and provided with trained staff to take care of temperature-controlled goods.
- Trustworthy transport of dangerous goods from an airport-to-airport is done in accordance with the IATA Regulations concerning dangerous goods with passive temperature control.
- Route Feeder operation by cooling truck is provided for most imports, accessible to the customs warehouse directly upon request.
- Modern insulation packaging prevents temperature fluctuations for a limited period regardless of the environment.

Figure 3.5. Passive Cool by Lufthansa Cargo

- **Dangerous:** This product aims to arry the cargo as responsibly as possible in line with the most stringent IATA safety requirements; ensuring that all regulations comply with all requirements required from shipping vehicles, explosive or inflammable material, to gas or magnetized material. Using DGD.online, it is particularly easy to carry dangerous products in a smooth manner.
  - All hazardous goods (classes 1 to 9) are transported under this category.
  - CAO (Cargo Aircraft Only) shipments to about 50 destinations world-wide are a part of the freight fleet which are preferred for this kind of goods.

- Physical and document inspections including airway inspections is particularly done for this category of goods.
- It is often available with special provisions such as temperature control or extra protection for the shipment of hazardous goods.
- It is transported at normal td. Pro pace, quicker td. Flash pace as well as on emergency shipping open, depending on the customer's preference.

Figure 3.6. Dangerous Goods by Lufthansa Cargo

- **Valuables:** Transportation of valuable goods is done by sophisticated safety concepts, high quality standards and absolute discretion with skilled staff – such as banking, gold, priced stone and donor organs. Their transportation value is of the highest importance to us.
    - Seamlessly tracking handling and security measures
    - 140 locations worldwide audited
    - Special infrastructure and video protection in protected areas
    - Transportation in containers specially made

Figure 3.7. Valuables by Lufthansa Cargo

- **Vulnerables:** Safe transport of goods whose appeal or value are essential for safeguarding: works of art, luxury, tobacco products, electronics and IT, high-value pharmaceutical products and firearms prototypes and weapons components, this service provides quickly and easily goods that are at risk of theft for their destination.

    - Carriage of cargo is done mainly in sealed containers.
    - Separate camera surveillance is provided for storage in secure areas at airports worldwide.
    - Optimal protection is given to Vulnerable goods in Frankfurt, Munich and New York security hubs, which provide the main hub and constitute the highest traffic rate.
    - Timely inspection by physical examination of shipments is done.
    - Quick handling is done by skilled staff according to the type of products.
    - Acceptance of safe shipments from other airlines is done, but no transfer of Vulnerable shipments is done to other airlines.

Figure 3.8. Vulnerables by Lufthansa Cargo

- **Perishables:** This product aims to deliver perishable freight including fruit and vegetables, flowers or fish at the destination as fresh as possible. Easy shipping, storage in temperature regulated conditions and the exclusive Perishable Center in Frankfurt are some of the means used to deliver perishable products.

    - Transport and storage of this category of goods is done in mainly temperature-controlled cargo holds and environments within the required temperature range.

- The largest Perishable Center in Europe is in the Frankfurt hub with state-of-the-art, certified and trained employees.
- Travel time between aircraft and storage area is reduced by car parks just outside the Perishable Central Frankfurt.
- The Perishable Center can deliver quick refreshment and vacuum refreshments.
- Goods are delivered to the receiving facility immediately after having been monitored and reported for customs purposes to the receiving facility.
- Excellent preparation of accurate distribution times is done before hand.

Figure 3.9. Perishables by Lufthansa Cargo

- **Live Animals:** Pets, horses and wild creatures, birds, and livestock: by housing and treatment of the species, quick travel times and 24/7 treatment by trained animal warehouses we guarantee creatures to be able to come in safely and with reduced discomfort.
  - Live animals are shipped often at full priority and speed with Lufthansa Cargo.
  - Specially developed horse containers and plastic containers for pets are provided with excellent ventilation for a safe and secure accommodation throughout the trip.
  - All animals are cared for, inspected and treated as needed during transportation by keeping with the strict IATA Live Animals Laws and the Free Trade Agreement on Endangered Species.
  - A team of trained personnel and animal care providers ensures maximum care for the animals transported via Live Animals Category.

Figure 3.10. Live Animals by Lufthansa Cargo

- **Courier:** The fastest possible time of transit for time-crisis and high value cargo: the option of direct aircraft transmission to our hubs and constant monitoring of time: materials ensure that your shipments are safely transited, irrespective of their size or weight limits.
    - The fastest possible time of transit for time-crisis and high value cargo is done via Courier.
    - The option of direct aircraft transmission to Lufthansa's hubs is provided with a constant monitoring of time.
    - Supervised handling ensures that the shipments are safely transited, irrespective of their size or weight limits.
    - Local adjustments are made according to the type of cargo and quantity of the cargo.
    - Immediate booking confirmation is done based on the capacity available to the customers.

Figure 3.11. Courier by Lufthansa

- **Emergency:** This product enables immediate support for customers' logistics emergencies: the fast connection from airport to airport allows customers to transport their shipment via air shortly – in accordance with the highest safety standards, regardless of the capacity required worldwide. From a small substitute to a bigger piece of equipment, there is a provision for emergency and fast travel for every product.

    - Constant monitoring of shipments is done, with priority given to immediate response in the event of problems.
    - Controlled aircraft handling is done at the hubs in Frankfurt, Munich and Vienna from where most of the traffic is directed.
    - 100% money back guarantee i.e. net freight costs reimbursement is done in the event of more than six hours of delay from the promised time of acceptance (TOA) for the carriage.
    - Reservation is done until the latest Time of Acceptance (TOA) at the nearest Lufthansa Cargo office.
    - Booking at local Lufthansa Office before LAT (Latest Acceptance Time) available.

Figure 3.12. Emergency by Lufthansa Cargo

- **Airmail/ecommerce:** This product renders critical deliveries consistent and efficient in hitting their destinations worldwide. It provides transport for a variety of products ranging from e-commerce (CN38), Express Mail Services (EMS), Air Mail Priority or Non-Priority.

    - Global cooperation is implemented on distance flights.
    - More than 170 regional airmail destinations are provided.

- Manual scanning in over 60 locations is accurate online archive.
- Seamless management team for sales, handling, IT and quality assurance is readily available for assistance.
- Trained personnel in locations worldwide to carefully load/unload airmail without causing any damage.

Figure 3.13. Airmail by Lufthansa Cargo

3.8. Digitization of process at Lufthansa Cargo

The world of digital change offers fresh opportunity: Lufthansa Cargo has been pushing the digital market for many years as one of the leading airfreight carriers. Such programs and technologies give them and their collaborators other advantages. Improved procedures, more effective methods, and a reduced error rate save time and resources and make it above everything possible: to change for the better.

Yet what lies ahead is more spellbound. With the onset of the pandemic across the globe, digitalization has become a necessity for the airline and various other industries. The path of digitalization will shape the future of Logistics. Lufthansa has already reached the benchmarks of recent years. It aims to improve the future of the airline industry by being a pioneer in digitization of data. The following timeline depicts the instance where Lufthansa Cargo has been a pioneer in digitization and aimed to improve its efficiency using digitization.

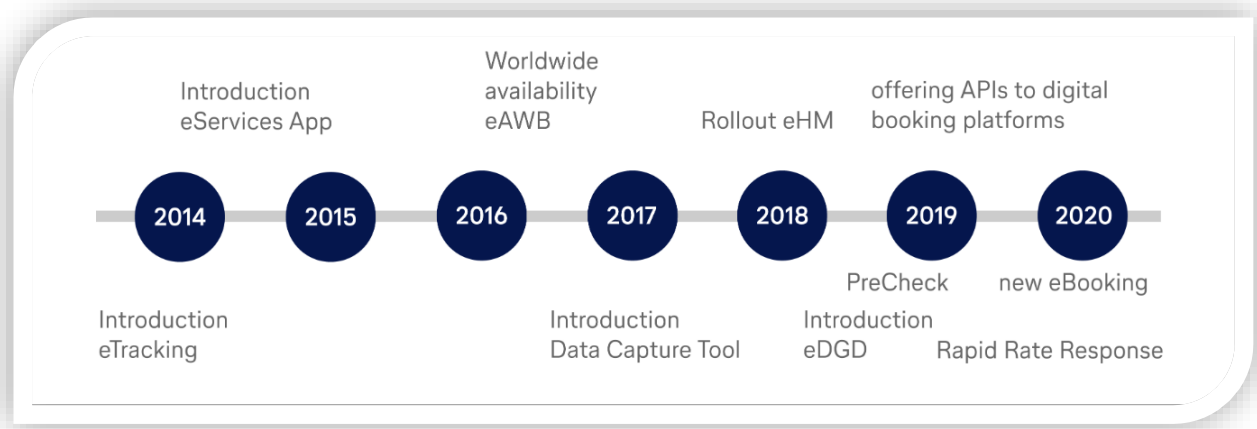

Figure 3.14. Timeline of various digitization initiatives by Lufthansa Cargo

When IATA proposed the solution of e-Freight to the world, Lufthansa Cargo was one of the pioneers who agreed to join this initiative to aim for a better world. Even now, Lufthansa aims to achieve a 100% e-AWB penetration rate to implement e-freight fully.

3.9. Cargo IMP and Cargo XML Standards

IATA has developed guidelines for communicating procedures, in order to allow effective communication between airlines and other parties. Cargo-IMP is long the industry's number-one communications standard for air waybills, flight manifests, and other documents. After the 34th edition in 2014, IATA did however stop supporting Cargo-IMP. The goal was to build on the new modern message format Cargo-XML (Cargo Extensible Markup Language). This is the current preferred model for electronic communications between airlines, including shippers, freight contractors, ground handlers, regulators, consumers and security agencies. The format was endorsed by prominent organizations like the Cargo Committee, Cargo Services and the Cargo Agency Conference. Creating an electronic air waybill with Cargo-IMP will lead to lack of manual correcting details, and hence, this data is to be corrected.

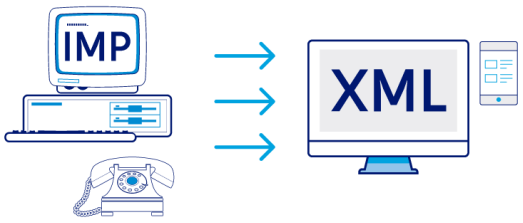

Figure 3.15. Transitioning of data from IMP to XML format

Cargo-IMP has been limited to a 7-bit ASCII data set, limiting data inputs in size. Some document elements can easily exceed the number of data fields available. This could trigger problems like that when dealing with the CargoIMP format any data will not be properly registered. The electronic airway weight creation with Cargo-IMP can involve the lack of data requiring manual correction, which is inefficient and costly.

Cargo-XML is a simple, but flexible format than its predecessor. Cargo-XML documents are inclusive not only of broader enlarged UTF-8 characters, but also of many mobile appliances and apps. It also allows easier onboarding of the partner with Cargo-XML. In comparison, Cargo-XML is compliant with other industry specifications, such as the World Customs Organization (WCO), as opposed to Cargo-IMP.

Cargo-XML supports multi-modal and cross-border message communication, facilitates electronic data interchange, improves process automation and improves data quality. The improved quality of data helps interested parties to respond quickly to the industry's frequently changing needs. Slowing up processes using Cargo-XML will eventually reduce costs. The upgrading to CFT-XML provides a further advantage in facilitating the implementation of the e-fraid initiatives of IATA including e-AWB and Advance CFI. It not only offers market rules that increase performance, but also improves compliance with rules like the ACI regulations.

Figure 3.16: Transfer of data via e-AWB

4. OBJECTIVES

Various objectives of the project involve:

a). Gain an insight into Air Cargo Industry.

b). To analyze the sales and operations processes for a cargo airline.

c). Conduct quality check of the data received by FWB (digital Data).

d). Find deviation between Paper AWB and FWB for the client.

e). Ensure FWB data is in sync with Paper AWB.

f). Assess clients' status of Multilateral e-AWB Agreement.

g). Digitalization of process at Lufthansa Cargo. Data quality check and reporting.

h). Reporting performance of Lufthansa throughout India for the year 2019.

4.9. Customer performance monitoring and reporting to respective customers,

4.10. Working on B2B events and internal visits by various high-level managers.

5. METHODOLOGY

5.1. Airport Stats

This document is used to determine the airport stats for the various airports that come under DEL F/GC. This document consists of data from all airports from across the nation. My task was to compile this data to analyze the performance of various airports across the nation. I created a table to collaborate the data of the airlines throughout the year 2019. My next task was to compare the data for the previous year i.e. the year 2018 for the corresponding month. I created a graph to determine the airport stats for the year 2018 and 2019 simultaneously for all the months of the year. My next task was to compare the data for which was meant to be seen i.e. the data for the desired airline. My aim was to create a visual representation that showed the comparison for every month of the years 2018 and 2019. I also had to depict the corresponding market share of the given airline. The given image is a depiction of the final product using sample data. Actual and confidential data is not depicted.

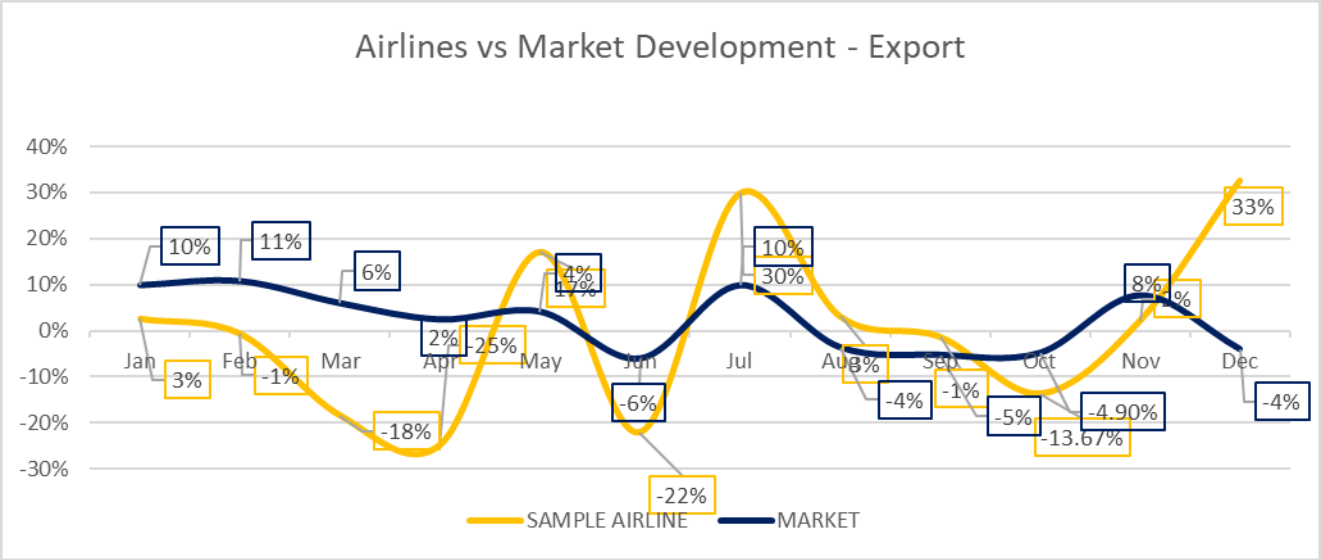

Figure 5.1. Graph of Airport Stats

The above graph depicts the Airport Stats for the given sample data. The yellow line depicts the sample airline deviation percentage as compared to the previous year. The blue line depicts the Entire market deviation percentage as compared to the previous year. For instance, the sample airline data shows that the export for the sample airline for the month of December 2019 has decreased by 4% as compared to the export for December for the year 2018. Similarly, the export tonnage for market for the month

of January 2019 has increased as compared to the export tonnage for market for the year 2018. It should be noted that when we talk about market, we talk about the entire airport for which the data is calculated. The data calculated for the airport stats enabled to determine the performance of several airports. It helped determine the airport where e-Freight is required the most and hence should be implemented as a priority. For instance, airports where tonnage is maximum could be shown how the paper Air Waybills reduce the efficiency of cargo and hence, could be driven towards e-AWB. Apart from that, it was used for internal purposes.

5.2. Long Term Contracts Monitoring

There are certain agreements or contracts signed between Lufthansa Cargo and their corresponding clients. These agreements pertain to a condition where the airline promises the client a certain rate depending on the actual weight of the cargo. These agreements are usually made for the entire season term. In airlines, as per IATA rules, there are two timetables – one for summer term and the other for winter term. The frequency, Day of Departure of Flight, Time of Departure of Flight and duration, etc. may vary for both the terms. Hence, there are two agreements made for every year. One is for the summer term and the other is for the winter term.

My task was to prepare these contracts and evaluate the performance of the contracts on a weekly basis for the various branches of Lufthansa Cargo AG which came under DEL F/GC. This was a task related to marketing. I contacted the various clients regarding their previous contracts and further contracts. I also monitored the status of the contract. This enabled the airline to gather data on the performance of the respective clients and determine the status of the contracts. It also helped boost the efficiency of the performance of the capacity utilization.

5.3. Revisiting 2019

This was a part of the project aimed to develop and analyze the data related to performance of various aspects of the organization in 2019. I had to develop data reports on revenue, tonnage and other aspects of Lufthansa Cargo throughout various stations of India. I had to categorize various customers based on their performance into global partners, premium partners, etc. and analyze data based on that categorization. Then I had to analyze data and sort trends related to speeds like td.Pro, td.Flash and their performance. Similarly, data analysis had to be done for products like Active Cool, Perishables,

Safe, etc.

I also had to compare growth trends for the entire market with the growth trends for Lufthansa Cargo. Then, there was the task of comparing trends between various stations that were overseen by Lufthansa Cargo Delhi. Although the data was easily available, it had to be organized and presented in a way that gave maximum information using minimum data. Furthermore, data regarding certain customers had to be organized and presented.

Figure 5.2. Revisiting 2019.

5.4. Daily Cargo Tracking for Delhi

Another part of my daily tasks included preparing a list of cargo booked by the customers to be sent on the flight for the day. This was essential for the capacity management. Pre-lockdown, there were two flights of Lufthansa from Delhi. The LH-761 departed from Indira Gandhi International Airport, New Delhi (DEL) to Frankfurt am Main Airport (FRA). The LH-763 departed from Indira Gandhi International Airport, New Delhi (DEL) to Munich International Airport (MUC). These were passenger flights that accommodated the cargo to be sent to a worldwide location via these ports. The list was used by the sales team to communicate with the clients. It basically consisted of the AWB number and other details of the cargo, including the customer who booked the cargo. In the evening,

this list was updated with the status of delivery of the respective cargo. The various stages included handing to the authorities, submission of cargo, customs clearance, etc. This list was used by the operations team to determine the current status of the cargo and plan further action and also for documentation purposes.

5.5. Organizing workshops and other events

Since I was mentoring under the Commercial Manager of Lufthansa Cargo, Delhi, my task was to assist him in every possible way. One such way was assistance in organizing events. A workshop was conducted for the internal members of the organization. I had to make various arrangements including those of hospitality of the attendees, the passes required, and many such things. I also took responsibility for arranging the necessary technical requirements for the workshop. I also helped organize an event for the visit of a board member from the headquarters. It was my responsibility to work on the hospitality, official documents and other requirements for the visit.

5.6. FWB and AWB Comparison

In accordance with the SOP recommended by the IATA, all carriers must conduct a quality control of the data content transmitted by the forwarders to the carrier's application. The e-AWB shall be defined as a consignment with a concluded electronic transport agreement, with no paper air waybill supporting evidence of the contract. There is no AWB document shipped to the site of the aircraft. The data must replace the AWB paper file, the contract between the shipper and the courier, which makes this data highly sensitive and significant. A Bilateral Agreement or an IATA Multilateral e-AWB Agreement shall be necessary if shipped via e-AWB. The Freight Forwarder shall act promptly to remit the revised Airline FWB / XFWB if they receive FNA Request in order to prevent delays in freight presentations.

I performed these data quality checks on electronic communications received by carriers as part of the Business and Network team.

This can be split roughly into three parts:

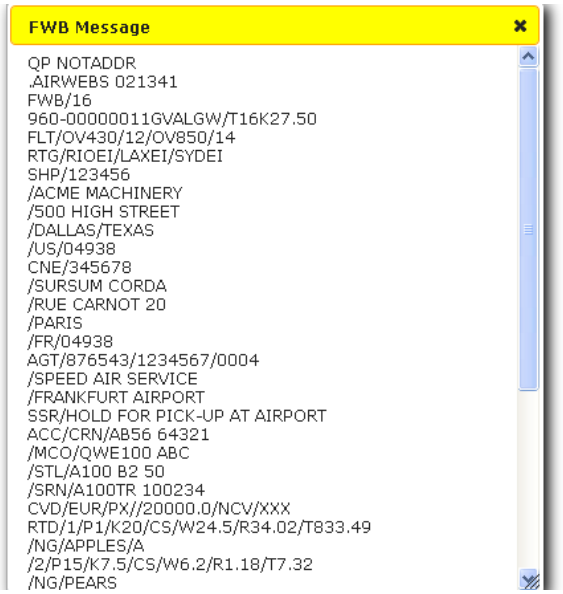

Figure 5.3. Sample FWB Message

1. Get the electronic sample response from the handling program sent by the forwarder.

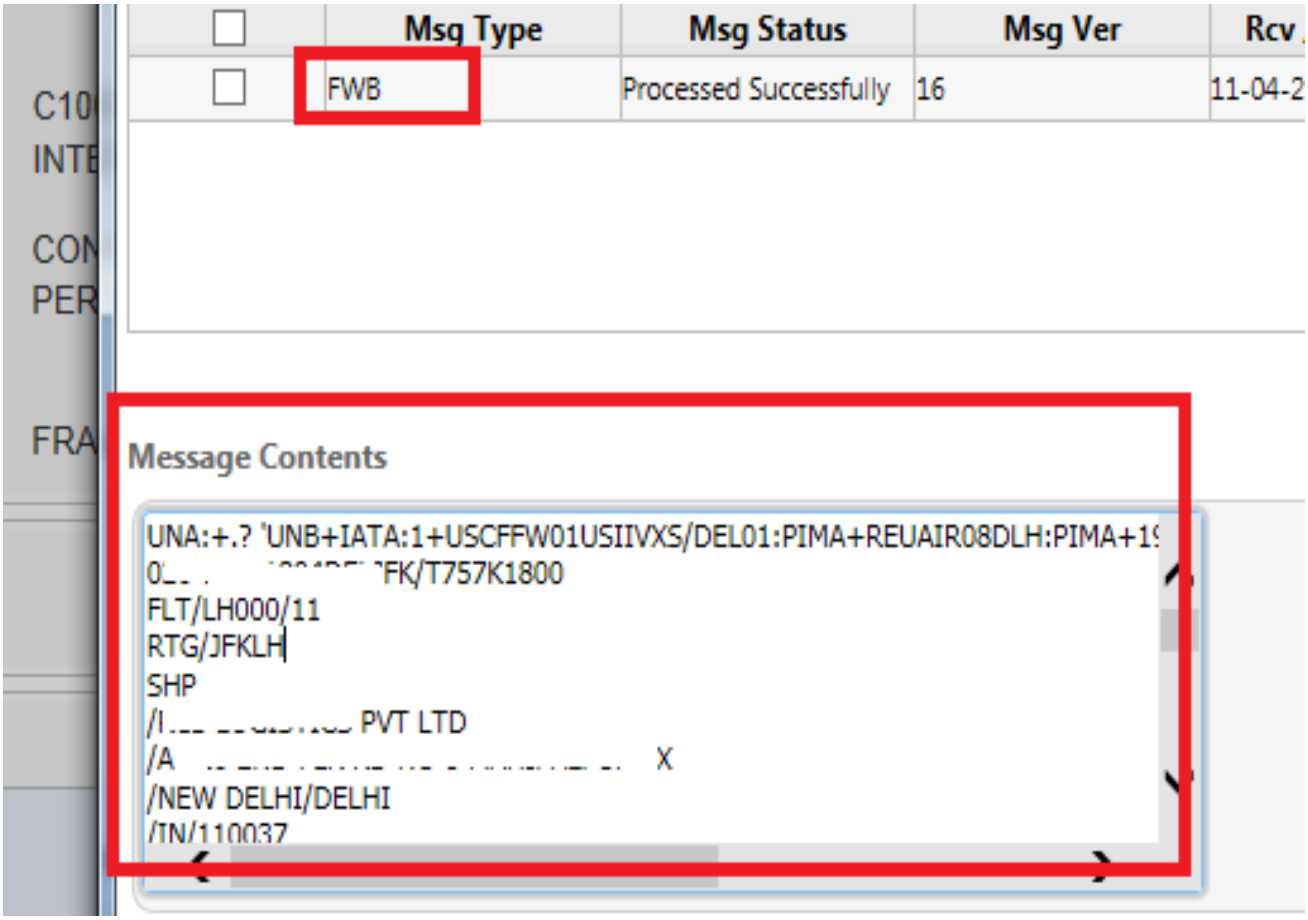

Figure 5.4. Electronic Sample Response from in-house handling applications

2. Compare the message's contents with the paper AWB that the forwarder has delivered.

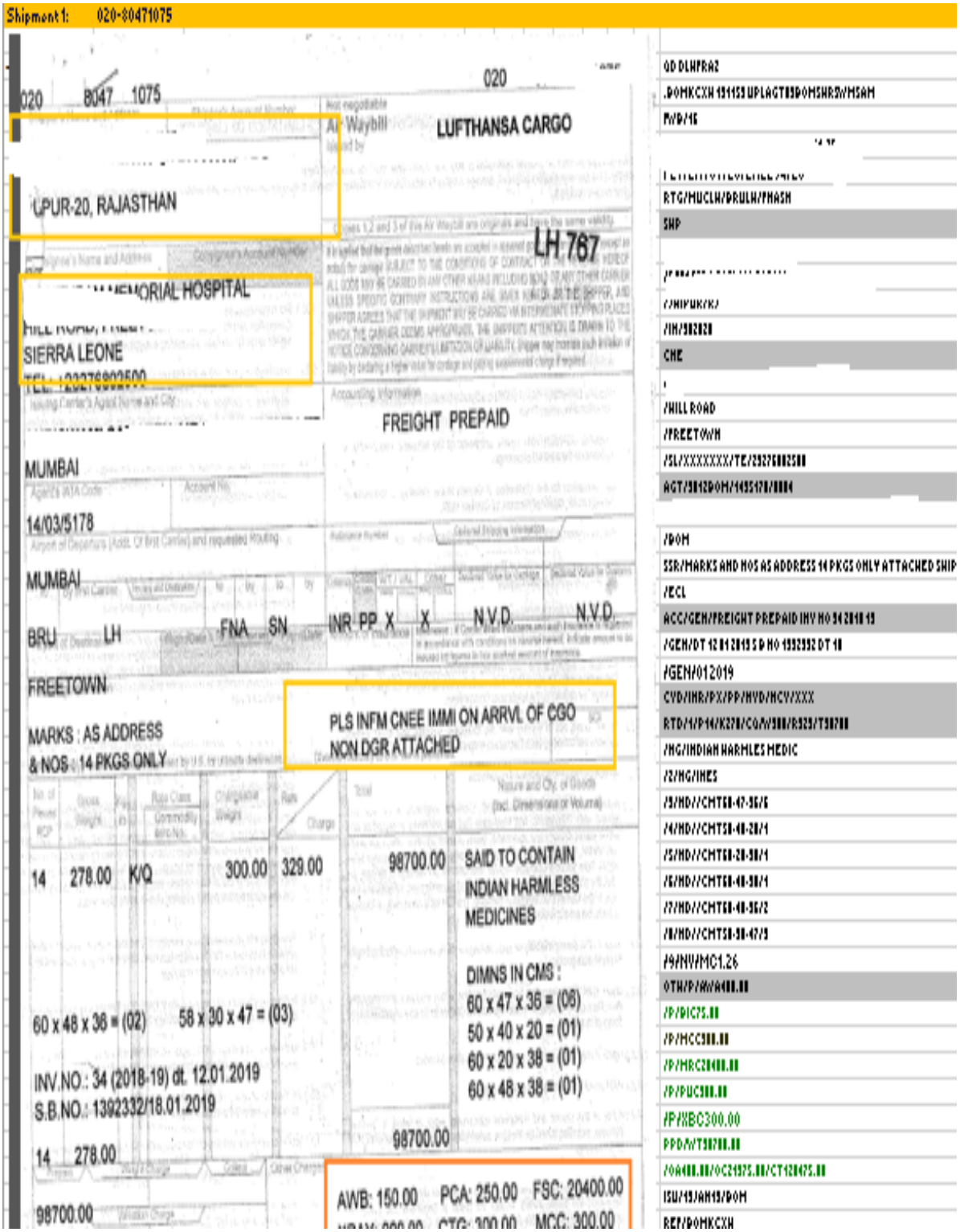

Figure 5.5. Comparison between the paper AWB and the message contents.

3. Mark the deviations, if any.

Overview:

Information	Finding	Comments
Routing / Flight	OK	
Shipper	Shipper deviating (Not Critical)	
Consignee	Consignee deviating (Not Critical)	
Agent	OK	
Notify	Notify Information missing (Not Critical)	
Accounting	OK	
Charge Declaration	OK	
Handlinginformation	OK	
Security Information	n.a.	
DGR Information	n.a.	
Cool.td / Fresh.td	n.a.	
Rate / Charges	OK	
Goods Description	Goods Description missing (Critical)	
Dimensions	Dimensions missing (Critical)	
Volume	Volume missing (Critical)	
Other Charges	OK	
Customs Origin	OK	
Issue Date	Issue Date Different (Critical)	

Figure 5.6. Marking of the deviations.

4. Measure magnitude of error using various codes.

	Error Description			Error Code
2	OK	Accounting	AccountingOK	OK
3	Accounting Information deviating (Critical)	Accounting	AccountingAccounting Information d	AC
4	Accounting Information deviating (Not Critical)	Accounting	AccountingAccounting Information d	310
5	Accounting Information missing (Critical)	Accounting	AccountingAccounting Information r	ACC
6	Accounting Information missing (Not Critical)	Accounting	AccountingAccounting Information r	AC 0
7	n.a.	Accounting	Accountingn.a.	A 305
8				
9	OK	Agent	AgentOK	OK
10	Agent deviating (Critical)	Agent	AgentAgent deviating (Critical)	AG
11	Agent deviating (Not Critical)	Agent	AgentAgent deviating (Not Critical)	310
12	Agent missing (Critical)	Agent	AgentAgent deviating (Critical)	AG 5
13				
14	OK	Consignee	ConsigneeOK	OK
15	Consignee deviating (Critical)	Consignee	ConsigneeConsignee deviating (Crit	300
16	Consignee deviating (Not Critical)	Consignee	ConsigneeConsignee deviating (Not	CN J
17				
18	OK	Customs Origin Code	Customs Origin CodeOK	OK
19	Customs Origin Code deviating (Critical)	Customs Origin Code	Customs Origin CodeCustoms Origin	300
20	Customs Origin Code deviating (Not Critical)	Customs Origin Code	Customs Origin CodeCustoms Origin	

Figure 5.7. Finding magnitude of errors using error codes.

5. Publish the report with the observation.

There was a regular interaction between the forwarders and internal experts regarding the information pertaining to this field.

5.7. Architecture

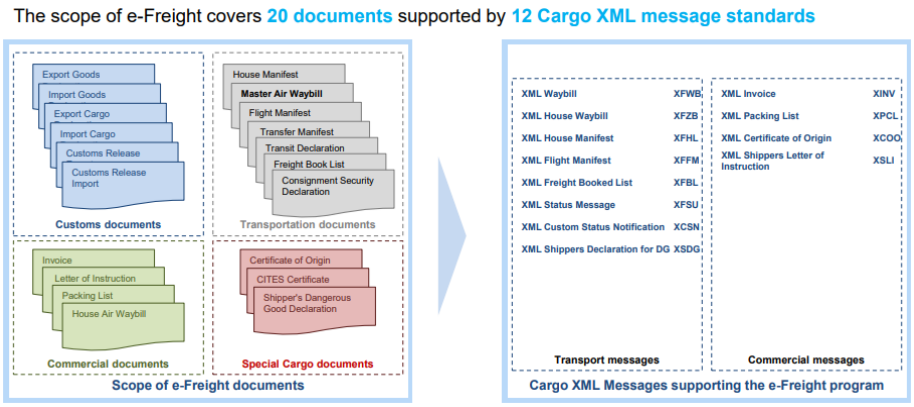

Figure 5.8. Scope of e-Freight

The above figure depicts how e-Freight covers the scope of 20 documents using 12 XML Standards.

Figure 5.9. Path of Standard Message Transmission

The first component of path analysis includes analysis and segmentation of data i.e. Standard Message transmitted from Freight Forwarders and forwarding it to the Ground Handlers.

Figure 5.10. Overview of transfer of AWB

The above diagram depicts the standard path of transmission of an e-AWB. The freight forwarders send the e-AWB to the Airlines which in turn send it to the Ground Handlers. The Ground Handlers in turn use the electronic AWB or print the paper AWB from it as per requirement.

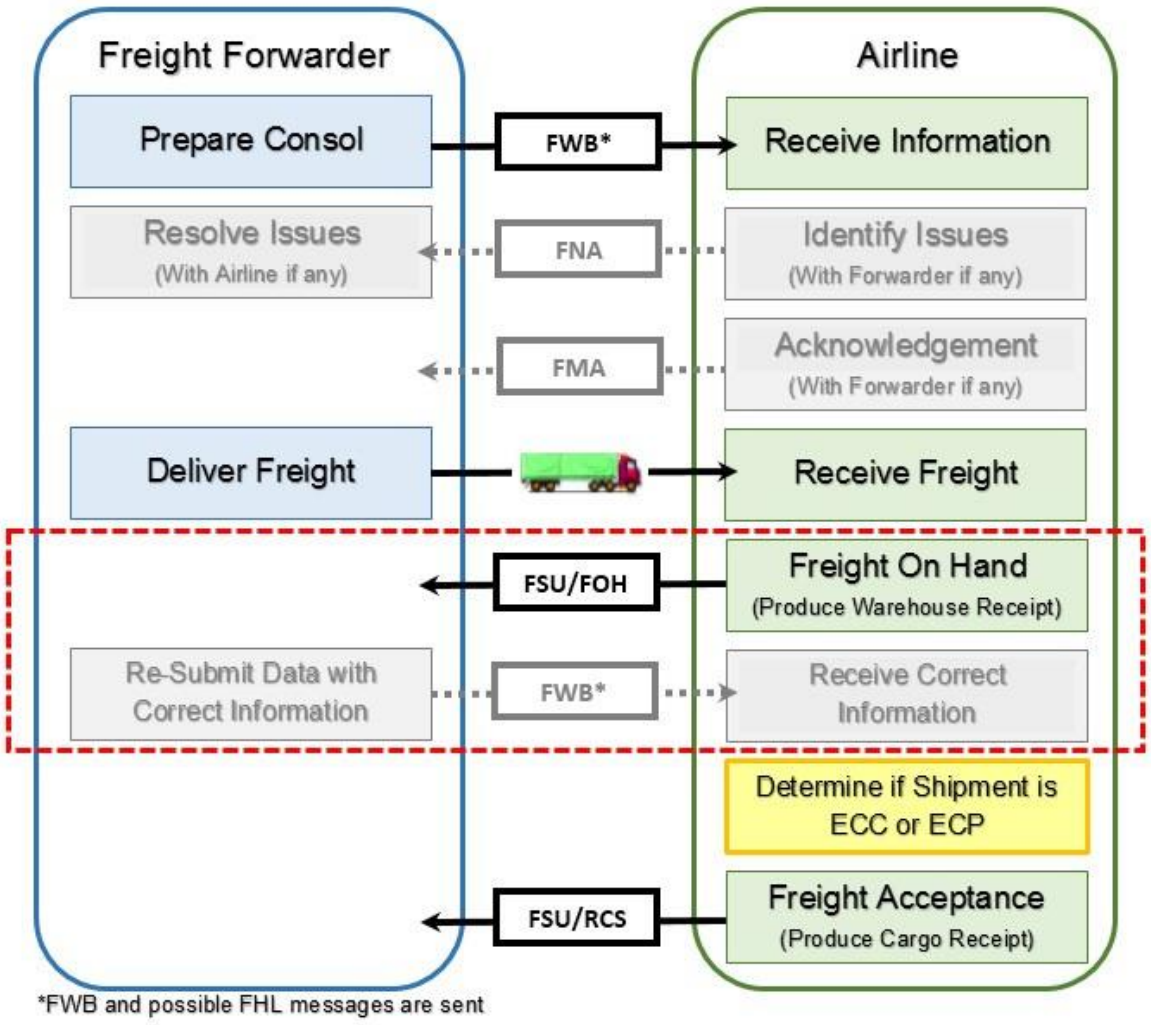

Figure 5.11. Process of data transferred between Freight Forwarder and Airline

5.8. Block Diagram

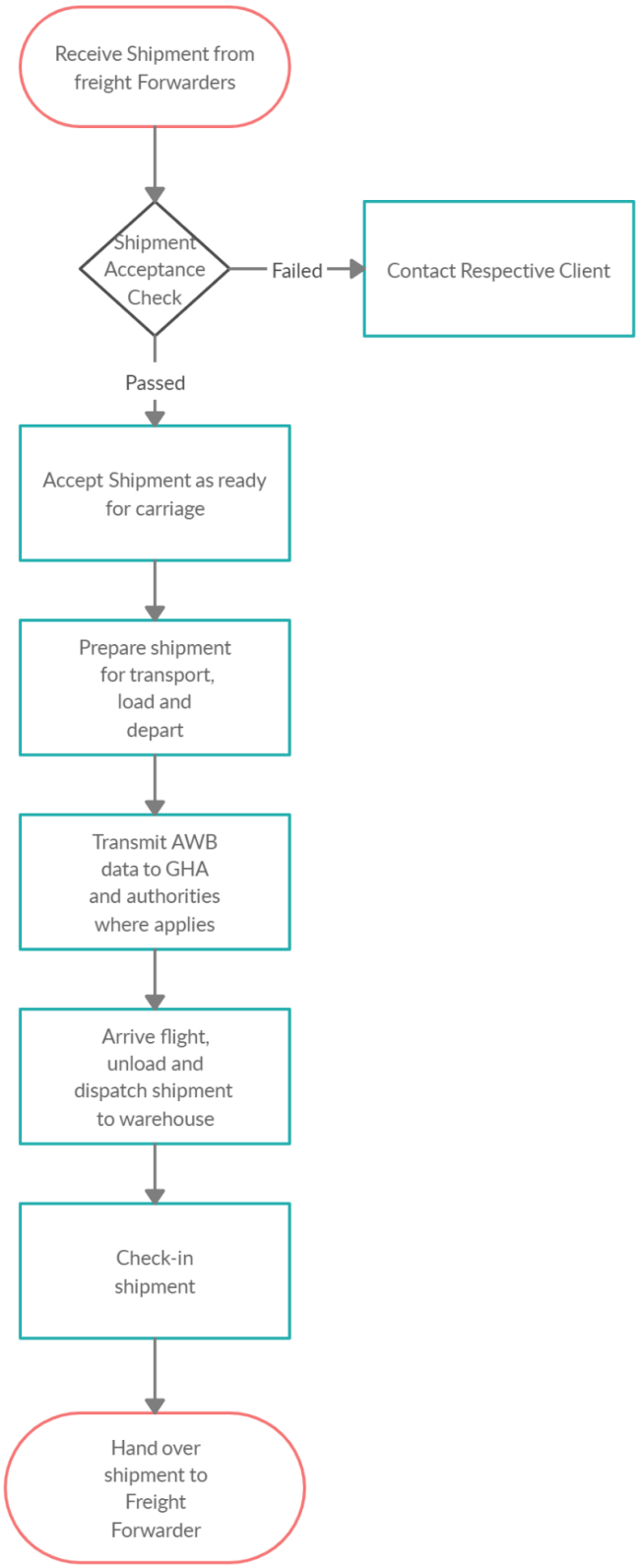

Figure 5.12. A full paperless air cargo process

The above figure depicts a full paperless air cargo transfer process as per IATA Standards.

6. OBSERVATIONS AND FINDINGS

During the course of this project, the following observations and realizations were achieved regarding the operational and marketing activities of Lufthansa Cargo AG, Delhi:

1. Successful creation of Airport Stats, a document to monitor the performance of airlines and airports across the nation: This document helped me observe various trends in the performance of cargo airlines across the nation and helped me deduce necessary conclusions based on the data.

2. Gained an insight into the Air Cargo Industry, regarding the various processes in the warehouse and other bonded areas: Using the various in-house tools and IBM Cognos, or visiting warehouses and bonded areas gave me a fair comprehensive of the kind of storage facilities provided by Delhi Cargo Service Center (DCSC) and helped me in various tasks related to operational activities of Lufthansa Cargo AG.

3. Frequent use of MS Excel for various in-house purpose: Even though I had learnt MS Excel prior to my internship, my skills were enhanced intensely, thanks to the various operational activities that required use of MS Excel. Using the software daily helped me gain a better grip on spreadsheet related activities.

4. Using various in-house tools for market data analysis: Using various in-house tools, coupled with software such as MS Excel helped me develop a comprehension of the market data related to air cargo.

5. Using various in-house tools to analyze client performance: Using various in-house tools, I was able to analyze the client performance for various contracts and other purposes. This helped me develop my skills related to the in-house tools and provide course for further action.

6. Event Management Coordination: For a brief period before the lockdown, I was involved in event coordination for various events including workshop for internal members in Delhi, or Board Visit in Delhi, or customer meet in Bangalore which was cancelled due to lockdown. These events helped me boost my skills of event planning and gain a better insight into formal and corporate event organization.

7. LIMITATIONS

There are various limitations in implementation of e-AWB from paper AWB.

- Regulatory restrictions: e-AWB deployment in all airports and all trade areas is not feasible because of regulatory constraints.
- Failure to harmonize: e-AWB protocols are not harmonized in main airports where e-AWB works between freight forwarders, airlines and ground handling officers.
- Technology limit: Many SME consignors do not have the systems enabled to transmit shipping data to airlines by means of technical ability / EDI.
- Complex processes: Forwarders dealing with several airlines in e-AWB proceedings are faced with complexity.
- Maturity threshold: Many markets have hit a certain maturity where main players have now attained the maximum capacity (airlines / freight forwarders), but there are also other markets behind the chase.

8. CONCLUSION & FUTURE WORK

E-freight is a small step towards digitalization. Other technologies, like implementing big data to achieve data precision, would be the upcoming milestones that the aviation industry has to achieve in the coming years. More than a decade ago, e-freight was defined based on contemporary technology. At that moment, emerging innovations have emerged and transform the way the air freight industry works and conducts business, including artificial intelligence, global news and big data. From e-AWB to digitizing the entire supply chain, airfreight industry must adopt digitization more quickly in order to ensure end-to - end tracking and tracking and reliability. The rate of penetration in the industry for electronic aerial waybill (e-AWB) was a discussion point for some time and, while adoption rates are improving, the International Air Transport Association (IATA) still misses the targets set for it.

With the unforeseen onset of Covid-19, aviation industry had a sudden impact on the operations, revenue and performance. With lockdown and social distancing becoming the new norms, the aviation industry is slowly getting back on track. In a scenario where contactless delivery is being implemented by general retail and e-commerce companies, we can expect to achieve a safe-distance cargo transportation in the very near future. Airports have already started using digital boarding pass and touchless kiosks to print bag tags. In such a scenario, digitalization of air waybills for cargo is not a very distant goal.

Today, digitalization is not merely a measure to enhance the efficiency of the cargo industry; it also becomes a necessity. The digitalization of air waybills in coming time will not only reduce the dependence of cargo industry on paper, thereby contributing towards a greener environment, it would also help the cargo industry to become more efficient and contribute to a better earth. Future work in this particular field would be using OCR to detect data and contribute to using automated functions to measure deviations. Using ML Algorithms to analyze and report data could also be seen as a future task pertaining to this field.

Data Quality Initiative is a small step to achieve this goal of a more efficient cargo transport procedure whilst trying to reduce the dependence on paper and be a part of enhancing technology to achieve a better world.

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