CAMRD-JT AVIATION COLLEGE

ARTIFICIAL INTELLIGENCE & ADVANCED DIGITALIZATION IN AVIATION SUPPLY CHAIN MANAGEMENT.

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1. **Introduction.**

   Supply Chain consists of several parties directly or indirectly involved in satisfying a customer requirement. A Supply Chain can be Analog ,Digital or both.
   An Analog Supply Chain is one in which the tasks are performed in some physical and non-electronic fashion. In the process transformation to Digital Supply Chain, even now many elements of Analog Supply Chain still exist in some form. The Digital Supply Chain is the result of the application of electronic technology to every aspect of the end to end supply chain. Electronic connectivity is the heart of the Digital supply chain.

   Aviation Supply Chain- It consists of Information, Airport, Airline & Passengers and Information, Airport, Airline & Cargo system. The deployment of electronic sensors and tracking capabilities will allow for real time tracking of movements of all items throughout every aspect of transportation and logistics that permeate any supply chain. Some ways to digitalize a supply chain is to include automation, data analytics, logistics platform and Internet of Things. A Digital Supply Chain is fully integrated all the way from customer through all levels of suppliers inclusive of functions with transparency and visibility throughout.

   Digitalization helps the supply chain become completely integrated, fully transparent for all players, from the suppliers of materials/ components to transporters and finally to customers.

   The Aviation , travels & tourism industries have been at the forefront of digital innovation.

   Transportation and Logistics are more significant for the aviation cargo system. Transportation management system(TMS) determines the optimal utilization of the transportation network to deliver goods to customers at the lowest cost. The functions of TMS include load planning, shipment scheduling and labour management. These systems also determine the inbound and outbound modes of transportation and routes so that deliveries can be made in a cost effective manner. Logistics planning tackles four major problem areas: 1. customer service levels. 2. facility planning. 3. inventory management & 4. transportation decisions.

   The customer service, demand are critical for the logistics planning.

   The companies must use Information Technology to help decrease costs and improve responsiveness in the transportation networks. Software is crucial to help in transportation planning, modal selection(from air,road,rail and waterways),routes and schedule. Technology allows carriers to identify the precise

location of each vehicle. Satellite based communication helps carriers communicate with each vehicle in the fleet.

While designing transportation networks, transporters must consider the trade off between transportation cost, inventory cost, operating cost and customer responsiveness. The supply chain goal is to minimise the total cost while providing the desired level of responsiveness to customers.

Technologies help in digitalization of supply chain and help the company react better to unforeseen changes caused by the weather or other unpredictable factors.

2. **Artificial Intelligence(A I)**.

British Mathematician Alan Turning developed AI in 1950, while answering his simple question "Can machines think ?" His paper "Computing machinery and Intelligence,1950 " established the vision AI. AI is the simulation of human intelligence by machines especially computer systems. Machine learning is a component of Artificial Intelligence. AI requires specialized hardware and software for writing and training machine learning algorithm. Python and Java are popular programming languages synonymous with AI. Since the last decade of the last century AI became popular and is being used for automation in various purposes. Twenty five years ago IBM using its "Deep Blue" computer powered with AI could defeat the international Grand Master Gary Kasparov in chess. Elon Mask's "Open AI "company created Robot "GPT-three" to write an article in 500 words like a professional writer using artificial intelligence. It is being predicted that in future AI/Machine Learning would be used in the Judiciary system. India's judiciary with its single hierarchy under Supreme Court is better suited for machine learning if the data is easily available for legal tech firms. This will whittle down the dependency burden of over 4 crore cases, is certainly an idea worth pursuing. AI is now being used in many metro cities in India for traffic management.

Over the years, AI and its subsets Machine Learning and Deep Learning are set to influence the future of many sectors including aviation. AI has found a wide array of applications in the aviation industry, from ground handling service to airport security and air traffic management(ATM) and now scope for more.

The future of AI is that in the next decade ,most of the passenger vehicles will be preferred self driven and without driver. These autonomous vehicles will recognize objects, interpret situations, and make decisions to ensure rider safety and respect traffic regulations. AI will make decisions for us in future, not for just mobility, but also in other fields like healthcare and aviation. AI will recommend medical treatment for particular patients. The ultimate use of AI in aviation will be when flights will operate pilot less for which pilot less test flight with passengers on board has been successfully undertaken in the US.

3. **Importance of Transportation & Logistics in Aviation Supply Chain.**

Transportation is one of the important operations in supply chain management. It is concerned with the movement of goods from one location to another. It is also one of the major sources of cost in the supply chain with increasing competition and high

customer expectation, timely and quick delivery has become the norm in the business environment. Efficient transportation infrastructure helps to make the supply chain efficient and responsive.

With the development of concept like "Cross Docking " and emergence of third party logistics, taking transportation decisions which minimise total costs, can increase the efficiency and profits in the supply chain. Transportation is a significant link between different stages of global supply chain. Supply Chain also uses responsive transportation to centralise inventories and operate with fewer facilities.

Because supply chain management involves supplier relationship, it relies heavily on activities known as logistics- the various activities required to physically move materials/components into company's operation facility and to move finished product to customers. Logistics is not merely a matter of transporting goods , but includes those activities along with managing the relationships needed to move the goods in a timely and efficient fashion consistent with the company's strategy. Logistics also known as physical distribution, encompasses the broad range activities concerned with efficiently delivering materials, parts, semi-finished items and finished products to designated places, at designated time and in proper condition. In global logistics, transportation(freight) accounts for more than fifty percent of the total logistics cost. To contain costs, global firms have been working hard to improve efficiency.

4. **ERP & Aviation Supply Chain.**

Enterprise Resource Planning(ERP) co ordinates business operations by integrating various business processes into a single platform. Aviation Cargo goods manufacturers and suppliers can take advantage of ERP system to maintain an efficient and cost effective supply chain.

Supply chain management manages flow of resources from raw materials at production level to finished products at the distribution level. ERP is more comprehensive and it covers not only SCM, but all business processes. ERP software for SCM connects different sections from inventory to logistics. Workers across various departments can share information and act promptly. Managers can interact with their team members when ERP system is in place.

Modern ERP and SCM can automate business functions, and when there is low stock in inventory, the system can contact the supplier automatically for restocking. In ERP with SCM, there is less risk of error because human intervention is limited.

The world is increasingly data driven. Integrating ERP with SCM is an opportunity to collect useful data and scale up business operation. In ERP with SCM, all useful data are integrated into one comprehensive platform, helping managers and workers to have visibility of all the processes.

The ultimate implication of this, is the achievement of " Just In Time " production when all operations fit into each other seamlessly.

CRM(Customer Relationship Management)- ERP Integration.

Many Cargo goods manufactures are increasingly turning to Enterprise Application Integration (EAI) for integrating CRM with ERP system. A manufacturer's internal departments such as production, finance and human resource etc.include back office

operation,while sales,marketing & channels of distribution etc.include front office operation. If the front and back offices are integrated in a manner so that there are no duplicated data or repetitive data gets into the system.

EAI's application can be the most cost effective way of integrating the data of back and front offices.

Thus, SCM-ERP software helps in streamlining business processes. It enables facilitating interaction between suppliers, manufacturers, managers, transporters, whole salers, retailers and customers.

One of the key advantages of ERP -SCM is that it allows full visibility into the processes, so that managers can foresee risks and develop risk mitigation plan ahead of any challenges. For instance, when the Covid-19 pandemic reached its heights, businesses with ERP in logistics and SCM were able to co ordinate their functions better and help their operations to meet the global challenges.

5. **Aviation Supply Chain Management.**

The Airline industry is increasingly focused towards reducing the fuel, maintenance and operational costs, keeping a high level of accuracy and deliver high quality of service. Aviation Supply Chain automation with digital connectivity, ERP software and Artificial Intelligence ensures a great tool to achieve this objective.

The aviation sector handles items , which are capital intensive. The items also involve a huge number of components, and a lot of these components are moving, creating challenges to track inventory accurately.   These issues   make supply chain management all the more challenging for the aviation industry.

Bench marking and managing supply chain activities in aviation involve making the supply chain digital through electronic connectivity, forecasting the customer requirements, capacity management, demand pattern analysis, and addressing key bottle necks like hanger space, logistics for passenger travels and cargo operations including fuel and maintenance costs.

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