

Towards A Strategic Technological Innovation in Aviation's Supply Chain, Unit Arab Emirates

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Abstract — The aviation industry in the United Arab Emirates (UAE) has witnessed unprecedented growth in recent years, driven by economic diversification and increasing global connectivity. To maintain a competitive edge, aviation supply chain units play a pivotal role in the seamless operation of the sector. This research study delves into the strategic technological innovation initiatives within the aviation supply chain unit in the UAE, aiming to assess their impact on efficiency, sustainability, and global competitiveness.

The research employs a mixed-methods approach, combining qualitative interviews with key industry stakeholders, supply chain managers, and technology experts with quantitative analysis of data collected from aviation supply chain companies across the UAE. By examining the adoption and integration of cutting-edge technologies such as blockchain, IoT, data analytics, and automation, this study identifies the key drivers, challenges, and outcomes associated with strategic technological innovation.

Preliminary findings indicate that technology-driven innovation has significantly improved supply chain visibility, reduced lead times, and enhanced the overall reliability of the aviation sector in the UAE. Moreover, it has enabled cost optimization, contributing to the industry's sustainability goals. However, barriers such as data security concerns, regulatory challenges, and the need for a skilled workforce persist.

This research not only contributes to the academic understanding of technological innovation in aviation supply chains but also offers practical insights for industry leaders, policymakers, and practitioners seeking to enhance their competitiveness and sustainability in an ever-evolving global landscape. The study underscores the pivotal role of strategic technological innovation in shaping the future of aviation supply chains in the United Arab Emirates and highlights the need for ongoing investments in technology and talent development.

Keywords — **Strategic Technological Innovation, Supply Chain, Aviation**

I. Introduction

The ability to integrate supply chain activities and the tools to do so have become requirements for competitiveness in the majority of sectors. As a result, there is no doubt that the trend toward increased usage of supply chain technologies will continue (Jimenez-Jimenez, et al, 2019). To protect market, share and increase market penetration, organizations must synchronize by embracing and deploying new electronic commerce and supply chain technology, as one manager put it: "With virtually daily technology advancement internationally in every element of the business."

Globally, we have seen faster technology innovation initiatives as businesses struggle to adapt to wild supply chain disruptions as the pandemic unfolds (Opute, et al., 2020). The difficulty is made worse by the fact that as more and more individuals conduct business and engage in other activities online, consumers' already high expectations for convenience and service have, if anything, increased. Therefore, it is believed that digital supply chain transformation provides a technique to quickly adjust to changes in component availability, transportation logistics, and other supply chain variables in order to satisfy these consistently increasing customer demands (Attaran, 2020). While implementing these changes, managers are often intent on increasing revenue and taking on greater responsibility for providing a better customer experience.

II. Methodology

The goal of this study is to ascertain what demographic profile of the respondents of aviation industry who are focused in the utilization of technological innovation in SCM, secondly; finding out what are the technological innovation frequently and commonly used in SCM in aviation industry, the researcher provided choices namely Artificial Intelligence / Machine Learning, Big data analytics, Robotic Process Automation, IoT and Cloud Technology and Blockchain; lastly, it will figure out how does technological innovation influence SCM in terms of Inventory Planning, Purchasing and Warehouse and logistic. Thus, since the study will only describe each of its variables, it will be in quantitative descriptive study.

As defined by Watson (2015), Quantitative research count the number of individuals who hold a given opinion or display a specific behavior or emotion. This kind of research depends on large samples and lays greater emphasis on the number of responses, whereas qualitative research seeks a more nuanced and in-depth understanding of the topic at hand. In quantitative research, it is customary to ask all respondents the same set of questions. The data is in numeric format, allowing for thorough quantitative analysis using readily available statistical techniques. On the contrary, surveys may be designed to elucidate initial replies; for instance, respondents who express satisfaction or unhappiness with a service may be asked more questions.

On the other hand, descriptive research is a non-inferential study which only observed the results of the individual variable, no significant difference nor correlation is intended to be explored. As defined by Kim, et al., (2017), the objective of descriptive research is to precisely

and methodically describe a population, situation, or phenomena. It can answer queries about what, where, when, and how, but not why. To explore one or more variables, a descriptive research design may employ a vast array of research methods. It enables researchers to investigate the background of a research problem before conducting additional study. Ultimately, it is a non-Experimental style of research in which variables are measured using numerical terms despite the researcher not manipulating the variables under investigation.

In conclusion, quantitative descriptive study is fitted for my research design since its main objective will only be exploring the variables relating to the identification of the demographic profile of the respondents of aviation industry who are focused in the utilization of technological innovation in SCM. Secondly, finding out what are the technological innovation frequently and commonly used in SCM in aviation industry, the researcher provided choices namely Artificial Intelligence / Machine Learning, Big data analytics, Robotic Process Automation, IoT and Cloud Technology and Blockchain. Third, it will figure out how does technological innovation influence SCM in terms of Inventory Planning, Purchasing and Warehouse and logistic. Lastly, the creation of a summative narrative relating to best practices in aviation industry as they utilized IT in SCM.

Respondents of the Study

To gather results relating to this study, the researcher sets the inclusion criteria for the respondents of the study, thus participating respondents must be;

- ✓ an employee of Aviation / Aerospace in United Arab Emirates.
- ✓ an employee who has served for at least 1 year in the said company.
- ✓ an employee in Supply Chain Management Department.
- ✓ an employee knowledge on Supply Chain Management and the technological innovations used in the operations.
- ✓ an employee who signs and agree on the given informed consent.

To the employees who do not meet the set inclusion criteria, directly they are excluded in the study. The inclusion criteria have been set to ensure saturation and richness of the quantitative data which will be relevant in the discussion of the study's findings.

Locale of the Study

The location of the study will be in United Arab Emirates. Employees in several aviation companies will be reached out to in order to facilitate the survey. The researcher considered this locale for easier access of data collection.

Sampling Technique

In this study, the researcher will gather 150 respondents from the overall population of the aviation company. The major aviation companies in UAE in study are approximately 153,000, the researcher decided to use convenience sampling. According to Bhardwaj (2019), convenience sampling is used by researchers to collect data for market studies from individuals who are easy to reach. Because of its cheap cost, ease, and broad use, this approach has surpassed all others as the preferred method for collecting samples. Most members may be contacted promptly and simply to participate in the sample.

When dealing with huge populations, researchers use a variety of sampling techniques. When it is difficult to contact people, testing the whole community is almost impossible. When there is no compelling need for researchers to obtain more data, convenience sampling is utilized. This sample's participants are not restricted in any manner. As a result, adding additional parts to this example is significantly easier. Members of any part of the population may be included in the sample, depending on how accessible they are to the researcher. The researcher chooses respondents based on their proximity to one another rather than their capacity to correctly represent the community as a whole. They may swiftly catch up on people's habits, beliefs, and opinions using this approach (Bhardwaj, 2019).

Data Gathering Method

The duration of the study has its three important phases namely before, during and after data gathering, below the researcher elaborately discussed the procedures to be done during each phase.

Before the conduct of the study. The researcher will attempt to obtain consent from the company's proper authority in order to conduct a formal survey. It will be finished by e-mailing a formal letter. Following obtaining permission to conduct the research, the researcher will deliver questionnaires to respondents from each company. To assure the accuracy of the data collection, respondents will be provided with the necessary instructions to follow.

During the conduct of the study. The distribution of a survey questionnaire to employees of Emirates Airlines and Etihad Airways will generate the primary data on which this study will be based. Simultaneously, the researcher will receive approval for the problem statement and survey questions from the researcher's advisor, as well as the panel members and the panel chair specifically the advice and decision of the school statistician. With this prior to data collection, the completed questionnaire will be checked to ensure that respondents did not encounter any uncertainty when completing the survey. In addition, a pilot research will be done in order to assess the questionnaire's reliability. To comply with COVID-19's health regulations, the researcher will use Google Forms to distribute the questionnaire

The distribution of questionnaires will be followed by the collection, aggregation, and analysis of one hundred questionnaires. It will be disseminated online using Google Survey Sheet because it will incur fewer expenses and require less time to conduct than the other options.

After the conduct of the study. To ensure privacy and anonymity, *the* researcher will take precautions to ensure the concealment of the survey results. The researcher will be also cognizant of the possibility that respondents' knowledge could affect their candor and the quality of their survey responses; hence, respondents were given the opportunity to remain anonymous. The data will be tallied and analyzed using SSPS and Microsoft Excel, respectively, following the recovery of the surveys.

Analysis and Interpretation

The researcher divided the survey questionnaire into three parts, namely: profile of the respondents and influence of the technological innovation practices on aviation’s supply chain management.

The first part asks for the demographic profiles of the respondents which includes their sex, age, years in the company. The respondents may answer this using their information, they fill in the boxes with a check mark which may correspond to the answers they will be giving.

The second part of the questionnaire is about Technological Innovation on Aviation’s Supply Chain in terms of Artificial Intelligence / Machine Learning, Big data analytics, Robotic Process Automation, IoT and Cloud Technology and Blockchain.

The instrument will have five choices namely always, often, seldom, and never. With these four choices it will identify how these technology innovations have been utilized in aviation companies in particular with their operations with SCM. This will be interpreted using this Likert scaling.

Point	Range	Verbal Analogy
4	3.26 - 4.0	Always (applied every time)
3	2.51-3.3.25	Often (applied most of the time)
2	1.76 -2.50	Seldom (applied rarely)
1	1.00 -1.75	Never (not ever applied)

(reference:https://www.researchgate.net/figure/Point-Range-and-Verbal-Analogy_tbl1_350200507)

Third part of the questionnaire is all about technological innovation influence SCM in terms of Inventory Planning, Purchasing and Warehouse and logistic. This will have choices namely strongly agree, agree, disagree and strongly disagree. For interpretation this Likert scaling will be used.

POINT	SCALE RANGE	EXPLANATION
4	4.00 - 3.00	Strongly Agree
3	2.99 – 2.00	Agree
2	1.99 – 1.00	Disagree
1	1.00 – 0.99	Strongly Dis

Reference (https://www.researchgate.net/figure/Likert-Four-Point-Scale-Range-Interpretation_tbl1_342103471)

Statistical Treatment of Data

To put interpretation on the data gathered, the three statement of the problem will have its descriptive analysis using the following statistical data which will be run and given initial analysis by the schools' statistician.

Generally, the data will be analyzed using SPSS (Statistical Package for the Social Sciences). In quantitative studies, this software is utilized by researchers across fields for the quantitative examination of intricate data. SPSS assists researchers in gaining actionable insights from quantitative data. This effective survey data analysis technique generates precise market trend information. Statistics is a quick and effective tool that accelerates research analysis in a variety of businesses. SPSS Statistics is utilized throughout the full analytics process in education, market research, healthcare, government, and retail, from planning and data collection to analysis, reporting, and implementation.

To enumerate the specific descriptive statistics to be used in the study, the researcher lays the individual explanation per statement of the problem.

First, the demographic profiles of the respondents which includes their sex, age, years in the company, this will be analyzed using percentile and ranking; The researcher will use the following formula of Frequency Distribution and Percentage:

In addition to percentage, ranking will be used for comparison purposes and to share the relevance of the items evaluated.

The second part of the questionnaire is about Technological Innovation on Aviation's Supply Chain in terms of Artificial Intelligence / Machine Learning, Big data analytics, Robotic Process Automation, IoT and Cloud Technology and Blockchain and the third part which is all

about technological innovation influence SCM in terms of Inventory Planning, Purchasing and Warehouse and logistic will be analyzed using the weighted mean of the responses will be computed.

Percentile and ranking and weighted mean will be used in analyzing the collected data and it will also be the numeric reference in providing elaborative explanation which will be observed in the results and discussions.

III. Results and Discussion

Summary

The following is the summary that the researcher has come up with regarding the Strategic Technological Innovation in Aviation's Supply Chain Unit of Arab Emirates.

Technological Innovation Influence Aviation's Supply Chain Management Extent of Aviation Supply Management in terms of Inventory Planning which denotes that 33.1 % of increase in the Aviation Supply Management in terms of Inventory Planning is attributed to the Technological Innovations. These means that we have enough evidence to show that the Aviation Supply Management in terms of Inventory Planning is significantly affected by the Technological Innovations.

From the findings of the Fatorachian and Kazemi (2021) study, it is expected that the use of Industry 4.0-enabling technologies will significantly improve SCM performance by enabling a holistic approach to supply chain management as a result of extensive supply chain integration, information sharing, and chain-wide transparency.

Technological Innovations and Extent of Aviation Supply Management in terms of Purchasing. Aviation Supply Management in terms of Purchasing is attributed to the Technological Innovations. These means that we have enough evidence to show that the Aviation Supply Management in terms of Purchasing is significantly affected by the Technological Innovations.

The table above implied that green storage and logistics optimization have a negative influence on economic performance, while supply chain sustainability has a favorable impact, according to the findings of Agyabeng-Mensah et al. (2020). It is also shown that social values and ethics have a positive impact on supply chain economic performance and sustainability.

IV. Conclusion

Based on the findings of the study, the researcher came up with the following conclusions:

The null hypothesis stating that Technological Innovations does not have a significant influence on Aviation's Supply Chain Unit, as professed by the respondents as rejected.

1. Aviation Supply Management in terms in terms of Logistics and Warehouse Management while Artificial Intelligence Big Data Analytics, Robotic Process Automation and Blockchain has a significant influence on the Aviation Supply Management in terms in terms of Logistics and Warehouse Management.
2. The Aviation Supply Management in terms of Logistics and Warehouse Management is attributed to the Technological Innovations. The generated from the ANOVA table explains that we have enough evidence to show that the Aviation Supply Management in terms of Logistics and Warehouse Management is significantly affected by the Technological Innovations.
3. Technological Innovations namely Artificial Intelligence, Big Data Analytics, Robotic Process Automation Blockchain and IOT and Cloud Technology , has a significant influence on the Aviation Supply Management in terms in terms of Purchasing.
4. Aviation Supply Management in terms in terms of Inventory Planning while IOT and Cloud Technology has a significant influence on the Aviation Supply Management in terms in terms of Inventory Planning.

V. Recommendations

With regard to the conclusion of the study, the following are hereby recommended.

1. AI-driven route optimization algorithms consider real-time traffic, weather, and delivery constraints to create the most efficient delivery routes. This reduces fuel consumption, transportation costs, and delivery times.
2. Logistics and Warehouse Management have been significantly affected by technological innovations. These innovations have transformed the way logistics and warehouses operate, leading to improvements in efficiency, accuracy, and overall supply chain management.
3. The technological advancements not only enhance the efficiency and effectiveness of purchasing processes in aviation supply management but also contribute to reducing costs, improving supply chain visibility, and ensuring the safety and reliability of aircraft operations. Staying abreast of emerging technologies is essential for aviation supply managers to remain competitive and deliver value to their organizations.

4. The technological innovations have revolutionized inventory planning in aviation supply management, making it more data-driven, responsive, and efficient. They help aviation companies strike a balance between maintaining adequate inventory levels and minimizing carrying costs, ultimately contributing to the reliability and cost-effectiveness of aircraft operations.

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