



Assessing the Application of Flight Catering Supply Chain Practices and Food and Beverage Quality in EgyptAir (Differences between Employees' Demographics)

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Abstract

The aviation industry has faced a number of challenges as flight services during the travel experience, media perception regarding quality of meals, logistics, and supply chain issues such as circulation of goods. The current research aims to assess the implementation of flight catering supply chain practices and F&B quality in EgyptAir. There is still a lack of academic literature concerning topics such as methodologies to guide and support supply chain management evaluation. The population of this study was the managers and employees who work in production and catering management in operation sector at In-flight Service EgyptAir Company. A stratified random sampling was applied in the current research. A quantitative method was used to collect the data. A self-administered questionnaire was conducted. A total of 220 questionnaire forms were distributed to managers and employees. The valid forms were 180 forms, which represent 81.8% from the distributed forms. SPSS V. 25 was used to analyze the data. The results showed that the supply chain practices and F&B quality were applied less than standard levels. On the other hand, there were only statistically significant differences between males and females, and respondents' experiences regarding perceiving F&B quality. The implication of these findings for the industry and future research are being deliberated as well. The study recommended that managers and staff should adopt supply chain management as a strategic function for improving service effectiveness and F&B quality.

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1. Introduction

The airline industry has played a vital role in moving people or products from one place to another, especially when the distances involved were far (Archana and Subha, 2012). Flight catering has been a complex food service industry that catered to a wide range of airlines (Sundarakani *et al.*, 2018).

Ko and Chen (2016) declared that consumers' request for airline meals was not only to fill the stomach, but to enjoy featured and high quality cuisines. The styles of airline meals have been generally determined by airline companies, and supplied by designated airline catering supplier (airline kitchen).

Airline management has required changing the food menu for all destinations approximately every week as a part of its competitive strategy to satisfy its passengers around the world. This competitive advantage created many challenges across the whole supply chain process by selecting the best ingredients, most of which were purchased from overseas. It led to build of an inventory for these items that has retained a very short shelf life and the managing of more suppliers from different countries around the globe (Sundarakani *et al.*, 2018).

Selecting strategic suppliers was based on several factors: first, the quality of ingredients required to maintain the image of airlines worldwide and to satisfy its customers. Second, the level of service to ensure that the suppliers delivered the right quantities at the right time with no shortages or backlog. Finally, the price range, which must be monitored to ensure the economy of scale for the high volume of goods purchased every year (Apics, 2018).

Nyberg and Wiklund (2017) suggested that the aviation industry has faced a number of challenges as flight services during the travel experience, media perception regarding quality of meals, logistics, and supply chain issues such as circulation of goods. It is difficult for the airline industry to prioritize supply chain issues while developing relevant strategies that reinforce its fundamental competencies by which catering operations were driven.

The current research aims to assess the implementation of flight catering supply chain practices and F&B quality at In-Flight Service Egypt Air Company. This aim can be divided into two objectives (1) Assessing the implementation of flight catering supply chain practices. (2) Investigating if there were statistical significant differences between respondents' demographics regarding applying supply chain practices and perceiving F&B quality.

Despite the growing academic and corporate interest in supply chain management (SCM), there is still a dearth of academic literature on subjects like the methodology that should direct and assist SCM evaluation. Furthermore, methodologies can be used by both academics and practitioners to develop complementary researches in this area (Simon *et al.*, 2006).

Most of the literature reviewed in the past has analyzed the impact of supply chain management on business performance only. However, the ways to improve catering quality in order to exceed consumers' needs have been required to study (Nataraja and Al-Aali 2011). So the current research aims to assess the implementation of flight catering supply chain practices (SCP) and F&B (F&B) quality in EgyptAir.

2. Literature Review

2.1. In-flight Catering Industry

Van der Walt and Bean (2022) illustrated that the flight catering industry has been a very large and global activity. The total market size was estimated to be around 12 billion euros. More than 1 billion passengers were served each year. It has been probably one of the most complex operational systems in the world. Furthermore, a single, long-haul Boeing 747 had over 40,000 items loaded on to it before it flew. Food items must be fresh and items for personal passenger use must be clean and serviceable. Bahraini *et al.* (2013) explained that a large-scale flight catering production unit might employ over 800 staff to produce as many as 25,000 meals per day during peak periods. A large international airline company might have hundreds of takeoffs and landings every day from just their main hub. These facts made flight catering unlike any other sector of the catering industry. Law (2011) explained that the synchronization of scheduling between suppliers, caterers and airlines, and even the end customers on flights were very important for increased supply chain effectiveness.

Grothues (2006) explained that while the way food was served on trays to airline passengers resembled to service styles in restaurants or cafeterias, the way food was prepared and cooked increasingly resembled a food manufacturing plant. Furthermore, Jones (2007) introduced that in a floor area, the production of hot fresh food took almost 10% of the total area. The other areas were designated to transporters and storehouse areas. The process of storing food would be similar to a shipment storehouse. Meanwhile, moving the prepared meals into the plane and serving the passengers would be much similar to the process of moving equipment in a military logistic process. According to Jose (2012), there should be a lot of training sessions on how to serve food in a plane because it was a very complicated process with the big number of flights every day. It was certified that the process of food serving included 20% of food preparation and 80% of logistics. This could be the reason why airlines should use the logistics of supply chain to reach the perfection in the business.

2.2. EgyptAir In-Flight Services Company

EgyptAir In-Flight Services Company started its business as a catering service section at 1948. It became a subsidiary company of EgyptAir Company. When EgyptAir foundation transformed into EgyptAir Holding Company in 2002, it continued to provide in-flight catering services for all passengers and crew members to EgyptAir airlines. Moreover, EgyptAir In-Flight Services Company has prepared F&B according to the menus agreed with the airlines, and needs and desires of passengers. Cairo catering complex has provided more than 30,000 meals daily for all classes. While the production of Hurgada and Sharm el-Sheikh Catering units mounts to more than 7,000 meals daily. EgyptAir In-Flight Services Company has managed and operated cafeterias, restaurants and lounges in different airports. All the

mentioned activities have been carried out by approximately 3000 employees. EgyptAir In-Flight Services Company has evolved and succeeded in catering services for various airlines inside and outside Egypt (EgyptAir Company Reports, 2022; Abd Elmoaty & Soliman, 2022).

2.3. Airline Catering Service Strategy

The success of an aircraft catering company hinged on consistently providing high-quality service in ever-shrinking amounts of time. To improve their competitive position, airline catering organizations must focus on two key service goals: flexibility and perfection (Rajaratnam & Sunmola, 2021). On the other hand, the logistics role has been strengthened by the involvement of airline catering in the complex food supply chain for the demanding operations of airlines. The supply chains for airline catering had to not only conform to the regulations for food production but also to the unique requirements of airline operations, such as flight duration, class designations, flight destinations, route sectors, aircraft types, storage restrictions, serving conditions, and passenger dietary requirements and preferences (Jones, 2012).

Additionally, real-time changes in the airline sector have included modifications to aircraft, flight schedules, and passenger movements. Therefore, in order to provide a quicker culinary service to the airline, catering service providers must make a decision quickly. Airlines have chosen their service plans. The strategy for the airline catering service must be understood by the airline catering organization. An aircraft catering company must maintain a specific level of product quality while keeping meal expenses as low as feasible (Rajaratnam and Sunmola, 2021).

2.4. Supply Chain and Supply Chain Management Definitions

Pienaar (2010:3) defined supply chain as “a general description of the process integration involving organizations to transform raw materials into finished goods and to transport them to the end-user”. Pedroso (2002:62) defined The supply chain management that the integration of the main processes that manage materials and information bi-directional flows, within the ambit of the enterprise and between the companies that take part into the supply chain, until reaching the end consumers, and having as main goal to aggregate value to the stakeholders and to the clients along these processes. Furthermore, according to Simchi-Levi *et al.* (2008:85), supply chain management (SCM) refers to “a set of methods used to effectively coordinate suppliers, producers, depots, and stores. Therefore, commodity is produced and distributed at the correct quantities, to the correct locations, and at the correct time, in order to reduce system costs while satisfying service level requirements”. Langley *et al.* (2008) stated that an important objective of supply chain management is to improve a corporate’s competitiveness in the global marketplace in spite of hard competitive forces and promptly changing customer needs.

2.5. Supply Chain Management Practices

Li *et al.* (2005) declared that SCPs included five aspects as strategic alliance, customer focus, information sharing, information quality and lean system. Furthermore, Prajogo and Olhager (2012) explained that these practices also included information technology and logistics integration. These practices will be illustrated as follows:

2.5.1. Strategic Alliance

A strategic alliance has aimed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits (Braziotis and Tannock, 2011). Strategic alliance between suppliers,

manufacturers, logistics service providers and customer is a significant source of competitive advantage and also the key for efficient operations and value creation (Holweg *et al.*, 2005).

2.5.2. Customer Focus

Ding *et al.* (2014) explained that Customer Relationships Management (CRM) has referred to the process of identifying, establishing, maintaining, enhancing, and when necessary terminating relationships with customers and other stakeholders. CRM is an essential component of many supply chains and has the object of maintaining and delivering consistent quality. The central point of a successful CRM system is information. This foundation of information is then utilized to deliver relevant services to the customer (Barratt, 2004). The information for each customer can then be shared within industry providing a full 360-degree view of the customer (Moore, 2006). As a result, the information within the CRM system must be kept up to date and relevant to the business (McGarry, 2006).

2.5.3. Information Sharing

Ding *et al.* (2014) stated that information sharing paradigm is the widespread belief that achieving a high degree of cooperative behavior has required that supply chain participants voluntarily have shared operating information and jointly plan strategies. Information sharing has enabled companies to access and share data along the supply chain, making the fulfill supply chain processes more efficient and cost effective. Prajogo and Olhager (2012) found information sharing has a significant effect on operations performance. They also found that information technologies capabilities and information sharing both have significant effects on logistics integration. Zhou (2007) also found that information sharing significant impact on SCPs including planning, production and delivery practices and has a significant effect on delivery performance.

2.5.4. Information Quality

The significance of information sharing impact on supply chain performance also depended on the quality of information sharing. Accuracy, timeliness, and good information formatting are factors that determine the quality of information.. Supplier uncertainty and inter-organizational relationships are most critical factors in determining the level of information sharing and quality (Li and Lin, 2006). Therefore, it is expected that information quality has a positive influence on F&B quality at inflight service EgyptAir Company.

2.5.5. Lean System

Ding *et al.* (2014) indicated that leanness system is the practice of driving out the unnecessary costs, and other wastes from the entire supply chain. The term “lean” has represented a system that used less of all inputs to create outputs similar to the mass production system, but has offered an increased choice to the end customer. The logic behind lean thinking in supply chain management was that organizations jointly identified the value stream for each product from concept to consumption and optimized this value stream regardless of traditional functional or corporate boundaries. Zarei *et al.* (2011) illustrated that the adoption of lean practices might be appropriate for all participants in the red meat industry in UK.

2.5.6. Information Technology

Prajogo and Olhager (2012) declared that information technology has played a central role in supply chain management. First, IT has allowed firms to increase the volume and complexity of information which needs to be communicated with their

trading partners. Second, IT has allowed firms to provide real-time supply chain information, including inventory level, delivery status, and production planning.

2.5.7. Logistics Integration

Prajogo and Olhager (2012) illustrated that the increasing competition has driven firms to not only improve their internal operations, but also focus on integrating their suppliers and customers into the overall value chain processes. The contribution of suppliers in delivering values to customers, hence, building competitive capabilities has been well recognized.

Integrated logistics also have allowed firms to adopt lean production systems which are characterized by reliable order cycles and inventory reduction (Schonberger, 2007). The majority of empirical surveys on supply chain integration report a positive relationship between integration and performance (Van der Vaart and van Donk, 2008).

2.6. Quality of Food and Beverage in Airline Companies

Maintaining high food quality is important for supply chain performance (Rong *et al.*, 2011). F&B were regarded as a crucial element for passengers to choose an airline (Giritlioglu *et al.*, 2014; Messner, 2016). Airlines have realized the importance of F&B in flights to attract more customers (Messner, 2016).

Byun and Jang (2018) indicated that there were three elements for F&B quality on a plane. (1) Internal quality included aspect of F&B like nutrition values, safety, and temperature of the food, quality, and freshness. Mouawad (2012) also added that (2) external quality was the second dimension. It represented the tangible characteristics of the F&B. (3) the service quality of F&B on board included many aspects like: professional performance, care for the passengers, timing, and fast service of the flight attendants. This would side by side with the cleanliness of the tools and the sanitation (Giritlioglu *et al.*, 2014; Messner, 2016).

2.7. Research Hypotheses

Based on the comprehensive literature review the research hypotheses are supposed as follows:

H1: There are no statistically significant differences among demographic characteristics of the sample (gender, age, educational levels, and experiences) towards applying supply chain practices at In-flight Service EgyptAir Company.

H1a: There are no statistically significant differences between males and females towards applying supply chain practices at In-flight Service EgyptAir Company.

H1b: There are no statistically significant differences between the respondents' ages towards applying supply chain practices at In-flight Service EgyptAir Company.

H1c: There are no statistically significant differences between the respondents' educational levels towards applying supply chain practices at In-flight Service EgyptAir Company.

H1d: There are no statistically significant differences between the respondents' experiences towards applying supply chain practices at In-flight Service EgyptAir Company.

H2: There are no statistically significant differences among demographic characteristics of sample (gender, age, educational levels, and experiences) towards perceiving F&B quality at In-flight Service EgyptAir Company.

H2a: There are no statistically significant differences between males and females towards perceiving F&B quality at In-flight Service EgyptAir Company.

H2b: There are no statistically significant differences between the respondents' ages towards perceiving F&B quality at In-flight Service EgyptAir Company.

H2c: There are no statistically significant differences between the respondents' educational levels towards perceiving F&B quality at In-flight Service EgyptAir Company.

H2d: There are no statistically significant differences between the respondents' experiences towards perceiving F&B quality at In-flight Service EgyptAir Company.

3. Methodology

3.1. Study Population and Sampling

The population of current research was the managers and employees who work in production and catering management in operation sector at In-flight Service EgyptAir Company. A stratified random sampling was applied in the current research to divide the target population into two or more relevant and significant strata based respondents' demographics. To obtain a statistically representative sample size of the infinite population, Cochran's formula was used (Singh and Masuku, 2014).

$$n = \frac{z^2 \sigma^2}{e^2}$$

Where (n) represents required sample size, (z) is the value corresponds to the level of confidence (1.96 at the confidence level of 95 %), (σ) is the variance of the population, and (e) represents the maximum allowed error (margin of error 5%) (Saunders *et al.*, 2012; Taherdoost, 2017; Zikmund *et al.*, 2013). Pilot study results one of the most effective ways in estimating population variance (Bartlett *et al.*, 2001). The researchers conducted a pilot study consisting of 30 questionnaires to obtain the estimated variance value of the population. The researcher relied on the supply chain practices variables as the most important variables of the research. The variance value these variables was 0.34.

$$n = \frac{1.96^2 \times 0.34^2}{5\%^2} \quad n = \frac{3.8416 \times 0.1156}{0.0025}$$

$n=177.6356 \rightarrow$ the suitable sample size was 178 participant. .

3.2. Research Tool (Questionnaire)

A quantitative method was used to collect the data. A self-administered questionnaire was conducted, because it was the most effective and convenient data collection tool for achieving research aim and objectives (Saunders *et al.*, 2016). The final draft of the questionnaire was divided into two sections. Section one contained demographic information, such as gender, age, educational level, experiences and position. In section two, the main constructs were represented to seven independent variables and one dependent variable. They consisted of 35 statements. These independent variables involved 29 statements. The independent variables were strategic alliance that involved four statements, customer focus that comprised three statements, and information sharing encompassed five statements, and information quality that included three statements. These independent variables were conducted from Ding *et al.* (2014). In addition, information technology involved six statements, lean system comprised three statements, and logistics integration encompassed five

statements. These variables were conducted from Prajogo and Olhager (2012). Furthermore, F&B quality as dependent variable consisted of six statements. All main variables were measured by asking respondents to express their experience with the applying flight catering supply chain practices and F&B quality for each item using a five-point Likert-style rating scale, where (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree).

3.3. Data Collection Procedures

Furthermore, the printed questionnaires were distributed in Arabic to the respondents, and then the respondents finished it on the spot and returned it to the researchers. These questionnaires were distributed during the period between November 2022 to February 2023. A total of 220 questionnaire forms were distributed to managers and employees. The returned forms (response rate) were 192 forms (87.27%). The valid forms were 180 forms, which represented (81.8%) from the distributed forms, and the non-valid forms were 12 forms, which represented (5.45%).

3.4. Data Analysis

The Statistical Package for the Social Sciences (SPSS) V. 25 was used to analyze the data. The questionnaires were coded, entered and analyzed. Appropriate statistical analyses were performed such as means, standard deviation, Cronbach's Alpha to measure internal consistency, factor analysis, and linear regression coefficients to detect the influence of supply chain practices dimensions on F&B quality.

3.5. Reliability and Validity

3.5.1. Reliability

Table 1: Reliability of the Scale

The Dimensions	No. of Statements	Cronbach's Alpha
Strategic Alliance	4	0.893
Customer Focus	3	0.806
Information Sharing (Communication)	5	0.961
Information Quality	3	0.833
Information Technology	6	0.911
Lean System (Improvement System)	3	0.872
Logistics Integration	5	0.881
Supply Chain Practices	29	0.961
Food and Beverage Quality	6	0.915
Alpha Cronbach's of Overall scale	35	0.967

Damon *et al.* (2011) explained that before proceeding with further analysis, the reliability testing was led in order to ensure the consistency and stability of the measurement across various items in the questionnaire. Cronbach's Alpha is one of the most frequently applied metrics to measure a scale's reliability, in which its index has ranged from 0.0 to 1.0. Researchers should target a value closer to 1.0, as Alpha value has proved that the instrument of the study is strong and consistent. However, It's crucial to remember that the threshold value of 0.7 is accepted in the social sciences.. Table 1 indicated that each variable has more than 0.7 Cronbach's Alpha, which means that all variables are reliable (Henson, 2001; Kottala and Herbert, 2020).

3.5.2. Validity

The initial questionnaire has been given to five referees to judge its content validity and the clarity of its items' meaning to avoid any misunderstanding as well as to assure its linkage with the main study aims. The experts recommended deleting some statements, modifying the wording of some statements, and clarifying the

meanings of some statements. The experts were experienced academic professors and lecturers in the field of the hospitality management. In addition, factor analysis was applied to measure the validity of questionnaire statements.

Table 2: Factor Analysis of Supply Chain Practices

Strategic Alliance	Loadings
We and our suppliers regularly work together to solve problems	0.73
We and our key suppliers have continuous improvement programs	0.77
We assist our suppliers to improve their product quality	0.79
Our key suppliers are involved in our planning and goal-setting activities	0.74
Sums of squared loadings	0.98
Customer Focus	Loadings
We frequently interact with customers to set reliability, responsiveness, and other standards for us	0.70
We facilitate customer's ability to seek assistance from us	0.72
We regularly evaluate the importance of our relationship with our customers	0.74
Sums of squared loadings	0.99
Information Sharing	Loadings
We share sensitive information (financial, production, design, research, and/or competition)	0.79
Suppliers are provided with any information that might help them	0.86
The exchange of information takes place frequently, informally, and/or timely	0.86
We keep each other informed about events or changes that may affect the other party	0.95
We have frequent face-to-face planning/communication with suppliers	0.86
Sums of squared loadings	0.98
Information Quality	Loadings
Information exchange between our trading partners and us is reliable	0.72
Information exchange between our trading partners and us is adequate	0.81
Information exchange between our trading partners and us is timely	0.72
Sums of squared loadings	0.97
Information Technology	Loadings
There are direct computer-to-computer links with key suppliers	0.95
Inter-organizational coordination is achieved using electronic links	0.94
We use information technology-enabled transaction processing	0.69
We have electronic mailing capabilities with our key suppliers	0.72
We use electronic transfer of purchase orders, invoices, and/or funds	0.95
We use advanced information systems to track and/or expedite shipments	0.94
	<i>Continued</i>

<i>Table 2: continued</i>	
Sums of squared loadings	0.96
Lean System	Loadings
Our firm has continuous quality improvement	0.80
Our firm drives suppliers for shorter lead-times	0.82
Our firm continuously streamlines ordering, receiving and paperwork from suppliers	0.76
Sums of squared loadings	0.99
Logistics Integration	Loadings
Inter-organizational logistic activities are closely coordinated	0.64
Our logistics activities are well integrated with suppliers' logistics activities	0.65
We have a seamless integration of logistics activities with suppliers	0.71
Our logistics integration is characterized by excellent distribution, transportation, and/or warehousing facilities	0.74
The inbound and outbound distribution of goods with our suppliers is well integrated	0.64
Sums of squared loadings	0.97

Factor analysis shown in table 2 attempted to identify key variables or factors that explain the pattern of correlations within a set of observed variables. Statistical loading should not be less than 0.6 (Watkins, 2018). Factor analysis of strategic alliance showed that all four statements were loaded on one factor explained 98 % of the variation in the primary variable. Moreover, factor analysis displayed that all three statements were responsible for changing in the variable of customer focus with a percentage of 99 %. In addition, factor analysis of information sharing stated that all five statements were loaded on one factor explained 98 % of the variation in the primary variable.

Furthermore, factor analysis of information quality in table 2 stated that all three statements were loaded on one factor explained 97 % of the variation in the primary variable. Moreover, table 2 showed that all six statements were responsible for changing in the variable of information technology with a percentage of 96 %. In addition, factor analysis displayed that all five statements were responsible for changing in the variable of lean system with a percentage of 99 %. Finally, factor analysis of logistic integration declared that all five statements were loaded on one factor explained 97 % of the variation in the primary variable. Therefore, the researcher found that the levels of loading values of supply chain practices were suitable due to they were more than 0.60 (Watkins, 2018).

Table 3: Factor Analysis of Food Quality

Food Quality	Loadings
The food was nutritious	0.68
- The in-flight catering company offered a variety of menu items	0.81
- The in-flight catering company offered fresh food	0.66
- The smell of the food was enticing	0.69
- The food was provided in a suitable quantity	0.66
- The food was offered in a right cooking temperature	0.69
Sums of squared loadings	0.96

According to table 3, factor analysis of food quality showed that all six statements were loaded on one factor explained 96 % of the variation in the primary variable. Therefore, the researcher found that the level of loading value of food quality was suitable due to they were more than 0.60 (Watkins, 2018).

4. Results

Table 4: Demographic Characteristics of the Respondents

Demographic Characteristics		Frequency	Percentage %
Gender	Male	121	67.2%
	Female	59	32.8%
	Total	180	100%
Age	20 - 30 Years	17	9.4%
	> 30 - 40 Years	115	63.9%
	> 40 - 50 Years	48	26.7%
	Total	180	100%
Education Levels	High School	3	1.7%
	Bachelor degree	117	65%
	Diploma	31	17.2%
	Master or PhD	29	16.1%
	Total	180	100%
Experience	1-3 Years	1	0.6%
	More than 3 - 5 Years	16	8.9%
	More than 5 - 10 Years	57	31.7%
	More than 10 -15 Years	106	58.9%
	Total	180	100%

According to gender, the results in table 4 showed that the percentage of males (67.2 %) was more than females (32.8 %) in the investigated sample. As shown in table, the respondents' ages ranged from 20 to over 60 years old. The majority of the respondents were between >30 and 40 years old (63.9 %). Regarding education levels, 65 % of the respondents had a Bachelor degree. In terms of employees' experience, almost 59 % of the respondents had an experience ranged from more than 10-15 years. It referred to the variety of demographic characteristics of the respondents in the investigated sample.

Table 5: Respondents' Position

Position	Frequency	Percentage %
Administration Manager	2	1.11%
Head of Department	10	5.55%
General Manager	10	5.55%
Assistant Manager	20	11.11 %
Supervisor	8	4.44%
Quartermaster officer	30	16.66%
Operation staff	100	55.55%
Total	180	100%

As shown in table 5, the results found that more than half (55.5 %) of the respondents were operation staff, followed by quartermaster officers (16.6 %), then Assistant Manager (11.11 %). In addition, Head of Department, and General Manager represented 5.55 % for each one, then Supervisor, and Administration Manager represented 4.4 %, and 1.11 % of the respondents respectively. It means that the majority of the job titles in inflight service EgyptAir Company were represented in the investigated sample.

Table 6: Descriptive Statistics of Supply Chain Practices Dimensions

Strategic Alliance	Mean	SD	Rank	Sig.
We and our suppliers regularly work together to solve problems	1.86	1.01	3	
We and our key suppliers have continuous improvement programs	1.90	0.88	2	
We assist our suppliers to improve their product quality	1.93	0.97	1	
Our key suppliers are involved in our planning and goal-setting activities	1.81	0.97	4	
Overall	1.87	0.83		0.00
Customer Focus	Mean	SD	Rank	Sig.
We frequently interact with customers to set reliability, responsiveness, and other standards for us	1.85	0.88	3	
We facilitate customer's ability to seek assistance from us	1.97	0.88	1	
We regularly evaluate the importance of our relationship with our customers	1.86	0.83	2	
Overall	1.89	0.73		0.00
Information Sharing (Communication)	Mean	SD	Rank	Sig.
We share sensitive information (financial, production, design, research, and/or competition)	1.93	0.91	1	
Suppliers are provided with any information that might help them	1.87	0.91	3	
The exchange of information takes place frequently, informally, and/ or timely	1.90	0.87	2	
We keep each other informed about events or changes that may affect the other party	1.82	0.85	4	
We have frequent face-to-face planning/communication with our suppliers	1.81	0.85	5	
Overall	1.87	0.82		0.00
Information Quality	Mean	SD	Rank	Sig.
Information exchange between our trading partners and us is reliable	1.70	0.83	3	
Information exchange between our trading partners and us is adequate	1.84	0.78	1	
Information exchange between our trading partners and us is timely	1.80	0.85	2	
Overall	1.78	0.71		0.00
		<i>Continued</i>		

<i>Table 6: continued</i>				
Information Technology	Mean	SD	Rank	Sig.
There are direct computer-to-computer links with key suppliers	1.87	0.87	5	
Inter-organizational coordination is achieved using electronic links	1.91	0.82	4	
We use information technology-enabled transaction processing	1.95	0.87	3	
We have electronic mailing capabilities with our key suppliers	1.98	0.85	1	
We use electronic transfer of purchase orders, invoices, and/or funds	1.87	0.87	5	
We use advanced information systems to track and/or expedite shipments	1.96	0.91	2	
Overall	1.92	0.72		0.00
Lean System	Mean	SD	Rank	Sig.
Our firm has continuous quality improvement	1.73	0.80	1	
Our firm drives suppliers for shorter lead-times	1.72	0.83	2	
Our firm continuously streamlines ordering, receiving and other paperwork from suppliers	1.67	0.85	3	
Overall	1.71	0.74		0.000
Logistics Integration	Mean	SD	Rank	Sig.
Inter-organizational logistic activities are closely coordinated	1.75	0.85	5	
Our logistics activities are well integrated with suppliers' logistics activities	1.85	0.85	1	
We have a seamless integration of logistics activities with our key suppliers	1.75	0.88	4	
Our logistics integration is characterized by excellent distribution, transportation, and/or warehousing facilities	1.80	0.82	3	
The inbound and outbound distribution of goods with our suppliers is well integrated	1.81	0.82	2	
Overall	1.79	0.69		0.00

Mean of dimensions, SD = Standard Deviation, and Sig. = significance of one-sample T-Test.

Table 6 indicated that the strategic alliance overall score was (M= 1.87; SD= 0.83) that has meant respondents were disagreed with this dimension. The strategic Alliance dimension consisted of four items. The respondents disagreed with "We assist our suppliers to improve their product quality", which was ranked first (M=1.93; SD= 0.97), while the last ranked item was "our key suppliers are involved in our planning and goal-setting activities" (M=1.81; SD= 0.97). In addition, customer focus variable comprised three items. The tabulated data also illustrated that the customer focus variable overall score was (M=1.89; SD=0.73). It indicated that the respondents were disagreed on this dimension. The first item was "We facilitate customer's ability to seek assistance from us" (M= 1.97; SD= 0.88). On the other hand, the last item was "We frequently interact with customers to set reliability, responsiveness, and other standards for us" (M= 1.85; SD= 0.88).

Furthermore, information sharing dimension composed of five items. The overall score of information sharing was (M= 1.87; SD= 0.82), which referred to the respondents were disagreed with this dimension. The respondents disagreed with "We share sensitive information (financial, production, design, research, and/or

competition), which was ranked first" (M=1.93; SD= 0.91). The last ranked item was "We have frequent face-to-face planning/communication with our suppliers" (M= 1.81; SD= 0.85). The current results agreed with Fawcett *et al.* (2007) who revealed that getting connectivity right is a serious challenge. And for now, despite tremendous progress, current information systems have fallen short of providing the seamless connectivity supply chain managers want. The connectivity challenge is exacerbated by organizational cultures and structures that reduce managers' willingness to share the information needed to improve overall supply chain performance.

Moreover, information quality dimension consisted of three items. The overall score of information quality was (M= 1.78; SD= 0.71), which indicated that the respondents were strongly disagree with this dimension. The respondents disagreed with "Information exchange between our trading partners and us is adequate", which was ranked first by score (M= 1.84; SD= 0.78), while the last ranked item was "Information exchange between our trading partners and us is reliable" by score (M= 1.70; SD= 0.83).

Regarding to information technology dimension, it comprised five items. The overall score of information technology was (M=1.92; SD=0.72), which referred to the respondents were disagreed with this dimension. The first item was "We have electronic mailing capabilities with our key suppliers" (M=1.98; SD= 0.85). On the other hand, the last items were "There are direct computer-to-computer links with key suppliers", and "We use electronic transfer of purchase orders, invoices, and/or funds" (M= 1.87; SD= 0.87). Furthermore, Lean System dimension composed of three items. The overall score of lean system was (M= 1.71; SD= 0.74), which has meant that the respondents were strongly disagreed with this dimension. The respondents strongly disagreed with "Our firm has continuous quality improvement", which was ranked first (M=1.73; SD= 0.80). The last ranked item was "Our firm continuously streamlines ordering, receiving and other paperwork from suppliers" by score (M= 1.67; SD= 0.85). Finally, concerning logistics integration variable, it consisted of five items. The overall score of logistics integration was (M= 1.79; SD= 0.69), which referred to the respondents were strongly disagree with this dimension. The first item was "Our logistics activities are well integrated with suppliers' logistics activities" (M= 1.85; SD= 0.85). On the other hand, the last ranked item was "Inter-organizational logistic activities are closely coordinated" (M= 1.75; SD= 0.85).

The p-value of the one-sample T-test was (0.00) of all variables, which indicated that there were statistically significant differences between food supply chain practices and the test value 4. This value was selected because it was a suitable value that referred to a degree of "agreement". In other words, respondents' responses of all dimensions were less than the test value. This result indicated that supply chain practices were applied less than the standard level in inflight service EgyptAir.

Table 7: Descriptive Statistics of Food Quality Dimension

Food Quality	Mean	SD	Rank	Sig.
The food was nutritious	1.81	0.78	6	
The flight catering company offered a variety of menu items	1.88	0.91	4	
The flight catering company offered fresh food	1.92	0.84	3	
The smell of the food was enticing	1.95	0.91	2	
The food was provided in a suitable quantity	1.96	0.91	1	
The food was offered in a right cooking temperature	1.86	0.90	5	
Overall	1.90	0.74		

Mean of F&B quality, SD = Standard Deviation, and Sig. =significance of one-sample T-Test

As shown in table 7, the food quality dimension comprised six items. The overall score of food quality variable was (M= 1.90; SD= 0.74), that referred to the respondents disagreed with this dimension. The respondents disagreed with "The food was provided in a suitable quantity" which was ranked first by score (M= 1.96; SD= 0.91). The last ranked item was "The food was offered in a right cooking temperature" (M= 1.86; SD= 0.90).

In addition, the p-value of the one-sample T-test was (0.00) of food quality variable, which indicated that there were statistically significant differences between mean of food quality variable and the test value 4. This value was selected because it was a suitable value that referred to a degree of "agreement". In other words, respondents' responses of all statements were less than the test value. This result indicated that food quality variable was less than the standard level in inflight service EgyptAir Company.

Table 8: The Differences between Males and Females Concerning Applying Supply Chain Practices and Food Quality

Dimensions	Group	N	Mean	SD	T-Test	
					T	Sig.
Strategic Alliance	Male	121	1.87	0.85	-.072	0.94
	Female	59	1.88	0.80		
Customer Focus	Male	121	1.87	0.71	-.599	0.55
	Female	59	1.94	0.77		
Information Sharing	Male	121	1.78	0.80	-1.998	0.04*
	Female	59	2.04	0.84		
Information Quality	Male	121	1.79	0.72	0.468	0.64
	Female	59	1.74	0.70		
Information Technology	Male	121	1.88	0.71	-1.239	0.21
	Female	59	2.02	0.74		
Lean System	Male	121	1.71	0.77	0.037	0.97
	Female	59	1.71	0.68		
Logistics Integration	Male	121	1.80	0.70	0.122	0.90
	Female	59	1.78	0.69		
Food Quality	Male	121	1.82	0.76	-1.957	0.05*
	Female	59	2.05	0.66		
Supply Chain Practices	Male	121	1.81	0.60	-.614	0.54
	Female	59	1.87	0.58		

From the results shown in table 8, it was noticeable that there were only statistically significant differences between males and females concerning information sharing variable of supply chain practices. The t-test Sig. was (0.04) which was less than (0.05). These differences were in favor of females (Mean = 2.04). The results showed that males were strongly disagreeing than females. It indicated that males were less recognized information sharing carried out by inflight service EgyptAir Company than females. Information sharing included sharing financial, production, design, research, and competition information; providing suppliers with any information to help them. It also involved exchanging information frequently, informally, and timely; keeping other parties informed with events and changes that

affect them; and having frequent face-to-face planning/communication with the supplier).

Regarding supply chain practices, the results displayed that there were no statistically significant differences between males and females towards applying supply chain practices at In-flight Service EgyptAir Company. The t-test value Sig. was (0.54) which was higher than (0.05). Therefore, the null hypothesis (H1a) was accepted.

Furthermore, there were statistically significant differences between males and females regarding perceiving F&B quality, where t-test Sig. was (0.05) which was \leq 0.05 significance level. These differences were in favor of females (Mean= 2.05). According the previous result, the null hypothesis (H2a) "there are no statistically significant differences between males and females towards perceiving F&B quality at In-flight Service EgyptAir Company" was rejected and alternative hypothesis was accepted. It referred to males were less perceived F&B quality served by inflight service EgyptAir Company than females (e.g. nutritive food, variety of menu items, fresh and enticing food items, food is provided in a suitable quantity and right temperature).

Table 9: Differences between Ages, education levels, and experiences of employees regarding to Supply Chain Practices and Food Quality

The Variables	Age		Education		Experience	
	F	Sig.	F	Sig.	F	Sig.
Supply Chain Practices	1.653	0.194	2.389	0.070	2.356	0.074
Food Quality	.604	0.548	1.523	0.210	3.412	0.019

The results of ANOVA test in table 9 revealed that the significance levels were higher than 0.05. It means there were no statistically significant differences between respondents' ages, educational levels, and experiences regarding to applying supply chain practices. According to previous result, the null hypotheses "H1b, H1c, and H1d" were accepted. It refers to the respondents agreed that supply chain practices were applied less than standard levels at In-Flight Service EgyptAir Company as mentioned above in table 6.

The LSD (Least Significant Difference) test was calculated to determine the sources of differences. Table 10 showed that there were no statistically significant differences between respondents who had experience from 1-3 years and more than > 3-5 years (Sig. = 0.60). On the other hand, there were statistically significant differences between respondents who had experience > 3-5 years and > 5 – 10 years (Sig. = 0.01), as well as between > 3-5 years and > 10 -15 year (Sig. = 0.002). These differences were in favor of respondents who had experience from 1-3 years (Mean = 1.66), more than 5 - 10 years (Mean = 1.87), and more than 10 -15 years (Mean = 1.99), against respondents who had experience more than 3 - 5 Years (Mean = 1.38). The current research agreed with Shiwakoti *et al.* (2022) that there were no statistically significant differences between respondents' ages, educational levels, and experiences regarding to applying supply chain practices. Furthermore, there were no significance differences between respondents' ages and educational levels concerning perceiving F&B quality at In-Flight Service EgyptAir Company (significance levels were higher than 0.05). Therefore, the null hypotheses "H2b, and H2c" were accepted. On the other hand, there were significant differences between

respondents' experiences in relation to perceiving F&B quality at In- Flight Service EgyptAir Company, where the significance level was 0.019, which was less than (0.05). According to the current result, the null hypothesis (H2d) was rejected and the alternative was accepted.

Table (10) LSD Test (Least Significant Difference)

Dependent Variable		Experience (I)	Experience (J)	Sig.
Food Quality	LSD	From 1-3 years	> 3-5 years	0.60
			> 5 – 10 years	0.69
			> 10 -15 year	0.52
		> 3-5 years	From 1-3 years	0.60
			> 5 – 10 years	0.01
			> 10 -15 year	0.002
		> 5 – 10 years	From 1-3 years	0.69
			> 3-5 years	0.01
> 10 -15 year	0.29			
> 10 -15 years	From 1-3 years	0.52		
	> 3-5 years	0.002		
	> 5 – 10 years	0.29		

* The mean difference is significant at the 0.05 level.

Table (11) Means of Food Quality Concerning Experiences

Dependent variable		Mean
Experience	1-3 Years	1.66
	More than 3 - 5 Years	1.38
	More than 5 - 10 Years	1.87
	More than 10 -15 Years	1.99

5. Conclusion and Recommendations

5.1 Conclusion

The aviation industry has faced a number of challenges such as flight services during the travel experience, media perception regarding quality of meals, logistics, and supply chain issues such as circulation of goods (Nyberg and Wiklund, 2017). The current study aims to assess the implementation of flight catering supply chain practices and their effects on F&B quality at In-Flight Service EgyptAirCompany. On the other hand, despite the increasing interests in supply chain management (SCM) within the academy and industrial environment, there is still a lack of academic literature concerning topics such as methodologies to guide and support SCM evaluation (Simon *et al.*, 2006).

The population of this study was the managers and employees who work in production and catering management in operation sector at In-flight Service EgyptAir Company. A stratified random sampling was applied in the current research to divide the target population into two or more relevant and significant strata based on one or a number of attributes. Cochran's formula was used for determining the sample size of infinite population. The suitable sample size was 178 participant. A quantitative method was used to collect the data. A self-administered questionnaire was conducted. It contained seven supply chain practices as independent variables, and

F&B quality as dependent variable. Furthermore, a pilot study was conducted for this study in October 2022 to examine the reliability of the questionnaire, develop and refine of it. A total of 220 questionnaire forms were distributed evenly to managers and employees. The returned forms (response rate) were 192 forms (87.27%). The valid forms were 180 forms, which represent (81.8%) from the distributed forms, and the non-valid forms were 12 forms, which represented (5.45%). The Statistical Package for the Social Sciences (SPSS) V. 25 was used to analyze the data. These questionnaires were coded, entered and analyzed.

The results showed that supply chain practices (strategic alliance, customer focus, information sharing, information quality, information technology, lean system, and logistics integration) were applied less than the standard level at In-Flight Service EgyptAir Company. Moreover, F&B quality was less than the standard level. On the other hand, there were no statistically significant differences between males and females towards applying supply chain practices at In-Flight Service EgyptAir Company. Therefore, the null hypothesis (H1a) was accepted.

Moreover, there were statistically significant differences between males and females regarding perceiving F&B quality. These differences were in favor of females. According the previous result, the null hypothesis (H2a) was rejected and alternative hypothesis was accepted. It referred to males were less perceived F&B quality served by inflight service EgyptAir Company than females.

There were no statistically significant differences between respondents' ages, educational levels, and experiences regarding to applying supply chain practices as well. According to previous result, the null hypotheses "H1b, H1c, and H1d" were accepted.

Furthermore, there were no significance differences between respondents' ages and educational levels concerning perceiving F&B quality at In-Flight Service EgyptAir Company. Therefore, the null hypotheses "H2b, and H2c" were accepted.

On the other hand, there were significant differences between respondents' experiences in relation to perceiving F&B quality at In-Flight Service EgyptAir Company. According to the current result, the null hypothesis (H2d) was rejected and the alternative was accepted.

5.2. Research Contributions

The research contribution emerges from evaluating the influence of flight catering supply chain practices implementation on F&B quality at In- Flight Service EgyptAir Company. The previous studies focused on assessing the impact of these practices on the performance of red meat processing industry. But the current research concentrated on measuring these practices at In-Flight Service EgyptAir Company and its influence on F&B quality. This influence of each practice on F&B quality is displayed in the empirical model of the current research.

5.3. Recommendations

The current research suggested a set of recommendations that would improve, control and ensure that the supply chain practices implement effectively at In-Flight Service EgyptAir Company as follows:

5.3.1. Recommendations for the Managers of In-Flight Service EgyptAir Company

- The managers should adopt supply chain management as a strategic function for improving service effectiveness and F&B quality.
- The managers should carry out an action plan to effective implementation of supply chain practices and F&B quality.
- The managers in EgyptAir Company and caterers should work together to meet the needs of onboard passengers.
- The managers should have an engaging work relationship with external suppliers to find the right products.
- Managers should establish data and information connection at the supply chain interface to respond to market's demands and to create best value for customers.
- The management need to build strong information technology techniques to improve F&B quality.
- The managers should provide training courses for staff on effective implementation of supply chain practices and improving F&B quality.
- The managers should activate the supervisory and control role on supply chain practices and F&B quality.

5.3.2. Recommendations for staff of In-Flight Service EgyptAir Company

- Staff should be involved in training courses of supply chain practices to effective implementation of these practices and improvement of F&B quality.
- Staff should contribute to set the action plan of supply chain practices with the managers.
- Staff should carry out the action plan that adopted by the managers to effective implementation of supply chain practices.
- Staff should follow the managers' policies and procedures for improving F&B quality.

5.4. Research limitations and future researches

The current research has some limitations. First, the research was applied on In-Flight service EgyptAir Company only. Future researches can be extended to examine multiple airline companies in different size and regions to analyze the global airline catering supply chain. Second, this research was conducted within the context of Egyptian airline market. The generalization of its findings to other contexts remains to be ascertained. The future research can be conducted to other countries. Finally, this research applied a quantitative approach to evaluate the in-flight catering SCPs and F&B quality. Thus, the further researchers shall also expand by using quantitative and qualitative approaches to get a deeper evaluation.

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