

# EFFECT OF THE ADOPTION OF TECHNOLOGY INNOVATIONS IN THE AIR CARGO LOGISTICS INDUSTRY IN SOUTH AFRICA

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## ABSTRACT

The recent advances in technology and innovations are poised to impact air cargo operations because the distribution of goods requires a seamless supply chain system that needs automation to coordinate air cargo flow properly. The response to issues about the fourth industrial revolution involving ICT and IoT technology applications is becoming unavoidable. Nevertheless, it has been observed that the air cargo logistics industry has been reluctant to adopt new technologies for their businesses. This study examines the effects of adopting and implementing emerging technological applications in the air cargo logistics industry in South Africa. Three hundred and seventy-three (373) stakeholders were sampled for data collection by random technique at the cargo terminal of OR Tambo International Airport. The data were collected by a questionnaire administered to the respondents with instructions to rank the information provided in order of significance. The study adopted exploratory factor analysis to analyse data. The study found that applying technology in the air cargo logistics industry promotes efficient operations, improves warehousing and enhances cargo delivery services for customer satisfaction. The study implies the need to improve the responsiveness of adopting emerging technological applications in the air cargo logistics industry in South Africa.

## 1. INTRODUCTION

According to International Air Transport Association (IATA, 2019), the air cargo industry experienced a weakened demand with a fall of 4.7% in comparison with the demand of February 2018. IATA (2019) also reported that the air cargo market capacity increased by 2.7% yearly. The record shows that it was the slowest annual growth rate in three (3) years. In contrast, other studies had anticipated that air freight volumes would continue to increase by around 3% annually until 2025 and likely after 2030 (Galea-Pace, 2020). Air cargo operation is observed as efficient means of transportation because of its capacity to deliver high-value and time-sensitive goods. The aviation industry's demand for air cargo services is catalysed by technological advancements (Galea-Pace, 2020).

The recent advances in technology are poised to impact air cargo operations. The distribution of goods follows the required seamless supply chain system that is automated to coordinate air cargo flow properly. The response to issues about the fourth industrial revolution involving ICT and IoT technological applications is becoming unavoidable (Barreto, Amaral & Pereira 2017) for seamless supply chain operations in air cargo distribution. This has prompted severe challenges in the logistics industry, which requires drastic technological changes for efficiency in supply chains. Logistical challenges can be improved by streamlining the supply chain connected by data platforms from order fulfilment to air cargo delivery to customer satisfaction. This is to organise uninterrupted

and optimal cargo distribution for efficient service delivery. This will mean providing a distribution system with a reduced delivery cost at optimal loading delivery capacities in the right direction and time. The challenge is to make technology support the flow of goods such that customers can trace their goods throughout the delivery process, even in the air, to provide better customer satisfaction.

The impact of technology on industries worldwide cannot be overemphasised. Its influence is highly significant to have transformed how companies conduct their businesses. The air cargo industry is not an exception from the impact of technology as emerging technological innovations are fast becoming major driving forces. Thus, stakeholders in the sector are under severe pressure to digitise their operations due to the increasingly widespread technological innovations. The volume of pressure on stakeholders in the air cargo logistics industry is creating a reluctance to apply disruptive technological innovations in their business (Government of India, 2012). As a result, the air cargo industry is often lamented as lagging in digitisation behind passenger air transport (Harper, 2022). Fernandes (2015) stated that the air cargo industry is slow in adopting technological innovations to modernise cargo flow and distribution even though technological applications are required for digitised data and cargo management systems across all distribution stages. To this end, this study aims to examine the effect of technological applications in the air cargo logistics industry with a focus on how to reduce the reluctance to adopt technological innovations designed to facilitate the seamless distribution of cargo for the economic development of South Africa. This paper's main question is what is the effect of adopting emerging innovative technologies in the air cargo logistics industry in South Africa? The goal is to address the level of reluctance and slowness of the industry to adopt and implement emerging technologies for handling air cargo operations.

## **2. LITERATURE REVIEW**

The literature on the application of technologies in industries is abounding. This is because smart technological applications have become an important means of business development. For the air cargo industry, Orozova et al. (2022) stated that emerging technological innovations have become an important part of cargo delivery for the integration of the supply chain operations due to globalisation. Technological applications and innovations can increase the effectiveness of supply chain cargo delivery in real time. Poleshkina (2021) also affirmed that technological applications in air cargo supply chain management serve as a digital solution to simplify distribution processes. The importance of applying digital technologies in the cargo shipping business was highlighted by Plomaritiu and Jeropoulos (2022).

Different researchers have studied the effect of technology on the air transport industry from different perspectives. For example, Hansman (2005) found that technologies significantly influence air transport's safety, efficiency, capacity, capability, environment and financial outlook. La, Bil and Heiets (2021) found that digital technology applications impact airline operations by enhancing passengers' flight experience. Notwithstanding the studies on technological innovation in the air transport industry, there is scarce literature that addresses the reluctance to adopt emerging technologies in the air cargo subsector of the aviation industry. Ajay (2022) attributed one of the reasons for the slow level of adopting technology applications in the industry to resistance to change.

Despite the relevance of the technology to the air cargo logistics industry, stakeholders still need to be convinced to adopt and implement emerging technologies in their operations.

So, this study presents the effects of adopting and implementing emerging technological applications in the air cargo logistics industry to encourage the timely application of technological innovations.

### **3. DATA AND METHODS**

This study adopted the survey research design for data collection and analysis. The research design is exploratory. The philosophy behind the research is positivism, which aims at quantifying data for exploratory analysis used in this study. The research study area is O. R. Tambo International Airport, Johannesburg. The airport is a major airport with substantive cargo traffic in South Africa. O.R. Tambo International Airport leads the remaining twenty-one (21) airports as the largest and busiest airport in South Africa. According to the Airports Council International (ACI) data, OR Tambo International Airport was ranked third (3<sup>rd</sup>) with 304,018 Tonnes in African cargo handling after Cairo and Jomo Kenyatta international airports (Further Africa, 2022).

The study used cargo agents, also known as freight forwarders, as the population for the research. The employees of the cargo agents' companies with offices at the Agent Building of the airport's cargo terminal form the study population. In all, ninety-seven (97) companies were contacted for this study. The study purposively sampled five (5) from each company to a total of four hundred and eighty-five (485) population. The selection aims to ensure that the General manager/manager, two partners and two other employees were included from each company in the survey. The simple random sampling technique was adopted to administer a questionnaire to the respondents. The random technique was adopted for its capacity to provide an equal chance for each member of the population to be sampled. Random numbers using Excel were generated and assigned to each questionnaire. The survey, therefore, produced three hundred and seventy-three (373) as the sample size for the study. The sample size had a 76.9 per cent success rate in the data collection process. Appendix 1 shows the list of the cargo agent companies, the total population and the sample size for the study.

A questionnaire was designed to collect data on the effects of the adoption of advanced technological applications in the air cargo logistics industry in South Africa. The questionnaire was administered with the assistance of four (4) research assistants, who were duly trained to collect the data for the study. The questionnaire contains two (2) sections. Section A seeks the respondents' background information, and section B seeks the opinion of the respondents about the effects of adopting advanced technological applications in air cargo logistics in South Africa. Section B of the questionnaire was presented on a 5-point Likert Scale with statements about the effects of adopting technological applications in the air cargo logistics industry for the respondents to consider in order of their significance. The order follows 1 – Not Significant to 5 – Highly Significant. The variables for the study were extracted from Guo, Pan, Guo, Gu and Kuusisto (2019) on the measurement framework for assessing disruptive innovations. The questionnaire used to collect data for the study is attached as Appendix 2.

The questionnaire contains preliminary questions highlighting stakeholders' responses and the adoption of technological applications in the air cargo industry. For the main issue of the study, the questionnaire presents eighteen (18) items in the 5-point Likert scale for respondents to rank in order of significance. The items are the effects of technological applications in logistics operations. The items include integrated operations, efficient operations, reluctance to adopt, improved operations, technology diffusion, simplified handling process, reduced shipping time, order accuracy, reduced transport cost,

inventory accuracy, reduced clearing time, improved warehousing operations, equipment utilisation, forecast uncertainty, monitor demand variability, improve cargo supply, and delivery within time.

The data collected were subjected to Exploratory Factor Analysis (EFA) as the technique for analysis. The goal of the technique is to identify the most significant effect(s) that the adoption of advanced technological applications has on the air cargo logistics industry in South Africa. EFA determines whether reduced unobserved common factors can represent the observed covariances or correlations in the variables. The technique estimates the factor loadings of the items to determine the number of common factors that can adequately describe the correlations between the observed variables.

Principal Axis Factoring (PFA) was employed in implementing EFA. For a decision on the correctness of the analytical output, the procedure for conducting EFA statistically includes techniques using Kaiser-Meyer-Olkin (KMO) and Bartlett tests, communalities, extraction of variance using principal axis factoring, correlation matrix, and factor rotation (with varimax) technique (Ledesma, Ferrando, Trógolo, Poó, Tosi & Castro, 2021).

#### 4. RESULTS

The output shows that the data is suitable and adequate for the analysis with the results of KMO and Bartlett's tests. The KMO test showing .584 indicates that the sample is adequate for EFA. Also, Bartlett's test of sphericity is significant at .000 with an Approximate Chi-Square value of 2665.901, showing that the data is suitable for the exploratory factor analysis (See Table 1).

**Table 1: Tests of data adequacy and suitability for EFA**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.584
Bartlett's Test of Sphericity	Approx. Chi-Square	2665.901
	Df	153
	Sig.	.000

The communalities estimate of the data presented in Table 2 shows that the variance in the variables can be ascribed to the common factors. The variance of each variable estimated by the analysis makes the communalities of the data. The model's communalities represent the sum of the squared loadings of the initial and extracted values of the variance of each variable. The extracted values presented in Table 2 show that all the variables have an acceptable variance to explain the variability in the common factors that serve as the effects of adopting advanced technological applications in the air cargo logistics industry in South Africa. The items with values less than 0.400 after extraction are considered to have little contribution to the overall output of the analysis.

The analysis took critical steps to identify the number of common factors that represent the effects of the adoption of advanced technological applications in the air cargo logistics industry in South Africa. The model specifies that the number of common factors is restricted to a maximum of three (3). So, the extraction was done using principal axis factoring with varimax rotation to identify the latent variables that make the common factors. The values were rotated according to size and suppressed to a least coefficient of 0.500. The percentage of the total variance that explained the common factors accounts

for 59 per cent of the factors serving as the effects of adopting technological applications in the air cargo logistics industry in South Africa (See Table 3).

**Table 2: Communalities of variables**

	Initial	Extraction
Integrated Operations	.968	.618
Efficient Operations	.973	.688
Reluctance to Adopt	.653	.275
Improved Operations	.892	.545
Technology Diffusion	.853	.445
Simplified Handling Process	.873	.683
Reduced Shipping Time	.716	.433
Order Accuracy	.767	.512
Reduced Delivery Time	.741	.601
Reduced Transport Cost	.934	.700
Inventory Accuracy	.695	.389
Reduced Clearing Time	.680	.367
Improved Warehousing Operations	.961	.829
Equipment Utilisation	.856	.600
Forecasts Uncertainty	.947	.810
Monitor Demand Variability	.831	.719
Contribute to Cargo Supply	.938	.747
Delivery within Time	.879	.686

Extraction Method: Principal Axis Factoring.

**Table 3: Total variance explained for the technological effect**

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.074	44.858	44.858	7.732	42.954	42.954	4.056	22.531	22.531
2	1.979	10.994	55.852	1.572	8.733	51.687	3.479	19.328	41.859
3	1.852	10.287	66.138	1.343	7.461	59.148	3.112	17.289	59.148
4	1.043	5.795	71.933						
5	1.024	5.688	77.621						
6	.834	4.634	82.255						
7	.772	4.290	86.545						
8	.633	3.519	90.064						
9	.482	2.677	92.741						
10	.385	2.141	94.882						
11	.312	1.731	96.613						
12	.169	.941	97.554						
13	.130	.720	98.274						
14	.104	.580	98.854						
15	.090	.498	99.351						
16	.062	.344	99.696						
17	.047	.259	99.954						
18	.008	.046	100.000						

Extraction Method: Principal Axis Factoring.

Table 3 provides an understanding of the proportions of the variance in the variables that make each common factor that serves as the effect of adopting technological applications in the air cargo logistics industry in South Africa. The percentage of the eigenvalues explains the total variation in the data that a factor represents.

The final output of the analysis is the rotated factor matrix presented in Table 4. It indicates the three (3) major effects of adopting advanced technological applications in the air cargo logistics industry in South Africa. The major items of the data are well loaded on each extracted factor, serving as the major effects of advanced technological applications in the air cargo logistics industry. The loadings of each item on the factors show that items “reduce shipping time” and “reluctance to adopt” have values less than 0.500 and are considered to have minimal contribution to the common factors.

**Table 4: Rotated Factor matrix of the effects of technological applications in the air cargo logistics industry**

	Factor		
	1	2	3
Efficient Operations	.780		
Integrated Operations	.732		
Simplified Handling Process	.728		
Monitor Demand Variability	.704		
Technology Diffusion	.667		
Forecasts Uncertainty	.614		
Reduced Shipping Time			
Improved Warehousing Operations		.767	
Equipment Utilisation		.704	
Inventory Accuracy		.616	
Improved Operations		.601	
Reduced Transport Cost		.565	
Reduced Clearing Time		.550	
Reduced Delivery Time			.769
Inventory Order Accuracy			.669
Delivery within Time			.657
Contribute to Cargo Supply			.650
Reluctance to Adopt			
<b>Factor Name (Technological Effects in Air Cargo Logistics Industry)</b>	Efficient Operations	Improved Warehousing	Improved Delivery Service

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

A critical examination of the result in Table 4 shows the correlated values of each item on the common factors. The items with the highest loading factors on each of the common factors have an efficient operation (.780) on Factor 1, warehousing operations (.767) on Factor 2 and improved delivery time (.769) on Factor 3. Following the highest values of the items, the significant effects of adopting advanced technological applications in the air cargo logistics industry in South Africa were named efficient operations, improved warehousing operations, and enhanced delivery service.

## 5. DISCUSSION OF RESULTS

This study has found that the major effects of the application of advanced technological innovations in the air cargo logistics industry are the provision of the lead for efficient operations, improvement in warehousing operations, and provision of support for cargo delivery services within the required time.

Each factor is believed to singly or jointly significantly affect the air cargo logistics industry in any country. The operational efficiency of cargo is pivotal to supply chain management and can drive customer-focused services in the air cargo industry. The efficiency in operations regarding air cargo logistics focuses on examination, clearing, handling costs and seamless distribution within the supply chain system. The application of technology provides efficiency by reducing the volume of manual handling of processes in the distribution management of cargo by the least waste of time and effort. According to Menon (2021), the efficiency of cargo supply operations through technological applications drives service quality with automation, diversification, collaboration and digitisation. The finding of this study about operational efficiency supports the conclusion of Galea-Pace (2020) that implementing technological applications and innovations in the air cargo logistics industry has brought significant improvements in operational efficiency with electronic Air Waybill. It implies that the application of advanced technology drives air cargo logistics operations in South Africa.

Warehousing has remained a significant aspect of the supply chain system for distributing and delivering goods from the origin to the destination. The warehouse plays an intermediary role in handling goods between the consignees and the consignor. It indicates that improved warehousing operations are required for satisfactory service delivery to the customers. This study found that technological warehousing applications significantly affect air cargo distribution logistics in South Africa. This corroborates Mecalus's (2022) statement that warehousing technology boosts air cargo logistics operations by reducing errors and costs for improved customer service delivery. Also, Ali and Rajbir (2022) stated that technology applications contribute to warehousing operations with improved inventory management for the logistics industry. The technological application in the air cargo logistics industry enhances the innovative warehouse operations management for information connectivity, process automation and sustainability (Zhen & Li, 2022). This study provides insight into the need to adopt emerging smart warehouse technologies in the air cargo logistics industry for improved operations.

This study also found that applying technologies in the air cargo logistics industry in South Africa will significantly support the timely delivery of goods to customers. It implies that technological applications in the air cargo logistics industry enhance customer satisfaction due to the time and cost reduction in cargo delivery. The result also supports Terang and Wahyuni (2021), who found the need for air cargo service improvement through technological applications for payment transactions and airline product promotion to increase customer loyalty. According to Wang and Yang (2007), the air cargo service quality technology sections include customer service, import and export, project management, administration and warehousing. Thus, technological applications in the air cargo logistics industry can improve customer satisfaction across all sections of the supply chain management for the final delivery of goods.

## **6. CONCLUSION AND RECOMMENDATIONS**

Technological advancements have continued to affect industries in magnificent ways. However, the response rate to adopting and implementing emerging technologies results from the need to determine the outcome of technological applications in most industries. This study attempts to examine the effects of technological applications in the air cargo logistics industry in South Africa. The study data were collected with a questionnaire administered to freight forwarders to attach a level of significance to each of the items that make the effects of technology in the air cargo logistics industry. The data were subjected

to exploratory factor analysis. In summary, the study found that applying technology in the air cargo logistics industry promotes efficient operations, improves warehousing and enhances cargo delivery services for customer satisfaction. This establishes the need for a prompt response for adopting and implementing emerging technologies in the air cargo logistics industry.

The findings of the study have the following implications and recommendations:

- It is in the interest of all stakeholders in the air cargo logistics industry to consistently improve all supply chain operations for cargo delivery. It is recommended that stakeholders in the industry pursue the timely adoption and application of new or emerging technologies with the capacity to reduce manual activities and improve operational efficiency. The result shows that technological applications improve efficient operations, implying that when emerging technological innovations are employed in the industry, overall air cargo operations will improve. So, stakeholders in the air cargo industry need to prioritise decisions for the timely adoption of innovations with the capacity to improve operations.
- The study implicitly identifies the importance of warehousing in the air cargo supply chain. The study's result indicates that technological applications significantly affect warehousing operations. It implies that emerging warehousing technology is a major focus for adopting and implementing innovations in the air cargo logistics industry. So, it is recommended that warehousing activities in the industry should be automated using emerging technologies for efficient operations.
- Finally, the result of the study concerning cargo service delivery implies that the ultimate goal of the air cargo logistics industry should be customer satisfaction through efficient cargo delivery at a highly reduced time and cost. The adoption and application of emerging technologies are recommended to provide customer satisfaction for every business arm in the industry. It indicates that stakeholders in the air cargo logistics industry should pay attention to innovations enhancing customer loyalty.

## **7. CONTRIBUTION OF THE STUDY**

The findings of this study provide a basis for understanding the need to adopt and implement emerging technological applications in air cargo logistics to eliminate the prevailing reluctance to adopt technological innovations in the industry. The result also contributes to the literature on the impact of technological applications in industry operations.

## **8. LIMITATIONS AND FUTURE RESEARCH**

Notwithstanding the generalisation of the study findings, it is limited as follows:

- The study specifically considered the air cargo industry in South Africa. Future studies need to examine the factors in other countries.
- The study does not assess the development of technological applications for the air cargo logistics industry.



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## Appendix 1 - Population and sample size for the study

S/N	Company Name	Population	Sample Size
1	ChristLand Freight	5	5
2	Giant Worldwide	5	4
3	Nothem Freight	5	4
4	JB Lois	5	4
5	Aramex	5	4
6	AllGators	5	4
7	Mathebulah Freight	5	4
8	Manta	5	4
9	Orbit	5	4
10	Vacant	5	4
11	Kene Import & Export	5	4
12	Mass Cargo	5	4
13	Sky-Air Freight	5	4
14	Ekhon Freight	5	4
15	Tirelano Projects	5	4
16	Wabilahi	5	4
17	Mercy Air Freight	5	4
18	Orbit	5	4
19	LSM Distributors	5	4
20	Lokongo Trading	5	4
21	Crown Procurement	5	4
22	Classic Access	5	4
23	Hilaire	5	4
24	New Dawn	5	4
25	May Cargo	5	4
26	Alphric Air Freight	5	4
27	Interlink	5	5
28	Cargo Examiners	5	4
29	My Bridge Import & Export	5	4
30	Worldnet Logistics	5	4
31	Temple Logistics	5	4
32	DHL	5	4
33	Roost Freight Services	5	4
34	Sosholoza	5	4
35	Mega Freight	5	4
36	Aim Services	5	4
37	OG Clearing & Forwarding	5	4
38	Lakeside Logistics	5	4
39	Interlink	5	5
40	Frietan	5	4
41	Outreach	5	4
42	Makeke	5	3
43	Joveric 4 Africa Trading	5	3
44	ZB Imports & Exports	5	3
45	Bridge Neil	5	3
46	Kale Freight	5	3
47	Kuene & Nagel	5	3
48	Brabenn Construction	5	3
49	Bidvest Panalpina	5	3
50	Advance Freight Forwarders	5	3
51	Kay's Cargo	5	3
52	Semako	5	3

53	Bridge Neil	5	3
54	Phinel Trading	5	3
55	Intrinsic	5	3
56	Manganyia Freight	5	3
57	DL Cargo	5	3
58	King's Freight Forwarders	5	4
59	GMA Logistics	5	3
60	Heneways	5	3
61	SGKB	5	3
62	Seacon	5	4
63	Big O Trading	5	4
64	National Freight Examiners	5	4
65	Perrinial	5	4
66	Tapizzy Trading	5	4
67	Inter-Sped	5	4
68	Turner Shipping	5	3
69	Tov Clearing	5	3
70	Tswele Pele	5	4
71	Montha Imports & Exports	5	4
72	Johannesburg Express Cargo	5	4
73	Procet Freight	5	4
74	Van Global	5	4
75	Orlando Global Services	5	4
76	Stand Out Logistics	5	4
77	Jidair	5	4
78	Tubana	5	5
79	AGC Freight	5	4
80	Shakoane Freight	5	4
81	Rohlig Grindrod	5	4
82	Newaves (PTY) Ltd	5	5
83	Eli-Air	5	4
84	Procet Freight	5	4
85	Matt-Pee	5	4
86	Kendarlington	5	4
87	Berigold Group of Fashion	5	4
88	Apolor	5	4
89	Ongopotse	5	4
90	Mina Il Bring	5	4
91	Tanzgates	5	4
92	Fish Eagle	5	4
93	Imani Centre	5	4
94	Millenium Freight Solutions	5	4
95	Noaves (PTY) ltd	5	4
96	Sophie's Air Freight	5	5
97	Botlokwa Import & Export	5	4
<b>Total</b>		<b>485</b>	<b>373</b>

## Appendix 2 – Questionnaire

### Effect of the Adoption of Technology Innovations in the Air Cargo Logistics Industry in South Africa

Dear Sir/Mam,

This questionnaire is designed to obtain information for research purposes at the University of Johannesburg, South Africa. Your support is solicited to provide adequate and accurate information to the questions, as all information provided will be treated with utmost confidence.

#### Section A – Demographic Information

1. Gender: Male ( )<sup>1</sup> Female ( )<sup>2</sup>
2. Age: .....
3. Marital Status: ..... Married ( )<sup>1</sup> Single ( )<sup>2</sup> Divorced ( )<sup>3</sup>
4. Educational Status: .... Primary Education ( )<sup>1</sup> Secondary Education ( )<sup>2</sup>  
Tertiary Education ( )<sup>3</sup>
5. Years of Work Experience: .....
6. Name of your company (Cargo Agency) .....
7. Your role in the company: General Manager/Manger ( )<sup>1</sup> Partner ( )<sup>2</sup>  
Other Employees ( )<sup>3</sup>

#### Section B – Effect of Technological Innovations in the Air Cargo Industry in South Africa

7. What is your view about the response of stakeholders to technological innovations in the air cargo industry in South Africa?
  - a. Highly Responsive ( )<sup>1</sup> Responsive ( )<sup>2</sup> Least Responsive ( )<sup>3</sup>  
Not Responsive ( )<sup>4</sup>
8. What is your view about the level of adoption of new technologies in air cargo logistics operations in South Africa?
9. Highly Adopted ( )<sup>1</sup> Moderately Adopted ( )<sup>2</sup> Least Adopted ( )<sup>3</sup> Not Adopted ( )<sup>4</sup>
10. Would you agree that technological applications affect the operations in the air cargo industry in South Africa? a. Yes, Agreed ( )<sup>1</sup> b. No, Disagreed ( )
11. If “Yes” to question 9, can you please rank the items presented in the table below to assess the effect of technological applications in the air cargo industry in South Africa in order of significance from 1 – Not Significant to 5 – Highly Significant.

S/N	Factors	1 – Not Agreed	2 – Least Agreed	3 – Fairly Agreed	4 – Agreed	5 – Highly Agreed
1	Integrated Operations					
2	Efficient Operations					
3	Reluctance to Adopt					
4	Improved Operations					
5	Technology Diffusion					
6	Simplified Handling Process					
7	Reduced Shipping Time					
8	Order Accuracy					
9	Reduced Delivery Time					
10	Reduced Transport Cost					
11	Inventory Accuracy					
12	Reduced Clearing Time					
13	Improved Warehousing Operation					
14	Equipment Utilisation					
15	Forecasts Uncertainty					
16	Monitor Demand Variability					
17	Contribute to Cargo Supply					
18	Delivery within Time					