THE ROLE OF DIGITALIZATION IN THE AIRLINE INDUSTRY PERFORMANCE AMID COVID-19: EVIDENCE FROM EMIRATE AIRLINE BALANCED SCORECARD PERFORMANCE

Babatunde A. OKUNEYE[1], Oluwatosin O. OGUNYOMI-OLUYOMI[2]

[1] Department of Economics, Faculty of Social Sciences, Olabisi Onabanjo University, Iwoye, Ogun State, Nigeria. E-mail: okuneyebabatunde@gmail.com

[2] Department of Economics, College of Humanities, Management and Social Sciences, Mountain Top University, Magboro, Ogun State, Nigeria. E-mail: tunjipeace6@gmail.com

JEL: C13, D22, F61, I12, M15, M21

Abstract

A number of studies in the digitalization-organizational performance literature have evaluated airline performance from the traditional performance theory; yet, fewer studies have evaluated the role of digitalization to optimize organizational bottom line performance. In view of the importance of digitalization-organization bottom line performance, this study empirically evaluates the role of digitalization in the airline performance before and during COVID-19 using the balanced scorecard performance model in the sample study, Emirate airline between 2015 and 2020. Importantly, multiple Pearson Product Moment correlation and descriptive statistics methods were used to estimate the relationship among the balanced scorecards performance. Also, the differential impact was used to show the differential impact and recovery period between before-COVID and during COVID-19 on the balanced scorecards performance. The empirical results showed that the role of digitalization practices is more effective in non-financial bottom lines than financial bottom line at both before and during COVID-19 in this study. Further, the study concluded that digitalization practices before COVID-19 enhances non-financial bottom lines than financial bottom lines whereas the role of digitalization practices during COVID-19 enhances neither financial nor non-financial bottom lines in Emirate airline. Therefore, this study recommends the need for Emirate airline management to further intensify and integrate digitalization practices across all the balanced scorecard bottom lines, especially the financial bottom lines such as revenue, operating cost and net debts to remain immune from current and future external shocks as well as become financial and non-financial sustainable.

Key words:

Digitalization,
Emirate Airline Balanced Scorecard Performance,
COVID-19,
Descriptive Analysis

Introduction

Over five decades ago, the performance in the global airline industry which is one of the frontline operational subsets in the aviation industry has been consistently vulnerable to global shocks that ranged across political, economic and health outbreaks. Specifically, these global shocks include the oil crisis,(1973), Iran-Iraq war (1980), Gulf war (1990), Asian crisis (1997), 9/11 terrorist attack (2000), severe acute respiratory syndrome (SARS) (2003), global recession (2009), and the latest is the coronavirus (COVID-19)(2019). Nonetheless, the global aviation industry has contributed about 3.6 percent of the world
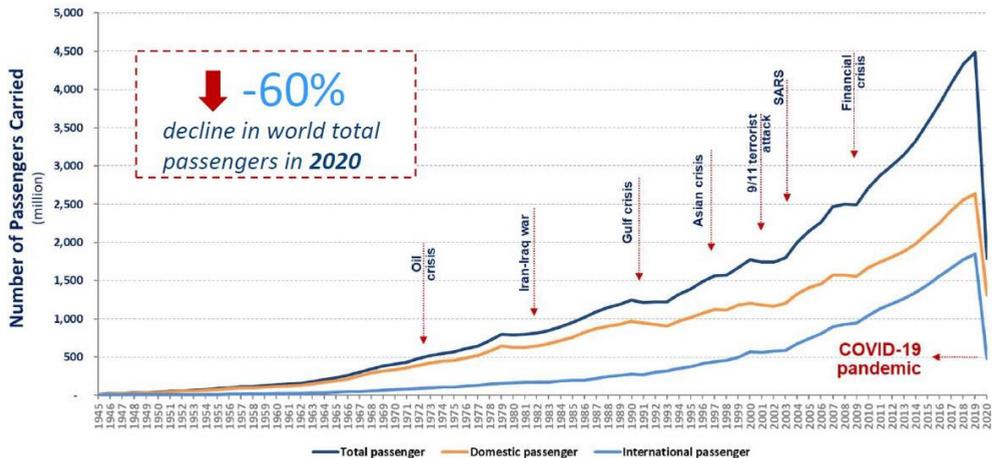
Figure 1. World Passenger Traffic Evolution and the Notable Decrease in Air Traffic from 1945 to 2020

Source: *Adapted from Olaganathan, 2021*

GDP and created a total of 65.6 million jobs around the world in the aviation sector and other related industries. Out of the 65 .6 million jobs, the global airlines industry directly employed over 2.7 million people and approximately 4.1 billion and 4.4 billion passengers were carried and expected in 2017 and 2018 respectively (Olaganathan, 2021; Air Transport Action Group (ATAG), 2018). Meanwhile, Figure 1

revealed that all past external shocks except COVID-19 exhibited a V-shape impact on the aviation industry performance and a magnitude of 60 percent decline in the world total passengers as of 2020.

Apparently, the global airline industry has been proven resistant to past shocks including the 9/11 terrorist attack and SARS of the 21st century pandemic events because their recovery were less than one financial year (IATA, 2020; ICAO, 2020). Surprisingly, COVID-19 is an unprecedented and a novel global health outbreak that has persisted for almost two years and still ravaging the world as well as the only health diseases that accounted for almost 38 percent world countries lockdowns of the 198 United Nations (UN) member when compared with the Spanish flu between 1918 and 1920 in the World (Dowling, March 2, 2020). Importantly, the coronavirus disease 2019 that is abbreviated as COVID-19 is known as an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), first broke out in December 2019 in Wuhan, the capital of China's Hubei province and has since spread geometrically across all continents and countries in the world. Sadly, since December 2019 till October, 28, 2021, coronavirus had infected more than 245 million people globally and had killed at least 4 million people while over 223 million people had recovered from the disease (Reavelo & Jerving, October 29, 2021; Worldometer, October 29, 2021).

Following the numerous external shocks and the recent COVID-19 threat to global aviation industry and particularly, the global airline industry, the evidences in a number of studies (Xuan, Khan, Su, & Khurshid, 2021; Meng, Gong, Liang, Li, Zeng & Yang, 2021; Olaganathan, 2021) found that about 7.5 million international and domestic flights cancelled, IATA member countries lost $239 million on average per day as well as halve annual revenue declined from $838 million to $419 million in 2020, and also the ICAO accounted for 80 percent passengers reduction when compared to 2019. Yet, none of these studies except (World Economic Forum (WEF), 2017; Frost & Sullivan, 2018; Olaganathan, 2021) consider the role of digital technology to salvage and optimize the COVID-19 pandemic losses in the airline industry performance, however, this is motivated to evaluate the role of digitalization practices in the airline industry from the system management performance theory.

Indeed, the role of digitalization since the 4th industrial revolution as a catalyst to achieve the triple bottom line (growth in people, profit, and place) vis-à-vis the business models remains controversial among firms, industries, and economies in the literature. Digitalization is defined as the automation of activities from manual process to the digital operations through the Internet of Things (IOT), cloud, 5G, artificial intelligence (AI), virtual reality, among to meet growing demand, reduce costs, and become competitive over rivalry. In otherwise, digitalization is simply the adoption of

disruptive technologies to deliver organizational value across profit, risk and time to market.

Following the proponent gains of digitalization, many organizations have massively invested in digital technologies with obsessions and optimist to affect the organization bottom line (Fitterling, 2017). Yet, in 2019, companies in European region invested $256 billion on digital technologies, but only 25% of those organizations delivered returns on investment (ROI) from digital investments. Then, the two arising questions are, first, does the value of digital investments match the meet the triple bottom line? Second, in the new normal periods of persistent global pandemic such as trade war, political upheaval, climate changes, and the recent COVID-19, how has the organizational digitalization investments achieve or sustain organizational triple bottom line? In line with this argument for the returns on digitalization investments (RODI) in many organizations, this study empirically evaluates the role of digitalization on organizational bottom line performance. In specific, this study contributes to existing literature in three fold. First, the appraisal of the Emirate airline performance using scorecard balance performance model. Second, the role of digitalization practices in the Emirate airline performance between before COVID-19 and during COVID-19. Third, the analysis of differential impact and recovery periods of the Emirate airline balanced scorecard performance between before COVID-19 and during COVID-19. To this end, the main objective of this study is to empirically evaluate the role of digitalization in the airline industry performance amidst COVID-19, using the Emirate airline balanced scorecard performance as sample study. Besides, the introduction, this paper is organized in the following sections: Section 2 discusses the literature review. Section 3 provides the theoretical framework and methodology. Also section 4 presents the results and discussions. Lastly, section 5 presents the conclusion and recommendations of the study.

2. Literature Review

Performance in the management discipline is broadly viewed from corporate and industrial performance, however, both corporate and industrial performance are synonymous in performance metrics. Importantly, performance is the comparison between the actual results (output) and the intended results (outputs) expressed in units and monetary values over a specified period. In the passage of time, organizational performance measurement has changed from the conventional to the modern to meet different stakeholders' objectives in the changing world. Besides the conceptual understanding of performance, the two underlying theories of performance are drawn from the traditional organizational performance theory and the system organizational

performance theory. The former, traditional organizational performance plays emphasis on financial performance indicator that is measured from the past historical records in the financial statement of a company. In financial performance, many organizations use the key performance indicators (KPIs) that ranges from profitability, liquidity, and debt ratios to assess how well a company perform in the past and not from the bottom line of business performance such as customers, employees, process, technology and innovations (DU plessie, Jooste & Stydom, 2001 cited in Shackeleton, 2007). In line with the traditional organizational performance theory, a number of studies (Attayah, Dhaif, Najaf & Frederico, 2021; Sobieralski, 2020; Kasim & Mahmut, 2020) have analysed the airline performance using the traditional financial performance approach. Although, only Attayah et al. (2021) explored financial performance metrics in the logistic times during the COVID-19 in their studies, while others measured financial in the airline industry before COVID-19 in their studies.

On the other hand, the system organizational performance measures not only past financial performance, but also the current and the future performance of an organization. More importantly, the system organizational performance theory focuses on measuring the bottom line of business performance from the holistic perspective. Further, the system organizational performance theory is sub-divided into four approaches- the goal-attainment, the system, the strategic-constitution and the competing-value respectively. In line with the digitalization era, the study considers the competing-value approach that is further decomposed into three competing-value management as drawn from the following management models-the total quality management (TQM), the excellence model, and the balanced scorecard model. Notably, this study embraces the balanced scorecard model developed by Kaplan & Norton (1992) to measure both past and future performance as well as the arising issues from both internal and external factors to meet the financial and non-financial objectives in the organization. Unlike traditional performance indicators that focuses only on key financial performance indicators (KFPIs), the balanced scorecard model measures financial and non-financial organizational performance using four indicators- financial, internal business process, learning & growth, and customer.

First, the financial indicator like the traditional financial performance considers the key financial performance indicators like profitability, liquidity and debt, however, the financial indicator under balanced scorecard model intends to achieve growth financial performance indicators through the role of digitalization operations that reduces the operational cost in the organization. Second, the internal business processes is a non-financial indicator that emphasises on the effectiveness and efficiency of the entire organizational activities. Otherwise, the process of digitalizing the internal business processes saves cost and increases productivity. Third, the learning and growth is

another non-financial indicator that is motivated and prepared to improve financial performance through constant future investment in what we have done and doing to remain very competitive. Lastly, the fourth indicator is the customer that focuses on how customer satisfaction, retention and growth can be improved to achieve sustainable financial objectives of the organization through digitalization practices (Shackleton, 2007).

In line with the role of digitalization in the organization performance, few studies (WEF, 2017; Wang, Tsai, Hsu & Nguyen, 2019; Aman & Altass, 2020; Mazis, 2020) have examined the role of digitalization in the organization performance but their studies have been limited to financial performance in the airline industry. In specific, Aman & Altass (2020) investigated the pre and post COVID-19 past financial performance as well as future performance in the airline industry while in the study of Wang, Tsai, Hsu & Nguyen (2019), they employed data envelopment analysis (EDA) and grey forecasting methods was used to evaluate the 16 major Asian airline performance over the study period 2012 to 2016 . In their study, they measured the organizational efficiency to improve the airline productivity and performance, unlike Aman & Altass (2020) that measured the financial performance between pre and post COVID-19 through the rate of recovery for each financial performance indicators. Unlike existing studies, Mazis (2020) assessed 8 success factors through the digital transformation in the airline industry, but failed to classify the 8 successful factors into the four balanced scorecard performance areas. Following the existing studies gap to capture both financial and non-financial performance through the digitalization practices in the airline industry, this study uses the balanced scorecard performance model to fill the gap in the digitalization-performance nexus literature.

3. Theoretical Framework and Methodology

Since the objective of this study is to appraise the role of digitalization on both financial and non-financial performance in the airline industry, hence, the balanced scorecard performance is theoretically modelled as shown in Figure 2. To achieve specific objectives, the balanced scorecard theoretical framework shows the relationship between financial indicator and non-financial indicators that comprises of financial, internal business process, learning and growth and customer, to achieve the end-result of a balanced scorecard performance

```
┌─────────────────────────┐
│ Financial Indicators    │
│ • Revenue Growth        │
│ • Operating cost Growth │
│ • Net Debt Growth       │
└─────────────────────────┘

┌─────────────────────────┐
│ Internal Business Process│
│ Indicators              │
│ • IT Assets growth      │          ┌─────────────────────┐
│ • Revenue per airline   │          │ Balanced Scorecard  │
│   employee growth       │          │ Performance         │
│ • Average airline       │          └─────────────────────┘
│   employees strength    │
│   growth                │
└─────────────────────────┘

┌─────────────────────────┐
│ Learning & Growth       │
│ Indicators              │
│ • No of Destination     │
│   Cities carried growth │
│ • Fleet growth          │
│ • Total Assets growth   │
└─────────────────────────┘

┌─────────────────────────┐
│ Customer Indicators     │
│ • No of Passengers      │
│   carried growth        │
│ • Goodwill growth       │
│ • Customer relationship │
│   growth                │
└─────────────────────────┘
```

Figure 2: Balanced Scorecard Performance Model
Source: *Authors compilation, 2021, Adapted from Kaplan & Norton, 1992.*

Following the theoretical framework and the existing studies of Wang, Tsai, Hsu & Nguyen (2019) and Aman & Altass (2020), the relevant variables used are justifiable in this study. Further the variables are source from Emirates annual report that range from 2015 to 2020. Although, the study periods is grouped into Pre COVID-19 era that covers between 2015 and 2018 while the post COVID-19 range from 2019 to 2020 to justify how the digitalization practices affects organizational performance before and after COVID-19 in the sample study, Emirates Airline full periods of study ranged from 2015 to 2020. Importantly, multiple correlation and descriptive statistics are employed to estimate the relationship and the extent at which digitalization affects emirate airline financial and non-financial performance between 2015 and 2020 in this study. Lastly, Table 1 shows the definition and measurement of the variables drawn from the balanced scorecard in this study.

Definition and Measurement of the Variables

Balanced Scorecard Performance Metrics	Variable	Definition	Formula	A priori Sign
Financial	Revenue Growth (RG)	This measures the rate of change in revenue over a state period as a result of digitalization process in an organization. It is obtained as the ratio of change in revenue to the base revenue expressed in percentage.	$RG = \dfrac{\Delta R}{G}$	+
	Operating Cost Growth (OCG)	It defines the cost minimization rate in the digital era over a given period. It measures the percentage change in operating cost to the base year operating cost.	$\dfrac{\Delta OC}{OC_{t-1}}$	-
	Net Debt Growth (NDG)	This shows the changes in the debts including the aircraft operating leads to equality ratio. The lower the NDG, the greater the role of digitalization to mutilate the debt growth in an organization and	$\dfrac{\Delta\, Net\, Debt}{D_{t-1}}$	-
Internal Business Process	IT Asset Growth (ITAG)	This is defined as the changes in the investment in information technology. In the Emirate financial report, computer software represents the IT investment. The higher the IT asset growth the higher the internal business process performance of an organization and vice-versa.	$\dfrac{\Delta ITA}{ITA_{t-1}}$	+
	Revenue per airline employee growth (RPEG)	The revenue per airline employee growth indicates airline employee productivity which leads to greater internal business process performance.	$\dfrac{\Delta RPE}{RPE_{t-1}}$	+
	Average airline employee strength growth (AVEG)	The average airline employee strength growth measures the changes in the number of airline employee is expected to be negative as the internal business processes are digitalized.	$\dfrac{\Delta AVE}{AVE_{t-1}}$	-

Learning & Growth	Number of Destination Cites growth (NDCG)	This is defined as the expansion of this number of destination cites that the airline fly or serve. The greater the NDCG, the higher the extent of learning and growth performance due to advancement in airline digitalization or technology.	$\dfrac{\Delta NDC}{NDC_{t-1}}$	+
	Fleet Growth(FG)	Fleet is defined as the number of aircraft owned or leased. The higher the number of craft, the greater the extent of leasing & growth due to intense of digitalization in the learning and growth.	$\dfrac{\Delta F}{FT}$	+
	Total Assets Growth (TAG)	Total assets growth is defined as the change in assets over a specified period of time. The higher the total assets the greater the learning and growth due to advancement in digital technology in an organization and vice-versa.	$\dfrac{\Delta TA}{TA_{t-1}}$	+
Customer	No of Passengers carried growth (NPCG)	The number of passengers carried growth is defined as the change in the number of passengers carried over a stated period. The higher the number of passengers carried, the greater the customer performance due to intense digital practices	$\dfrac{NPC}{NPC_{t-1}}$	+
	Goodwill growth (GG)	Goodwill is defined as the non-tangible assets of firm. In other words, the goodwill growth indicates the degree of improvement in the organization reputation and customer loyalty. The higher the goodwill growth, the higher the level of customer satisfaction, retention and performance due to intense digital practices	$\dfrac{G}{G_{T-1}}$	+
	Customer relationship growth (CRG)	Customer relationship is also one of the non-tangible assets of a firm. This is defined as the extent at which customer royalty and perception about the firm changes over time. The higher the customer relating, the higher the customer satisfaction & retention due to intense digitalization which aid customer relationship via all social networks and vice-versa.	$\dfrac{\Delta CR}{CR_{t-1}}$	+

Source: *Authors compilation, 2021*

4. Results and Discussions

4.1. Correlation Matrix

Tables 2 and 3 show the degree of relationship among the balanced scorecard performance variables before COVID-19 and during COVID-19 era in the Emirate airline in this study.

Table 2

Correlation Matrix for Emirate Airline Performance Before COVID-19 (2015-2018)

	R	OC	ND	ITA	RPE	AVES	NDC	F	TA	NPC	G	CR
R	1.00											
OC	0.953*	1.00										
ND	-0.681	-0.426	1.00									
ITA	0.399	0.388	-0.249	1.00								
RPE	0.928	0.782	0.173	0.213	1.00							
AVES	-0.478	-0.208	0.923	0.132	-0.770	1.00						
NDC	0.817	0.948	-0.147	0.473	0.548	0.112	1.00					
F	0.894	0.961*	-0.346	0.612	0.667	-0.043	0.969*	1.00				
TA	0.900	0.920	-0.458	0.716	0.703	-0.134	0.907	0.982*	1.00			
NPC	0.786	0.910	-0.147	0.620	0.501	0.160	0.984*	0.978*	0.940	1.00		
G	0.975*	0.985*	-0.528	0.506	0.824	-0.276	0.917	0.971*	0.963*	0.903	1.00	
CR	0.794	0.788	-0.463	0.869	0.605	-0.098	0.793	0.908	0.966*	0.870	0.866	1.00

Note: * , ** and *** represent 1%, 5% and 10% significance levels
Source: *Authors' Compilation, 2021*

Table 2 correlation coefficients results found that operation cost (OC) and goodwill (G) have the highest significant correlation coefficients of 0.975 and 0.953 at 1% significance levels respectively. However, the operation cost coefficient sign conforms not to the *A priori* expectation because the digitalization practices at Emirate airline should show a negative or very low associations between operation cost and revenue. Meanwhile, Table 2 found that the number of passengers carried and number of destination cities have a positive and significant highest degree of association of 0.984 in this study. This suggests that Emirate airline digitalization practices have consistently concentrated more in these two bottom lines, customer and learning and

growth scorecard performance than others before COVID-19 between 2015 and 2018. Although, the high positive association of 0.87 between IT asset and customer in Table 2 also confirmed that Emirate airline used digitalization practices in these two bottom lines, internal business operations and customer but has not been consistent in the intensity of the digital technology, as compared to customer and learning and growth bottom lines in this study. In line with the Table 2 results, the correlation matrix results concluded that the role of digitalization in Emirate airline has a positive association with non-financial performance indicators than the financial indicators before COVID-19 between 2015 and 2018. In specific, Emirate airline between 2015 and 2018 has consistently digitalized customer and learning and growth bottom lines performance than other bottom lines in the balanced scorecard performance in this study.

Table 3

Correlation Matrix for Emirate Airline Performance Before and During COVID-19 (2015-2020)

	R	OC	ND	ITA	RPE	AVES	NDC	F	TA	NPC	G	CR
R	1.00											
OC	0.983**	1.00										
ND	-0.769	0.756	1.00									
ITA	-0.182	-0.130	0.417	1.00								
RPE	0.973**	0.958**	-0.051	-0.918	1.00							
AVES	0.930**	0.894*	-0.817*	0.473	0.548	1.00						
NDC	-0.024	0.145	0.273	0.537	0.042	-0.184	1.00					
F	0.404	0.523	0.031	0.567	0.493	0.182	0.862*	1.00				
TA	-0.294	-0.285	0.832*	0.538	-0.129	-0.450	0.413	0.430	1.00			
NPC	0.992**	0.967**	-0.788	-0.200	0.939**	0.969**	-0.073	0.343	-0.337	1.00		
G	0.097	0.189	0.453	0.570	0.258	-0.162	0.797	0.876*	0.789	0.021	1.00	
CR	-0.186	-0.064	0.355	0.875*	-0.095	-0.373	0.806	0.732	0.448	-0.244	0.696	1.00

Note: * , **, and *** represent 1%, 5% and 10% significance levels
Source: *Authors' Compilation, 2021*

Result from Table 3 revealed that of all the correlation coefficients in the first column, revenue (R) and number of passengers carried (NPC) have the highest positive and significant correlation coefficient of 0.99 at 1% level of significance. This suggests that Emirate airline before and during COVID-19 has consistently used digitalization

practices in these two bottom lines, the financial and customer scorecard performance over other balanced scorecard indicators between 2015 and 2020. Furthermore, Table 3 results found that there is a strong positive and significant relationship between revenue and revenue per airline employee (RPE) of about 93.0% at 5% significance level, implying that Emirate airline digitalization practices have greatly enhanced financial and internal business operations performance unlike table 2 in this study. In line with the Table 3 results, the correlation matrix results concluded that the role of digitization practices in Emirate airline has a positive association with both financial and non-financial bottom lines performance before and during COVID-19 between 2015 and 2020. This finding is line with Mazis (2020) that airlines revenues nearly doubled while the industry overall grew by 32 percent between 2017 and prior to the pandemic due to digital transformation.

4.2   Descriptive Analysis

4.2.1. Trend Analysis of Emirate Airline Performance: The Pre and Post COVID -19

Table 4 shows the trend in Emirate Airline balanced scorecard performance before and during COVID-19 between 2015 and 2020 in this study. Importantly, the balanced scorecard performance in Table 4 is expressed in percentage which indicates the change in each balanced scorecard performance. Apparently, Table 4 found that all the changes in the balanced scorecard performance are not consistent and sustainable both before and during COVID-19 but it is evident that Emirate airline digitalization practices before COVID-19 enhance both financial and non-financial bottom line performance while Emirate airline digitalization practices during COVID-19 enhance neither financial nor non-financial bottom line performance in this study . In specific, year 2017 exhibited the best balanced scorecard performance which signified the intensified digitalization practices in Emirate airline while year 2020 was the worst balanced scorecard performance in spite the role of digitalization practices in Emirate airline. This inferred that Emirate airline digitalization practices during COVID-19 were not effective to enhance all balance scorecard performance indicators, except average airline employee growth (AVEG) and customer relationship growth.

Table 4

Trend in Emirate Airline Balanced Scorecard Performance (2015 -2020)

Year	R	RG (%)	OC	OCG (%)	ND	NDG (%)	ITA	ITAG (%)	RPE	RPEG (%)	AVES	AVESG (%)	NDC	NDCG (%)	F	FG (%)	TA	TAG (%)	NPC	NPCG (%)	G	GG (%)	CR	CRG (%)
2015	85,044	-	76,714	-	-	215.9	125	-	1,717	-	48,023	-	153	-	251	-	119,179	-	51,833	-	1555	-	73	-
2016	85,083	0.05	82,648	6.76	-	237.9	154	23.2	1,580	-7.98	51,628	7.51	156	1.96	259	3.19	121,558	2.00	56,076	8.14	1707	9.77	137	87.67
2017	92,322	8.51	88,236	6.76	-	216.4	480	211.7	1,784	12.91	49,740	-3.66	157	0.64	268	3.47	127,587	4.96	58,485	4.30	1909	11.83	487	255.47
2018	97,907	6.05	95,260	7.96	-	209.8	1.98	-58.75	1,975	10.71	47,808	-3.88	158	0.64	270	0.75	127,398	-0.15	58,601	0.20	2065	8.17	363	-25.46
DURING COVID-19																								
2019	91,972	-6.06	85,564	-10.18	-	381.2	372	87.88	1,935	-2.03	47,518	-0.61	157	0.63	270	0	172,062	35.06	56,162	-4.16	2266	9.73	348	-4.13
2020	30,927	-66.37	45,948	-46.30	-	459.0	359	-3.49	929	-51.99	33,304	-29.91	157	0	259	-4.07	151,777	-11.79	6,553	-88.33	1934	-14.65	418	20.11

Source: *Authors' Compilation from Emirate Airline Annual Report, 2015-2020.*

4.2.2. Analysis of Differential Impact and Recovery of Balanced Scorecard Performance in Emirate Airline: The Before and During COVID-19

Differential Impact and Recovery of Emirate Airline Balanced Scorecard Performance Between Before and During COVID-19

Balanced Scorecard Performance Metrics	Variable	Before COVID-19	During COVID-19	Differential impact	Balanced Scorecard performance Impact	Recovery period (In years)
Financial	RG	4.86%	-36.22%	-31.35%	-80.85%	6 years 5 months
	OCG	17.15%	-28.24%	-11.09%		8months
	NDG	220%	420.1%	-200.1		11 months
Internal Business Process	ITAG	58.72	42.20	-16.52%	-12.66%	3 months
	RPEG	5.21	-27.01	-21.8		4 months
	AVESG	-0.01	-0.32	+0.33		33 years
Learning and Growth	NDCG	1.08	-0.315	0.765	3.52%	2 months
	FG	2.47	-2.035	+0.435		2 months
	TAG	2.27	11.635*	+9.365*		10 months*
Customer	NPCG	4.21	-46.245	-42.035	-49.13%	9 years 11 months
	GG	9.92	-2.46	-7.46		9 months
	CRG	105.89	-99	-97.9		11 months

Source: *Authors' Computation, 2021*

Table 5 shows the differential impact between the before and during COVID-19 among the four areas of balanced scorecard performance in Emirate airline within the study periods 2015 and 2020. Specifically, the differential impact found that all the learning and growth indicators are positive whereas other balanced scorecard performances are negative except internal business process that is mixed in Emirate airline over the study period 2015 to 2020. Furthermore, in line with differential impacts among the balanced scorecard performance, Table 5 results showed the recovery period for each of the balanced scorecard performance. Like the differential impact results, Table 5 found that all the learning and growth performance indicators have the lowest recovery periods over other balanced scorecard performance indicators in Emirate airline within the study periods. This suggests that Emirate airline will recover quickest to the numbers of destination cities and number of fleet achieving the results

of before-COVID-19 era within 2 months respectively and followed by the number of total assets as of the pre-COVID-19 era within 10 months. This shortest recovery period is learning and growth bottom line performance which attests more to effective role of digitalization practices in non-financial bottom lines than financial bottom line in Emirate airline. On the contrary, the average airline per employee (AVE) has the longest recovery of 33 years but signifies the effective role of digitalization in Emirate airline, while the number of passengers and revenue with 9 years 11 months and 6 years recovery periods confirmed that digitalization practices in financial bottom lines are not very effective whereas other balanced scorecard performance indicators recovery periods except number of passengers are all less than one year, indicating effective role of digitalization practices in Emirate airline in this study.

5. Conclusion and Recommendations

This study has conducted an empirical appraisal of the role of digitalization in the airline industry performance amidst COVID-19. Importantly, the study used the balanced scorecard performance indicators of Emirate airline before and during COVID-19 over the study period 2015-2020. Specifically, the study concluded that the role of digitalization practices is more effective in non-financial bottom lines than financial bottom lines at both before and during COVID-19 in this study. Further, the study concluded that digitalization practices before COVID-19 enhance non-financial bottom lines than financial bottom lines whereas the role of digitalization practices during COVID-19 enhances neither financial nor non-financial bottom lines in Emirate airline. In particular, the digitalization practices in learning and growth remain the most effective when compared with other balanced scorecard performance in this study. Therefore, this study recommends that there is a need for Emirate airline management to further intensify and integrate digitalization practices across all the balanced scorecard bottom lines, especially the financial bottom lines such as revenue, operating cost and net debts to remain immune to current and future external shocks as well as become financial and non-financial sustainable. In specific, the Emirate airline digital technology should invest more in marketing, advertisement, and other business applications that would increase the revenue through increase in number of passengers via the e-booking flights on the passengers smartphones, destinations and fleets and ultimately reduce workforce via e-boarding passes issuance by the passengers and not staff and thus eventually decrease the operational cost and debt financing cost on the going forward in the competitive airline industry through digitalization practices.

References

1. Air transport Action Group (2018) 'Aviation benefits beyond borders', 2-8. www.aviationbenefits.org

2. Aman, Q. and Altass, S. (2020) 'Pre and Post-COVID-19 condition, performance and future of the airline industry: Evidence from accounting data' Amazonia Investiga, 10(37), 9-23.

3. Attayah, O.F., Dhiaf, M.M., Najaf, K., and Frederico, G.F. (2021) 'Impact of COVID-19 on financial performance of logistics firms: Evidence from G-20 countries', Journal of Global Operations and Strategic Sourcing, 1-26. Doi: 10.1108//GOSS 03-2021-0028.

4. Dowling, S. (2020) 'Coronavirus: What can we learn from the Spanish flu? BBC Future'. https://www.bbc.com/future/article/20200302-coronavirus-what-can-we-learn-from-the-spanish-flu

5. Fitterling , J. (2017) 'Pursuing the triple bottom line in the digital age'. https://www.chemanager-online.com/en/topics/strategy/pursuing-triple-bottom-line-digital-age

6. International Air Transport Association (IATA) 'COVID-19 fourth impact assessment. Available online' https://ww.iata.org/en/iata-repository/publications/economic-reports/and/amid-fourth-impact-assessment.

7. International Civil Aviation Organization (ICAO) (2020) ' Effects of novel coronavirus (COVID-19) on civil aviation : Economic impact analysis', Report Submitted to the Economic Development-Air Transport Bureau.

8. Kaplan, R.S. and Norton, D.P. (1992) 'The balanced scorecard: Measures that

drive performance', Harvard Business Review, (January-February), 71-79.

9. Kasim, K. and Mahmut, B. (2020) 'Evaluation of airlines performance using an integrated critic and CODAS methodology: The case of Star Alliance member airlines', Studies in Business and Economics, 15(1), 83-99.

10. Mazareanu (2020) 'Coronavirus : impact on the aviation industry', World Statistics and Facts, Statista. https://www.statista.com/topics/6178/coronavirus-impact-on-the-aviation-industry-worldwide/#topicHeader__wrapper.

11. Mazis, N. (2020) 'Digital transformation and the airline industry-8 Success Factors'. https://www.linkedin.com/pulse/digital-transformation-airline-industry-8-success-factors-mazis

12. Meng, F., Gong, W., Liang, J., Li, X., Zeng, Y. and Yang, L. (2021) 'Impact of different control policies for COVID-19 outbreak on the air transportation industry: A comparison between China, the U.S. and Singapore', PLOS ONE, 16(3), 1-19. https://doi.org/10.1371/journal.pone.0248361.

13. Olaganathan, R. (2021) 'Impact of COVID-19 on airline industry and strategic plan for its recovery with special reference to data analytics technology', Global Journal of Engineering and Technology Advances, 7(1), 1-15. https://doi.org/10.30574/gjeta.2021.7.1.0050

14. Ravelo, J.L. and Jerving, S. (2021) 'A timeline of the coronavirus outbreak'. [Online] (Assessed October 29, 2021).

15. Shackleton, C. (2007) 'Developing key performance indicators for corporate communication in the information technology industry', MCom. Dissertation, University of Pretoria, Pretoria.

16. Sobieralski, J.B. (2020) 'COVID-19 and airline employment: Insights from historical uncertainty shocks to the industry', Transportation Research Interdisciplinary Perspective, 5, 100-123.

17. Wang, C., Tsai, T., Hsu, H. and Nguyen, L. (2019) 'Performance evaluation of major Asian airline companies using DEA Window model and Grey theory', Sustainability MDPI, 11, 1-20. Doi:10.3390/su11092701.

18. World Economic Forum (WEF) (2017) 'Digital transformation initiative aviation, travel, and tourism'.https://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-aviation-travel-and-tourism-white-paper.pdf

19. Worldometer (2020) 'COVID-19 Coronavirus pandemic' . Online [Assessed September 2020]

20. Xuan, X., Khan, K., Su, C., and Khurshid, A. (2021) 'Will COVID-19 threaten the survival of the airline industry?', Sustainability MDPI, 13, 1-18. https://doi.org/103390/su132111666.