

Addis Ababa University
College of Business and Economics
School of Commerce



**THE EFFECT OF INNOVATION ACTIVITIES ON THE PERFORMANCE OF
ETHIOPIAN AIRLINES GROUP DURING COVID19**

BY
ABIY ASRAT

August, 2021
Addis Ababa, Ethiopia

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**A RESEARCH PROJECT WORK SUBMITTED TO OFFICE OF
GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY SCHOOL OF
COMMERCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS IN BUSINESS LEADERSHIP**

ADVISOR

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August, 2021

Addis Ababa, Ethiopia

STATEMENT OF DECLARATION

I, Abiy Asrat, declare that this Master's Thesis titled "The Effect of Innovation Activities on the Performance of Ethiopian Airlines Group During Covid19" is my original work. I have carried out the study independently with the edifying guidance of my research advisor, Fesseha Afework (A/Professor). All referenced literatures in this study are duly acknowledged, in the appropriate setting. I also confirm that this study has not been submitted for the award of any diploma, degree or any other higher education program in this or any other institution.

Abiy Asrat

Declared by

Signature

Date

STATEMENT OF CERTIFICATION

This is to certify that, Abiy Asrat has carried out this project work on the topic titled “The Effect of Innovation Activities in the Performance of Ethiopian Airlines Group During Covid19”. Accordingly, I hereby assure that his work is appropriate and standard enough to be submitted for the award of the Degree of Master of Arts in Business Leadership.

Fesseha Afework

(A/Professor)

Advisor Name

Signature

Date

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
DEPARTMENT OF BUSINESS LEADERSHIP
POSTGRADUATE PROGRAM
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THE EFFECT OF INNOVATION ACTIVITIES ON THE PERFORMANCE
OF ETHIOPIAN AIRLINES GROUP DURING COVID19

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I am so indebted for the relentless encouragement and support of my family and friends, who have been with me throughout this work.

Moreover, I would like to thank Ethiopian Airlines Group and all respondents, for their cooperation in the collection of the data which has a crucial role in the success of this study.

To the best of my knowledge and as checked from the record of Ethiopian Airlines Group, this is the first academic research conducted on the specific topic. Moreover, this is the first research work that considered the Airline for evaluation of its status as innovation-active and innovative firm based on the international guidelines.

Hence, as an original work and the first academic work that has focused on the phenomenon represented by the specific topic of this thesis, it is my strong belief that the outcomes from this scientific study may have a supportive contribution in the decision-making process of Ethiopian Airlines Group, in a period of Covid19 challenges - which has not yet ended when this study is finalized.

Acronyms

BSC: Balanced Scorecard

Eurostat: European Statistical Office

EUR: Euro

ETG: Ethiopian Airlines Group

IATA: International Air Transportation Association

ICAO: International Civil Aviation Organization

ISO: International Standard Organization

OECD: Organization for Economic Co-operation and Development

UNECA: United Nations Economic Commission for Africa

USD: United States Dollar

WHO: World Health Organization

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Abstract

This study was conducted to assess the effect of innovation activities on the performance of Ethiopian Airlines Group during the time of the global airline industry crisis, which followed the emergence of the Covid19 pandemic. The researcher was motivated to seize the opportunity that the phenomenon was still fresh by the time the study was conducted. Consequently, the majority of the Airline staffs who have partaken in the process of tackling this challenge were used as sources of primary data, which benefited the study in getting a reliable source to respond to the survey questions. A descripto-explanatory research design was used for the analysis, which employed both primary and secondary data as applicable to answer the research questions. The census survey included the 49 active partakers in the value stream of innovation management. This value stream includes stages of incubation, implementation follow up tasks and impact evaluation functions. Using the Statistical Package for Social Sciences (SPSS) software version 26, a multiple linear regression was conducted to determine the effect of innovation in the performance of Ethiopian Airlines Group during the three semiannual performance periods since the emergence of COVID19 pandemic. The results of the study have depicted that, process, product and organizational innovation had both significant and positive effect on the performance of Ethiopian Airlines, while marketing innovation was found to have insignificant effect on determining the performance of the Airline during the study period. In line with the findings, the researcher recommends that Ethiopian Airlines Group needs to continually strengthen its comparative and competitive advantages on innovation, in order to harness the sustaining virtues of firm innovativeness in trying times where the core business is impaired, as that created by Covid19 pandemic. Furthermore, the company needs to seriously examine its marketing innovation activities and reassess each corresponding investment on marketing innovation with a cost-benefit analysis.

Keywords: Ethiopian Airlines Group, Innovation, Performance, Covid19

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Covid19 was declared by World Health Organization as a global health emergency on the 30th of January, 2020 (World Health Organization [WHO], 2020). Consequently, the global health situations and economic parameters were critically impaired by the largescale lockdown days and international travel restrictions, among others (Ozili & Arun, 2020).

Earlier studies did highlight the potential of innovation in supporting firms in times of crisis, in which empirical findings indicated both positive and negative effects of innovation on firm performance (Archibugi, Filippetti, & Frenz, 2013). Some researchers have indicated that calamities associated to pandemics, such as that caused by Covid19, are considered as conditions that create opportunities for innovation activities to be demanded by organizations (Andrias et al., 2020). Congruently, El Akoum and El Achi (2021) have shown the opportunities created for innovation outputs associated with COVID19, in that, outputs of sustainable innovation were needed by several sectors and firms to navigate through the effects of the crisis. Consequently, since the beginning of the Covid19 pandemic, researchers have noticed innovation activities being undertaken in several industries as a means to tackle the sudden and shocking impact of the pandemic on business and social settings (Woolliscroft, 2020).

A study by Chen and Roldan (2021) has indicated that, since the emergence of Covid19, innovation was instrumental in improvements in the digital economy. Similarly, according to Farrugia and Plutowski (2020) innovation had a positive effect in the clinical sector that strived to tackle the challenges of the pandemic. In addition to the clinical processes, Tan et al. (2020) have also marked the contribution of innovative processes in protecting health workers who were at the first line of treating patients of Covid19. However, Rusinko (2020) remarked that the success of innovation in response to Covid19 has depended on the speed and agility to bring innovative outputs, especially, in health care operators responding to Covid19.

In addition to the health care and the digital economy sectors, the global airline industry was also where innovation activities were demonstrated (Amankuah-Amoah, 2021). According to the

study by Amankuah-Amoah (2021), the Airline industry has demonstrated considerable innovation activities as response to the Covid19 crisis. The list included innovations such as: UV Ray disinfection, contactless technologies and financial innovations.

The Airline industry is among global industries that were severely affected by the Covid19 pandemic. Since the start of the pandemic in March 2020, the airlines industry had lost a significant amount of its planned revenue. Researchers consider that there are two main elements driving this negative trend, namely: travel restrictions and overall economic development. With regards to the travel restriction, this scale which is associated to the COVID19 pandemic is the strictest international travel restrictions that the air transport industry has ever experienced (MELAS & MELASOVÁ, 2020).

The report of the International Civil Aviation Organization shows that, due to the COVID19 pandemic, the airline industry has lost USD 371 Billion in gross operating passenger revenue in 2020, as compared to 2019. The same analysis and forecast indicated that the loss is forecasted to be USD 276 to 315 for 2021. The decline in passenger number for 2020 and 2021 is 60% and 42 to 48 %, respectively, as compared to 2019 (ICAO, 2021).

The international air transport association has also revealed its forecast on profitability of the Airline industry and the analysis revealed that it will not happen before 2022. This report also discloses that many Airlines have been subject to loans, government aids, laying off of employees and differing payment of prior debts. Consequently, another challenge to the Airlines will be the handling of such differed loans. This implies that the challenge posed by COVID19 on Airlines is a treat for survival (IATA, 2021).

Specifically focusing on the African Airlines industry, it has registered a loss amounting 60% of capacity, 132 Million passenger traffic, USD 22 Billion revenue, in 2020 - as compared to the previous year. A research conducted by United Nation Economic Commission for Africa has indicated that many airlines in Africa face bankruptcy, if their liquidity crisis is not addressed with urgency. It is indicated that many airlines are already insolvent and for instance Air Mauritius has already entered administration (United Nations Economic Commission for Africa [UN ECA], 2021; International Civil Aviation Organization [ICAO], 2021). The international trend indicated in the same paper shows that Airlines in United States and Germany have

received financial assistance from their governments. A case in point, Germany government provided a bailout of 9 billion EUR to Lufthansa and the United States Government secured USD 61 Billion relief package for United States Airlines. This shows how the survival and performance of Airlines is tested in this time (UN ECA, 2021).

Ethiopian Airlines has been the largest airline and among few profitable Airlines of African origin, before covid19. The Airline has also won the Best African Airline award consecutively in 2017, 2018 and 2019. As COVID19 emerged as a pandemic, Ethiopian Airlines was able to survive from loss and remained as cash positive (Ethiopian Airlines Group [ETG], 2021). In contrast to the aforementioned large European and North American carriers, Ethiopian Airlines didn't receive any direct relief financing or bailout from the government.

How did Ethiopian survive from loss, while the industry is hit by travel restrictions as well as reduction in many parameters, specially a sharp decline of operating passenger revenue? This question has a very essential relevance because the existing challenge is not yet normalized, and the lesson would benefit for risk management in future possible perfect storms that might hit the Airlines.

Garrowl and Lurkin (2021) stressed that, the impact of the Covid19 crisis has compelled Airlines to device a special mechanism that equips them with special competence of speed and business agility in business decision making. Actions that entail flexibility gives an advantage to firms to swiftly seize opportunities. This benefits a firm, when the firm is intended to change problems to opportunities. This is a notion of innovation Strategy. As discussed by Jansen et al. (2006), a company that employs exploratory innovation in its business harness the advantages of quickly adapting with changing scenarios in an ever-changing business environment.

Considering the aforementioned points, it calls for a timely research that can investigate the case scientifically to find the effect of innovation activities on the performance of Ethiopian Airlines during COVID19 global Airline crisis.

To the best knowledge of the student researcher, to date, no academic paper has a chance to cover this recent phenomenon regarding the role of innovation on Ethiopian Airlines Group's performance, as Ethiopian Airlines Group strives to survive, amidst the historically

unprecedented harsh industry situation. Consequently, this paper is intended to be an eyes opener and a reference to further studies to be conducted on the effect of different variables in the survival straggle of Ethiopian Airlines, during the covid19 global crisis.

1.2. Background of the Organization

Ethiopian Airlines Group is the flag carrier of Ethiopia, which was established on September 8, 1945 by an agreement made between Ethiopian government and Transcontinental and Western Airlines (TWA). Ethiopian started its first scheduled international flight on April 8, 1946, to Cairo (Ethiopian Factsheet, March 2021).

Accordingly, on April 8, 2021 Ethiopian has celebrated its 75th year anniversary of commencing its first international operation. In these 75 years of operation, Ethiopian has been one of the leading Airlines of Africa reputed for its prominence in bringing new technologies as well as its vast network of destinations in Africa.

In the latest industry awards, such as the reputed airlines award of Skytrax, Ethiopian has been winning the best airline of Africa award since 2017. In terms of fleet size, Ethiopian is peerless in its continent with 127 wide body and narrow body aircrafts, by the time this research is conducted. Another forty plus aircrafts are already in the manufacturing stage, with intact order. With these aircrafts, the airline works on 22 domestic and 127 international airports. Besides, no other airline has as many destinations in Africa as Ethiopian Airlines, which currently is serving 62 airports, though the restrictions associated to Covid19 are temporary setbacks. Ethiopian cargo, which is one of the strategic business units of ETG, is the largest cargo airlines of Africa, that serves more than 58 destinations globally (ETG, 2021). During the Covid19 period of global airline industry crisis, Ethiopian Airlines Group announced that it was compelled to cut 90% of its international flights and lost USD 550 Million, only between January and April, 2020 (ETG Communications, 08 April 2020).

Since October 2016, Ethiopian Airlines Group has established an R&D department and as of September 2019, the airline has an innovation hub with a value stream extending from incubation phase to impact assessment. Ethiopian Airlines Group is fully owned by the government of Ethiopia.

1.3. Statement of the Problem

The Covid19 global crisis has hit the global airline industry in unprecedented scale and Ethiopian Airlines Group has also been affected by the multifractal consequences. While many airlines have become insolvent or rescued by bailout and relief finance of governments, Ethiopian Airlines has sustained and survived as cash positive without any direct financial assistance from the government. Even in the very harsh times of the pandemic, where majority of countries in the world levied travel restriction and banned regular passenger flights, Ethiopian Airlines has managed to survive.

Previous scholarly works have tried to shed light on what the effect of innovation could be in times of crisis, especially when the major offerings of a company become paralyzed due to emerging phenomena (Chesbrough, 2019). However, so far it is still unknown what the status of Ethiopian Airlines Group is, in terms of innovation activities, since there is no official annual reports of the Airline that has explicitly indicated the status of the Airline with regards to ‘firm innovativeness’ criteria set by international organs, such as International Standard Organization (ISO) and the Oslo Manual (Organization for Economic Cooperation and Development [OECD] and European Statistics Office [Eurostat], 2018).

Most importantly, a question that needs to be answered is what the effect of innovation was in Ethiopian Airlines Group’s performance during the Covid19 period, where the global Airline industry was in crisis. Answering this question has a multifaceted impact in the real world and contemporary operation of the Airlines, since the Covid19 effect is still continuing. A business striving to survive in a changing industry climate due to Covid19, would logically need to make critical managerial decisions in response to the challenges. Unless a scientific answer is provided, this vague area is expected to logically create a gap in decision making and to back managerial interventions with scientific findings. This also adds to the demand for a timely need for a scientific research to answer the aforementioned question.

Considering the timeliness of this problem, this research is mainly intended to assess the effect of innovation in the performance of Ethiopian Airlines, especially, at the time of Covid19 crisis. Moreover, it is important to determine the innovation status of the company by using the

international standards (OECD & Eurostat, 2018), as it is not yet publicized neither by the company nor by prior researches.

1.4. Research Questions

This research focusses on finding answers to the three questions indicated below:

1. What was the innovation status of ETG since the emergence of Covid19 pandemic?
2. What were the relationships between the four types of innovations and the performance of Ethiopian Airlines Group, since the emergence of the Covid19 pandemic?
3. What were the effects of the four types of innovation on the performance of Ethiopian Airline Group, since the emergence of Covid19 pandemic?

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of this research is to assess the innovation status of Ethiopian Airlines Group in the Covid19 period and, if there was any innovation activity, to study the effect of innovation activities on the performance of Ethiopian Airlines Group during the period since the outbreak of Covid19 until June30, 2021.

1.5.2. Specific Objectives

The specific objectives of this study are:

1. To descriptively assess the quantity and type of innovation projects implemented by ETG and thereby determine the ‘innovation status’ of Ethiopian Airlines Group in the study period.
2. To examine the relationship between the four types of innovation and the performance of Ethiopian Airlines Group, since the emergence of Covid19
3. To assess the effects of the four types of innovation in the performance of Ethiopian Airline Group, during Covid19 period.

1.6. Significance of the study

This study is expected to have a significant importance for decision makers in the Airline industry, especially in the Airline studied, given the fact that the period defining the impact of Covid19 on the airline industry is not yet over. In fact, reports show that the impact is expected to influence the business in the coming seasons too (IATA, 2021). Moreover, the results of the study are expected to give insight on the relative impacts of the four types of innovation on the performance of the Airline. As far as the researcher knows, this study is the first to study the direct role of innovation on performance of Ethiopian Airlines and more importantly in assessing the most recent performance periods undergone under the influence of the Covid19 pandemic. The researcher is hopeful that, as a pioneer and original work on the particular topic, this will contribute to shed light for further studies in the area.

1.7. Delimitation / Scope/ of the study

It is apparent that the performance of Ethiopian Airlines Group, at a given period, can be influenced by many variables. This research is specifically and only focused on the effect of innovation activities on Ethiopian Airlines Group's performance in the three semiannual performance periods impacted by COVID19, in which the last semiannual period is that ended at June 30, 2021. Only the four innovation types as discussed in Oslo Manual 3rd edition are adopted for the study. With regards to the dependent variable, Performance, only the four elements of BSC as shown in Ethiopian Airlines Group's BSC are adopted.

1.8. Limitation of the Study

The researcher could not find any other literature work that specifically was done on the relationship of innovation and Airlines performance in times of the Covid19 crisis. Accordingly, this study is compelled to use reports by international aviation related organizations that publish Airline related statistics, as a reference. Though it is unverified at international level, however as per the 'documented information' of Ethiopian Airlines Group, this study is the first one in studying the role of innovation in the Covid19 period performance of Ethiopian Airlines Group by taking innovation types as an explanatory variable and using the innovation data of the Airline. Due to these reasons, it is expectable that the researcher couldn't find a prior work on this particular subject conducted on this specific company. This might affect the study in missing

the virtues of comparing results with prior literatures on the subject. However, literatures on the role of innovation in Covid19 and that on firm performance were reviewed in this study.

Moreover, as the respondents were skipping the personal information part of the questionnaire and a considerable number of respondents left it blank, therefore the researcher has left descriptive analysis on age, academic qualification etc. Though not included, the researcher is convinced that this information is not relevant to the study, and it is rather only a good to have information.

Finally, until the time this study is finalized, ETG has not yet publicized the fiscal years' performance reports of 2019/20 and 2020/21. Hence, this study considers this reality and the model is chosen in a way that doesn't require data from the balance sheet of the Airline.

1.9. Definition of Key Terms

- An innovation-active firm is a firm that engaged at some time during the observation period in one or more activities of innovation type. (OECD & Eurostat, 2018)
- An innovative firm is a firm that has delivered an output of innovation, in real and tangible terms, in the observation period. The delivery of the outputs could be individually by the firms or in a sort of collaboration with other entities. (OECD & Eurostat, 2018)
- A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. (OECD & Eurostat, 2005)
- A non-innovative firm is a firm that reports no innovations within the observation period. (OECD & Eurostat, 2018)
- An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. (OECD & Eurostat, 2005)
- A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. (OECD & Eurostat, 2005)
- A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant

improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. (OECD & Eurostat, 2005)

1.10. Organization of the Study

This thesis is organized in five chapters. The first chapter provides an introductory article, a background and the area of the study. Subsequently, it presents the problem identified to form the research questions and objectives, among other introductory sub sections. In Chapter two prior scholarly works are reviewed in two parts, theoretical and empirical reviews, to yield an adequate foundation to construct the conceptual framework and guide the upcoming parts of the study. In Chapter three, the research methodology with relevant information about the study area, the sampling procedures as well as the research design are illustrated, among other related subsections. Chapter four is dedicated to the analysis part of the study and it includes sections for descriptive analysis, correlation analysis and regression analysis. These three parts of the analysis are used to answer the three research questions, respectively. The final chapter, Chapter Five, presents summary of the findings as well as conclusion and recommendation. A suggestion to future research works is also provided at the end of the chapter. The reference page and the questionnaire used for the study are provided at the end of this paper.

CHAPTER TWO

LITERATURE REVIEW

This chapter is dedicated to review prior works, both theoretical and empirical, in order to set foundation for the conceptual framework as well as the measurement scales to be used in the analysis needed to answer the research questions.

This chapter has three major subsections, namely the theoretical review, the empirical review and the conceptual framework derived from the two parts of the review.

2.1. Theoretical Literature Review

In this section, the concepts, models and notions of both Innovation and Firm Performance will be discussed, to the extent it establishes a workable scholarly background that paves the way to pursue the research work that follows

2.1.1. Basic Concepts on Innovation

2.1.1.1. Theories and Conceptual Models of Innovation

In the scholarly literature, there has been several theories and conceptual frameworks of innovation. The below review points out some of the widely known theories of innovation.

A. Schumpeter's 'Creative Destruction'

The "creative destruction" concept introduced by Schumpeter (1942) has given an insight to the subsequent literatures on the economic role of innovation, both at Micro and Macroeconomic levels. In his book *Capitalism Socialism and Democracy*, Schumpeter (1942) put forward an edifying notion which argues that economic growth is ignited through a disruption that happens in the existing economic activity through innovative actions.

B. Diffusion Theory

Roger (1962) examined the ways by which innovation is communicated and adopted over time through the arena of a social system. According to this theory, there are four rudimentary aspects that govern the diffusion of an innovative idea. These aspects or elements are the innovation output, the channel through which the innovation is communicated, the time and the social system. Due to its context that entails a social system, the process of innovation is dependent on human capital. Besides, the theory confers that the reaches of the new idea, or the implemented idea representing innovation, needs to be as vast as possible to a level that innovation subscribes

many users who enables it to self-sustain. The theory also confers that, with the rate of adoption incrementing, a critical mass can be reached in which a sufficient number of operators have subscribed to adoption of the new innovation. This enables the innovation to self-sustain.

C. Disruptive Innovation

A distinctive attribute of a disruptive innovation is that it creates a new market and value network. This new development will create a scenario which redefine the market structure and replace existing dominant product together with industry leaders (Rahman et al., 2017).

According to Christensen (1997), who is regarded as the key founder of this theory, disruptive innovation is different from sustaining innovation in that the goal of sustaining innovation is to improve existing product, whereas, disruptive innovation looks for new set of customers.

D. Models of Innovation Process

Both Kriz and Welch (2018) as well as Neely and Hii (2014) have reviewed relevant models of innovation that were available at the time their papers were published. The researcher has examined the contrast between the two reviews on Models of Innovation Process, which has a time difference of two decades. The difference is basically that Neely and Hii's (2014) work didn't include the Open Innovation Model, which was introduced in 2017.

Some innovation models with wide acceptance in the literatures of business and economics are illustrated below.

i. Linear Models

Listing of the major innovation models often commences from the two models that exhibit linearity in the innovation process, namely, the technology push model and market pull model (Kriz & Welch, 2018).

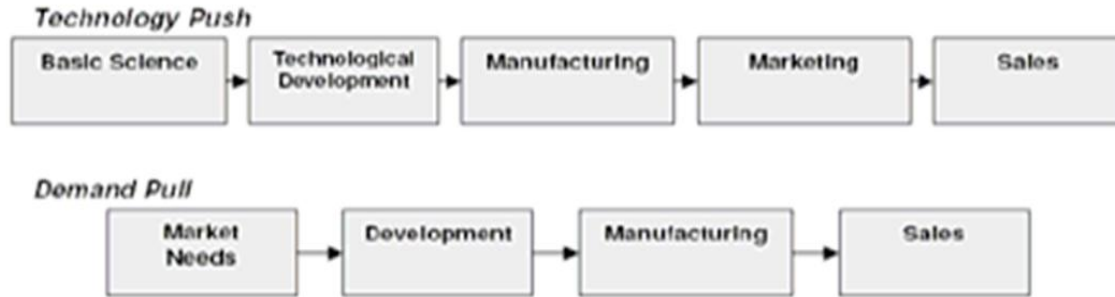
- **Technology Push Model**

This model assumes that the scientific research brings discoveries which will then be used for R&D works that will be followed by manufacturing and sales.

- **The Market Pull (Demand Pull) Model**

The market-pull model emphasizes the strong bond of the firm and the consumers. Accordingly, inputs for the R&D function is expected to be generated from the market. Then, the ideas which is brought in from the market are further handled by the R&D team to be sent to manufacturing and sales of new products.

Figure 1: Technology Push and Demand-Pull Model



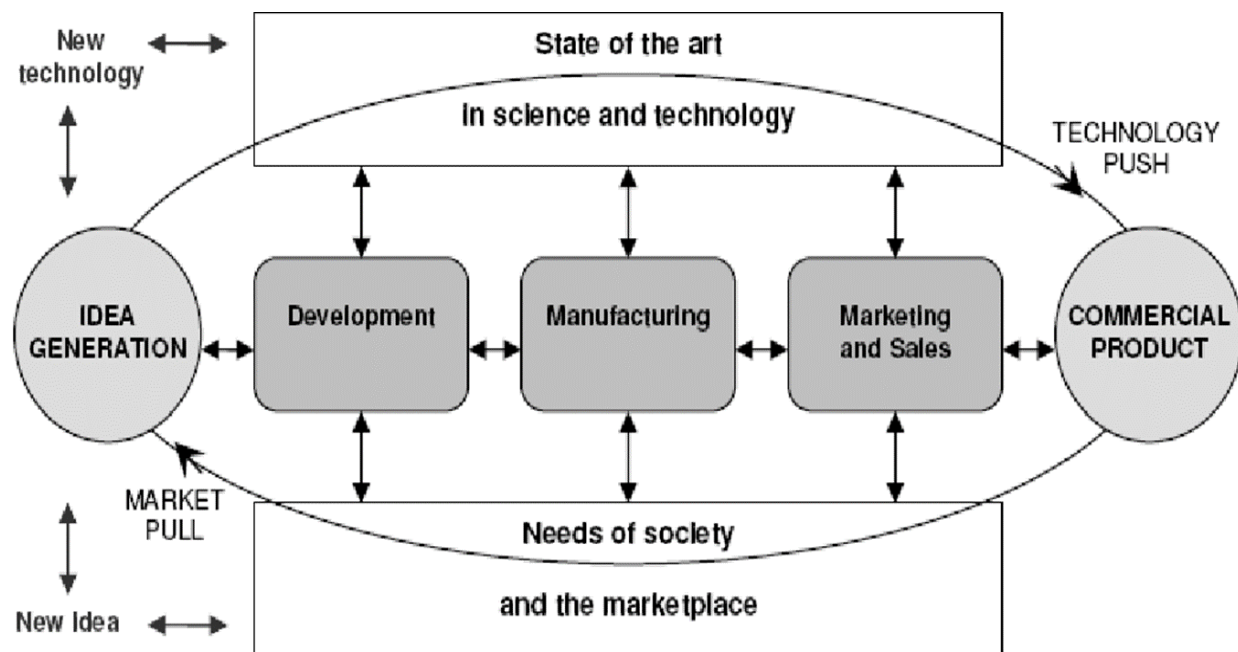
Source: Rothwell (1994)

ii. Simultaneous-coupling model

Trot (2017) illustrated that the special attribute of this model, as compared to the previous ones, is that it included marketing, manufacturing and R&D into account. According to this model, innovation is synthesized with simultaneous actions in the marketing, manufacturing and R&D functions.

According to Rothwell and Zegveld (1985) this model gives attention to the complex communication paths that link the inter-organization settings as well as respective external stakeholders on the firm's innovation, such as the broader scientific community and the market place.

Figure 2: Simultaneous-Coupling Model

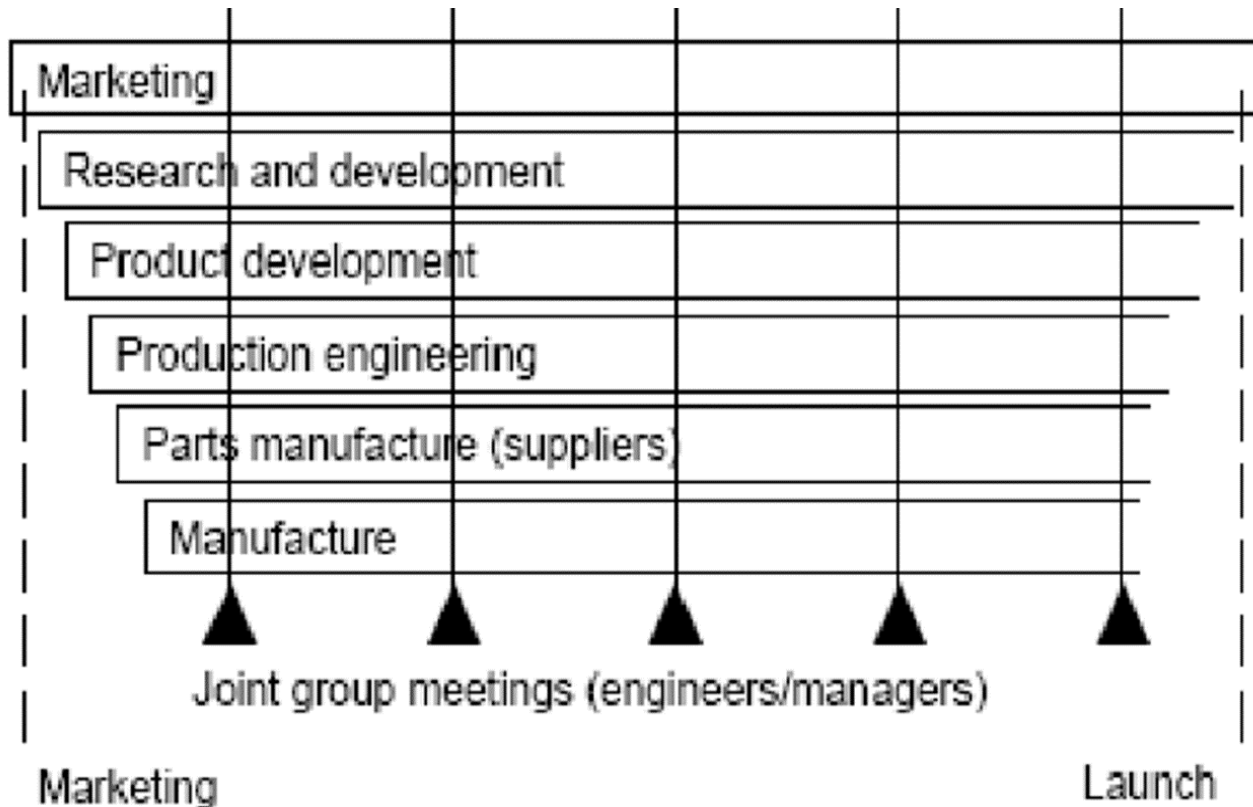


Source: Rothwell (1994)

iii. Integrated Model

The special attribute of this model is that it has addressed the weakness of the previous models which were characterized by sequential flow of information. This model assumes that, in innovation process, there is a high level of functional integration and parallel activities across functions. Hence, sequential flow of information is not the case in the real-world scenario. (Preez, Louw and Essmann, 2009)

Figure 3: Integrated Model



Source: du Preez and Louw (2008)

iv. Network Models

This model is characterized by its emphasis to the interactions of the firm with the micro and macro environment and stakeholders thereof. Whereas, this model assumes that new developments were made within the firm's boundaries, which is a key point that differentiate this model with the one to be discussed in subsection V below.

Figure 4: Network Model

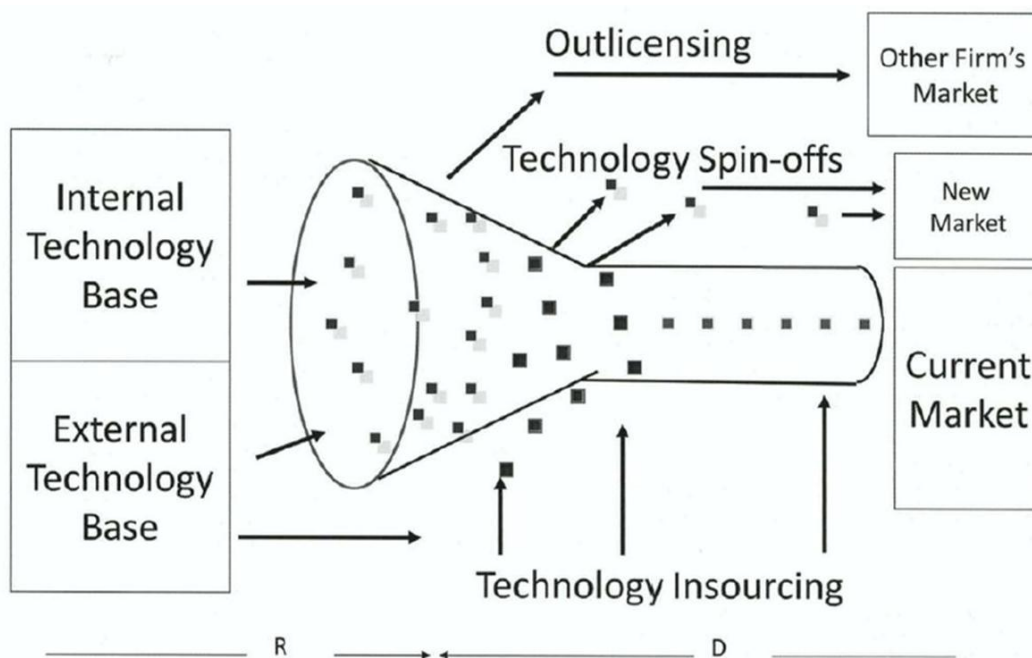


Source: du Preez and Louw (2008)

v. Open Innovation

This model is essentially a network models, but rather than being closed here the networks are open. Consequently, the range of innovation opportunities to be utilized is openly vast and not constrained in the boundaries of the firm (Trott, 2017).

Figure 5: Open Innovation Model



Source: du Preez and Louw (2008)

2.1.1.2 Taxonomy of Innovation

There are two main approaches, given by OECD & Eurostat, which are being widely used in studying the taxonomy of innovation. The first one is that included in Oslo Manual Third Edition and the other one is the one discussed in Oslo Manual Fourth Edition (OECD & Eurostat, 2005; 2018).

According to Oslo Manual Third Edition (OECD & Eurostat, 2005), there are four major types of innovation, namely, product, process, marketing and organizational innovations. Whereas, in the Oslo Manual fourth edition, the taxonomy is reconfigured in to two, as Product and Business Process Innovations. In a sample pilot testing, the researcher founds that the taxonomy pointed out in the third edition is better understood by the respondents in the target population. Accordingly, the researcher has adopted the innovation taxonomy indicated in the third edition of the Oslo Manual as the better approach to be understood by the respondents in the study population. The referenced literatures for data collection instrument and tests conducted in this regard have shown validity for the taxonomy adopted in this study.

While this study uses the taxonomy of innovation which is being used in the study area, which is similar to that given by Oslo Manual 3rd edition, however it is important to describe the different approaches used by scholars in earlier literatures. Among such literatures, Schumpeter (1934) provided a taxonomy of innovation that categorized innovations essentially in terms of products, process or method, new supply channels, discovery and tapping to new markets as well as a newer structuring or organization. Whereas, Drucker (1985), also emphasized the importance of innovation types such as marketing and organization.

2.1.2. Firm Performance and the Balanced Scorecard

At its early days of development, the balanced scorecard has already put forward the basic essentiality of addressing non-financial areas of a given firm's potential growth avenues. These three non-financial areas, in addition to the financial element, are the customer, internal business process and learning & growth perspectives (Kaplan & Norton, 1992).

Today, Balanced Score Card (BSC) has gained a considerable recognition by firms around the world. Literatures show that BSC is adopted by 30 – 80 % of firms in the world (Taticchi et al., 2010). Ethiopian Airlines Group is not an exception here. Among variants developed by different

scholars, there is a new model of BSC proposed by Razek (2012), which comprises 6 perspectives, namely: financial, customer, internal process, learning and growth, risk management and social perspectives. However, this study didn't use those models because the organization under study, Ethiopian Airlines Group, uses the four perspectives of BSC, that include financial, customer, internal business process and learning & growth.

2.1.3 Innovation, Firm Performance and Business Profiling

2.1.3.1 Innovation and Firm Performance

As can be observed from the current Airline industry crisis associated with Covid19, firms and markets are prone to changes in the industry environment. In such times, it would be a survival issue to seek for ways of passing such trying times. According to Drucker (1985), innovations is key in providing firms a strategic orientation which enables them to sustain and stay competitive in times of challenging business environment. Furthermore, other researchers also have pointed out that innovation facilitates the efforts of firms to see opportunity in encountered problems and achieve sustainable competitive advantage (Hitt et al., 2001; Kuratko et al., 2005).

2.1.3.2 Framework for Business Profiling Based on Innovation Status

According to Oslo Manual Fourth Edition, a given firm's status in terms of innovation is identified by measuring the existence of any innovation activities in the observation period as well as enumerating if any outputs of innovation are recorded in the specified time period. The manual recommends an observation period to be in the range of one and three years. In this study, the observation period is the three semi-annual performance periods of Ethiopian Airlines Group, which were conducted under the influence of the Covid19 pandemic.

According to the framework, a firm must have at least one innovation in the study period to get the status of an innovative firm. Whereas, if a given firm had a activities of innovation I a study period, it is an innovation active firm whether the activity has yield innovation or not. Innovation activities may not yield an innovation in a given period due to different reasons such as: be ongoing without an innovation or be aborted, discontinued, or put on hold. Considering these scenarios as a basis, the criteria for innovative and innovation-active firm is shown below.

This table illustrates the possible scenarios in the business profiling task, according to Oslo Manual fourth edition (OECD & Eurostat, 2018).

Table 1. Innovation-active and Innovative firms

Does the organization/firm/company conducted innovation activities in the study Period			
		Yes	No
Does the organization under investigation has brought at least on innovation output during the study period?	Yes	The firm is said to be an Innovative Firm	This is a special case which might happen when the background innovation activities to bring about the innovation output were done in a period prior to the observation period.
	No	The firm is said to be an innovation-active Firm	The firm is neither innovative nor innovation active in the observation period.

Source: Adopted from Oslo Manual, 2018

2.1.4 Innovation Leadership

In general, literatures suggest that firms with innovation leadership has a potential of sustaining through difficult business situations. McEntire (2011) has indicated that innovation is an important factor for firms in ensuring continued success and competitiveness, while the industry situations keep changing inevitably. Mamford et al. (2002) has indicated that innovation is a potentially powerful influence on organizational performance, especially in the 21st century firm leadership. Furthermore, literatures indicate that the notion of innovation leadership has roots in the path-goal theory (House, R. J., 1996; Evans, M.G., 1996) and Leader-Member Exchange Theory (Basu & Green, 1997).

Even though the purpose of this study is not to directly assess innovation leadership in the study area, nevertheless, the researcher was interested to discuss the notion as a related construct to the constructs of focus in this study, namely innovation and firm performance.

Leaders require to ensure sustainability of their business during challenging times and times of crisis gives them a chance to test their effectiveness in innovation leadership (McEntire, 2011).

2.2. Empirical Literature Review

The scholarly literature has long been focusing on the constructs of innovation and firm performance, in which different empirical studies have resulted contrasting results. This section reviews selected works of researchers who have conducted researches in this particular subject. This section illustrates some of the empirical studies with the respective results of the study.

To begin with, a study which was conducted by Hashi and Stojčić (2013) that considered different countries with varying degree of development, has showed a result in which the relationship of innovation and productivity was assessed scientifically. Whereas another research indicated that the cumulativeness of innovation, which is conducting both technological and non-technological innovations, gives an upper hand to firm's productivity as compared to firms which only adopt one (Leeuwen, 2009). Yet, another empirical evidence demonstrated by Karlsson and Tavassoli (2015), has showed that firms that choose and afford to have a complex innovation strategy perform better in terms of their future productivity.

Among studies which are relatively recent to the observation period of this study, Wang et al. (2020), showed that there is a positive association between radical innovation and firm performance, while incremental innovation has a negative effect on firm performance.

Whereas, Atalaya, Anafarta, and Sarvanc (2013) had conducted research in the garment industry of Turkey, where they have assessed the relationship between the different types of innovation on the performance of a given firm. This study has showcased a result in which product and process innovation, which are also called technological innovations, are both significantly and positively related to firm performance. Karabulut (2015) has indicated that innovation in general has a positive relationship with firm performance, while marketing innovation is found to be negatively associated with one part of the BSC, namely, L&G performance.

Considering the contrast of results from research works conducted on the relationship of innovation and firm performance, it is evident that more empirical works are needed in this area.

2.3. Research Gap

The researcher couldn't present empirical researches that demonstrate the effect of innovation in the airline industry during a challenging industry situation of Covid19. This is expectable in that, to the best knowledge of the researcher, this study is the first one to consider the case in Ethiopian Airlines as well as another research work on this topic couldn't be found by the

researcher. This might be due to the fact that the Covid19 pandemic is a recent phenomenon by the time this study is conducted. When considering scholarly works at global level, there are several studies which assessed the role of innovation in different sectors and firms, as indicated in 2.2 above. However, a striking difference is observed on the findings as well as conclusions of the studies, in that, the effects of the different types of innovation on performance of the firm has yield different results. To this end, the potential role of innovation in the performance of Ethiopian Airlines Group, specially in the period of the Covid19 pandemic, needs to be known through scientific studies.

2.4. Conceptual Framework

Taking in to account the discussion so far, the below figure is developed to represent the relationship between innovation in a firm context, as indicated by Oslo Manual third edition, and the firm's performance as given by the Airline's BSC, which is the existing performance measurement model adopted by the firm under study – Ethiopian Airlines Group.

Accordingly, the conceptual framework of the study is:

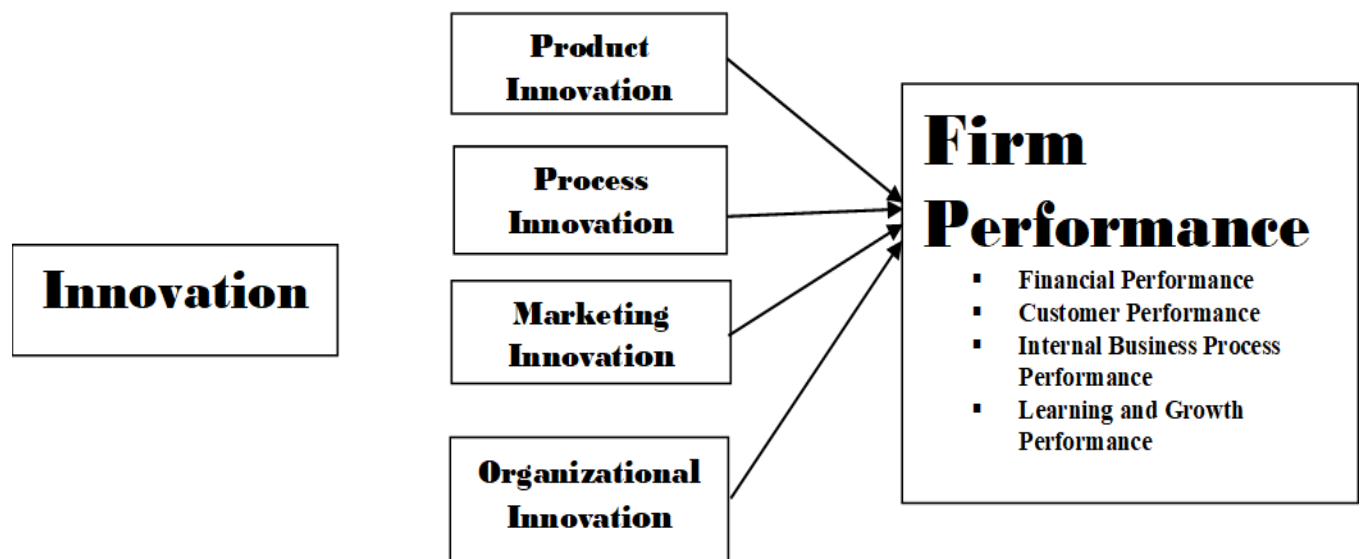


Figure 6: Basic Conceptual Framework

Source: The researcher based on Literature review

Based on the conceptual framework, the regression equation will be as follows

$$ETGPc19 = \beta_0 + \beta_1 \text{ProductINNC19} + \beta_2 \text{ProcessINNC19} + \beta_3 \text{MktINNC19} + \beta_4 \text{OrgINNC19} + \epsilon_i$$

Where:

Dependent variable:

ETGPc19 = Performance of Ethiopian Airlines Group during the Covid19 airline industry challenge period

Independent variables:

ProductINNC19 = Product Innovations in Ethiopian Airlines Group during the Covid19 airline industry challenge period

ProcessINNC19 = Process Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

MktINNC19 = Marketing Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

OrgINNC19 = Organizational Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Description of the study area and The Study Period

This study is conducted in Ethiopian Airlines Group. Specifically, the study area is the innovation value stream encompassing the stages from incubation stage to implementation follow-up and impact assessment stages. Accordingly, the study has targeted the departments and teams with direct participation in this process.

Ethiopian Airlines Group follows a fiscal year system that starts in July 1 and ends June 30. Accordingly, the covid19 pandemic was declared as a global emergency in January, 2020 (WHO, 2020), which falls in the second semi-annual period of 2019/20 fiscal year. Hence, this study has included this semi-annual period as well as two consecutive semi-annual performance periods, namely first semi-annual of 2020/21 and second semi-annual of 2020/2021.

3.2. Research Design and Approach

Research Approach

In order to answer the different research questions, this research has adopted quantitative approach.

Type / design/ of Research

The researcher has adopted a descripto-explanatory design which combines descriptive and explanatory designs as indicated by Saunders et al. (2012). In order to attain the first research objective mentioned in Chapter One, a descriptive design is used. For the rest of the specific research objectives, explanatory design is adopted as it is instrumental in establishing causal relationships between the independent and dependent variables.

3.3. Population of the study

The population of the study constitute of all active members in the innovation project incubations and high-level implementation follow-up value stream. The population encompasses both experts and management members, where the prior accounts for 28 job positions and the later 24. This value stream is selected as the population of the study on the basis of getting direct and

firsthand access to information about the innovation activities of the company at the level which enables them to answer the questions enlisted in the questionnaire.

Practically, the population size is 49, in consideration of actual participation and presence in the value stream as the innovation projects were conducted in the study period.

3.4. Sampling Technique

The sampling technique adopted is a census or total population sampling technique. Total population sampling is a type of purposive sampling, and appropriate technique when the numbers of cases are relatively smaller and the entire population meets a given criterion (Ilker, Sulaiman & Rukayya, 2016). In the case of this research, it is essential to include everyone in the study since the value stream encompasses job positions that extend from the incubation phase, prototype testing stage and finally to innovation implementation and the central follow-up as well as the innovation management part of the fruition tasks. Hence, this value stream is principally the closer wing for innovation activities of Ethiopian Airlines Group.

3.5. Sampling Size and Sample Size Determination

This study has taken all the population for the study. In the innovation activities incubation and implementation management value stream, there are 49 employees currently on duty and actively partaking in the innovation processes during the study period.

3.6. Data Source and Method of Collection

3.6.1. Source and Types of data

This research applies both primary and secondary data, whereby majority of the research questions are to be answered with primary data. The data is organized by own survey and, for the secondary data, unpublished statistical reports as well as communications obtained from Ethiopian Airlines Group were used.

3.6.2. Data Collection Methods

To determine answers for the first research questions, which is to answer whether ETG qualifies the innovation active and innovative firm status per the international scale, the study used

secondary data from Ethiopian Airlines Group that covers the study period. Whereas, for the second and third research questions, the study used primary data obtained through questionnaires.

For the primary data gathered with structured questionnaires, the researcher has administered the questionnaire both digitally by using ‘Google Form’ as well as in person with support from volunteer data collectors who assisted the researcher in the administration and collection of questionnaires. The questionnaire used has three parts, namely Part I, II and III. Part I is general information about the respondents. Part II was focused on innovation whereas Part III is on performance. Both part II and III include 4 subparts, respectively. Part II is comprised of the four types of innovation as per Oslo Manual (OECD & Eurostat, 2005). Whereas part III is adopted from the BSC of Ethiopian Airlines Group, that includes the four dimensions of performance as featured in the Balanced Score Card (BSC) model.

The questionnaire used by this study is closed-ended with Likert scale measurement. The Likert scale used differs for part II and part III.

To sum up, as indicated in the Oslo Manual Third Edition (OECD & Eurostat, 2005), innovation can be seen from four dimensions, namely product, process, marketing and organizational. Whereas the concept of firm performance is composed of four perspectives namely the financial, customer, Internal Business Process and Learning & Growth perspectives.

Part II consists of four subsections with a total of 15 questions, as indicated in table 3 below. The Likert scale is given by:

1. Very Low
2. Below Average
3. Average
4. Above Average
5. Very High

Table 2: Components of questions related to innovation

No.	Performance	Total number of questions
1	Product Innovation	4
2	Process Innovation	3
3	Marketing Innovation	3
4	Organizational Innovation	5

Source: The questionnaire of this study

Part III consists of four subsections with a total of 16 questions, as indicated in table 1. The Likert scale associated with this part are:

1. Very Unsuccessful
2. Unsuccessful
3. Similar
4. Successful
5. Very Successful

This part has an important feature in that, the questions are presented in a way that establish relative measurement which compares the relative performance of Ethiopian Airlines in reference to the industry average and competitors' performance.

Table 3: Components of questions related to performance

No.	Performance	Total number of questions
1	Financial Performance	4
2	Customer Performance	4
3	Internal Business Process Performance	4
4	Learning and Growth Performance	4

Source: The questionnaire of this study

As mentioned earlier, these components of questions related performance are directly taken from the Group level BSC of ETG. Hence, when part II and III considered together, technically the quest is how the different types of innovation activities of ETG have affected the Group level BSC of the Airline.

3.7. Validity and Reliability

3.7.1. Validity

The researcher has used two different sources of data and data collection methods. That is, the researcher derived data both from questionnaire survey on the opinion of employees at different level in the innovation value stream of Ethiopian Airlines Group, as well as it uses an independent statistical analysis to assess the innovation status of the Airline as per the standard set forward by the Oslo Manual Fourth Edition (OECD & Eurostat, 2018).

Moreover, the research instrument is adopted from references that are widely used by researchers who study the effect of innovation on firm performance (Atalaya et al., 2013).

For the performance part, the existing BSC of the Ethiopian Airlines Group was used. The researcher received the BSC of ETG at group level from the company, so that the exact and ratified factors are considered on the research for validity reasons.

3.7.2. Reliability

Reliability is a measure of consistency which tests if measures produce similar results under consistent condition. As this study used structured questionnaire, the researcher tested the

questionnaire for reliability and calculated using the Cronbach's alpha coefficient (Cronbach, 1951). The Cronbach Alpha Coefficient has a range between zero and one. The rule of thumb in assessing reliability through Cronbach Alpha is that, those values below 5 are not acceptable. Those ranging from 5 to 8 are in the acceptable range and values above 8 are considered very reliable tests.

Table 4: Summary of scale and Cronbach's alpha values

No.	Variables of the study	Number of items	Cronbach's alpha values
1	Product Innovation	4	0.831
2	Process Innovation	3	0.808
3	Marketing Innovation	3	0.819
4	Organizational Innovation	5	0.829
5	Performance	16	0.858

Source: survey questionnaire, 2021

3.8.Method of Data Analysis

Since this research has basically used descripto-explanatory model, which has both descriptive and explanatory design as well as data from primary and secondary sources, the analysis has two parts. These two separate analyses are aimed at giving the study an advantage of triangulation.

Part one of the analysis used descriptive analysis based on the secondary data received from Ethiopian Airlines Group on the different types of innovation works conducted in the three semi-annual periods that encompass the period of Covid19, since its emergence as a global emergency.

Part Two of the analysis uses regression analysis using SPSS version 26, in which all the necessary tests are conducted to ensure the quality of the analysis.

For the analysis in part two, the general multiple regression model is given by

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \epsilon_i$$

Where: Y_i is dependent variable for i^{th} observation; X_i is independent variable for i^{th} observation;

B_0 is the intercept; β_n are regression coefficients; and ϵ_i is the error term for i^{th} observation

The multiple regression was conducted with the model indicated below. Based on the conceptual framework, the regression equation will be as follows

$$ETGPc19 = \beta_0 + \beta_1 \text{ProductINNc19} + \beta_2 \text{ProcessINNc19} + \beta_3 \text{MktINNc19} + \beta_4 \text{OrgINNc19} + \epsilon_i$$

Where:

Dependent variables:

ETGPc19 = Performance of Ethiopian Airlines Group during the Covid19 airline industry challenge period

Independent Variables

ProductINNc19 = Product Innovations in Ethiopian Airlines Group during the Covid19 airline industry challenge period

ProcessINNc19 = Process Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

MktINNc19 = Marketing Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

OrgINNc19 = Organizational Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

3.9. Ethical Consideration

As indicated by Creswell (2009), this research has fully considered the ethical foundations for conducting a research work, such as: Right to Choose, right to safety, right to be informed, right to privacy, confidentiality.

Moreover, in doing studies with regards to the innovation of a business entity, caution must be given not to breach the trade secrets of specific innovations, in which the contents are not ready to be shared (OECD & Eurostat, 2018).

Accordingly, the researcher has done all applicable to ensure the right to choose, right to safety, right to be informed, right to privacy and confidentiality. Moreover, this thesis doesn't illustrate detail contents of specific innovations that are being used by Ethiopian Airlines Group which are currently kept as trade secrets.

CHAPTER FOUR

ANALYSIS, DISCUSSION AND INTERPRETATION

4.1.Introduction

The analysis part is divided in two three major sections. While the first subsection is dedicated to descriptively analyzing the innovation activities of ETG, whereas the second and third subsections respectively showcase the linear relationship and causal relationships between the dependent and independent variables.

4.2.Descriptive Analysis

Descriptive analysis was conducted with two sources of data, namely primary and secondary. The subsection 4.2.1 illustrates the mean values of each dependent and independent variables. Whereas, subsection 4.2.2 describes the relative percentage of innovation types implemented in Ethiopian Airlines Group during the three semiannual periods since the emergence of Covid19 as a global health emergency.

4.2.1. Descriptive Analysis with primary data

In this section, the mean values of the dependent and independent variables is presented to build insight on the relative scores. As indicated in the table below, from the four types of innovation, process innovation has the highest mean value whereas marketing innovation has the lowest. Product innovation also have a higher mean value, relatively.

Table 5: Mean values of dependent and independent variables, 2021

Descriptive Statistics		
	N	Mean
ProcessINnc19	49	3.4898
ProductINnc19	49	3.4082
MktINnc19	49	2.8929
OrgINnc19	49	3.1184
ETGPc19	49	3.1148
Valid N (listwise)	49	

Source: Own Survey, SPSS v26 output, 2021

4.2.2. Descriptive analysis with secondary data

This part of the study constitutes the analysis to answer the first research question and compares the results with the descriptive data presented in section 4.2.1.

Using the framework provided in Oslo Manual, Fourth Edition, analysis was conducted to determine the innovation status of Ethiopian Airlines Group, for each of the three reporting periods, described in section 3.2.

The results show that, several innovation activities were done in all the three semi-annual periods, under study.

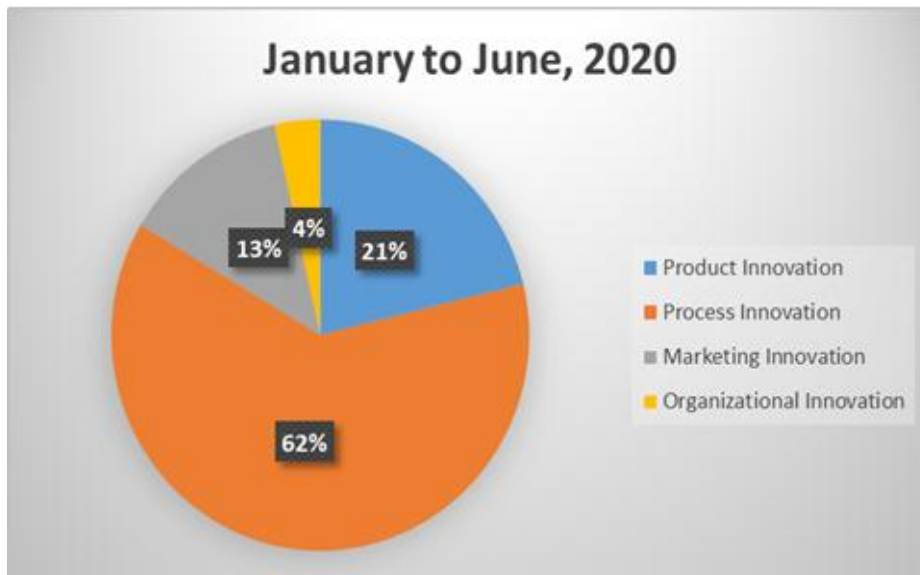
The charts below show the percentage share of different innovation types among innovation activities that yield in implemented innovations.

Innovation outputs in each of the three semiannual performance periods covered in the study are portrayed below.

i. Semi-annual Performance Period from January 1 to June 30, 2020.

In this semi-annual performance period, it is verified that there were both innovation activities and innovation outputs in all the four types of innovation.

Figure 7: Implemented Innovation Projects from January to June, 2020



Source: Own calculation based on data from Ethiopian Airlines Group, Unpublished

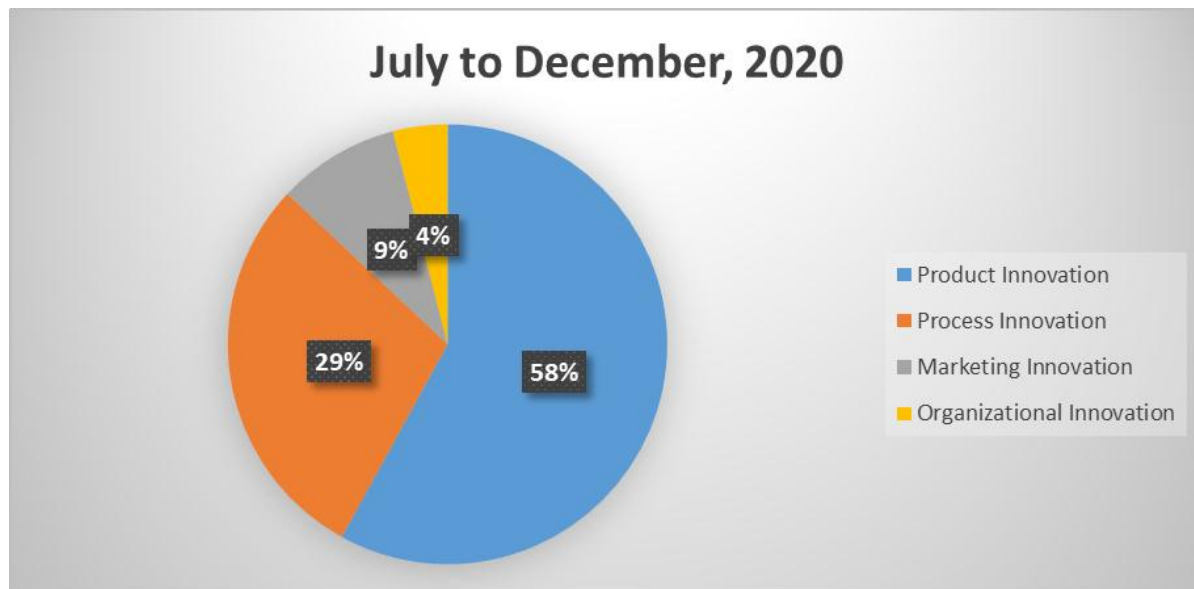
Whereas, it can be seen that there is a difference in the relative share of the four innovation types in the total number of innovation outputs conducted in this specific period. In this period, more

process innovations were rolled out, whereas Figure 7 displays that product marketing and organizational innovations together were less than 40% of the total innovation outputs.

ii. Semi-annual Performance Period from July 1 to December 31, 2020.

As shown in Figure 8, in this period too, ETG had rolled out innovations. Particularly, this semiannual period exhibited a relatively higher share of product innovation as referenced from the total number of innovations rolled out.

Figure 8: Implemented Innovation Projects from June to December 2020



Source: Own calculation based on data from Ethiopian Airlines Group, Unpublished

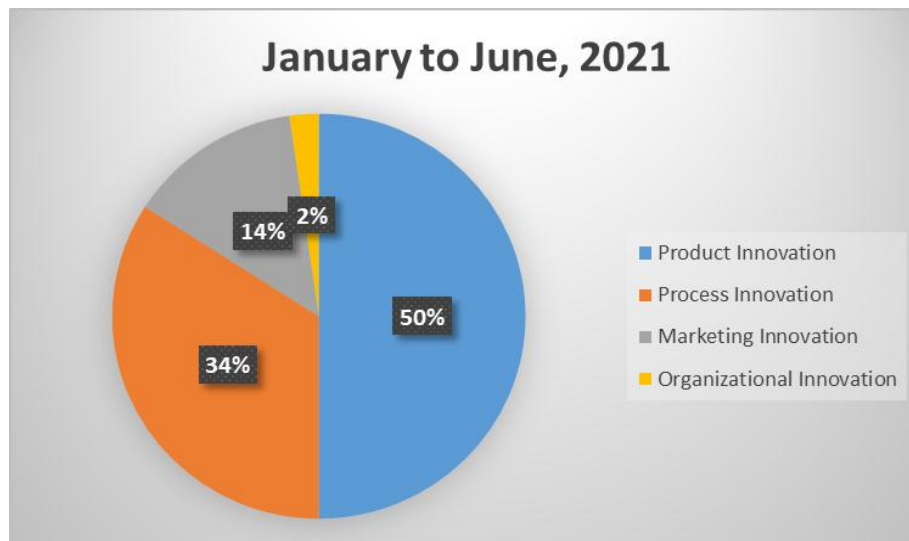
iii. Semi-annual Performance Period from January 1 to June 30, 2021.

In this semi-annual performance period also, ETG had embarked on innovation activities that yield different innovations, in the four types of innovation though in different relative shares. Figure 9 portrays the relative share of the four innovation types that were rolled out in this specific semiannual period. Once again, the data shows that process innovation takes the majority followed by product innovation, where organizational innovation has the smallest share in number of innovations.

Since this is a descriptive analysis, no inference can be taken to judge the impact of a given innovation type on the overall performance, by only looking at the relative share it has from the total number of innovations. However, this data is sufficient enough to classify the company as

innovation active, innovative or non-innovation/non-innovation-active firm, as per the Oslo Manual Fourth Edition (OECD & Eurostat, 2018).

Figure 9: Implemented Innovation Projects from January to June, 2021



Source: Own calculation based on data from Ethiopian Airlines Group, Unpublished

Based on the criteria for a firm to be named innovation active and/or innovative firm is discussed in section 2.1.3.1 and Table 1. Accordingly, the results from the descriptive analysis show that Ethiopian Airlines Group satisfies the status of both innovation active and innovative firm in the observation period.

The descriptive analysis in the previous section 4.2, has yielded results instrumental in answering the first research question thereof as well as an input to proceed to answering the first research question. Hence, this part of the analysis constitutes the statistical analysis work to answer the second research question, which is stated in section 1.4.

4.3. Correlation Statistics

Before passing to the next session that displays the regression analysis, it would be beneficial to learn about the correlation among the variables of the study.

4.3.1. Correlation of Independent Variables with the Dependent Variable

In summary of the correlation analysis results presented in the table below, process innovation and product innovation have shown a positive and significant correlation with the dependent

variable at 99% confidence level. Whereas, the explanatory variable '*Marketing Innovation of ETG in the time of Covid19*' has displayed a negative correlation with the dependent variable at 99% confidence level. In the case of the independent variable '*Organizational Innovation of ETG in the time of Covid19*', the result shows a positive correlation with the dependent variable which is significant at 95% confidence level.

4.3.2. Correlation between the independent variables and Components of the Dependent Variable

In a more detailed look at the correlations of each components of the dependent variable with the independent variables, the independent variable '*Process Innovation of ETG in the time of Covid19*' has shown positive and significant correlations with not only the dependent variable but also individually with all its four components. In fact, the significance level of the correlation is at 95% for financial performance, whereas it is at 99% confidence level for the rest of the components of the performance, namely, customer performance, Internal Business Process Performance and Learning & Growth Performance in the time of Covid19. On the other hand, though the independent variable '*Product Innovation of ETG in the time of Covid19*' has shown a positive and significant correlation with the dependent variable '*Performance of ETG in the time of Covid19*' at 99% confidence level, however it didn't show significance of correlation with the individual components of the dependent variable, neither at 99% nor at 95% confidence level. However, it still has a positive relationship. Contrariwise, the independent variable '*Marketing Innovation of ETG in the time of Covid19*' has shown negative correlation with all the components of dependent variables, where the correlation is significant at 95% for all components of the dependent variable except for financial performance, which found to be insignificant at 95%. Whereas the remaining independent variable, '*Organizational Innovation of ETG in the time of Covid19*' has shown insignificant correlation with all the components of the dependent variable, at 95% confidence level, though it has a positive sign.

Table 6: Correlation Statistics

Correlations										
		Process INNC19	Product tINNC1 9	MktINNC 19	OrgIN Nc19	FPc19	CPc19	BPPc 19	LDPc 19	ETGPc 19
Process INNC19	Pearson Correlation	1	.063	-.314*	.058	.336*	.555**	.569**	.526**	.592**
	Sig. (2-tailed)		.668	.028	.694	.018	.000	.000	.000	.000
	N	49	49	49	49	49	49	49	49	49
Product INNC19	Pearson Correlation	.063	1	-.365**	-.004	.264	.159	.121	.156	.456**
	Sig. (2-tailed)	.668		.010	.977	.066	.274	.408	.285	.001
	N	49	49	49	49	49	49	49	49	49
MktINNC c19	Pearson Correlation	-.314*	-.365**	1	-.093	-.122	-.307*	-.317*	-.297*	-.426**
	Sig. (2-tailed)	.028	.010		.527	.405	.032	.027	.038	.002
	N	49	49	49	49	49	49	49	49	49
OrgINNC c19	Pearson Correlation	.058	-.004	-.093	1	.136	.095	.160	.193	.307*
	Sig. (2-tailed)	.694	.977	.527		.353	.518	.273	.184	.032
	N	49	49	49	49	49	49	49	49	49
FPc19	Pearson Correlation	.336*	.264	-.122	.136	1	.240	.276	.173	.346*
	Sig. (2-tailed)	.018	.066	.405	.353		.097	.055	.236	.015
	N	49	49	49	49	49	49	49	49	49
CPc19	Pearson Correlation	.555**	.159	-.307*	.095	.240	1	.925**	.936**	.855**
	Sig. (2-tailed)	.000	.274	.032	.518	.097		.000	.000	.000
	N	49	49	49	49	49	49	49	49	49
BPPc19	Pearson Correlation	.569**	.121	-.317*	.160	.276	.925**	1	.969**	.885**
	Sig. (2-tailed)	.000	.408	.027	.273	.055	.000		.000	.000
	N	49	49	49	49	49	49	49	49	49
LDPc19	Pearson Correlation	.526**	.156	-.297*	.193	.173	.936**	.969**	1	.889**
	Sig. (2-tailed)	.000	.285	.038	.184	.236	.000	.000		.000
	N	49	49	49	49	49	49	49	49	49
ETGPc 19	Pearson Correlation	.592**	.456**	-.426**	.307*	.346*	.855**	.885**	.889**	1
	Sig. (2-tailed)	.000	.001	.002	.032	.015	.000	.000	.000	
	N	49	49	49	49	49	49	49	49	49
*. Correlation is significant at the 0.05 level (2-tailed).										
**. Correlation is significant at the 0.01 level (2-tailed).										

Source: Own Survey, SPSS v26 output, 2021

4.4. Regression Analysis

4.4.1 Diagnosis Test Result

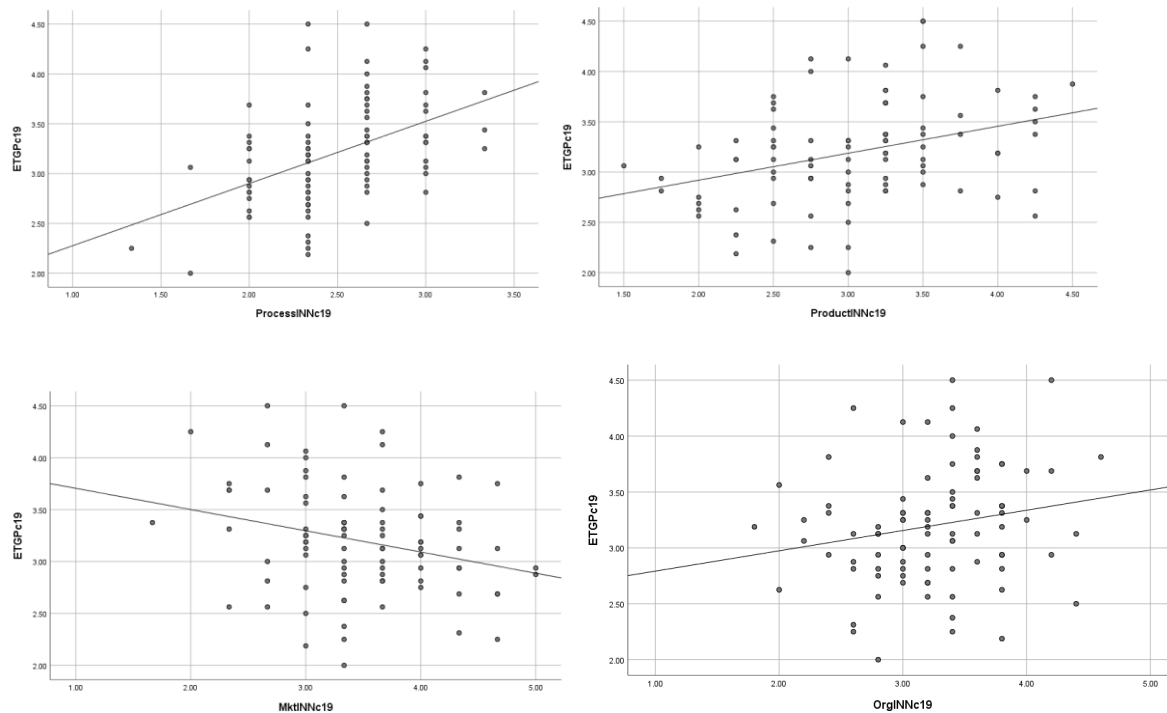
At the outset, the researcher has conducted diagnosis tests in order to avoid the potential of invalid results. Accordingly, this model has shown soundness based on the tests described in this section.

4.4.1.1. Linearity

The researcher applied a scatter plot diagram with line of fit, in order to find out the linearity of the relationship between the dependent variable (ETGPc19) and the independent variables (ProcessINNc19, ProductINNc19, MktINNc19 and OrgINNc19).

The results of the analysis revealed that the linearity condition is met.

Figure 10: Scatter Plot with Fit Line



Source: Own Survey, SPSS v26 output, 2021

Note: The result of scatter plot diagram with line of fit confirmed that a linear relationship existed between the dependent variable and those four independent variables.

4.4.1.2. Normality

The other important assumption that needs to be verified, in proceeding to a multiple regression analysis with ordinary least square (OLS) method, is that the assumption of a normally distributed source of sample data (Keith, 2006).

By taking into account the size of the sample, which is less than 50, the appropriate test selected is Shapiro-Wilk test of normality. As can be seen from Table 6, the Shapiro-Wilk revealed the p-value for all variables is above 5%. From this result, it can be inferred that normality is maintained.

Table 7: Taste of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
ProcessINNc19	.968	49	.209
ProductINNc19	.979	49	.522
MktINNc19	.970	49	.232
OrgINNc19	.978	49	.481
ETGPc19	.954	49	.054

Source: Own Survey, SPSS v26 output, 2021

4.4.1.3. Multicollinearity

The researcher has tested for multi-collinearity using the VIF method. Garcia et al. (2015) has indicated that The Variance inflation factor (VIF), most preferably less than 5 and in general less than 10, can be used to verify non-existence of multi-collinearity problem (García et al., 2015). As such, Table 8 indicates that variables in this model do not have a multi-collinearity problem.

Table 8: Variance Inflation Factor Test

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.401	.684		.587	.560		
ProcessINNc19	.370	.070	.522	5.256	.000	.898	1.114
ProductINNc19	.334	.087	.390	3.842	.000	.862	1.160
MktINNc19	-.089	.100	-.095	-.888	.379	.775	1.290
OrgINNc19	.255	.090	.269	2.845	.007	.989	1.011

a. Dependent Variable: ETGPc19

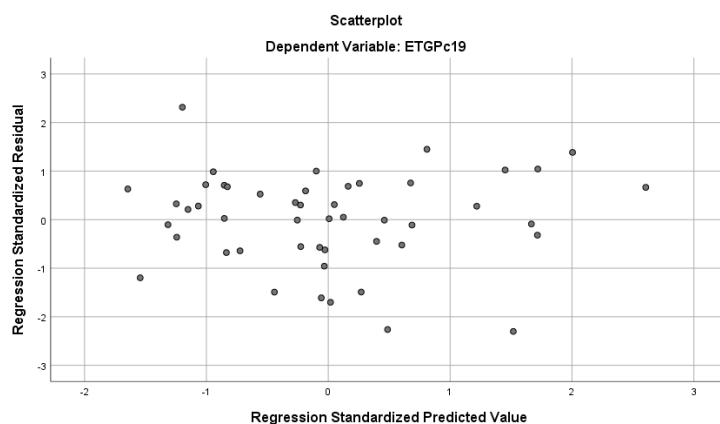
Source: Own Survey, SPSS v26 output, 2021

4.4.1.4 Homoscedasticity

The researcher has assessed one of the key assumptions to conduct the linear regression analysis, which is Homoscedasticity. The assumption is that every disturbance has an unknown and the same dispersion (Stephen and Rechar, 1965).

To check this if this assumption holds in the data, the researcher used the Scatterplot method by using SPSS, version 26.

Figure 11: Scatter plot of Standardized Residuals



Source: Own Survey, SPSS v29 output, 2021

As it can be seen in Figure 10 above the standardized residuals are evenly confirming that the data has no heteroscedasticity problem.

4.4.1.5. Autocorrelation

The assumption of Autocorrelation indicates that when observations are made over time, the effect of the disturbance occurring at one period dose not carry-over into another period. In this regard the Durbin-Watson statistics is used to test Autocorrelation (White, K., 1992). Accordingly, the researcher has used the Durbin-Watson statistic to check Autocorrelation on the data of the study. Consequently, according to the acceptable range of this test, the value 2.113 shown in table below, is found to be acceptable.

Table 9: Durbin-Watson Statistics

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.781 ^a	.610	.575	.36600	2.113
a. Predictors: (Constant), OrgINNc19, ProductINNc19, ProcessINNc19, MktINNc19					
b. Dependent Variable: ETGPc19					

Source: Own Survey SPSS v26 output, 2021

4.4.2. Regression Analysis

Once the assumptions were thoroughly checked, as indicated in section 4.2., regression analysis was conducted using the model specified in section 2.8. that is

$$ETGPc19 = \beta_0 + \beta_1 \text{ProductINNc19} + \beta_2 \text{ProcessINNc19} + \beta_3 \text{MktINNc19} + \beta_4 \text{OrgINNc19} + \epsilon_i$$

Where:

Dependent variables:

ETGPc19 = Performance of Ethiopian Airlines Group during the Covid19 airline industry challenge period

Independent Variables

ProductINNc19 = Product Innovations in Ethiopian Airlines Group during the Covid19 airline industry challenge period

ProcessINNc19 = Process Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

MktINNc19 = Marketing Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

OrgINNc19 = Organizational Innovation in Ethiopian Airlines Group during the Covid19 airline industry challenge period

The results of the regression analysis are shown in tables 10, 11 and 12.

Table 10: Regression Analysis Results

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.401	.684		.587	.560
	ProcessINNc19	.370	.070	.522	5.256	.000
	ProductINNc19	.334	.087	.390	3.842	.000
	MktINNc19	-.089	.100	-.095	-.888	.379
	OrgINNc19	.255	.090	.269	2.845	.007
a. Dependent Variable: ETGPc19						

Source: Own Survey, SPSS v26 output, 2021

Table 11: Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.781 ^a	.610	.575	.36600	.610	17.203	4	44	.000
a. Predictors: (Constant), OrgINNc19, ProductINNc19, ProcessINNc19, MktINNc19									

Source: Own survey and analysis, SPSS V26 output, 2021

Table 12: ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.218	4	2.304	17.203	.000 ^b
	Residual	5.894	44	.134		
	Total	15.112	48			
a. Dependent Variable: ETGPc19						
b. Predictors: (Constant), OrgINNc19, ProductINNc19, ProcessINNc19, MktINNc19						

Source: Own Survey, SPSS v26 output, 2021

As can be referred from the results included in Table 4.7, the adjusted R-Squared is 0.575, which indicates that 57% of the change in Ethiopian Airlines Group's performance, in the observation period, is explained by changes in the explanatory variables. The F test with p value 0.00 (which is less than one) indicates that the regression model is a good fit.

In general, the result has shown that innovation has a positive and significant role in the performance of Ethiopian Airlines Group during the period of industry challenge that followed the emergence of the Covid19 pandemic. Specifically, the regression result shows that, among the four types of innovation, product, process and organizational innovation have a significant

role in the performance of the Airline during the study period, whereas marketing innovation has shown to be of insignificant in explaining changes in the performance variable. As compared to the empirical studies discussed in section 2.2, the results of this study agree with that of Atalaya et al. (2013) in terms of which innovation variables found to have a significant effect on firm performance.

4.5. Interpretation of Results

The results in the preceding sections have revealed that innovation has significant effect on Ethiopian Airlines Group's performance in the time of Covid19, in which time the major business offerings of an Airline, such as scheduled passenger flight services, were significantly reduced thereby impacting many airlines to the extent of bankruptcy.

As it was shown in the descriptive analysis of the analysis, Ethiopian Airlines Group has embarked on different innovation projects but with the fact that the overwhelming majority of accomplished projects in the observation period are process and product innovations. While the question of why the Airline was engaged in more numbers of a given type of innovation over the other is not the purpose of this study, however, it is important to consider the fact that the period is where Airlines were going bankrupt and others fight for survival. Such industry scenarios call for extraordinary consciousness to cost-effectiveness and cost saving innovative processes as well as coming up with new product offerings based on the changes in the industry trends.

CHAPTER FIVE

Summary Conclusion and Recommendation

This chapter is dedicated to portray the inferences that can be drawn from the previous chapter of analysis, and thereby to put forward logical recommendation that are based on the understanding provided by the conclusions of this study. Moreover, a suggestion is indicated in consideration of future researchers who might be interested to conduct studies on this particular topic or a broader scope.

5.1. Summary of the Findings

The descriptive analysis part was focused on answering the first research question that required a descriptive analysis of secondary data, which is instrumental in assessing and determining the innovation status of Ethiopian Airlines Group as a firm. Hence, based on the criteria set by the Oslo manual (OECD & Eurostat, 2018). The result has shown that Ethiopian Airlines Group was both an innovation active and an innovative firm in the study period. Besides, the descriptive analysis has provided more information useful to classify the implemented innovations by category of four: namely product, process, marketing and organizational innovations implemented in the three semi-annual periods that the study period covers. As described earlier, this period covers second semiannual of 2019/20, first semiannual period of 2020/21 and second semiannual of 2020/21 which ended on June 30, 2021. The results have shown that process and product innovations were the dominant type of innovations being implemented in Ethiopian Airlines Group during all the three parts of the observation period. Moreover, the descriptive analysis on the primary data also showed that process and product innovation have the highest mean values.

The correlation analysis has shown that, all the four types of innovation are significantly correlated to the dependent variable – Performance of Ethiopian Airlines Group during Covid19. Except for marketing innovation which is negatively correlated, the rest three types of innovation are positively correlated to the dependent variable. However, when the causal relationship is examined with regression analysis, the effect of this negatively correlated variable is found to be statistically insignificant.

The regression analysis has yielded an evidence needed to answer the third research question, which is the effect of innovation activities on the performance of Ethiopian Airlines Group during the study period. The period specifically covers the period of the first three semi-annual periods in which the global Airlines Industry has suffered the impact of Covid19. With regards to specific variables, the analysis has shown that process innovation and product innovation had a positive and statistically significant effect with $\beta = 0.522$ and $\beta = 0.39$, respectively at $p < 0.01$ and adjusted $R^2 = 0.575$. Whereas, organizational innovation had a positive and statistically significant effect with $\beta = 0.269$ at $p < 0.05$ and adjusted $R^2 = 0.575$. However, as indicated above, the study revealed that the effect of marketing innovation was not significant in the performance of the Airline in the specified period. These results converge to findings of other researchers, such as, Atalaya et al. (2013), who have conducted study to assess the effect of innovation on firm performance in garment industries of Turkey, as reviewed in the empirical literature - section 2.2.

5.2. Conclusions

This study was conducted in light of the three research questions which entailed the scientific research process that followed. Essentially, the quest of the first research question was, to find out what the innovation status of Ethiopian Airlines Group was during the study period, based on the innovation status criteria set by the Oslo Manual Fourth Edition (OECD & Eurostat, 2018). This question was an essential research enquiry in logically answering the second and third research question that aims at understanding what the relationship and effect innovation has in the performance of ETG, during Covid19.

Hence, in reference to the first research question, the researcher has concluded that Ethiopian Airlines Group has qualified and satisfied the status of both innovation active and innovative firm during the study period. Hence, on this period, where there was a sharp decline in its core business activities, the innovation activities of the airline were yielding innovation outputs which enabled the Airline to qualify for innovation active and innovative firm status.

In reference to the second research question, the study has also concluded that all innovation types have significant correlation with the firm performance in Ethiopian Airlines Group, during the study period Covid19. In fact, unlike the other three innovation types, Marketing Innovation was negatively correlated to the performance of the Airline, during the study period.

In reference to the third research question, which enquires what effect innovation activities have on the performance of Ethiopian Airlines Group During Covid19, this study has concluded that innovation activities of ETG had significant and positive effect on the performance of the Airline.

Specifically, only Process, Product and Organizational Innovations are those types of innovation with significant effect on the performance of the Airline, in the study period. Marketing Innovation is found to be statistically insignificant to have effect on performance of the Airline, as shown by the regression analysis with primary data from the census survey on the innovation value stream of ETG.

Accordingly, the research has managed to drive conclusions on all the three research questions.

5.3. Recommendations

As indicated in the previous sections, the phenomena that inspired this study is the global impact of Covid19 on the Airline industry, and this phenomenon has not ended by the time this study is concluded. Consequently, the findings and conclusion of this study would have a relevance for real time decisions to be made in Ethiopian Airlines Group.

As indicated in the conclusion section, innovation had a significant and positive effect on the performance of Ethiopian Airlines Group, at a time its core business operations were halted significantly and many other Airlines gone bankrupted as per the information provided in section 1.1 of this thesis.

Accordingly, the researcher recommends that Ethiopian Airlines should give due attention to ways of expanding innovative inputs, in recognition of the significant and positive effect, especially in the process, product and organizational innovation areas.

Moreover, the researcher recommends that the Airline should conduct a root cause analysis on the reasons for both the insignificant effect and negative correlation of marketing innovation activities, as shown from the regression result and the correlation analysis.

Even though this study was focused only on the Covid19 period, the researcher recommends the Airline to assess and officially include its innovation status of each performance periods, on its annual reports. Given the results of this study, ETG's performance in the innovation spectrum should be considered among activities that significantly affect the overall performance.

5.4. Suggestions for Future Research

As indicated in the literature and the findings of this study, there are innovation works which do not make it to fruition. Since it wasn't the purpose of this study, the researcher preferred not to get into the details of investigating the reasons why some innovation works succeed and bring about results that contribute to the performance of the firm while other innovation works couldn't be implemented. Consequently, this could be an interesting area for future researchers that would further consider the relationship of innovation and firm performance.

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APPENDIX A:

Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE GRADUATE PROGRAM

MASTERS OF ARTS IN BUSINESS LEADERSHIP

Dear Respondent:

Currently, I am working on a research in partial fulfillment of a Master's Degree in Business Leadership, from School of Commerce, Addis Ababa University. This study tries to assess the role of innovative activities in the performance of Ethiopian Airlines Group during the Covid19 Global Airline Industry Crisis.

Cordially, I hereby request for your cooperation in completing this questionnaire, which will be used as input for the study I am conducting as part of requirement for master's degree in Business Leadership from Addis Ababa University. The researcher hereby confirms that the purpose of this questionnaire is purely academic. Accordingly, privacy is strictly maintained, and the respondent is encouraged to remain anonymous.

Note

The questionnaire has three parts, as indicated below.

Part I: General Information

Part II: Questions related to innovation activities that might have took place in Ethiopian Airlines Group during the Covid19 Crisis

Part III: Questions on performance of Ethiopian Airlines Group during the Covid19 Crisis, as compared to the industry average and performance of regional competitors

With Very Best Regards!

Part I General Information					
1. Sex a. Male b. Female					
2. Age a. 30 and Below b. From 31 to 40 years c. From 41 to 50 years d. Above 51 years					
3. Educational Qualification a. Below Diploma b. Diploma c. Degree d. Masters and above					
4. Years of service in Ethiopian Airlines Group a. Below 5 years b. 6 to 15 years c. From 16 to 25 years d. Above 25 years					
Part II Questions related to innovation activities					
A. Question on Product Innovation					
In part two, the Likert scale adopted to answer the respective questions is indicted here. (1) Very Low (2) Below Average (3) Average (4) Above Average (5) Very High					
How do you rate Ethiopian Airlines Group’s innovation in the period of Covid19 Airline Industry crisis, as seen from the following perspectives	1	2	3	4	5

1. ETG's innovation to launch effective new and significantly improved services to seize opportunities in the change of trends attributed to emergence of the Covid19 pandemic.					
2. ETG's innovation to extend numbers of new product lines to harness untapped potentials of its strategic business units, in the period where the impact of Covid19 challenged the Airline industry					
3. ETG's innovation to enlarged new markets with NPD (new product development), in the period where the impact of Covid19 challenged the Airline industry					
4. ETG's innovation in launching customized products in accordance with changes in the market demands, particularly, in the period where the impact of Covid19 challenged the Airline industry					
B. Questions on Process Innovation					
(1) Very Low (2) Below Average (3) Average (4) Above Average (5) Very High					
How do you rate Ethiopian Airlines Group's innovation in the period of Covid19 Airline Industry crisis, as seen from the following perspectives?	1	2	3	4	5
1. ETG's innovation to implement new, effective and innovative processes that contribute to enhance efficiency, in the period where the impact of Covid19 challenged the Airline industry					
2. ETG's innovation to use new and significantly improved production techniques that gives it advantage over competitors, in the period where the impact of Covid19 challenged the Airline industry					
3. ETG's innovation to introduce new and significantly improved systems and/or tools that transform process for better output quality with cost saving - during the period of Covid19 Airline industry challenge					

C. Questions on Marketing Innovation					
(1) Very Low (2) Below Average (3) Average (4) Above Average (5) Very High					
How do you rate Ethiopian Airlines Group's innovation in the period of Covid19 Airline Industry crisis, as seen from the following perspectives?	1	2	3	4	5
1. ETG's innovation to introduce new and significantly improved (innovative) distribution methods, in the period where the impact of Covid19 challenged the Airline industry					
2. ETG's innovation to introduce new and significantly improved (innovative) promotion methods, in the period where the impact of Covid19 challenged the Airline industry					
3. ETG's innovation to continually enlarge potential demand markets with new and significantly improved (innovative) pricing techniques, in the period where the impact of Covid19 challenged the Airline industry					
D. Questions on Organizational Innovation					
(1) Very Low (2) Below Average (3) Average (4) Above Average (5) Very High					
How do you rate Ethiopian Airlines Group's activity in the period of Covid19 Airline Industry crisis, as seen from the following perspectives?	1	2	3	4	5
1. ETG's innovation in establishing new and significantly improved (innovative) reward systems, in the period where the impact of Covid19 challenged the Airline industry					

2. ETG's innovation in establishing new and significantly improved (innovative) work designs, in the period where the impact of Covid19 challenged the Airline industry					
3. ETG's innovation in adopting new and significantly improved (innovative) administration models aiming at NPD (New Product Development), in the period where the impact of Covid19 challenged the Airline industry					
4. ETG's innovation in introducing new and significantly improved (innovative) human resource management system for pursuing operational efficiency, in the period where the impact of Covid19 challenged the Airline industry					
5. ETG's innovation in introducing a new and significantly improved (innovative) organizational structure to realize opportunities from the changing industry trends associated with the Covid19 global airline industry challenge					
Part III Questions on Performance of Ethiopian Airlines Group during the Covid19 Crisis, as compared to the industry average and performance of regional competitors					
The Likert scale to be used in part I is given below. (1) Very Unsuccessful (2) Unsuccessful (3) Similar (4) Successful (5) Very Successful					
A. Questions on Financial Performance					

How do you rate the level of achievement of Ethiopian Airlines Group during the covid19 crisis period, in reference to the average global industry performance and/or compared to the performance of competitors?	1	2	3	4	5
1. In generating sales revenue					
2. In achieving cost saving and cost reduction					
3. In increasing profitability					
4. In increasing asset utilization					
B. Questions on Performance on Customer					
How do you rate the level of achievement of Ethiopian Airlines Group during the covid19 crisis period, in reference to the average global industry performance and/or compared to the performance of competitors?	1	2	3	4	5
1. Increasing flight punctuality					
2. Increasing customer satisfaction					
3. Increasing customer retention					
4. Increasing digital experience					
C. Question on Performance in Internal Business Process					
How do you rate the level of achievement of Ethiopian Airlines Group during the covid19 crisis period, in reference to the average global industry performance and/or compared to the performance of competitors?	1	2	3	4	5
1. Implementation of new processes that reduced production costs					

2. Implementation of new processes that reduced duration of production					
3. Technology for new service (product) development					
4. Introduction of new technology for new processes					
D. Question on Performance in Learning and Growth					
How do you rate the level of achievement of Ethiopian Airlines Group during the covid19 crisis period, in reference to the average global industry performance and/or compared to the performance of competitors?	1	2	3	4	5
1. Increment on employee happiness					
2. Gathering information about new services associated with new covid19 trends					
3. Gathering information about customers referring to emerging needs associated to Covid19					
4. Employee health monitoring					