

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

GRADUATE PROGRAM

IN PROJECT MANAGEMENT

Effects of Coronavirus (COVID-19) on Information and Communication Technology (ICT) Projects Implementation Performance: The Case of Ethiopian Airlines Group.

By Haile Gebresilassie Gebremdhin

Advisor: Dr. Dakito Alemu

March 2021

Addis Ababa, Ethiopia

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By Haile Gebresilassie Gebremdhin

ID No: GSD/8168/10

A Research Project Work Submitted to Addis Ababa University School of Commerce in Partial Fulfillment of the Requirement for Master of Arts in Project Management (MAPM)

Advisor: Dr. Dakito Alemu

March 2021

Addis Ababa, Ethiopia

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DECLARATIONS

I, Haile Gebresilassie Gebremedhin, with registration number GSD/8168/10, do hereby declare that this research project work entitled "**Effects of Coronavirus (COVID-19) on Information and Communication Technology (ICT) Projects Implementation Performance: The Case of Ethiopian Airlines Group**" is carried out by myself with the handy assistance and provision of my advisor Dr. Dakito Alemu. The research is my original work, and that it has not been submitted partially or in full, by any other person for an award of Master of Arts degree in any other university or educational institution.

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Approval Sheet

The undersigned to certify that they have read and hereby recommend to the Addis Ababa University School of Commerce to accept the research project work submitted by HAILE GEBRESILASSIE GEBREMEDHIN and entitled: "**Effects of Coronavirus (COVID-19) on Information Communication Technology (ICT) Projects Implementation Performance: The Case of Ethiopian Airlines Group,"** in partial fulfillment of the requirements for the award of a Master of Arts degree in Project Management.

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Acronyms

No	**Abbreviations**	**Descriptions**
1	ACI	Airports Council International
2	ADD	Addis Ababa
3	CDC	Centers for Disease Control and Prevention
4	CIO	Chief Information Office
5	CRM	Customer Relationship Management
6	CRS	Computerized Reservation System
7	COVID-19	Coronavirus Disease of 2019
8	EAA	Ethiopian Aviation Academy
9	EAL	Ethiopian Air Lines
10	ERP	Enterprise resource planning
11	ETG	Ethiopian Airline Group
12	EAL	Ethiopian Air Lines
13	FAA	Federal Aviation Administration
14	GDS	Global distribution systems
15	IaaS	Infrastructure as A Service
16	ICAO	International Civil Aviation Organization
17	ICT	Information and Communication Technology
18	IT	Information Technology
19	MRO	Maintenance and Repair Overhaul
20	MSI	Master System Integration
21	NBAA	National Business Aviation Association
22	NCBI	National Center for Biotechnology Information
23	PaaS	Platform as a Service
24	PMBOK	Project Management Body of Knowledge
25	PMI	Project Management Institutions
26	PRINCE	Projects IN Controlled Environments
27	PSS	Passenger Sales Services
28	SaaS	Software as a Service
29	SARS	Severe Acute Respiratory Syndrome
30	SD-WAN	Software defined Wide Area Network
31	SPSS	Statistical Package for Social Science
32	TWA	Trans World Airlines
33	VoIP	Voice Over IP Address
34	WHO	World Health Organization
35		

Table I: Acronyms

Abstract

This study concentrates on the effects of COVID-19 on ICT projects implementation performance in the case of Ethiopian Airlines Group IT division. Airline industries are more dependent on Information and Communication Technologies services, and enterprises are spending huge investment to design and deliver new infrastructure services and upgrade existing services, ICT projects are the most essential part of organization's business strategies. Accordingly, the overall objective of the research was conducted to investigate the major effects of COVID19 pandemic on ICT projects implementation performance and identify the other challenges of ICT projects performance in Ethiopian Airline Group IT division. The study adopted the descriptive research design with qualitative research approach for the appropriate completion of the study. The major findings of the study revealed that project knowledge areas such as time management, cost management, communication management, risk management, & procurement management have significant effects on the ICT projects implementation performance in Ethiopian Airlines Group IT division because of the COVID-19 pandemic. Hence, the researcher recommends Ethiopian Airlines Group IT division higher IT managements should give the top priority for the ICT projects implementation performance by using the identified effects of COVID-19 pandemic.

Key words: *Coronavirus, Covid-19, ICT, Airlines, Ethiopian Airlines, Project, Project management, Project implementation,*

CHAPTER ONE

1. INTRODUCTION

This chapter will describe and introduces the background of the study by providing background information about the research topic, background of the organization that introduces about the company, statement of the problem that explains the reason to study on the topic, objectives of the study to be achieved, and the research questions that must be raised to answer or meet the research's objectives. Significance of the study that highlights the importance of the research, scope and limitation of the study including definitions of terms for the study are also part of this section. Finally, this part of the research introductions will be ended-up by outlining of the organization of the rest of the chapters.

1.1. Background of the Study

The launch of technology is increasing the customers' expectation to build and increase their relationship with the organization. Understanding customers' preferences, ICT advancement and transformation help the Airlines re-engineer their commercial developments by addressing the industry challenges and opportunities and transform its practices to a customer-centric approach. This standard approach improves the connectivity and enhances the customers' happiness and advanced software functions provide real-time value to the customers (Shaik, 2018).

Over the years, technology has been transforming promptly as international atmosphere becomes greatly competitive and innovative business. The role of information communication technology has become very critical to all organizations to continue competitive in the market. According to Statista.com (Oct 2020) statistics, almost 4.66 billion people were active internet users as of Oct 2020, covering 59 percent of the worldwide population. Mobile has now become the most essential channel for Internet access global as mobile Internet users' account for 91 percent of total Internet users.

The aviation operations since decades are based on ICT industry. The aviation industry widely practices diversity of applications through the digitalization of different processes. A list of solutions can be determine improving Airlines industry control a variety of procedures, such as automated records, aircraft performance and flight planning optimization, crew administration or fuel efficiency. Other new facilities have in current periods become accessible, such as solutions for live flight tracing (Shaik, 2018).

ICT practice in air travel extends to reservation, planning, flight regulator, payments, radar setup, weight determination, equilibrium of aircraft, loading, altitude measurement, instrument landing, communication to ground-based beacons, message to ground-based stations, device readings and demonstration, caution signals, fire detection, engine performance monitoring, emergency operation, cargo tagging and tracking. Hence, trends in technology affects all industries; travel and aviation are no exception. To stay competitive, Airlines must use the newest technology to offer passengers for better travelling experiences. Some of the evolving technologies in the Airlines industry are connectivity; passenger loyalty; biometrics, sensors tracking technology, virtual reality, improving security, and cloud computing solutions.

Air transport has always been strictly connected with information communication technologies (ICT), benefiting from the technological developments and, at the same time contributing to its evolution. The modern customer is more familiar with ICT; they have access to information which made more sophisticated and demanding, requiring specialized and interactive services. The advancement of ICT designed and re-engineered the air travel industry globally. The air travel linked with travel business is greatly disjointed and varied, linking a "worldwide supplier community" with passengers/consumers being distributed globally. The evolution of ICTs demonstrated that concentrating data is key element in the improvement of air travel and tourism renovating circulation into an electronic marketplace (Buhalis, cited by Shaik, 2018).

Market environments and business advancements affect the development of any enterprise. The increase in traffic and competitive pressure has been badly affecting the financial sustainability of the Airline industry. The recent international market situations and business advancements combined with advancing technological fashions and consumer predilections are announcing more encounters than ever before. ICT computerization has eliminated obstacles and improved the landscape of air travel industry. It improves the business in reducing of costs, enhancing interactions with the consumers and users, and advancing the commercial performance in a sustainable way (Perez, 2017; cited by Shaik, 2018). ICT solutions and improved mobile technologies help Airlines to improve operational efficiency, customer service, increase safety and decrease costs penetrating every aspect of Airlines operation. Passengers are becoming ever more satisfied and they want to be connected everywhere, including in the air (Ethiopian Roadmap, 2019).

Information communication technology (ICT) creates essential modifications in the kind and functions of technology in the enterprise. It can provide influential strategic and persistent tools for companies which, if suitably applied and used, can bring about great benefits in promoting and firming their competitiveness. ICT contains all digital technology that supports individuals, businesses, and companies in using information. It includes all automated inventions that deal with information in digital form. Therefore, ICT is also involved with digital data storing, retrieval, and transmission (Porter, 2001).

1.2. Background of the Organization

Ethiopian Airlines Group, formerly Ethiopian Air Lines Inc. (EAL), was founded by the ruling of Emperor Haile Selassie I at the end of 1945. TWA, the U.S. giant that supported form several carriers in developing countries later World War II, was contracted for technical support. Though TWA controlled the board seats for a while, government of Ethiopia owned the entire Airline's equity. Ethiopian is the flag carrier of Ethiopia, the fastest developing Airlines in Africa. During the past seventy plus years of operation, Ethiopian has grown to be one of the continent's leading carriers, first class in efficiency and functioning success. Ethiopian Airlines commands the lion's portion of the Pan-African passenger and cargo transportation running the youngest and most modern fleet to 127 international and 21 domestic destinations passenger and cargo destinations across five continents. Ethiopian fleet consist of ultra-modern and natural pleasant aircraft such as Airbus A350, Boeing 787-8, Boeing 787-9, Boeing 777- 300ER, Boeing 777-200LR, Boeing 777-200 Freighter, Bombardier Q-400 double cabin with average fleet age of five years. In fact, Ethiopian is the first Airlines in Africa to own operate these aircrafts (Ethiopian Annual, 2019).

The Ethiopian Airlines Group structure will allow all the completely owned enterprises to follow combined long-term vision and mutual developing program while they deliver high excellence international standard services to their common consumers. The Ethiopian Airports Enterprise will continue its interior independence, its own marque, and its occupations playing a significant and fundamental role to incorporate services of all participants such as Airlines, immigration services, customs, security services, ground handlers and the other services to confirm that all deliver worldwide standard airport services to the end customer, the passenger. The passenger happiness will be the most essential focus of all service providers and international standard key performance indicators will be given to all stakeholders which will measure the standards.

The main goal is to improve the customer experience at airport to meet international standard and thereby making ADD airport the greatest connecting hub in Africa (Ethiopian Press, 2018). The successful operation of the first eight years of "Vision 2025" strategy has laid a solid basis for the fast, profitable, and sustainable growth of the coming years. Although the targets were much stretched, Ethiopian exceptionally remarkable success has enabled Airlines business to achieve all the targets except revenue in 2018/19 fiscal year. Hence, the early achievements of the targets are necessary to develop new strategic roadmap called Vision 2035.

Ethiopian Airline Group will be one of the top twenty most competitive and leading aviation group in the world by providing safe, secured, market driven, customer focused passenger, cargo transport & logistics services, Aviation training, Airport management, Aerospace manufacturing and tourism services by 2035. Ethiopian has the development strategy would scale up the growth of the Airlines and applying a 15-year strategic plan vision 2035 and would make Ethiopian $25 billion enterprise with more than two hundreds airplanes, and suit to the leading aviation group in Africa with nine strategic business units; Ethiopian International Services; Ethiopian Cargo and Logistics Services; Ethiopian MRO Services; Ethiopian Aviation Academy; Ethiopian Ground Services, Ethiopian Express Services, Ethiopian Airports and Ethiopian Skylight Hotel. Ethiopian is multi-award-winning Airlines recording an average growth of 25% in the past eight years (Ethiopian Annual, 2019).

The most difficult year because of the effects of COVID-19 pandemic, in its seven decades' history, the fiscal year 2019/20 was the most challenging year for Ethiopian Airlines because of the effects of COVID-19 pandemic. Ethiopian passenger services are almost fully suspended with only 5% remaining and Ethiopian has estimated a total loss of gross revenue of USD 985 million by the end of June 2020. So far, it is managing the crisis with its own money and operation without any layoff or salary reduction but may not be able to continue as crisis is deepening further. During first half year 2020, freighters services will utilize that are converted to load cargo in the cabin. In the second half of the fiscal year, if passenger travel demand will start to normalize, freighter services will gradually decrease and use only eight of the converted aircraft to cargo. The coming fiscal year 2020/21 will be more challenging year than the last five months as the economic damage will deepen 2nd and 3rd wave of the COVID-19 pandemic spread may be occurred.

1.3. Statement of the Problem

Ethiopian Airlines Group's corporate ICT function will be the most competitive and leading service provider for its group members in Africa by 2035. With the vision of becoming World Class Airline for effective implementation of ICT projects, the company has studied and implemented strategy to manage ICT as a key business driver and competitive advantage by focusing on improved productivity, efficient service delivery, cost reduction, revenue generation, operational safety and quality, customer service and improved decision-making capability which is based on ICT applications and Infrastructure (Ethiopian Vision, 2035). Ethiopian is one of the pioneers in introducing Computer Technology in the country using punch card for its operation in 1960's. ICT has simplified and transformed its wide range Airlines business functions. Accordingly, the continuous investment on ICT including on process and people will indeed further modernize the entire system and will have profound and far-reaching result in the overall operations and competitiveness of the Airlines (Ethiopian Annual, 2019).

Seeing this fact, Ethiopian Airlines Group has recently embarked on implementing major ICT systems to facilitate its marketing, strategic and operational management to support its vision and growth strategy. The various ICT systems implemented in earlier few years are critical strategic assets contributed by IT division in Ethiopian growth, profitable and sustainable strategic journey, as they assist in introducing best practices, customer satisfaction, cost reductions and maximize efficiency and effectiveness as well as bring greatest benefits in encouraging and strengthening Ethiopian Airlines Group competitiveness (Ethiopian Annual, 2019).

Now a days, Ethiopian Airlines Group continued implementing key ICT solutions like Star Alliance related ICT solutions, booking engine upgrade, mobile application booking, automated exchange and refund, web check-in, mobile App check-in, Traveler Notification Service, Sabre executive dashboard, Net Access (Sabre access via internet), the ultra-modern Boeing 787 e-enabling systems, the new version of schedule manager, Cargo weight and balance system, full Maintenix MRO system, IATA Simplified Interline Settlement System implementation. The Master system integration (MSI) project, Human Resource Management, Logistics, Middleware, Corporate Portal, Data Warehousing, Business Intelligence & Global contact center enhancement are from the major projects and fully implemented (Ethiopian Annual, 2019).

The technology architecture will be strengthened in the next five-ten years by taking advantage of emerging technology and Airline industry trends with respect to general ICT infrastructure upgrade, Business support functions like Service Oriented Architecture, VoIP, IP telephony, hardware and Application virtualization, disaster recovery plan, Data security and identity management, IP broadband connectivity to or from aircraft, cloud computing, etc. IT investment with its implementation plan is essential to meet Ethiopian Vision 2035 targets. And promised in aligning with business strategic objective (Ethiopian Roadmap, 2019)

IT Division will base its management, governance, architecture, and operation on standard based practices as well as de-facto standards where no standard exist. Ethiopian will leverage Airline and ICT industry application development to access best practice solutions. Since Airline as an industry is quite matured, Ethiopian will look forward to absorbing best practices embedded in the ICT solutions both in terms of industry standard processes and technologies. The same can also be accessed using the vendor experienced in Airline industry.

Gradually the IT division aims to evolve into a separate operational organization and profit center capable of not only meeting Ethiopian's ICT needs, and able to generate revenue by providing expertise services to local and African Airlines industry. By embracing emerging ICT trends like Cloud Computing, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Virtualization, VoIP, SD-WAN, and Ethiopian's ICT division will enable the different businesses of the Group to have faster go to market capability, be more productive and make better-informed decisions. At the same time, ICT projects implementation of these technologies will minimize ongoing support costs while maximizing the overall value derived from the investment (Ethiopian Roadmap, 2019).

In response to global COVID-19 pandemic, Ethiopian has been emphasizing the proposed safety procedures in its aircraft, operations, and customer service contact points to ensure its customers' health, comfort and provide them with assurance when planning their travel. As part of COVID-19 control strategy, Ethiopian will temporarily close all its ticket offices in Ethiopia effective from 30 Mar 2020. The Ethiopian has made all necessary arrangements to continue providing the services via Ethiopian Mobile App, Website, Chatbot, E-mail, Social Media and Global Contact Center with improved flexibility, choice, and value (Ethiopian Press, 2020).

The technologies with multi-channel platforms enable customers' reservation and pay as well as request for adjustment on booking, 24/7 services with multiple alternatives. Ethiopian Airlines Group IT division currently there are many ICT projects under implementation (outsourced, in-house, upgrade, rollout, and installation projects). And some of the projects were on hold or suspended status in the case of COVID-19 pandemic that affects the Airlines business.

Some empirical studies were reviewed in relation to the focus of ICT projects implementation. Challenges influencing implementation of emerging ICT technologies, (Ashioya, 2014) that concludes with employee attitudes towards these new technologies should be managed in much better way and employees should be involved from early stages of planning. Assessing factors affecting implementation of ICT projects in government agency, (Nancy**,** 2017) that finds top management support, characteristics of the people in project team and availability of resources for IT infrastructure are most significant factors influencing the implementation of ICT projects. Assessment of practices and factors influencing ICT projects implementation, (Meaza, 2018) that achieves project integration, cost, human resource, and procurement management in the implementation of the ICT projects are practiced at low level. And Assessing factors affecting success of ICT projects implementation in public sectors, **(**Ermias**,** 2018) that concludes top management commitment, proper planning, good communication, user involvement and technical team skill are major factors for successful ICT projects implementation.

The further the project is suspended; the additional capital will be spent on it (Larsen et al., 2016; Plummer-Braeckman et al., 2019). Some construction bodies have been compensating full-time or short-term contract workers throughout the lockdown, while the project that they were engaged in continued static. When workers return to work, they will not finish the project on time, thereby indicating that they will be employed to the project for an extra time at added cost. In general, nearly all construction projects have been harshly affected by the global COVID-19 pandemic, and the reality is that there will be project schedule overdues as well as budget overruns. Unavoidably, some construction projects will have to be suspended due to lack of financing because some project sponsors' foundations of funding were negatively influenced by COVID-19 pandemic. Consequently, construction project managers, project sponsors and specialists will have to re-plan, re-think, re-learn, adjust, and adapt to the unstable various issues related with the COVID- 19 pandemic to accomplish project objectives.

The COVID-19 pandemic has resulted in substantial disruptions and hardships across nations and industries. Like other industries such as Airlines, retail, and restaurants, the construction industry has also been affected in several ways. Through interviews, the current article focused on cataloging the early effects of COVID-19 pandemic as reported by construction stakeholders. The study findings identified that the construction industry experienced several adverse effects. These included material distribution delays, shortage of material, permitting delays, lower productivity rates, cash flow-related challenges, project suspension, price escalations, and potential conflicts and disputes (Alsharef A. 2021).

According to the global nature of the Airline business IT infrastructure and service is vital for running the operations smoothly and effectively throughout the entire organizational internal communication and external communication such as business to business (B2B) and business to customer (B2C). The previous studies have focused on the causes for project failure in various sectors rather than project success and have concentrated on time and cost overruns. The studies have supposed that if projects completion time exceeds its due date, or expenses overrun the budget, or results did not satisfy a company's programmed criteria then the project is a failure. From the literature review that projects might not meet one of these criteria and yet is regarded as success. In considering this, the main interest of this study is to identify and evaluate the effects of COVID-19 pandemic on ICT projects performance that are under implementation in Ethiopian Airlines Group IT division and fulfill the knowledge gap between the effects and the action taken during the COVID-19 pandemic by creating awareness and indicating the major influences to mitigate its worst case of ICT projects implementation performance in Ethiopian Airlines Group IT division.

Based on the above reviewed previous research there are no known studies by the researchers have attempted to the effects of COVID-19 on ICT projects implementation performance in aviation industry particularly in Ethiopian Airlines Group IT division. To the best of the researcher knowledge, there is no topic which is clearly related with the study area. Therefore, this study tries to answer the questions what the major effects of COVID-19 on ICT projects implementation performance in the case of Ethiopian Airlines Group IT division with different parameters like time, cost, communication, procurement, risk management, and other challenges.

1.2. Research Questions

1.2.1. General Research Question

To focus on the concerns disclosed under the statement of the problem section, the next research question was established. The central research question for the study is: What are the major effects of COVID-19 pandemic on the ICT projects implementation performance in Ethiopian Airlines Group IT division?

1.2.2. Specific Research Questions

To address the matters revealed under the statement of the problem, the subsequent specific research questions were developed. The specific research questions for the study are:

1) How COVID-19 pandemic affects ICT projects implementation performance in relation to project procurement, communication, risk, time, and cost management?
2) What are the other challenges of ICT projects implementation performance in Ethiopian Airline Group IT division?
3) What actions taken to effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division?

1.3. Objectives of the Study

1.3.1. General Objectifies

The general objective of this research is to assess the major effects of COVID-19 pandemic on ICT projects implementation performance in Ethiopian Airlines Group IT division.

1.3.2. Specific Objectives

To achieve the general objective of the study in details, the below specific objectives have stated:

1) To examine how COVID-19 pandemic affects ICT projects implementation performance in relation to procurement, communication, risk, time, and cost management in Ethiopian Airlines Group IT division.
2) To determine the other challenges on the ICT projects implementation performance in Ethiopian Airlines Group IT division.
3) To identify actions undertaken to mitigate the effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division.

1.4. Significance of the Study

The outcomes of this investigation will benefit several stakeholders, such as, Ethiopian Airlines Group, IT executives, other companies, and more researchers. Therefore, the study's findings will promote Ethiopian Airlines Group IT division to improve the ICT projects management strategies; the concerned upper management body will identify how ICT projects implementation is in line with the targeted mission and objectives of the Ethiopian Airline Group on the aviation industry. Future more, researchers can apply this research's result as the ground to investigate more effects about the ICT projects implementation performance during COVID-19 pandemic.

In addition to this, the study will have some involvement for further research of the case and will be important to professionals in developing better effects mitigation procedures in the ICT projects implementation performance during and after COVID-19 pandemic. It can also provide as reference material for additional studies on how to prepare for sudden challenges that affects the ICT projects implementation performance and linking it with project risk, time, cost, communication, and procurement to accomplish ICT projects implementation performance.

1.5. Scope of the Study

To make the study well manageable, the scope of this research is limited to IT division of Ethiopian Airlines Group, with the effects of COVID-19 pandemic for implementing ICT projects. This study will only focus and concentrates on evaluating the effects of COVID-19 on ICT projects implementation performance in the case of Ethiopian Airlines Group IT division. It is mainly emphases on five of project management knowledge areas: project time, cost, communication, risk, and procurement management and associate it with the effects of COVID-19 pandemic and attempt to assess their contribution to the ICT projects implementation performance in Ethiopian Airlines Group IT division.

Finally, the study will try to identify the effects faced with COVID-19 pandemic on ICT projects implementation performance and provide possible recommendation to mitigate the effects of COVID-19 pandemic within the Ethiopian Airlines Group IT division in the future time.

1.5.1. Geographical Scope

Ethiopian Airlines Group operates internationally and has several bureaus out of Addis Ababa as well as both domestic and international offices. This study utilized respondents from the Head Quarter where most of ICT projects will be executed. And due to the nature of the ICT projects, almost all the ICT projects team members work in the Head Quarter both for managerial and operational determination manner. Moreover, this study focused only on three major departments which will be responsible for all ICT projects in the Ethiopian Airline Group under IT division.

1.5.2. Conceptual Scope

The conceptual scope of the research is constrained to evaluating the effects of COVID-19 on ICT projects implementation performance. The investigation of the study is confined to the challenges of ICT projects implementation performance in Ethiopian Airlines Group IT division during COVID-19 pandemic. Hence the deductions drawn from this investigation are applied to ICT projects implementation performance enhancement and IT alignment in the Airline business. The respondents were selected from three departments under IT division. A descriptive and explanatory research design was utilized; interviews questions were used as an instrument to collect the primary data for the participants.

1.6. Limitation of the Study

The main limitation of this paper was absence of sufficient theoretical and empirical literature on the effects of COVID-19 pandemic on ICT projects implementation performance and related influences. The study has limited itself on assessing only the effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division. The potential constraints of the study are unable to include all ICT projects implemented in Ethiopian Airlines Group IT division. The study is focused about the most critical effects on ICT projects implementation performance only due to time constraint, and other limitations.

1.7. Definition of Terms

Coronavirus: is a type of virus. There are many different kinds, and some cause disease. A newly identified coronavirus, SARS-CoV-2, has caused a worldwide pandemic of respiratory illness, called COVID-19 (Lauran S. 2020)**.**

COVID-19: illness caused by a novel coronavirus (SARS coronavirus 2) (Lauran S. 2020).

ICT: refers to all the technology used to handle networks, broadcast media, intelligent building management, audiovisual systems, web-based control and monitoring functions (AIMS, 2020).

Airline: is a company that owns and operates many airplanes which are used for transporting passengers and goods to different places (Wiki, 2020).

Ethiopian Airlines: are the national Airline and the flag carrier of Ethiopia with its main hub at Bole International Airport during the past seventy plus years (www.ethiopianairlines.com).

Project management: is the art of planning, controlling, and executing a project in a way that ensures successful delivery of the desired outcome (PMBOK, 2013).

Project implementation: is about managing resources to deliver products and services, or deliverables of any projects (PMBOK, 2013).

ICT Project: is the configuration of networking and installation of new application, customer relationship management, enterprise resource planning system, and building IT infrastructure.

ICT project management is the process of planning, organizing and delineating responsibility for the completion of organizations' specific information technology goals (Ben C. 2015).

ICT Project implementation is the collection of techniques and methods that project managers use to plan, coordinate, and complete ICT projects.

1.8. Research Organizations

This study focused on the effects of COVID-19 on ICT projects implementation performance in the case of Ethiopian Airlines Group IT division. This study is divided into five chapters as follows: The first chapter discusses about the necessity of this study. It contains background of the study, statement of the problem, general and specific objectives, significance, and scope of the study with introductory remarks. The second chapter contains the review of published research papers for related study on the ICT projects implementation performance issues and influences of the COVID-19 pandemic on Airlines industry. The third chapter illustrates the methodology adopted for this study. It provides details of various analyzing approaches used for data analysis and the data collection strategy. The fourth chapter explains, presents, interprets, and discusses the descriptive and explanatory analysis results including the hierarchal assessment of effects of COVID-19 pandemic on ICT projects implementation performance in Ethiopian Airlines Group IT division. The final chapter discusses about the summary, conclusions, and recommendations with line of actions for future works to provide more benefits in achieving ICT projects implementation performance in Ethiopian Airlines Group IT division.

CHAPTER TOW

2. LITERATURE REVIEW

2.1 Introduction

This is the chapter where different literatures both the theoretical and empirical results, which have a relevance to the research topic, will be presented. In other words, this chapter will provide theoretical discussion, definition of concepts, terms, present others' works (empirical results) that are important to areas of Airlines business, aviation and tourism industries, project management, project implementation, and ICT projects implementation.

2.2. Novel Coronavirus (COVID-19) pandemic (2019)

2.2.1. What is COVID-19?

Coronavirus is a mild to severe respiratory disease that is produced by a coronavirus (Severe acute respiratory syndrome coronavirus 2 of the species Beta coronavirus), is spread mainly by interaction with infectious material (such as respiratory droplets) or with substances or surfaces polluted by the causative virus, is characterized especially by fever, cough, and shortness of breath and may progress to pneumonia and respiratory failure (Dictionary, 2020).

COVID-19 pandemic is an illness triggered by a new strain of coronavirus. 'CO' stands for corona, 'VI' for Virus, and 'D' for Disease. Previously, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV'. Coronavirus disease 2019 is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first discovered amidst outbreak of respiratory disease cases in Wuhan City, Hubei Province, China. It was initially reported on Dec 31, 2019. On January 30, 2020, they declared the COVID-19 outbreak global health emergency. On Mar 11, 2020, it declared COVID-19 as a global pandemic (WHO, 2019).

2.2.2. The COVID-19 pandemic's effects on aviation and tourism industry

Earlier the coronavirus, an average of more than 1 million people was flying by airplane at any given time. The pandemic decreased the number to less than 100,000 and looks at the numbers on the pandemic's influence on Airlines industry. The COVID-19 pandemic virus has distributed globally without recognizing boundaries. It has obstructed all industries, sectors, and aspects of our lives with destructive economic and financial losses and significant uncertainties.

According to UNWTO, Aviation industry revenues were $830 billion in 2019. These revenues were estimated at $872 billion in 2020. As the number of new contaminations continues to flood in every portion of the world, governments are working vigorously to slow the infections. Many countries have put a halt on long distance. On 5th of March 2020, the International Air Transport Association (IATA) has anticipated that COVID-19 pandemic could extremely interrupt the Airlines business and cause a loss of about US $ 113 billion (UNWTO, 2020). While the Airlines must halt flying due to major reduction of passengers' demand, the airport operator does not have many selections rather than to continue their operations and facilitate essential movement such as cargo flights. As stated by Airport Council International media release article, the recovery of overall aviation businesses could take more than 18 months to reach pre-crisis traffic levels. The same concern also highlights by ACI that a rapid and truthful response associated to global economic strategy is required to keep the essential airport operations which mean at the same time it will safeguard millions of jobs everywhere in the world (ACI, 2020).

Air transport is one of the sectors with the maximum distribution in production across companies and, to a lesser extent, in effectiveness. Airline businesses thus entered the crisis with amazingly different abilities to withstand such a shock and diverse possibilities for the future (OCED, 2020). The largest decline because of COVID-19 pandemic is expected in passenger travel per World Trade Organization's Services Trade Barometer 11. Ethiopian Airlines Group, the largest carrier in continent, the Airlines lost $550 million from January to April 2020 because of the coronavirus outbreak. By the end of March 2020, Ethiopian Airlines Group has suspended flights to ninety destinations across the world and the Airline is working only 10% of its flight capacity. As a result, further decline in revenue is forecasted that would last at least through June 2020.

Tourism industry is also fronting related challenges. According to the UNWTO newest estimate, there will be a projected fall of between 20-30% that could translate into decline in international tourism receipts of between US$ 300 to 450 billion, almost one third of the US$ 1.5 trillion produced in 2019. Getting into consideration the previous market styles, it displays that between five- and seven-years' worth of growth would be lost because of coronavirus pandemic. The exceptional establishment of travel limitations across the world, the global tourist arrivals will fall by 20% to 30% in 2020 when compared with 2019. Many millions of jobs in the Airlines industry are at risk of being lost as around 80% of all tourism businesses and enterprises.

2.3. What is a project?

A project is a temporary venture that exists to produce defined results. It is a series of single, complicated, and linked events with one purpose that must be finished by a given time, budget, and specification. Each project will have agreed and unique objectives as well as its own project plan, budget, timescale, deliverables, and tasks. A project may also include people from diverse teams within an organization who are brought together to complete a specific goal (PRINCE2).

According to the PMI (PMBOK, 2013), projects can drive change in the organizations to achieve an increase in business value. Projects enable business value, which is defined as the computable profit resulting from business endeavor. Leaders in organizations initiative projects in response to factors which influence their organization's ongoing operations and business strategies, and which also align with the strategic objectives of the organization, including: Meet supervisory, legal, or social requirements, satisfy participant requests or needs, implement change business or technological approaches; and produce, advance, fix products, procedures, or facilities. The project plan will have identified the time, cost, and resource availability needed to deliver the scope and quality of a project. In other words, the project is in stability at the achievement of the project preparation session and approval of the promise of resources and dollars to the project. That will not last too long, however change is waiting around the corner.

2.3.1 What is a project management?

Project management is a method and a set of techniques based on the accepted principles of management used for planning, estimating, and controlling work activities to reach a desired result on time, within budget and according to specification. Project management can be defined as the discipline of applying specific processes and principles to initiate, plan, execute and manage the way that new initiatives or changes are implemented within an organization. Project management is different to management of business-as-usual activity, which is an ongoing process, as it involves creating new work packages to achieve agreed ends or goals (PRINCE2).

Project management has been found as one of the most important aspects of the complete implementation process of projects. The main objective of project management is to make sure the projects finish in time, in the specified budget limit, with in defined scope and desired quality for achieving other project objectives. It is the use of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

2.3.3. The Project Management process groups

A Project management process group is a logical grouping of project management processes to achieve specific project objectives. These five process groups consist of the project management life cycle and are common for all projects. The specific phases within a project, however, are exceptional to each project and characterize the project life cycle (PMBOK, 2013).

Initiation process group: the project goal, need or problem is identified. The project manager is appointed to the project and the project charter is established.

Planning process group: the project manager and the project team coordinated to plan all the required stages to accomplish the successful project completion. The project planning procedures are iterative in nature and it is believed that planning will happen often during the project phase.

Execution process group: once the project plan has been established, the project team works about implementing the project plan to generate the deliverables of the project. The project can change to project planning as required during project implementation.

Monitoring and controlling process group: as the project is being implemented by the project team, the project manager supervises and controls the work for time, cost, scope, quality, risk, and other components of the project objectives.

Closing process group: at the end of each stage and complete project, project closure occurs to confirm that all the work has been achieved, is accepted, and eventually transferred ownership from the project team to operations.

2.3.4. The project Management Knowledge Areas

According to PMBOK, (2013), there are ten project management knowledge areas. These ten knowledge areas segment different actions completed by the project manager throughout the project. The ten project management knowledge areas are discussed below:

Project integration management: this special knowledge area is the coordination of the events in all the other knowledge areas. How well the project manager performs in one of knowledge directly affects the performance of the other knowledge areas. Project integration management examines the interactions & contingencies among the knowledge areas to ensure that the project is adequately planned, executed, controlled, and closed (PMBOK, 2013).

Project plan development: integrating and coordinating all project plans to create a consistent and articulate paper.

Project plan execution: considering the project plan by completing events contained there.
Project integrated change control: coordinating changes across the entire projects

Project scope management: the project scope is defined, documented, & approved. The project scope is protected from unauthorized changes, edited with approved changes, and validated by the project stakeholders for project acceptance (PMBOK, 2013).
Initiation: authorizing the project or phase
Scope planning: acquiring a written scope statement as grounds for future project findings.
Scope definition: segmenting project deliverables in to smaller and manageable pieces.
Scope verification: validating acknowledgment of the project scope.
Scope change control: managing modifications to the project scope.

Project time management: the project time is defined first by the working hours of the project, any project milestones, and ultimately project deadline. The project team's availability during the project is documented and planned. The project manager will work with them to identify the project tasks and task duration estimates to create project timeline (PMBOK, 2013).
Activity definition: recognizing the specialized events that must be completed to produce the several project deliverables.
Activity sequencing: categorizing and recording inter activities and dependencies.
Activity duration estimate: estimating the number of work times that will be required to achieve specific activities.
Schedule development: evaluating activity structures, durations, and resource needs to establish the project schedule.
Schedule control: managing modifications the project schedule.

Project costs management: the costs of the project are estimated so that a budget for the project can be assigned. Project costs include materials, services, facilities, software licenses, and other expenses attributed directly to the project (PMBOK, 2013).
Resource planning: determining what resources and what amounts of each should be used to execute project activities.
Cost estimate: establishing an approximate of the costs of the resources required to accomplish the project activities.

Cost budgeting: distributing the overall cost estimation to specific project activities.
Cost control: managing modifications to the project budget or cost.

Project quality management: what constitutes quality in the project is defined in specific metrics and agreed upon among the stakeholders as early in the project as possible. The project work to confirm that quality has been ascertained in the work (PMBOK, 2013).
Quality planning: distinguishing which quality specifications are important to the project and establishing how to satisfy them.
Quality assurance: assessing the overall project implementation on consistent basis to deliver assurance that the project will satisfy the important quality specifications.
Quality control: supervising specific project results to ascertain if they conform to important quality benchmarks and discovering ways to reduce causes poor performance.

Project human resources management: the project manager works with the project team to verify that each team member is completing their assignments, working well with others, and their participation and performance is reported to their respective managers (PMBOK, 2013).
Organizational planning: identifying, documenting, & assigning project roles, responsibilities, and reporting relationships.
Staff acquisition: obtaining human resources necessary assigned for working on the project.
Team development: creating individual and group skills to enhance project implementation.

Project communications management: stakeholders will need information from the project manager will need to provide information to the project manager throughout the project life cycle. This knowledge area creates a communications management plan that address that will need what information, when information is needed, and the best modality for communications.
Communications planning: determining the information requirements of the stakeholders, who needs what information, when they will how it will be given them?
Information distribution: preparing required information available to project stakeholders in a timely manner.
Performance reporting: gathering and distributing performance information. This encompasses status reporting, progress measurement, and predicting.

Administrative closure: producing, gathering, and distributing information to validate phase or project closure.

Project risk management: risks are situations, events, conditions that can threaten, and sometimes benefit, the objectives of the project. Risks must be identified, analyzed, and response created for the risk event. The probability and effects of each risk event is evaluated to create a risk score to justify the costs needed to manage the risk event (PMBOK, 2013).

Risk planning: deciding how to approach and plan risk management actions for the project.

Risk identification: ascertaining the risks that influence the project and recording their traits.

Qualitative risk analysis: performing qualitative analysis of risks & conditions to prioritize their effect on the project objectives.

Quantitative risk analysis: measuring the probability and consequences of risk and estimating their implications for project objectives.

Risk resource planning: developing procedure, techniques to improve chances and decrease threats to the project's purposes.

Risk monitoring and control: monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle.

Project procurement management: should the project need to purchase goods or services, a formal process for procurement will need to be created. The plan should address the project's selection of contract type, administration of the contract, purchasing audits, and contract closeout (PMBOK, 2013).

Procurement planning: determining what to procure and when.

Solicitation planning: documenting requirements and identifying potential sources.

Solicitation: obtaining quotations, bids, offers or proposals as appropriate.

Source selection: choosing from among potential sellers.

Contract administration: managing the relationship with the seller.

Contract closure: completion and settlement of contract, including resolve of open items.

Project stakeholder management: stakeholders are anyone that has a vested interest in the project. Stakeholder management is the identification, inclusion, and communication with the groups of project stakeholders (PMBOK, 2013).

Identify stakeholders: identifying the persons, parties, or companies that could influence or be affected by decision, activity, or outcome of the project.

Plan stakeholder engagement: developing appropriate and suitable management approaches to realistically involve stakeholders during the project life cycle.

Manage stakeholder engagement: collaborating and doing with participants to meet their needs anticipations, address problems as they happened.

Monitor stakeholder engagement: supervising the whole project participants' interactions and modifying approaches and plans for employing stakeholders.

These ten knowledge areas are to be managed iteratively throughout the project. Apart from procurement, a project manager will likely encounter all ten of these knowledge areas in every project. There is no set order in which the areas should be managed, but rather project manager shifts to the appropriate knowledge and processes based on what is occurring within the project.

2.3.5. What is project implementation?

Project implementation consists of carrying out the activities with the aim of delivering the outputs and monitoring progress compared to the work plan. Monitoring can be defined as control of the project implementation to keep the project on track and achieve the end results of the project. The project manager is responsible for regular monitoring of the project, but the partner organizations should also contribute actively to the effective monitoring of the project.

Project implementation (project execution) is the phase where visions and plans become reality. The implementation phase uses the most project time and resources; as a result, costs are usually the highest during this phase. Project managers experience the greatest conflicts over schedules in this phase. Project implementation phase is the third phase of project management life cycle. The implementation phase involves putting the project plan into action. It is here that the project manager will coordinate and direct project resources to meet the objectives of the project plan. As the project unfolds, it is the project manager's job to direct and manage each activity, every step of the way what happens in the implementation of the project life cycle (Press books, 2020).

2.3.6. What is ICT?

ICT is a wider term for IT, which indications to all communication technologies containing the internet, wireless networks, cell phones, computers, software, middleware, videoconferencing, social networking and other media applications and services enabling users to access, retrieve, store, transmit and manipulate information in a digital form (AIMS, 2020). ICT is involved with the storage, retrieval, manipulation, transmission, or receipt of digital data. Importantly, it is also involved with the method these different uses can work with each other. In business, ICT is often grouped into two broad types of products or services:

The term ICT is also used to refer to the conjunction of audiovisual and telephone networks with computer networks through a single cabling/link system. There are large commercial motivations to combine the telephone network with the computer network system using single unified system of cabling, signal distribution, and management. ICT is more precise term that emphasizes the role of unified communications and the integration of telecommunications computers as well as necessary enterprise software, middleware, storage, and audio-visual systems (Wiki, 2020).

2.3.7. What are ICT projects?

ICT projects are usually thought as purely a set of activities requiring hardware, networking systems, developing software and applications with the end goal of introducing technological changes. ICT projects can be any type of project that deals with IT infrastructure, information systems, and computer technology. This can include software development activities, such as programming mobile application or large-scale software system. ICT projects include designing organization's IT infrastructure, deploying systems, developing software, employing IT security, research and development, assessment and change management (Schwable, 2014).

2.3.8. What are ICT projects management?

ICT project management is a sub-discipline of project management in which ICT projects are designed, monitored, and regulated. ICT projects, like any projects, are a temporary attempt to accomplish the final objectives. ICT projects are usually thought as merely a set of activities requiring only hardware, networking infrastructure, software, and applications with the goal of introducing technological changes. ICT projects are receiving great attention in the Airlines industry because they touch almost everyone’s lives (Schwalbe, 2014).

IT project management is the practice of supervising the plan, organization, and responsibility to accomplish information technology objectives. Since the archive of IT covers around most of a business or company, the scope of these projects can be larger and complicated. The importance of IT project management means that it is more than just utilizing knowledge, aligning skills, and using regular instruments and procedures to drive a project to completion. IT project managers deal with the challenges of interdependent integrations, rapid technology upgrades, and version changes that can occur throughout the project timeline.

Organizations and project teams have always felt that ICT projects are different and must have unique set of project management instruments and procedures to accomplish them. However, project management techniques and instruments can apply to any project in any industry, regardless of whether it involves software, hardware, construction, engineering, or services. It is not the tools that are different, but rather the projects. What make ICT projects different are their unique risks, the rapid development requirements to meet rush-to-market demands, short life of technology, and multiple dependencies with other projects. The instruments are same, but they must be applied differently depending upon the project type and complexity (Gentile, 2012).

ICT project management is the successful surveillance of all information technology projects that an organization undertakes. ICT project managers are responsible for the initiation, planning, budgeting, execution, leading, troubleshooting, and maintenance of these projects (Wrike, 2020). The kinds of things an ICT project manager might do include: Installation of hardware and Help-desk services, software, website, and application development and other technology services. Upgrades rollout of networks, cloud computing solutions, implementation of solutions for data management and business analytics.

2.3.9. What is ICT project implementation?

ICT projects passes through project implementation process, among others project management practices were the most important part of the project management process usually implemented throughout the project life cycle. ICT projects are handled in a well-defined way using a subset of project management technique, certifying that ICT projects are completely recognized and controlled at all phases of execution. Managing ICT projects are relatively challenging which need proper project management practices until the closure of the project.

ICT projects are getting great interest in Airlines industry because they touch almost everyone's lives. The correct automated information is essential to make great decision in less time for any kind of ICT projects either for business, financial, aviation, government, military, or non-profit organization. The successful ICT project creates the highest quality services with the fewest number of defects in shortest, most cost-effective manner that satisfies customer needs. ICT projects implementation includes supervising projects for software development, hardware installations, network infrastructure upgrades; cloud computing, virtualization rollouts, business analytics, data management projects and implementing ICT projects.

2.3.10. History of the use of ICT in the Airlines business

Most of the Airlines have been investing greatly in ICT since the 1950s. They have established the introduction of ICT as they realized, early, the need for effective, quick, cheap, and precise handling of their inventory to communicate with travel agencies and other distributors. Carriers welcomed that bookings could no longer be on manual presentation boards, where travelers were recorded, as they extended their fleet and routes. Up to the 1970s, most travel organizations had to establish the best paths and tickets for their customers in manual (Agusdinata, 2002).

SABRE computer reservation system (CRS) was announced in 1962 by American Airlines alternatively to expend its Boeing 770 fleet by 50% (8-12 aircrafts). In mid-1970's SABRE have made as a powerful inventory control system. SABRE made base for the adjustments in flight strategies for aircrafts, tracking spare parts, managing events for crews and for developing the level of decision support system for the Airlines management. Then after almost all the Airlines have been followed the same system to provide the facilities to satisfies their customers.

In 1970's USA Air transportation deregulation made airlines to make a change in their fare and routes. This have made a huge growth of air traffic and increased the demand for information, (Christensen J, 2000) Computerized Reservation Systems gave a chance for Airlines to improve their internal organization and CRS have made into powerful tool to control Airlines inventories in this way CRS made Airlines communicate easily with travel agencies, consolidators, other distributors by providing update routes, availability price standards. Airlines have increased tariffs communication needs. Agents have used newly introduced computer technologies to control their reservation and to get easily about tariff information (Feldman, 2007).

In 1980's Airlines, Computerized Reservation System executives realized that air transportation was a fairly small and has large travel experience then travel agencies are demanded to increase the number of carriers from single terminal and increase the value of information on destination. CRS were developed too much and introduced GDS (Global Distribution Systems) by offering huge range of tourism products, such as hotels and car rental reservations.

In 1990's Global Distribution Systems (GDS) have become like a travel supermarket by offering information and reservation capacity by providing high level of travel products such as accommodation, car rental, exact plans for non- air transportation etc., It offer a chance for travel agencies to access their essential information on their screens and to develop the travel schedule (itinerary) from the convenience of one inter-connected system. Global Distribution Systems have become a one of the marketing, essential technique for scheduled Airlines functioning and strategic agendas as they can monitor and distribute majority of Airline seats (UKEssays, 2018).

Airlines trying to ensure somewhat by using technology to advance their efficiency and therefore they attempt to merge new technologies such as electronic scales, stacker systems, handheld terminals, and bar coding to increase their usage competency and to reduce planning costs. These systems will support Airlines internally such as administration, accounting, and passengers or goods handling process by coordinate inventory management, sales, marketing, yield & revenue management, ticketing, and departure control systems and other departments. Airlines will use decision support systems to control traffic & bookings on computer reservation systems because to identify customer activities, traffic flows or trends, as well as the performance of followers and sales agencies (Feldman, 2007).

Airlines are advanced users and number of Airline functions relies heavily on ICT. Distribution and collaboration with partners are possibly one of the most critical areas of ICT involvement. Many low-cost carriers rely exclusively on ICT for displaying their accessibility and for communicating and transacting with their clients. ICTs are equally essential in operational management and support to the optimization of procedures and processes as well as for service elements such as in-flight entertainment and customer services (Verville, 2003).

2.3.11. The importance of ICT in the Airlines business

Information and Communication Technology (ICT) is heavily embedded in all levels of Airline operations. Recently, ICT can provide powerful strategic and tactical tools for organizations, if properly applied and used, could bring great advantages in promoting and strengthening their competitiveness (Porter, 2001). Few other industries rely on so many partners to collaborate closely for delivering their products and few other value chains are as elaborate as the one for travel (Buhalis, 2008). All Airlines rely heavily on ICT for their operations and management services for wide range of business functions. As a result, ICT can affect Airlines costs and operational efficiency that well managed ICT can generate great value for them (Lee, 2001).

ICT are essential for the operational management of Airlines. There are several needs including check-in, allocation of seats, generating number of reports & orders, such as flight paths, weather forecasts, load balance calculations, manifests for Airport immigration and security authorities, in-flight catering orders and crew rosters. ICT assist number of functions including inventory and reservations management as well as ticketing. Airlines have bases and distributors around the world, particularly at destinations they are serving. Hence, they need efficient coordination and communications with stations, branches, distributors, and customers globally (Gholami, 2008).

2.3.12. Areas of ICT practice in the Airlines business

The portfolio of solutions for Airline planning and control ranges from network planning, code share handling, crew management, to pricing, price distribution and revenue management (Christensen J, 2000). Airlines ICT is further supplemented by business intelligence services, marketing, and sales solutions. Two main groups of Airline business functions supported by ICT include first, an Airline's flight operational activities and the second its business management and control functions. As far as operations are concerned, ICT contribute to the optimization of flight related procedures and processes (Doganis, 2001).

The Airlines operations supported by ICT includes dispatch, coordination of flights and related resources namely crew, aircraft, passenger and freight processing, and Airport facilities such as check-in gates, ramps, baggage handling etc. From business management and control point of view, Airlines service ICT in most functions, from administrative tasks and accounting to financial management, human resources, and procurement (Verville, 2003).

Airlines use technology to develop and manage their business model as well as to monitor the external environment & competition, undertake revenue analysis, forecasting, maintain historical data, predict demand, and design desirable products (Agusdinata, 2002). ICT are essential for monitoring & forecasting the performance of strategic business units for deciding which markets Airlines should penetrate how routes and crew planning, frequency of services, choice of aircraft and developing relationships with strategic partners are key functions supported (Buhalis, 1998).

Airlines usually have wide network of hubs to support and monitor all kinds of connections on hub and operational details, such as aircraft starts, crew connections, passenger, baggage, and cargo connections. Airlines have also been investing to improve their direct communication and manage their loyalty. Increasingly, e-ticketing initiates paperless transactions, while offering significant savings. Tactical pricing, special offers promotions are all facilitated by constantly assessing traffic by taking both proactive and reactive measures to adjust demand and supply. Most Airlines use standardized software to undertake those functions, operations and generate reports. Airports and Airlines need to work together to reduce aircraft turn-around times and to shorten passenger connection times. These systems help station managers plan their operations and ensure that all resources are in place to service each flight. Baggage handling and monitoring systems allows to increase their efficiency and to track every bag as it moves through system. They support procedures of checked passenger baggage to ensure security, reduce operating costs, and improve passenger satisfaction without compromising punctuality (Gholami, 2008).

According to the above theoretical literature reviews there are many pandemics including coronavirus that affects the Aviation, Airlines and Tourism industries with different period and divers spreading level, in relative to the other pandemic coronavirus is spreads in the highest level with the fastest manner. During the outbreak of COVID-19 pandemic almost all part of the world counties decides to lockdown by their authority with internal & external travel restrictions. The travel restrictions affect all Airlines and tourism industries because their businesses are fully dependent with passengers' travel and cargo transportation. The COVID-19 pandemic made the greatest significant effects on the aviation industry due to travel limitations and decline of demand among passengers. Major reductions in passenger numbers have resulted in-flights being cancelled or planes flying empty between airports, which in turn massively reduced revenues for Airlines business and forced many Airlines to lay off employees or declare bankruptcy.

Some of them have attempted to avoid refunding cancelled flights to minimize their losses. Some Airplane manufacturers and airport operators also lay off their employees. According to African news (2020), the travel sector has been one of the worst casualties of the coronavirus pandemic with flights grounded and borders closed. Africa's biggest Airline is facing more than $1 billion in lost revenue and saw 90% drop in international passenger traffic. When the Ethiopian Airlines Group business affected because of COVID-19 pandemic the top management directed some action based on cost saving strategy by reducing operational expenses and suspending some budgets that allocated to ICT projects.

2.4. Empirical Literature Review

2.4.1. Previous Studies on related to the ICT projects implementation

Some chosen former studies were assessed to improve the subject matter. Hence, this portion is concentrated on challenges on ICT projects implementation performance and their effects on the organization both from local and global research.

Ashioya**,** (2014) with the research titled "Challenges influencing implementation of emerging ICT technologies in Kenya today". Expressed in his conclusion, the issues and challenges facing the implementation of emerging technology need to be addressed to improve the uptake of these new technologies. Also, the study concluded that the employee attitudes towards these new technologies should be managed in a much better way. Again, another conclusion was that the employees should be involved from the early stages of planning so that they feel their input is considered when implementing these new technologies.

Nancy**,** (2017) with the research titled "Factors influencing implementation of ICT projects in government agency in Kenya". The study established four independent variables availability of infrastructural facilities, financial resources, staff competencies and top management support all had great influence on implementation of ICT projects. The study achieves that top management support is the most significant factors influencing the success of ICT projects. Effectiveness is influenced by the characteristics of the people in the project team, in the quality of their relations with each other and their capacity to understand the needs. The availability of resources for IT infrastructure purchase and hiring skilled IT staff's availability of high-speed internet connection and networked systems will greatly influence implementation of ICT projects.

Meaza**,** (2018) with research titled "Assessment of practices and challenges of implementing ICT project management in Ethio-telecom". The major findings made by the researcher expressed as follows: The four project management knowledge areas like project integration, project cost, project human resource and project procurement management in the implementation of the ICT projects are practiced at low level. While project scope, time, quality, communication, risk, and stakeholder managements are practiced at high level during the implementation of ICT projects.

Ermias**,** (2018) with the research titled "Assessing factors affecting the success of ICT project implementation in public sectors: In the case of city government of Addis Ababa (CGAA)**".** The study tried to assess both success factors and challenges together produced framework that enables the successful implementation of ICT projects in public sector organization. Finally, the researcher developed framework that enables ICT project implementation. The study showed that there were different success factors that contribute the ICT project implementation success. These success factors are top management support; proper planning, communication, good project selection, user involvement technical team skill and commitment were identified.

Elias**,** (2018) with the research titled "Critical success factors to information technology projects implementation: the case of commercial bank of Ethiopia". The overall objective of the study was to identify CSFs to successful implementation of IT projects. Accordingly, various CSFs have been identified and then analyzed by this project work that was believed to matter to the successful implementation of IT projects. What makes this study's result consistent is that the group of CSFs extraction method revealed that among the five extracted major components, merely one of this found to be technological. In this study, all the extracted dimensions were already labeled as process, quality, enterprise, project, business, and IT alignment related CFS.

2.5. Effects of COVID-19 on ICT Projects Implementation Performance.

Project Impact: If a force claim was granted by the owner, then the contractor must demonstrate the damages suffered from the COVID-19 pandemic. The effects to a project can be categorized in five categories (Critelli, J. 2020):

Cost or budget: COVID-19 costs should be tracked separately by assessing the performance barriers. The cost analysis should be evaluated based on affected scope of work, idle apparatus, general situations, preventive measures, thermal readings, employee screening and facilities.

Schedule delay: Evaluate and quantify idle time, incurred cost to date and scheduled time delays caused by this event. The contractor should assess the current conditions and update the schedule to reflect the new late-start and late-finish dates of events with updated date for project success.

Communication or Resources: Evaluate the availability of resources due to sickness and social or physical distancing guidelines.

Procurement or Logistics: Evaluate the effect on essential lead times of materials, shipments, and critical components delays.

Quality issues: Evaluate the influence on accomplishment, lack of skilled personnel and limited travel of skilled resources.

2.5.1. Effects on Project Cost Management

The effects of COVID-19 pandemic on the business activities are noticeable in all from reduced consumer discretionary spending to a freeze on business expenditures including capital budgets, hiring, and reduction of everything but the essential operational expenses. Stated differently, virtually any substantial business expenditure that is not necessary is on hold. The exceptions are those that are critical for operations and clearly net positive from an expeditious return on investment from a cost reduction perspective (Laura W, 2020).

According to Peng Zou, Di Huo & Meng Li (2020), financial policies are supporting production and operation. Companies anticipate public strategies and measures such as the "tax exclusion, decrease, suspension, pay back and reimbursement", to lower production costs of companies, and help businesses to survive the challenging time of operation, while gradually returning to normal business operations.

Budget suspended: Budgets that assigned to the project, resources for this money and enough money assigned to the projects all these are major problems to implement ICT project. Most budgets that were allocated for ICT projects were suspended due to COVID-19 pandemic.

Cost overrun is the amount by which the actual cost exceeds the budgeted, estimated, original, or target cost. It is the excess of actual cost over planned budget; it is the additional amount of money required to deliver the project (Avots, 1983).

2.5.2. Effects on Project Time Management

ICT projects delays are often caused by circumstances that create barriers to launch and further implementation of project activities. Rarely a delay can be caused by a request of the customer, sponsor, other stakeholders have enough authorities on their ICT projects. When project delays are unpredicted, they are unmanageable and have rather negative effects on project activities and results. An unanticipated delay extends the overall duration of project activities and involves an increase in project budget or costs. It produces time-associated cost effects that increase resource expenditure and require more time for reaching projects implementation success.

Long vacation: It is the type of extended leave or vacation that to be given to the employees for keeping physical distancing. This condition creates the ICT projects delay and affects the quality of the project implementation. Ethiopian that has implemented long vacation to exercise the physical distancing within the compound and inside the office to prevent the transmission of COVID-19 pandemic between the employees.

Working from home: Ethiopian Airlines Group that have applied "remote working" procedures for their IT staff in 2020 as an alternative temporary arrangement during the COVID-19 crisis**,** working from home protocols as protective procedures or in response to the order or directive of the federal government restricting face-to-face interaction. This condition creates the physical communication gap and physical presence for stakeholders that participate on the ICT projects.

Weekend Shift: Ethiopian Airlines Group that has implemented weekend shift to exercise the physical distancing within the compound and inside the office to prevent the transmission of COVID-19 pandemic between employees. The COVID-19 pandemic has highlighted additional issues affecting management at all levels. The IT industry cannot ignore the effects that this is having, not only now but possibly in the future, on working practices.

Programs might have to be re-designed so that there is less labor on site at given time to allow for social distancing, greater use of pre-cast materials might be considered, increased welfare facilities on site for workers so they feel safe in going to work. According to Peng Zou, (2020), Firms acknowledged the difficulties and devoted more efforts to Research & Development and innovations. However, the pandemic has overdue the promotion of new products as well as the growth of projects in collaboration with other organizations, especially for the IT industry.

Many firms have encountered greater labor prices, which have forced them to consider reducing the number of workforces, cutting salaries, and suspending staffing until the effects of the pandemic are over. Business has been tackling higher proportion of employment problems, and the real estate business has been dropping the jobs. Both IT and Production industries have also sought out loans as well as funding from shareholders. The pandemic also negatively affected the high-tech innovation and human resources in some companies. For instance, the pandemic has delayed the launch of new products, new recruits, and the progress of projects in collaboration with other companies (Zou *et al*, 2020). A previous study demonstrated the existence of delays on construction projects in Kuwait due to the COVID-19 pandemic. The results confirmed that the delays in projects were critical delays and the cause was that 95% of employees could not work at any time due to government reaction to the pandemic (Thamer A. N. Alenezi, 2020). The COVID-19 pandemic in Kuwait has affected projects. The delays in projects were due to the staffs being unable to work at any time. The delays in projects were identified as critical delays.

2.5.3. Effects on Project Communication Management

Communication is one of the important elements to confirm stakeholder happiness and buy-in on the approach going forward. In this step, a formal plan for notifications, and frequency should be established. The objective for communication is to fulfill the requirements of established plan and communicate the effectiveness of implementation (Critelli, J. 2020). Communication creates a bridge between different stakeholders who may have diverse cultural backgrounds, various levels of proficiency, perspectives, and interests, which effects upon the project implementation.

According to Qiu, Wuqi (2017), poor internal and external communication barriers seriously affected the credibility of the government internally and externally. During the SARS outbreak, formal communication, and coordination among adjacent regions, related departments, and agencies were absent. SARS stressed the essential of communication with domestic and global strategy makers, financial markets, the travel industry, and other key sectors. The keys to effective cooperation are information sharing and development of coordination mechanism. Timely decision-making, smooth execution and effectiveness of pandemic management relied greatly on collaboration between different stakeholders. Project status communications deliver a means to periodically to communicate the project status to stakeholders outside of phase reviews. If some phases are scheduled to have long duration, there is approval to skip some reviews.

Virtual Communication: It is how people interact with others without being in the same place. It is used by remote teams in an office environment and practically every industry. For most IT employees, enterprise communication takes place over various channels: poor communication between remote teams increases the chances of things going wrong. Running a remote team is not always easy. The tools might be inferior, and our project team likely interacts much less than in the office; especially true if someone has never worked remotely before.

Physical distancing: It is also called "physical distancing" means keeping secure space between yourself and other people who are not from your household. To exercise physical distancing, stay at least 6 feet (about 2 arms' length) from other people who are not from our household in both indoor and outdoor spaces. Ethiopian has applied physical distancing within the compound and inside the office to prevent the transmission of COVID-19 pandemic between the employees.

Communication gap: refer to a condition in which misunderstanding, or the complete lack of communication, severely influences the interactions among the people working on the project. Communication gaps can happen when offering ideas, presenting information, introducing shift, proposing policies, gaining input, making recommendations, implementing standards, giving, or receiving feedback, or simply converse with customers, suppliers, coworkers, and teammates.

2.5.4. Effects on Project Procurement Management

Procurement is the process of finding and approving to terms, and obtaining goods, services, or works from an external source, often via tendering or competitive bidding process. Procurement is used to ensure the buyer receives, goods, services, or works at the best possible price when aspects such as quality, cost, time, and location are compared.

Approval Challenge: There were challenges to get approval for purchase order for ICT projects materials because of the cost saving strategies that are directed via top management for the survival mode of the Ethiopian Airline Group.

Purchasing process: Purchasing is the process of business or organization uses to acquire goods or services to accomplish its goals. Although there are several organizations that attempt to set standards in the purchasing process, processes can vary greatly between organizations. There are four main steps: identifying the need, supplier evaluation selection, purchase order and delivery.

Material shipping delay: The materials in the process of shipment by completing the purchase process are delayed because of flight lockdown and cancellation. Ethiopian will make material shipment by its own flight to minimize the extra cost that paid for cargo transportation. But during the COVID-19 pandemic almost all flights were suspended and unable to make material shipments that are necessary for ICT projects implementation performance.

According to Vinay Sharma, (2020) COVID-19 pandemic is progressing very rapidly; new cases are being reported in many countries across the world, which makes the assessment of needs very difficult. Effects on ongoing operations: Procurement processes may be delayed or cancelled in some ongoing projects because of COVID-19 pandemic crisis. The procurement professionals are advising countries on actions to take, but there is a probability of contracts being delayed or terminated due to force situations, as contractors and suppliers are not able to carry out their contracts due to border closings or self-isolation.

The producing and processing of raw material parts and logistics etc. were affected by the epidemic situation in various regions, with different degrees of delay in delivery and work stoppages while waiting for materials. The spread of epidemic to outside China affected many export businesses. Some firms reported cancellation of orders or delayed receipt of goods from overseas customers (Zou *et al*, 2020).

2.5.5. Effects on Project Risk Management

Risks are internal or external events that may occur during project implementation and could threaten the achievement of project objectives and the project. A risk could be, for example, a partner dropping out or a key change in strategy that goes against what the project is trying to achieve. Basic risk management is important for every project, but the level of detail needed varies depending on the size of the project and the number of risks and possible effects on the achievement of the objectives. Identifying risks and outlining contingency measures for when they happen should be a task for every partnership, regardless of whether this is required by the programmed or not. One of the most common risks that organizations are assessing due to COVID-19 pandemic is the risk to project schedule. Many of our client partners have had to reallocate resources, including project team members, to attend to the immediate surge of patients in their facilities.

Additionally, in some states, construction projects have been suspended to reduce transmission of the virus. To avoid a complete halt in the project, review the schedule and determine if there are areas that can be compressed or consolidated or if there is work that can be done concurrently rather than sequentially. Develop a priority scale for the project and work on deliverables. The prioritization technique is one of the simplest methods for requirement prioritization that can be utilized during review process. The specific efforts were adopted to manage the challenges of the COVID-19 in construction offices. These included safety measures such as requiring workers to wear face coverings, implementing social distancing guidelines, adopting COVID-19 pandemic related safety training, and encouraging work from home initiatives. Other risk management measures to combat the effects of the pandemic included establishing a task force that is tasked with offering COVID-19 guidelines, proactive steps to reduce risk of delays, advocacy efforts seeking to establish construction operations as being essential and leveraging governmental relief programs to preserve businesses and the workforce (Alsharef A. 2021).

Crowded workplace: COVID-19 spreads principally through breathing droplets or contact with contaminated surfaces. Exposure can occur at the workplace, while travelling to work, during work related travel to an area with local community transmission, as well as on the way to and from the workplace. The risk of exposure to COVID-19 pandemic in workplace depends on the likelihood of coming within one meter of others, in having frequent physical contact with people who may be infected with COVID-19 pandemic, and through contact with contaminated surfaces and objects.

Fear of Infection: fear of infection and fear of transmission of virus among frontline employees working within ICT project team creates the physical communication gap to perform the day-to-day tasks, actions, and activities. This was the major challenge for ICT projects implementation during the COVID-19 pandemic time.

Equipment sharing: There are many shared equipment (technical tools, telephones, laptops, computers, copy machines, staples, landscaping tools, etc.) Whenever possible, each employee should be assigned their own equipment. If this is not possible, they provide EPA approved disinfectant to apply before and after use and display signage to remind employees to do so.

2.6. Conceptual Framework

A conceptual framework represents the researcher's synthesis of the literature review on how to explain a phenomenon. It represents out the actions required during the study, given his previous knowledge of other researchers' point of view and his observations about research. In other words, the conceptual framework is the researchers' understanding of how the variables in his study connect. Thus, it identifies the variables required in the research investigation. It is the researcher's map in pursuing the investigation.

The conceptual framework "sets the stage" to present the study question that drives investigation being reported based on the problem statement. The problem statement gives the context and issues that caused the researcher to conduct the study. In this context the dependent variable is ICT projects implementation performance (on time, within budget and best quality), while communication, procurement, risk, time, and cost management are independent variables.

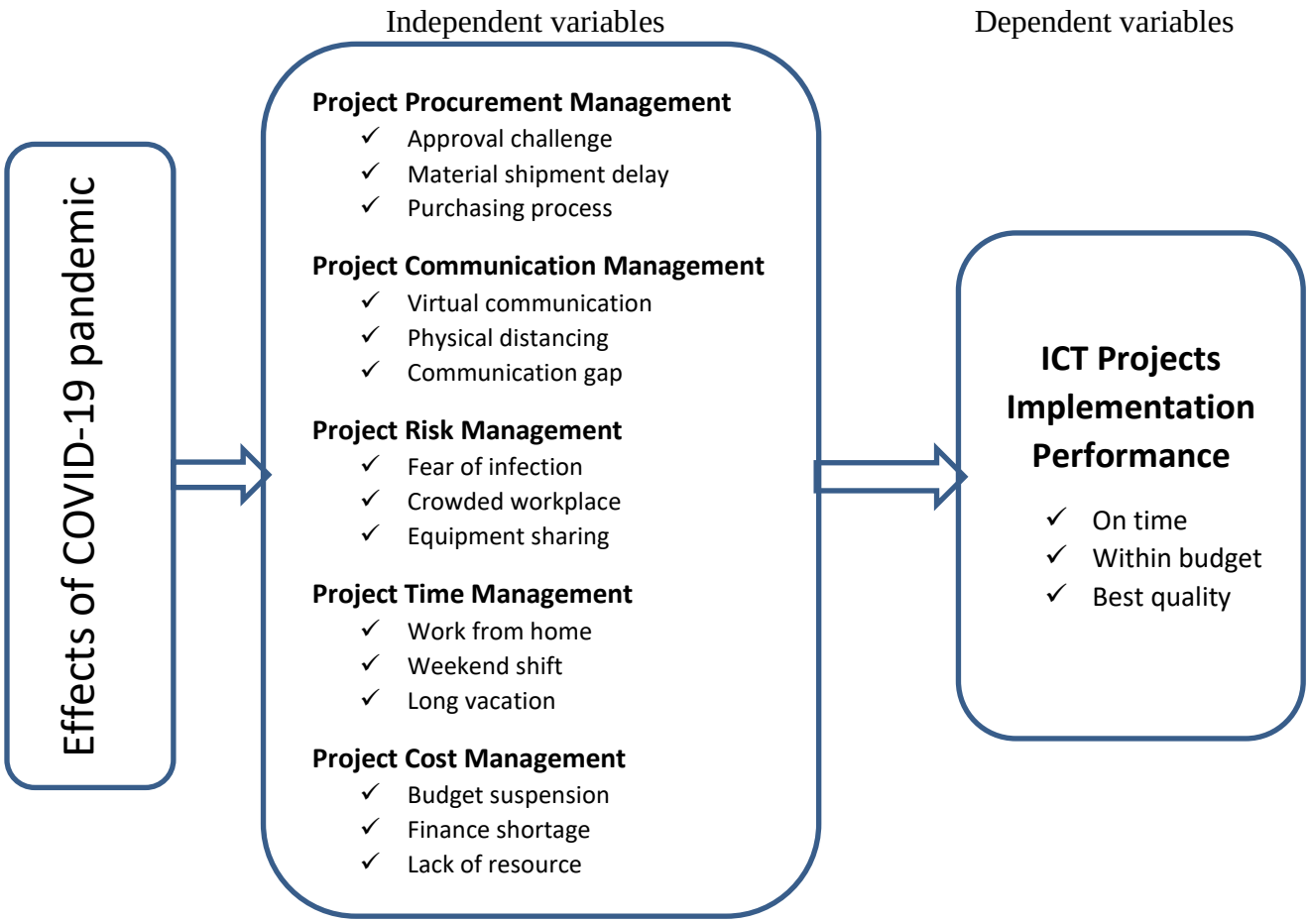


Figure 2.6: Conceptual Framework developed by researcher: March 2021.

CHAPTER THREE

3. RESEARCH METHODS AND METHODOLOGY

3.1. Introduction

This chapter of the study discussed the procedures that followed or employed while undertaking the study process. Subtopics of this section are summary of background information about the study area, research design, research approach, data type and source, sample size and sampling techniques, data collection methods and procedures, method of data analysis, reliability and validity measurements and ethical consideration.

3.2. Description Area of the Study

According to the organizational structure of Ethiopian Airlines Group, Information and Communication Technology (ICT) has the following managerial structure: There are four heads under the Chief Information Officer (CIO) IT division. 1) Head IT infrastructure design and delivery. 2) Head Application development and digital solutions, 3) Head IT Service operation, 4) Head IT service strategy and business transformation. Ethiopian Airlines Group IT division will derive the business to transform it into process centric organization by strengthening users understanding of leveraging IT infrastructure to meet business needs, while developing IT staff business knowledge and work culture.

Ethiopian Head IT infrastructure design and delivery aligns the department's objectives and programs with IT division's objectives strategies and participates in defining Enterprise Infrastructure Architecture;; identifies revenue generation opportunities in IT and exploit those opportunities is responsible for proper planning, design, implementation and optimization of the IT Infrastructure design and delivery; ensures adequacy and availability of the required IT project implementation security measures established policies, procedures and standards; directs, follows and adopts latest developments and trends is responsible for vendor management related to ICT projects implementation performance.

Team leader Networks design & delivery performs need analysis of networks & communications systems and services based on the ICT projects strategies and business requirements; plans, designs, implements, and optimizes networks and communications facilities and infrastructure providing data, voice, and video communication solutions organization-wide; ensures these facilities and services are secure, sufficient, fault-tolerant, scalable, and cost-effective manner.

In Ethiopian Airlines Group, ICT is the main tool for all the strategic business units to operate their day-to-day activities. For example, In ETG-MRO, Maintenix is the main IT application that uses for real-time data visibility to enable improved decision-making, quick response to change, and assured compliance on asset release. In Ethiopian Cargo, Cargo-Spot is the application that uses for handling cargo operations and terminal management system that is efficient for ground handlers and terminal operators. The study was done at Ethiopian Airlines Group IT division offices under three different departments head IT infrastructure design and delivery, head IT application design and delivery, and digital solutions.

3.3. Research Design

The research design refers to the overall strategy that one may choose to integrate the different components of the study in a coherent and logical way. This was done to ensure that research problem was effectively addressed. Research design can also be considered as a blueprint or the roadmap for the collection, measurement, and analysis of data (Kothari, 2004). This research was a formal structural study based on five research questions.

A descriptive research presents a picture of the specific details of a situation, social setting, or relationship. The major purpose of descriptive research is to describe attributes of a population and goes on to identify the reasons for something that occurs (Kothari, 2004). In this study, the researcher revealed the effects of the COVID-19 pandemic on the ICT projects implementation performance in Ethiopian Airlines Group IT division. Thus, it emphasizes on finding out the effects of COVID-19 pandemic on ICT projects implementation performance. Therefore, in that perspective the research used descriptive research design.

3.4. Research Approach

The qualitative approaches have been used equally and likely by researchers depending on the type of the research and data utilized. According to Kothari (2004), qualitative research approach is concerned with subjective assessment of attitudes, opinions, and experience. The researcher utilized suitable research approach to manage data to address the methodological issues as discovered in the research problem. Scholars have advocated the use of research approach, which is often considered as a structured set of rational decision-making choices or guidelines for generating valid and consistent research results. It also confirms the achievement of information through objective technique important to the research problems.

Qualitative research often involves a smaller number of key informants. This may be because the methods used such as interviews are time and labor intensive but also because many people are not needed for the purposes of statistical analysis or to generalize from the results. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus group discussions, individual interviews, and participation/observations. The sample size is typically small, and key informants are selected to fulfil a given proportion. To conduct this research, the researcher used interview, observation and document reviews were used to collect qualitative data from target population.

This study is used the qualitative approach to examine the effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division, because it is a technique or approach used to explain, present, describe and investigate the casual associations and leanings using the focus group discussions, interviews, observations, and project document analysis.

3.5. Target population

According to Dawson (2002), the first step in the process of sampling target is specifying the population of the study. Population or universe refers to any collection of specified groups of cases to be studied. The population needs to be properly defined so that there is no ambiguity as to whether a given unit belongs to the population. The intended population of this study was staffs in Information Technology (IT) division in Ethiopian who are directly participating in implementation of the different ICT projects; these are IT project managers, Team leaders and management members.

Ethiopian Airlines Group IT division is segmented in to four categories by the nature of work these are: IT Infrastructure Design and Delivery, IT Service Operation, IT Business Strategy and Transformation, IT Application Development and Digital Solutions with the target population is about 231 staffs. Among four categories the sample size of this study was Head IT Infrastructure Design and Delivery, Head IT Application Development and Digital Solutions and IT projects management office are selected for this study because these teams are the one who has the overall accountability for the initiating, planning, design, implementing, monitoring, controlling and closure of ICT projects.

3.6. Sampling Design

Sampling design, which is the definite plan of a researcher to obtain a sample of the population being studied, non-probability sampling which are very suitable for different studies according to the availability and objective of resources according to the data analysis (Kothari, 2004). Inclusion criteria are defined as the key features of the target population that the investigators will use to answer their research questions. In contrast, exclusion criteria are defined as features of the potential study participants who meet the inclusion criteria but present with the further features that could interfere with the success of the study or increase their risk for an unfavorable outcome (Bras Pneumol. 2018). Therefore, based on the non-probability sampling approach of inclusive and exclusive criteria sampling, the sample units of the study were chosen. This method of sampling was used because the researcher's objective is to obtain detailed and accurate information from sources with relevant expertise and/or experience directly related to the topic of the data analysis. The researcher sampled a total of 12 key informants from the targeted population partaking with the ICT projects implementation performance.

3.7. Sources of Data Collection

The first data type considered in this study is primary data which was collected through self-administered and semi-structured interview questions, focus group discussions and observations from selected key informants. According to Kothari (2004), primary data is an original, fresh, and first-time data whereas the secondary data type is the statistically processed information for other main purpose already available data. The main advantage of collecting and using primary data is to have a consistent data that can fit for the objective the researcher intends to use. Therefore, the response of key informants, which was collected through interview questions, group discussions and observations, have been used as the primary data source for this study.

The study used both primary and secondary data. The primary data was collected from Ethiopian Airlines Group IT division staffs through interview questions, focus group discussions and observations to investigate the effects of COVID-19 pandemic on ICT projects implementation performance from project manager or owner point of view. The secondary data was collected from books, research journals and articles conducted on the ICT projects implementation performance and related studies, ICT project documents of Ethiopian Airlines Group portal and/or Internet.

3.8. Research Instrument

The study relied on the data collected through semi-structured interview questions, focus group discussions and observations to meet the objectives of the study. According to Mugenda and Mugenda (2003), interview questions, focus group discussions and observations are commonly used to obtain important information about a population under the study. Each item is developed to address specific themes of the study. Each key informant selected was briefed on how to be interviewed with the interview questions. The key informants were given time frame within which they were to answer to the interview questions after which the interview was conducted by the researcher on agreed time.

3.9. Method of Data Collection

The data was collected through interview, focus group discussions and observations based on the research questions. The instrument was prepared following set of guidelines to ensure that the effort put in obtaining reliable data is not compromised (Carlton & Covert, 2007). The interview questions were developed and organized based on the research questions to ensure relevance to the problem. This method was selected with interests to protect the privacy of key informants.

3.9.1 Primary data

The study combines both primary and secondary data. The primary data collected from Information Technology project managers, team leaders and engineers through semi-structured interviews questions, focus group discussions and observations to gather firsthand data about the effects of COVOD-19 pandemic on ICT projects implementation performance of research topic.

Interviews: This tool was employed to collect information by conducting face to face interviews from various key informants, focus group discussions and observations from the selected key informants who closely manage ICT projects in Ethiopian Airline Group IT division. Interviews can be performed through face-to-face and virtual Microsoft teams used for this research. It allows a great deal of interaction between the interviewer and the interviewee.

Focus group discussions: A formal discussion was conducted to ICT projects participants and selected key informants from various departments to identify strength, weakness, opportunities, and effects of COVID-19 pandemic on the ICT projects implementation performance to enable researcher to understand better operation of the Ethiopian Airlines Group IT division.

Observations: This method was used to observe how the whole process of ICT projects implementation performance needed by user departments up to acquiring services done in Ethiopian Airline Group IT division.

3.9.2 Secondary data

The secondary data were collected from project document resources of Ethiopian Airlines Group ICT projects planning, portal and/or internet and lesson learned with ICT projects documented from previously deployed ICT projects implementation performance.

3.10. Procedures of Data Collection

According to Donald Schwab (2005), it was pilot tested prior to using the study semi-structured interview questions, focus group discussions and observations in the study area. Before using it for substantive analysis, it is important to pre-test interview questions on individuals like those who would be asked to complete it. The aim of this was to simplify the interview questions and ensure that it was not difficult for the key informants to respond to interview questions. The preliminary data gathered ensured that the research questions were answered. To collect data the researcher used mainly the semi-structured interview questions format to get perception of the key informants about the effects of COVID-19 on ICT projects implementation performance.

3.11. Data Analysis Methods

The data review process included the clean-up and clarification of data. The information was then coded and reviewed for mistakes and omissions (Kothari, 2004). To present the results, frequency tables and percentages were used. Interview responses, focus group discussions and observations were tabulated, coded, and analyzed for the interpretations and results finding and discussions from the data collected. To obtain proportions properly, the responses from the semi-structured interview questions, focus group discussions and observations were identified and the answer was then recorded by descriptive narrative sentences. Data analysis is accomplished after data collection from the data source and some primary data processing actions and it is done according to the research objective. But in some qualitative research, data collection, analysis and reporting are often carried out in parallel. In this study interview responses were examined and coded using thematic analysis method. It is stored and analyzed using NVIVO version 10. Thematic analysis is one method for reducing data into meaningful information or patterns.

3.12. Validity and Reliability

Validity always connects to the extent to which the research data as well as the procedures for finding the data are accurate, honest and on target (Denscombe, 2010). Relevant information requires careful planning to ensure that the information is clearly related to research objectives and was collected from the individuals best suited to providing the information. Acquiring information that is the completed and truthful involves well planned information collection instruments and survey administration procedures. Validity refers to how accurately a procedure measures what it is intended to evaluate. If research has high validity that means it produces results that correspond to real properties, features, and variations in the physical or social world.

Reliability refers to the statement used to measure the consistency of the research findings. According to Sekaran and Bougie (2010), reliability of measurement is established by examining the stability and consistency of the data. To ensure the reliability of the research findings, the researcher designed the interview questions, focus group discussions and observations in simple short format, to avoid key informants' confusion.

3.13. Ethical Considerations

In this study ethical consideration was applied by maintaining confidentiality of information about the organization and key informants. In addition to this, the gathered data were only used for this study, not used for other purpose, or transferred to other party. Furthermore, the key informants were ordered not to tell any information about their name and other personal code while answering to the interview questions.

The researcher followed the following rules to always ensure the issues of ethicality in the research process. The first is, the key informants were communicated well about the purpose, objectives, and significance of the study, and all the information or facts they provide was exclusively used for research purpose only and they kept confidential. The second rule that the researcher kept in mind is all the literatures reviewed and used are cited using the APA style of citation. Hence, the researcher believed and ensured that all writers and researchers are properly acknowledged. In addition to the above two rules, the researcher has still been at his most care to use and encode all data to avoid misrepresentation of the findings during the data analysis.

CHAPTER FOUR

4. DATA ANAYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter deals with the presentation, analysis, interpretation, and discussion of data gathered from the interview questions, focus group discussions, observations, and ICT projects document reviews. Responses for the measures on the interview questions are summarized and presented using tables, graphs, and charts. The first section looks at the general information of the key informants. The second section looks the major effects of COVID-19 pandemic on ICT projects implementation performance, and the third section looks at action taken during COVID-19 pandemic to mitigate the effect. The fourth section presents the discussion about the analyzed and interpreted information.

4.2. Descriptive Analysis

This part of the data analysis used to describe majorly general information variables such as age group, gender, position, educational level, and work experience of staffs. Some of the descriptive statistics (frequency and percent) have been used to explain general information variables. Descriptive statistics are very essential because if we easily presented our raw data it would be hard to visualize what the data was indicating, especially if there was a lot of it. Descriptive statistics, therefore, enables us to present the data in more meaningful way, which allows simpler interpretation of the collected data from the key informants.

4.3. Response Rate

The researcher planned and prepared 12 key informants with interviews questions, focus group discussions and observations from IT project management office staffs, Networks Design and Delivery, Systems and Database Design and Delivery, Special Systems Design and Delivery, Selected team leaders, senior experts. From 12 key informants which had been self-administered to the interviews, 10 of them were completed and interviewed for the data analysis. This explains to 83.3% complete rate of the key informants. Only 2 of them failed to be interviewed on time with 16.7% because of personal reason. Overall, the response rate can be considered to have been high. A response rate of 50% was considered adequate for analysis and reporting, rate of 60% was good and a response rate of 70% and over was considered very good (Mugenda, 2003).

4.4. General Information of the key informants

The study required to find out the selected of the key informants in the Ethiopian Airlines Group IT staffs. The age group, educational level, work experiences, departments, and positions of the key informants. This is for general information and is not a direct objective of the study.

No	Descriptions		Key informants		Total	
			Frequency(n)	Percent (%)	N	%
1	Gender	Male	8	80%	10	100%
		Female	2	20%		
2	Age Group	21-25 Years	0	0%	10	100%
		26-30 Years	6	60%		
		31-35 Years	3	30%		
		36-40 Years	1	10%		
3	Educational level	Certificate/Diploma	0	0%	10	100%
		Undergraduate Degree	6	60%		
		Postgraduate Degree	4	40%		
		Doctorate Degree	0	0		
4	Work Experience	3 to 5 Years	0	0%	10	100%
		6 to 10 Years	6	60%		
		11 to 15 Years	3	30%		
		Above 15 Years	1	10%		
5	Current Positions	Junior	0	0%	10	100%
		Senior	6	60%		
		Expert	1	10%		
		Team Leader	2	20%		
		Head/Manager	1	10%		

Table 4.4: Gender information (Source: Own Survey January 2021)

As per the above general information profile of the key informants five features; gender, age group, their position in IT division, educational level, and work experiences have been identified. From the above (Table 4.4), it is noticeable that majority of the respondents who participated in the study were males represented by 80% and followed by females 20%.

Majority of the key informants who participated in the study represented by 60% are aged between 26 to 30 years and 31 to 35 years with 30%. The table further reveals the rest are aged 36 to 40 years with 10%. More than the half of key informants 60% have attained undergraduate level of education 40% have attained postgraduate level of education. And there are not the respondents that attained the Doctorate degree and diploma level of education.

Regarding the work experience the key informants 60% have work experiences for 6 to 10 years. The table further reveals the respondents 30% that have been working for 11 to 15 years, from the key informants 10% for above 15 years experiences. Nearly half of the key informants 60% are with senior position, about 10% are with expert position; about 20% are with the team leader position; about 10% are with head/manager positions.

4.5. How COVID-19 pandemic affects ICT projects implementation performance

Key informants were questioned or interviewed to explain the effects of COVID-19 pandemic that causes performance problems in the implementation of ICT projects in Ethiopian Airlines Group IT division. They honestly explained the effects of COVID-19 pandemic that challenges of the implementation performance of ICT projects in detail what they encountered during their ICT projects implementation. The major effects of COVID-19 pandemic on the ICT projects implementation performance are selected from project management knowledge areas like project procurement management, communication management, risk management, time management, and cost management. The responses and references listed in the following table 4.5.

No	Affected project management knowledge areas	Responses		References	
		Count	%	Count	%
1	Project procurement management	17	22.36%	37	13.91%
2	Project communication management	12	15.79%	52	19.55%
3	Project risk management	8	10.53%	38	14.28%
4	Project time management	15	19.74%	45	16.92%
5	Project cost management	24	31.58%	94	35.34%
	Total	76	100%	266	100%

Table 4.5: Responses and references (Source: Own Survey March 2021)

4.5.1. Project procurement management

Project procurement management accounts for 13.91% of the references. It is one of the most affected project management knowledge areas during the COVID-19 pandemic on ICT projects implementation performance. The key informants like IT heads, project managers and team leaders explained as

"…*for the best performance of the ICT projects implementation, procurement management is essential and important. Because of this, if the procurements have processed timely and material delivery within a time, then the ICT projects will be implemented effectively…"*

ICT projects implementation performance are highly dependent by procurement management. So, procurement process must be performed within the scheduled time, and experienced fast response to implement the ICT projects. IT head and project managers expressed that:

"…*during the COVID-19 pandemic in our ICT projects implementation, we encountered many challenges from procurement like longer process, material shipment delay, and slow responding the given time. The procurement process took longer time due to the COVID-19 pandemic…"*

ICT projects implementation need quicker reaction from the procurement management to get smooth implementation of the ICT projects. If the project procurement management is not properly applied and materials are not timely delivered due to the COVID-19 pandemic, then ICT projects implementation performance is highly affected.

4.5.2. Project communication management

Project communication management accounts for 19.55% of the references. ICT projects implementation in the firm requires the effective of communication management as it promotes acceptance good performance of ICT projects in the organization. ICT projects implementation needs good performance to deliver value cannot be implemented without good communication management. Effective communication among project team members is vital for project good performance. According to the key informants' the project team leader there was poor interaction between the project team members and project manager due to COVID-19 pandemic.

"…During ICT projects implementation, the communication was poor because of the COVID-19 pandemic. Most of the time communication gaps were experienced among project team members

and diverse participants to communicate effectively. Because of the COVID-19 pandemic creates physical distancing and virtual communication with remote working…"

There was a detailed discussion by most of the key informants that to confirm communication management, effective communication among the project manager and project team members including participants must be maintained. IT head and project team leader said:

"…good *communication is way of giving necessary information between different parties to effectively manage and implement the ICT projects successfully. Also, the best communication among these parties must be managed and minimize communication gap due to COVID-19..."*

Effective communication is essential for ICT projects implementation performance. It requires a communication among project team members, team leader, clients, partners, vendors, internal and external stakeholders. Challenges and risks are unable to be resolved within a scheduled time if there is no effective communication during ICT projects implementation.

4.5.3. Project risk management

Project risk management accounts for 14.28% of the references. ICT projects implementation performance demands to be free from risks and threats during COVID-19 pandemic throughout the implementation steps in the businesses. The key informants interview shows that there were some project risk management issues identified during COVID-19 pandemic on ICT projects implementation quality performance. IT Head declared that:

"…In some ICT projects implementation performance there were risks in terms of project quality performance during COVID-19 pandemic due to the shortage of experienced manpower…also during ICT projects implementation fear of infection risk is happened among project team…."

The key informants responded that concerning about project risk management challenges during COVID-19 pandemic on the ICT projects implementation performance. Project managers with technical team and business experts from the various departments are usually trying to mitigate the risks that occurred on ICT projects. IT head and project managers confirmed:

"…during ICT project implementation in Ethiopian Airline Group IT division there were some risks due to COVID-19 pandemic with the ICT projects quality performance…"

Before risk management, risk assessment must be held to avoid or minimize the ICT projects implementation risks during COVID-19 pandemic and identify risks of the previous ICT projects implemented. For example, the same type of ICT projects. So, attention must be taken during ICT projects implementation risks during the COVID-19 pandemic.

4.5.4. Project time management

Project time management accounts for 16.92% of the references. It is greatly affected ICT projects implementation performance during COVID-19 pandemic. According to the questions from interview presented for key informants' project time management as key determinant of ICT projects implementation performance were identified and the key informants were essential to specify the extent to which it had been performed in Ethiopian Airlines Group IT division during the COVID-19 pandemic. This also confirmed by IT head and project manager.

"…in *our case project time management has given attention during COVID-19 pandemic and it is endorsed by all ICT project managers. But there is a scheduled time delay on different ICT projects implementation out of original plan due to COVID-19 pandemic…"*

On the implementation of ICT projects, different problems should be careful during COVID-19 pandemic to confirm effective project time management. ICT projects implementation were not accomplished due the original scheduled time and that project team members should understood their roles and what was expected of them. Respondents also confirmed this idea during interview:

"…*due to COVID-19 pandemic, most of our ICT projects implementation in Ethiopian Airlines Group IT division were not finished according to the scheduled time. This condition affected our ICT projects implementation performance and as the enterprise as a whole…"*

Moreover, from the ICT projects document review it also confirms the above idea. According to the ICT projects document review and the researcher remark, all ICT projects implementation in Ethiopian Airlines Group IT division were not implemented according to their original scheduled time during COVID-19 pandemic. The ICT projects implementation document review indicated that all ICT projects were extended at least a year.

4.5.5. Project cost management

Project cost management accounts for 35.34% of the references. It is one of project management knowledge areas that affected due to COVID-19 pandemic on the ICT projects implementation performance. According to the key informants' response that enough project budget allocation for ICT projects implementation is significant performance measure. IT head and project managers were explained:

"…in our case budget suspension that affects the ICT projects implementation performance during COVID-19 pandemic. ICT projects should be executed using the assigned budget. So, ICT projects must have sufficient budget to be implemented within the original scheduled time…"

The purpose of project cost management is to confirm that enough, appropriate, and applicable budget allocation like capital, apparatus, workforce, spaces, and others are adjusted and timely implemented in the process of implementation of the ICT projects. However, budget shortage for the effective implementation of ICT projects, there was poor managing the allocated budget for ICT projects during COVID-19 pandemic. Project manager and project team leader stated:

"… ICT Projects budgets are allocated when the ICT projects implementation starts, and only limited budget are presented during the COVID-19 pandemic. This condition affected our ICT projects implementation; projects were not completed within the scheduled time…"

According to key informants' justifications project cost management that affected by COVID-19 pandemic ICT projects implementation performance, there was the limitation in ICT projects implementation. If such type of condition happened, then the ICT projects implementation performance will become highly influenced and affected. Due to the budget suspended of ICT projects implementation performance and become late because of the budget suspension within the scheduled time required during COVID-19 pandemic.

4.6. Other challenges of ICT projects implementation performance

Implementations of ICT projects in Ethiopian Airlines Group IT division were challenged with other than COVID-19 pandemic. ICT project implementation was very challenging. The other challenges that encountered on the ICT projects implementation performance are like project management practices, project initiation and planning problems, project tracking system tools, project manager personal skills and other inter department issues.

Key informants revealed that the absence adequate project management practices are one of the other challenges that affect ICT projects implementation performance. This challenge has a negative effect on ICT projects. For instance, if the project management practice is not exercised during the ICT project implementation, then it is not possible to evaluate, control, monitor and follow up the status of the implementation of ICT projects performance. IT head replied:

"…*we encountered in our IT division there were no formal project management practices to manage the given ICT projects for evaluating, controlling, and monitoring the status of implementation performance at any stages of the ICT projects. Then we confronted problems to get the right status report from each ICT projects under implementation in IT division…"*

All ICT projects should be undertaken through the project's management steps, starting from the project initiation to the closure with the client business requirements and analysis to get the right project design and project implementation. Due to project initiation and planning issues, ITC projects implementation were not accomplished based on the scheduled time, allocated budget and the required quality. ICT projects document reviews and interview investigation also agreed this. For example, IT head, project manager and team leader described about their ICT projects implementation performance:

"…*because of the improper project initiation and planning stage problems ICT projects implementation were delayed and increased cost to adjust extra and new business needs. Due to this problem ICT projects were affected by their time, budget and quality…"*

Absence of project tracking system tool highly affects ICT projects implementation performance because of the ICT projects performance visibility problems. If the ICT projects implementation invisible the higher managements were unable to follow up taken actions to their intervention in the encountered problems, then ICT project implementation become challenged IT head described:

"…constantly evaluated, monitored, and controlled follow up for ICT projects visibility based on defined objectives, goals, scheduled time, and budgeted cost, analyzing these tracking tools and reporting to get managerial responses and actions for the identified risk and challenges…"

Project tracking system tool is necessary to follow up the status of each ICT projects during implementation and it must be practiced properly. It should deliver understanding into the ICT projects implementation progress so that suitable helpful actions can be taken when the ICT projects performance diverged significantly from the original scheduled time.

4.7. Actions taken to the effects of COVID-19 on ICT projects implementation performance

Ethiopian Airline Group as a company and IT division as department, the following actions are taken during COVID-19 pandemic. High cost saving strategic plan amendment, cost saving from the small to large amount of costs, contract negotiations with vendors, contract reviewed for cost discount, and penalty avoidance for the delayed payments, request wave for payment extension, passenger aircraft transformed to cargo transportation and logistics services.

To mitigate the effects of COVID-19 pandemic on ICT projects implementation performance, IT top managements must participate in the contact negotiation to get price discount for operational service during COVID-19 pandemic. The IT head supported this idea:

"…we highly negotiated using our maximum efforts with the service providers and vendors that they must give us the service payment discount, payment period extension, penalty avoidance, and other cost related discussions until the COVID-19 pandemic is eliminated from the world, and they must give attention and participate to ICT project implementation performance…"

Almost all the key informants were or had been working in the ICT projects implementation that involved with the external service providers like Microsoft, Genesys, SITA, Sabre, and AVIT companies, and other service providers. IT head and team leader maintained this idea

"…some ICT projects were outsourced to global vendors or service providers to implement and to deliver services with technical team support and we need to propose the contact negotiation to mitigate the effects of COVID-19 pandemic on our day-to-day operations and payment terms negotiation the main and needs maximum efforts to deal with them..."

As a company and as an IT division, the following actions were taken to decrease and protect the employees from the COVID-19 pandemic infection. Such as virtual meeting to avoid physical contact, virtual communication is experienced, internally and externally, shift arrangement (late and early morning shift), cafeteria scheduling, office disinfectant spray, mask and sanitizer delivery, awareness creation, weekend shift, and working from home or remote working style.

4.8. ICT projects implementation performance

4.8.1. Time performance

ICT projects implementation performance encountered time delay due to COVID-19 pandemic. As the key informants explained about on time accomplishment of ICT projects implementation

and most of the ICT projects were not finalized within the scheduled time. Based on the key informant's answer almost all the ICT projects were not finalized according to the schedule time because of COVID-19 pandemic. Almost all key informants replied as:

"… during ICT projects implementation, the ICT projects encountered many challenges during COVID-19 pandemic. For example, procurement process took long time to start the ICT projects implementation due to COVID-19 pandemic and because of this material shipments delivery delayed and shortage of experienced manpower…"

ICT Projects to be finalized within the scheduled time, ITC projects implementation must start on time unless it will become delayed. This idea also supported by the data from the ICT projects document review, ICT projects implementation were delayed because of budget suspend and cost control approval challenges due to COVID-19, IT head and project managers portrayed:

"…in case of some ICT projects implementation after the bid process have been completed, there is a challenge to get budget approval due to budget suspension. i.e., cost control…"

The question for "*Do you think that your ICT projects implementation were finished within the scheduled time during COVID-19 pandemic?"*

Most of the key informants answered as "*NO*" from this it can be agreed that the ICT projects implementation were accomplished behind the scheduled time due to COVID-19 pandemic.

4.8.2. Cost performance

Budget is one of the criteria that ICT projects implementation performance can be measured or evaluated. The researcher asked for the questions: "*Do you think that your ICT projects were finished within the budget assigned during COVID-19 pandemic?"*

All most all key informants replied "NO". IT head, team leader, and project manager explained.

"…because of budget suspension during the ICT projects implementation due to COVID-19 pandemic. If there were extra requirements which are main elements of specification or which were not involved during ICT projects planning and if customers request other necessity, then budget is not assigned due to shortage of financial resources…"

If the allocated ICT projects budget is suspended due to COVID-19 pandemic, it has negative effect on the ICT projects requirement and quality of the ICT projects performance. Such kind of situation must be reserved into deliberation during ICT projects preparation stages.

Also, the researcher asked key informants *"if budget is suspended due to COVID-19 pandemic, do you think that ICT projects can meet all required quality and finished within time?" Then* IT head, team leader and project manager replied as

"…*I don't think, because ICT projects need a good quality of products, services and professional manpower for achievement of ICT projects, for this reason they may negotiated their quality…"*

ICT projects which were accomplished in such approach will be encountered diverse problems. For example, Terminal Network installation and baggage self-drop projects, records from project document review and field observations confirmed this. There were additional materials that are important for the ICT projects accomplishment that were delayed due to COVID-19 pandemic. Due to this Network operation team and End user support struggle to accept and maintain the standard operation and finally the ICT projects became ineffective.

4.8.3. Quality performance

One characteristic of evaluating the ICT projects implementation performance is quality. Head IT infrastructure and Team leader described about the implemented ICT projects quality as:

"… according to the project standard quality cannot be negotiated in any way and we belief that ICT projects must be finalized with a better quality, but due to COVID-19 pandemic we have facing quality issues because of experienced manpower…"

This shows that the owners need better quality ICT projects implementation performance that achieve the goals Ethiopian Airline Group IT division during COVID-19 pandemic. From our observations, there are a lot criticize on the implemented ICT projects. For example, the Airport terminal expansion ICT projects implementation. IT head described:

"…quality of an ICT projects implementation may come from the experienced and qualified manpower. Which means if they have the better skill and involve in ICT projects implementation the quality of the ICT projects will have good quality…"

Moreover, from the implemented ICT projects document reviews and actual observation shown that most of ICT projects did not fully meet the essential quality. For example, Airport Terminal ICT projects were criticized by Network support team, End user support and internal customers.

4.9. Discussions on the Findings

This section provides the summary of the major discoveries collected from the data analysis, discussions, conclusions, and recommendations. The results are summarized along with the objectives of the study, discussions are produced, conclusions are derived from the study and recommendations for action and further studies are given.

4.9.1. How COVID-19 pandemic affects ICT projects performance

The study demonstrates that at Ethiopian Airlines Group IT division the COVID-19 pandemic has significant effects on the ICT projects implementation performance. As it is shown in data presentation the data from interview and ICT projects implementation document review revealed that the ICT projects implementation performance is highly affected. However, the study indicated that; there were not standard procedures. When there are no formal ICT projects implementation procedures are not taken place to handle the effects of COVID-19 pandemic, the ICT project implementation will not be well documented.

4.9.1.1. Project procurement management

This outcome approves with the key informants believed that the ICT projects implementation performance is affected by of project procurement management during COVID-19 pandemic. In consequence, it is evident that most of the key informants believed that the ICT projects implementation procurement management processes were affected by COVID-19 pandemic. The process of procurement process become longer than usual, delay in material shipment delivery due to lockdown and travel restriction to the source of countries, and purchasing approval is delayed due to shortage of budget suspended because of COVID-19 pandemic.

Based on the findings the ICT projects implementation procurements were highly affected by COVID-19 pandemic in Ethiopian Airlines Group IT division. According to key informants' procurement management were the main problems to continue the implementation of ICT projects within the scheduled time and allocated budget and some of the ICT projects were delayed during the COVID-19 because of procurement delay for the execution of ICT projects.

4.9.1.2. Project communication management

The finding displays that, all key informants approved communications and managing these communications among diverse parties is very important. Effective communication management among the ICT project team members is one of the important performance indicators that could affect the ICT projects implementation, particularly during the execution stage. A good communication between parties involved in the ICT projects is essential to make certain ICT projects implementation run smoothly. Active communication between parties can benefit the ICT projects implementation in two ways. First, it helps the ICT projects running efficiently, and second, it would resolve most of ICT projects implementation problems quicker.

This outcome approves with key informants believed that the ICT projects implementation performance is affected by project communication management during COVID-19 pandemic. In consequence, it is evident that most of key informants believed that ICT projects implementation performance is affected by COVID-19 pandemic. Communication management means in this context, virtual communication, weekend shift, and fear of infection due to social distancing exercise in the working place in Ethiopian IT division due to COVID-19 pandemic.

Based on the findings ICT projects implementation performance was affected due to COVID-19 pandemic in Ethiopian Airlines Group IT division. According to the key informants response and researcher observation communication management was the other main issues to continue the implementation of ICT projects within the allocated schedule time and budgeted cost and some of the ICT projects were in delayed state during COVID-19 pandemic time because of the lack of proper communication management of for the execution of ICT projects.

4.9.1.3. Project risk management

To effectively evaluate the risks in COVID-19 pandemic, project managers need to focus on the right metrics and deliberate all the dimensions of risk: severity, possibility, and quickness. How quickly might the effects mark us inside our organization, supply chain, and balance sheet? As we navigate through the COVID-19 pandemic, there are lessons we can apply from previous pandemics, and actions we can take today to set the stage for a more resilient future.

This result approves with key informants believed that ICT projects implementation performance are encountering with significant financial shortage due to COVID-19 pandemic budget suspend, which has caused in the necessity to lay off contracted staffs.

While the Ethiopian Airlines Group has approved budget funding for some of some prioritized ICT projects affected because of the COVID-19 pandemic. There is no assurance that this will be enough for the accomplishment of the ICT projects. Some ICT projects implementation will be suspended temporarily, and the company may be further affected due to COVID-19 pandemic. Additionally, to process the ICT projects, bid on work opportunities, some major suppliers are requiring a COVID-19 pandemic strategy.

4.9.1.4. Project time management

This outcome approves with key informants said that ICT projects implementation performance is affects by project time management during COVID-19 pandemic. In consequence, it is evident that most of the key informants believed that the ICT projects time management is affected by COVID-19 pandemic. Time management means in this context, long vacation, and working from home, weekend shift and project delays due to COVID-19 pandemic.

Based on the findings ICT projects time management was affected due to COVID-19 pandemic in Ethiopian Airlines Group IT division. According to the researcher observation scheduled time management was the other main issues to continue the implementation of ICT projects within the allocated cost or budget and some of the ICT projects costs were increased during the pandemic time because of the scheduled time delay for the execution of ICT projects.

4.9.1.5. Project cost management

This outcome approves with the key informants believed that the ICT projects implementation performance was very much affected by project cost management during COVID-19 pandemic. In consequence, it is evident that most of the key informants believed that the ICT projects implementation cost management is affects by COVID-19 pandemic. Cost management means in this context, budget suspension, cost increase, and finance issues due to COVID-19 pandemic.

Based on the finding's ICT projects implementation cost management was affected by COVID-19 pandemic in Ethiopian Airlines Group IT division. According to the key informants' response and researcher observations budget suspension were the main difficulties to continue the implementation of ICT projects within the original scheduled time and some of the ICT projects implementation were in freezing state during the COVID-19 pandemic time because of the shortage of budget for the execution of ICT projects.

4.10. Other challenges of ICT projects implementation performance

According to the study results there were other challenges of ICT projects implementation performance during the time of COVID-19 pandemic. Such as project initiation and planning issues, outsourced stakeholders' management issues, absence of project tracking system, scope change due to users' requirements, prioritization with unplanned urgency issues, lack of skill training, and lack of week internal communication.

Project management practices are the backbone of any project implementation, especially for ICT projects implementation. In Ethiopian Airlines Group IT division, the practice of project management for the given ICT project is very minimal and needs to be improved in the future.

Project initiation and planning issue, absence of clear definition of what an ICT projects are and what should be done as business-as-usual activity. Some activities that should be managed as a project are being managed as business as usual and vice versa.

Outsourced stakeholders' problems are the major challenges of ICT projects implementation performance in Ethiopian Airlines Group IT division. Outsourced stakeholders have limited skilled human resources to do the ICT projects implementation with the scheduled time. And absence of project tracking system is the next major challenge for ICT projects implementation.

The project tracking system is used to monitor and control the status of each ICT projects by tracking the given schedule and budget to evaluate and make managerial decision on the specific ICT projects. Project tracking system tool is creating the visibility control at any stage of ICT projects. Scope change and adjustment by users' requirements is the other challenge of ICT projects implementation. Users might add or remove some requirements outside of the identified scope during the scope identification of the ICT projects implementation.

Prioritization is another major challenge to the ICT projects implementation performance in Ethiopian Airlines Group IT division. Prioritization is the main tool to implement different ICT projects based on their necessity and urgency needs. If there is no prioritization, the ICT projects are affected by unplanned urgency in the middle of implementation. Lack of adequate training internal and external communication are also challenging for the implementation of ICT projects. Therefore, other challenges of ICT projects implementation performance were additional effects during the COVID-19 pandemic.

4.11. Actions taken to the effects of COVID-19 on ICT projects implementation

Based on the study results there were actions that are taken to minimize the effects of COVID-19 pandemic on ICT projects implementation performance in Ethiopian IT division. Such as early and late morning schedule, weekend shift, working from home, and awareness creation for physical distancing and other prevention methods to minimize the spread of the VOVID-19 pandemic in the compound of the Ethiopian Airlines Group.

Early and late morning schedule is the arrangement of bus services in two categories; the first category is early morning schedule that the working hour is from 7:00 PM to 4:00 AM and the second category is late morning schedule that the working hour is from 9:00 PM to 6:00 AM. By arranging this schedule, the bus services can carry based on the capacity of their seats and this helps to exercise the physical distancing during bus transportation.

Weekend shift is the arrangement some of the staffs to be scheduled in weekend to minimize the number of staffs during normal office hours. And working from home is the planning of some selected staffs to do their work from their home to increase the physical distancing inside the office as well as in the compound. The above actions were taken to minimize the effects of COVID-19 pandemic for the implementation performance of ICT projects. Top IT managements able to negotiate highly with the service providers and vendors to including the contract adjustment negotiation to get price discount, payment terms extension, penalty avoidance due to payment delay to minimize the effects of the COVID-19 pandemic.

4.12. Summary

The regular and continuous follow up for ICT projects implementation performance especially from the effects of COVID-19 pandemic on Ethiopian Airlines Group IT division. This involves IT top management dedication to follow up the ICT projects implementation consistently. Inadequate ICT projects implementation performance evaluating effects of COVID-19 pandemic to what extent were revealed by the key informants. The evaluating process should start from the strategic developing stage of ICT projects implementation until the functioning stages. It should deliver knowledge into the ICT projects implementation performance so that suitable remedial activities can be taken when the ICT projects performance differed significantly from the original scheduled time plan.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Introduction

In this section of the study, the summarized main findings of the research results which meets both main and specific objectives of the research, summary of major findings, conclusions drawn based on the qualitative data analysis output, lists of recommendations and insights on the limitation of the study and future researchers' area are presented.

5.2. Summary of Major Findings

Since the main objective of this study is to evaluate the effects of COVID-19 pandemic on ICT projects implementation performance in the case of Ethiopian Airlines Group IT division. The study was targeted the total of 12 key informants. Though, only 10 key informants interviewed and completed their responses participating with 83.3% response rate. Key informants from diverse age group, educational background, and year of experience in the ICT projects are represented in the collected data. According to the previous chapter analysis, the results of effect of COVID-19 on the ICT projects implementation performance. And following this general objective, the study attempted to answer the specific objectives.

The main goal of this study was to answer both the general and specific objectives which will solve the problem identified for the effects of COVID-19 on the ICT projects implementation performance in the case Ethiopian Airlines Group IT division. Therefore, in the below the major findings that can align with the answers to the specific questions is presented. Concerning to the main objective of the research, the data analysis part of the study showed that five project management knowledge areas are identified which have significant effects on the ICT projects implementation performance in Ethiopian Airlines Group IT division.

The general objective of the study was to evaluate the major effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division. Based on the interview questions data analysis results, the effects of COVID-19 pandemic on the ICT projects implementation performance presented as:

The first specific objective is to investigate how COVID-19 pandemic that affects ICT projects implementation performance in relation to project procurement, communication, risk, time, and cost management in Ethiopian Airlines Group IT division.

- The study was to evaluate the effects of COVID-19 pandemic on the ICT projects implementation performance in relation to the project procurement management in Ethiopian Airlines Group IT division. Project procurement management was identified as the first highly affected project management knowledge area and has more effect on ICT projects implementation performance based on the outcome of this study in taking effect on ICT projects during COVID-19 pandemic period.
- The study was to assess the effect of COVID-19 pandemic on the ICT projects implementation performance in relation to project cost management in Ethiopian Airlines Group IT division. Project cost management were recognized as the next highly affected project management knowledge areas and has the major effect on ICT projects implementation performance based on result of this study during COVID-19 pandemic.
- The study was to examine the effect of COVID-19 pandemic on the ICT projects implementation performance in relation to project time management in Ethiopian Airlines Group IT division. Project time management was identified as the next highly affected project management knowledge area and has effect on ICT projects implementation performance based on the result of this study during COVID-19 pandemic period.
- The study was to identify the effect of COVID-19 pandemic on the ICT projects implementation performance in relation to project communication management in Ethiopian IT division. Project communication management was categorized as the next highly affected and has the effect on ICT projects implementation performance based on the result of this study during COVID-19 pandemic period.
- The study was to determine the effect of COVID-19 pandemic on the ICT projects implementation performance in relation to project risk management in Ethiopian IT division. Project risk management was categorized as the next highly affected and has the effect on the ICT projects implementation performance based on the result of this study during COVID-19 pandemic.

The second specific objective is to determine the other challenges of ICT project implementation performance in Ethiopian Airlines Group IT division. According to the study findings there were different kinds of challenges identified with the key informants' responses. Such as project management practice problems, absence of project tracking system, inter department relation issues, project manager personal skill, project initiation and planning problems, and longer procurement process during project preparation.

The third specific objective is to identify actions undertaken to mitigate the effects of COVID-19 on ICT projects implementation performance in Ethiopian Airlines Group IT division. Based on the study findings we have identified some actions taken from the key informants' responses. Such as deep negotiation with service providers and vendors, suspending non high priority ICT projects, practicing the cost saving strategies highly and consistently, encouraging the virtual meeting instead of physical meeting in the conference hall, delivering face mask and sanitizer every month, free COVID-19 testing and isolation center.

To summarize, the research questions that align with the specific objectives of the study and the general objective is answered with the descriptive analysis performed on the qualitative data analysis obtained from the selected ICT projects implementation key informants.

5.3. Conclusions

The fundamental purpose of the study was to evaluate the major effects of COVID-19 pandemic on the ICT projects implementation performance Ethiopian Airlines Group IT division. The researcher also tried to review in detail in the introduction and literature review. Following the outcomes and discussions in chapter four data analysis and description of data, literature review from chapter two, and project management knowledge areas that the below conclusions are forwarded about the effects of the COVID-19 pandemic on the ICT projects implementation performance in Ethiopian Airlines Group IT division.

Regarding the project procurement management, the results demonstrated that it has high major significant effects on the ICT projects implementation performance during the time of COVID-19 pandemic. When the project procurement management is influenced and the ICT projects implementation performance also highly affected. To effectively implementing the ICT projects, the procurement management is properly practiced without any problems.

Involving the project communication management, have high effects on the ICT projects implementation performance due to COVID-19 pandemic when compared to procurement, cost, and time management as per the data analysis results. Project communication management is one of the essential elements to ensure the excellent ICT projects implementation performance. An effective communication for notifications should be established to minimize the interaction gap.

In case of project risk management, it is very affected during the COVID-19 pandemic when it is taking greater effects. The ICT projects team members have focused their collaboration on addressing challenges with existing systems. In addition to ensuring that all the ICT projects implementation performance can proceed safely, however, it is time to begin considering starting new ICT projects, which will rely on defining how future risks will be mitigated.

Concerning the project time management, have great effects on the ICT projects implementation performance during COVID-19 pandemic when compared to procurement and cost management as per the result. A project schedule time is a timetable showing the forecast start and finish dates for activities or events within ICT projects implementation. If the schedule time is delayed due to COVID-19 pandemic the cost overrun is occurred on ICT projects implementation performance.

Finally, looking into the project cost management, have high effects on the ICT projects implementation performance when compared to the procurement management as per the results observed in previous chapter. The project budgeting is performed in parallel with the projects scheduling process. It is highly dependent on scheduled time. If the budget of ICT projects were suspended due to COVID-19 pandemic and the scheduled time of ICT projects implementation performance is also delayed.

In conclusion, based on the findings and the discussions for the above five project management knowledge areas (procurement management, communication management, risk management, time management, and cost management) are highly affected due to COVID-19 pandemic in relation to ICT projects implementation performance within Ethiopian Airline Group IT division.

5.4. Recommendations

Based on the outcomes and conclusions of the study, the next recommendations have been given to mitigate the effects COVID-19 pandemic on the ICT projects implementation performance in Ethiopian Airlines Group IT division.

To the international organizations like Ethiopian Aviation Group must be given the top priority for ICT projects by mitigating the identified effects of COVID-19 pandemic. The researcher is forward the following recommendation by the analysis result where ICT projects implementation performance for the identified effects of COVID-19 in Ethiopian Airlines Group IT division.

Project procurement management, the priority may be given to some types of the ICT projects implementation performance. It will be up to procurement specialists to build a case for why their ICT projects should be prioritized over another ICT projects. Even though, the shortage of suppliers and shipment delivery delays may continue as some industries. As the finding of the study shows project procurement management is the first most affected by COVID-19 pandemic on ICT projects implementation performance. So that Ethiopian Airlines Group IT division should select ICT projects those are most important for the Airline business and should be prioritized, controlled, and must be clearly defined objectives for procurement department.

Project communication management, to maintain effective communication in the ICT projects implementation. Thus, identifying as to how the communication gaps emerge in the workplace and taking necessary steps to maintain effective communication at work will be of great benefit to Airline business. The COVID-19 is the main reason for the communication gap by making the most communications virtual. The outcome of the study demonstrates project communication management is the most affected due to COVID-19 pandemic on ICT projects implementation performance so that Ethiopian Airlines Group IT division should select ICT projects those are more important for Airlines business should discuss to minimize the communication gap and should clearly addressed the information between the projects team and the implementer.

Project risk management, As COVID-19 pandemic constraints slowly lift across the country, ICT professionals have a very different working environment and associate set of ICT project risks to navigate. New safety procedures will need to be placed in position on ICT project sites to allow employees to resume to work carefully, with adjustments differing from a simple to major reworks. In Addition, COVID-19 pandemic could affect ICT projects schedules, and delays may result that are beyond the control of ICT professionals. In this case, professionals should consider combining a strict provision in their agreements and keep detailed documentation on the status of a project especially if it is suspended.

Project time management, the effect of time can have on the costs and timings of major ICT projects implementation performance. The project team involved in major ICT projects will be equally concerned with the consequences of delay. This is particularly so given the frequency of delays to large-scale ICT projects implementation performance and the associated effect this can have on cost. When delays occur in ICT projects the Ethiopian IT division will want to recover any additional costs or losses associated with the delay from implementer. As result of the study expresses project time management is the third most affected by COVID-19 pandemic on the ICT projects implementation performance so that Ethiopian Airlines Group IT division should select ICT projects those are most important for the Airline business and should be prioritized.

Project cost management: cost is a statement of the amount of money available to spend over a period on the specific project. Budget suspension is occurred during the COVID-19 pandemic that is budgeted for the ICT projects implementation. As conclusion of the study displays project cost management is the most affected by COVID-19 pandemic on ICT projects implementation performance. So that Ethiopian Airlines Group IT division should select ICT projects those are most important for Airline business should be budgeted and negotiated with finance department.

Other challenges of the ICT projects implementation performance such as project management practice problems, lack of project manager personal skills, outsourced stakeholders' management issues, absence of project tracking system tools, change of scope due to users' requirements, prioritization with unplanned urgency issues, lack of skill training, and lack of week internal communication. The researcher recommends for the IT top managements should do the next activities such as managing the outsourced stakeholders, developing project tracking system, selecting the priority of ICT projects based on their necessity, avoiding unplanned urgency, and preparing the formal skill training for the project team.

Ethiopian Airlines Group IT division was challenged by effects of COVID-19 pandemic on ICT projects performance under implementation process because of the project procurement management, cost management, communication management, risk management, and time management according the to the conclusion of the above section. However, the researcher recommends that the IT division top managements should look for the different alternatives of implementing the ICT projects to minimize the identified effects during COVID-19 pandemic.

Finally, the researcher highly recommends to the Ethiopian Airlines Group IT division IT top managements should take actions that can mitigate the effects of COVID-19 pandemic on ICT projects implementation performance using technical and strategical leadership skills by encouraging the project team members to develop themselves on ICT projects with innovation ideas to implement the most ICT projects through their internal professional to minimize the outsourced ICT projects that leads to procure products or services.

5.5. Research limitations and future study area

This study focuses and limited on the ICT projects that are under implementation in the past 2020 fiscal year and continued to the current year 2021 at Ethiopian Airlines Group IT division, because of the worldwide outbreak of COVID-19 pandemic and most of the ICT projects that are affected highly in the case of different project management knowledge areas such as project procurement management, communication management, risk management, time management, and. cost management and other challenges.

The researcher welcomes other future researchers who wish to study on the subject at similar case of Ethiopian Airlines Group IT division to include other effects for ICT projects that will be implemented in the future time by looking different perspectives.

Further research could be done to assess the overall effects of COVID-19 pandemic for the competitiveness of Ethiopian Airlines Group business in the big aviation market and how it can be used for minimizing the effects of COVID-19 pandemic and other related effects for the sustainable development purposes, considering the Ethiopian Airlines Group business strategic roadmap plan 2035.

Moreover, the ICT projects phase considered in this study is implementation stage only. Hence, the future research including all the ICT projects life cycles also recommended to be conducted using both qualitative and quantitative analysis methods.

References

African Airlines; Available online: *https://african.business/2020/07/economy/ethiopian-airlines-moves-from-passengers-to-cargo-as-pandemic-bites/* (Accessed in January 2021)

Agusdinata, Buyung & de Klein, Wouter, (2002). "The dynamics of airline alliances," Journal of Air Transport Management, Elsevier, vol. 8(4), DOI: 10.1016/S0969-6997(01)00052-7

Alsharef, A.; Banerjee, S.; Uddin, SMJ.; Albert, A.; Jaselskis, E. Early Impacts of the COVID-19 Pandemic on the United States Construction Industry. Int. J. Environ. Res. Public Health 2021, 18, 1559. https://doi.org/10.3390/ijerph18041559

Ashioya, S. J. Challenges influencing implementation of emerging ICT technologies in Kenya today; Master's Thesis, US International University, (2014)

Avots, I. Cost-Relevance Analysis for Overrun Control. International Journal of Project Management, (1983), Available online*: https://doi.org/10.1016/0263-7863(83)90018-2* (Accessed in January 2021)

Buhalis, D. eAirlines: strategic and tactical use of ICT in the airline industry. Information and Management. (2004). Available online: *https://doi.org/10.1016/j.im.2003.08.015* (Accessed in January 2021)

Buhalis, D. and Law, R. Progress in Information Technology and Tourism Management: (2008) Available online: *https://doi.org/10.1016/j.tourman.2008.01.005* (Accessed in January 2021)

Buhalis, D. Strategic use of information technologies in the tourism industry, Tourism Management, (1998), *https://doi.org/10.1016/S0261-5177(98)00038-7* (Accessed in Jan 2021)

Centers for Disease Control; Available online: *https://www.cdc.gov/vhf/ebola/about.html* (Accessed in January 2021)

Christensen, J. IT and business: a history of Scandinavian airlines, Aarhus University Press, Arhus, Denmark, (2000).

Elias Y. Critical success factors to information technology projects implementation: the case of commercial bank of Ethiopia, Master's Thesis, AAU, Ethiopia (2018)

Ermias, K. Assessing factors affecting the success of ICT project implementation in public sectors: In the case of city government of Addis Ababa, Master's Thesis, AAU, (2018)

Ethiopian Airlines: Available online: *https://corporate.ethiopianairlines.com/media/Performance-Report* (Accessed in January 2021)

Ethiopian Airlines; Available online: *https://corporate.ethiopianairlines.com/media/Press-Release* (Accessed in January 2021)

David Colton and Robert W. Covert, Designing and constructing instruments for social research and evaluation, Jossey-Bass, San Francisco, (2007).

Dawson, C. Practical Research Methods. British Library Cataloguing in publication data, United Kingdom, (2002).

Denscombe M. The Good research Guide 4th ed, Open University Press, McGraw-Hill House, England, (2010), ISBN-13: 978 0 335 24140 8

Doganis, R. The airline business in the 21st century, Routledge, London. (2001), Available online: *https://doi.org/10.4324/9780203991916*, (Accessed in January 2021)

Federal Aviation Administration (FAA), "FAA Statement on Ebola," (2014), Available online: *https://www.faa.gov/news/press_releases/news_story.cfm?newsId=17375* (Read in January 2021)

Feldman, J. Determining future levels of airline competition, Travel and Tourism Analyst, vol 3, pp70-82, USA, (2007).

Gholami, R., Emrouznejad, A., and Schmidt, H. *The Impact of ICT on Productivity of Airline Industry.* Operations and Information Management. Aston Business School, (2008).

GoodRx; Available online: *https://www.goodrx.com/blog/what-does-covid-19-mean-who-named-it/* (Accessed in January 2021)

Inform IT, Communication Gaps and How to close them, (Naomi K, 2013) Available online: *https://www.informit.com/articles/article.aspx?p=2122831* (Accessed in January 2021)

Khan, L. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition. McGraw Hill, (1993).

Kothari, C. R. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4lh Edition, New Age International. New Delhi, (2004).

Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. (2016). Factors affecting schedule delay, cost overrun, and quality level in public construction projects. Journal of Management in Engineering, 32(1), 1-29.

Lee, C. S. Modeling the business value of information technology, Information and Management, California State University, Long Beach, USA, (2001).

Meaza, T. Assessment of practices and challenges of implementing ICT project management in Ethio-telecom, Ethiopia, Master's Thesis, AAU, (2018)

Mugenda, O.M and Mugenda, A.G. Research methods: Quantitative and qualitative approaches. 2nd. Rev. ed. Nairobi: Act press, (2003).

Nancy, M. M. Factor's influencing implementation of ICT projects in government agency in Kenya. Master's Thesis, Nairobi, (2017)

NBAA; Available online: *https://nbaa.org/aircraft-operations/safety/swine-flu/* (Accessed in January 2021)

NBCI, Available online: *https://www.ncbi.nlm.nih.gov/books/NBK553072/* (Accessed in January 2021)

Nextiva; Available online: *https://www.nextiva.com/blog/virtual-team-communication.html* (Accessed in January 2021)

Peng Zou, Di Huo and Meng Li. Global Health Research and Policy: The impact of the COVID-19 pandemic on firms, a survey in Guangdong Province, China (2020).

Perez, D. How is the Information Technology disrupting aviation data analytic? (2017). Available online: *https://datascience.aero/information-technology-industry/* (Accessed in January 2021)

Plummer-Braeckman, J., Disselhoff, T., & Kirchherr, J. (2019). Cost and schedule overruns in large hydropower dams: an assessment of projects completed since 2000. International Journal of Water Resources Development, 1-16.

PMBOK Guide, A guide to the project management body of knowledge 5th edition. Project Management Institute, Inc. (2013), ISBN 978-1-935589-67-9.

Porter, M. Strategy, and the Internet. *Harvard Business Review*, vol 2, (2001). pp63-78.

Protiviti, Impact of COVID-19 on Construction Projects, Critelli, J. (2020). Available online: *https://www.protiviti.com/US-en/insights/covid-19-impact-construction-projects* (Accessed in January 2021)

Qiu, Wuqi, Risk Communication for Emergency Management of Pandemic Prevention and Control in China: A Comparative Study of SARS and H7N9, (2017).

Research and Markets, Laura W, COVID-19 Impact on ICT Industry (2Q 2020 Edition), Available online: *https://www.researchandmarkets.com/reports/* (Accessed in January 2021)

Sekaran, U. and Bougie, R. Research Methods for Business: A Skill Building Approach, (5th Ed.), (2009).

Schwalbe, K. Information technology project management (6th Ed.). Course technology, Boston: Cengage Learning, (2010).

Shaik, N. Role of Information Technology in Civil Aviation: A Focus on Cyber Crimes and Emerging Legal Issues, (2018).

TechTarget, IT project management, (2015). Available online: *https://askinglot.com/goto/_374603A8* (Accessed in January 2021)

Thamer A. N. Alenezi, Covid-19 Causes of Delays on Construction Projects in Kuwait, International Journal of Engineering Research and General Science Volume 8. (2020). ISSN 2091-2730

UKEssays; Available online: *https://www.ukessays.com/essays/tourism/the-use-of-ict-in-the-airline-industry-tourism-essay.php?vref=1* (Accessed in January 2021)

Verville, K. Computer reservation systems and airline competition, Tourism Management, pp. 174-183, (2003).

World Bank, Vinay S. COVID-19 Challenges and Response (2020), Available online: *https://blogs.worldbank.org/voices/covid-19-challenges-and-response-how-procurement-underpins-world-banks-response-pandemic* (Accessed in January 2021)

Wikipedia Ethiopian Airlines: Available online: *https://en.wikipedia.org/wiki/Ethiopian_Airlines* (Accessed in January 2021)

Wikipedia; Available online: *https://en.wikipedia.org/wiki/Impact_of_the_COVID-19_pandemic_on_aviation* (Accessed in January 2021)

Yale Medicine; Available online: *https://www.yalemedicine.org/news/2019-novel-coronavirus* (Accessed in January 2021)

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Appendixes

Appendix I: Interview Questions

Interview Questions

My name is Haile Gebresilassie; I am a post-graduate student in project management at Addis Ababa University School of Commerce. Currently I am working a research project work for the partial fulfillment of my Master of Arts in project management. This project work is titled as "The **Effects of COVID-19 pandemic on ICT Projects Implementation Performance: The Case of Ethiopian Airlines Group**".

In the circumstance of any inquiry, please do not hesitate to contact me for any trouble and/or explanation with my address indicated below:

Name: Haile Gebresilassie

Email Address: hailye2013@gmail.com

Phone Number: **+251922930569**

Part I: General Information

Q#1: Name of Organization: Ethiopian Airlines Group

Q#2: Gender: ☐ Male ☐ Female

Q#3: Age Group: ----------

Q#4: Educational Level: ----------

Q#5: Current Position: ----------

Q#6: Experience: ----------

Part II: Effects of COVID-19 pandemic on ICT Projects Implementation Performance:

Q#1: What are the overall effects of COVID-19 on the Ethiopian Airline Group?

Q#2: How COVID-19 pandemic affects ICT projects implementation performance?

I. How COVID-19 pandemic affect project procurement management in relation to ICT projects implementation performance?
II. How COVID-19 pandemic affect project communication management in relation to ICT projects implementation performance?
III. How COVID-19 pandemic affect project risk management in relation to ICT projects implementation performance?
IV. How COVID-19 pandemic affect project time management in relation to ICT projects implementation performance?
V. How COVID-19 pandemic affect project cost management in relation to ICT projects implementation performance?

Q#3: What are the other **challenges** on ICT projects implementation performance in Ethiopian Airlines Group IT division?

Q#4: What **actions taken** to mitigate the effects of COVID-19 pandemic on ICT projects in Ethiopian Airlines Group IT division?

Part III: ICT projects implementation performance

A. Time performance

Do you think that our ICT projects implementation were finished within the scheduled time during COVID-19 pandemic?

B. Cost performance

Do you think that our ICT projects implementation were finalized within the assigned budget during COVID-19 pandemic?

C. Quality performance

How you measure quality of our implemented ICT projects during COVID-19 pandemic?

Thank you in advance for your valuable time and cooperation!!!

Appendix II: ICT Projects Implementation Status

No	ICT Project Lists	Project type	Start date	End date	Status	Remark
I	**System and Database and Design Delivery**					
1	Airport Central Monitoring Management Tool	Software		11/20/2020	Suspended	
2	Azure Stack and Kubernetes	Software		11/13/2020	Suspended	
3	New Airport Infrastructure	Software		9/30/2020	Suspended	
4	Identity and Governance (IGA)	Software		30/09/2020	Suspended	
5	Azure DevOps Server	Software		11/22/2020	Suspended	
6	Truck/Bus and Vehicle Simulator	Software			Suspended	
7	DBMS Replacement	Software		9/18/2020	Suspended	
8	Virtual Desktop Infrastructure	Software		12/25/2020	Suspended	
9	Office 365 Utilization	Software		10/10/2020	Suspended	
10	Windows 10 upgrade infrastructure	Software		11/20/2020	Suspended	
11	Big Data Platform Implementation	Software		4/2/2020	Suspended	
12	Cargo Data center Standardization	Software		10/11/2020	Suspended	
13	Email Archiving	Software			Suspended	
II	**Networks Design and Delivery**					
1	Domestic Airports Network Installation	Network Infrastructure		11/20/2020	Suspended	
2	EAE Network	Network Infrastructure		07/05/2020	Suspended	
3	DC and Edge firewall replacement	Network Infrastructure		5/5/2020	Suspended	
4	SD WAN including solution for CUTE	Network Infrastructure		06/05/2020	Suspended	

5	Cargo Customers Network Installation	Network Infrastructure			Suspended	
6	SDA	Network Infrastructure			Suspended	
7	Implementing WLC for Airport	Network Infrastructure		12/27/2020	Suspended	
8	DC and DR redundancy	Network Infrastructure		31/05/2020	Suspended	
9	4G LTE for Airside Apron			6/12/2020	Suspended	
III	**IT Application Design and Delivery**					
1	E-passport with immigration	Application		10/9/2020	Suspended	
2	EAA Digital Transformation	Application		5/18/2020	Suspended	
3	Cargo Revenue Accounting System (ET-CRAS)	Application			Suspended	

Table 4.6: ICT projects lists (Source: ICT projects implementation document: March 2021)