ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS DEPARTMENT OF MANAGEMENT

The Effect of Achieving Competitive Excellence (ACE) Tool on passenger air transport service performance: The case of Ethiopian Airlines Ground Services (GRH)

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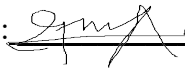
DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other university. I, Hailu Abebe, have carried out MSc thesis on "**The Effect of Achieving competitive excellence (ACE) tool on passenger air transport service performance: the case of Ethiopian Airlines Ground Services (GRH)**" independently in partial fulfillment of the requirement of degree of Science in Quality Management and Organizational Excellence. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Name: Hailu Abebe Signature:  Date: 02July,2024

STATEMENT OF CERTIFICATE

Thesis advisor, I hereby certify that I have read and evaluated this thesis prepared under my guidance and supervision by Hailu Abebe entitled ‘‘**The Effect of Achieving competitive excellence (ACE) tool on passenger air transport service performance: the case of Ethiopian Airlines Ground Services (GRH)**’’. I here assure that his work is appropriate to be submitted for examination with my approval.

Advisor	**Signature**	**Date**
Abera Legesse (PhD)		24June,2024

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GRADUATE STUDIES

As mentioned on the Board of Examiners of the MSc thesis open defense examined. We certified that we have read and evaluated the thesis prepared by Hailu Abebe and examined the candidate. We recommend that the thesis be accepted as fulfilling the thesis requirements for the master's degree of Science in Quality Management and Organizational Excellence

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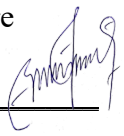
Mebrahtu L. Teklehaimanot (Ph.D.)		02 July 2024
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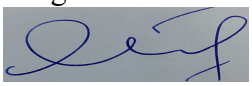
DR.Aberea Legesse		24/June,2024

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ABBREVIATIONS

ETG: Ethiopian Group

ACE: Achieving competitive excellence

CSA: Customer service Agent

QMP: Quality Management Practices

TQM: Total Quality Management

DM: Decision making.

ETAG: Ethiopian Airlines Group

PI: Process improvement

SD: Standard Deviation

SPSS: Statistical Package for Social Science

UTC: United Technologies Corporation

VSM: Value stream mapping

WE: Waste elimination

GRH: Ground handling services

IOSA: IATA Operational Safety Audit

PRSA: Passenger's Requiring Special Assistance

OTP: On time Performance

SOPs: Standard operating procedures

ABSTRACT

ACE (Achieving Competitive Excellence) is a company-wide strategy. It is an approach to relentlessly improving the value of service that we deliver to our esteemed customers. ACE provides direction for prioritizing strategies, creates procedures for converting plans into actions, and sets up systems for collecting feedback on performance and areas for development (Roth 2010). Since 2007, ETAG (Ethiopian Aviation Group) has been using ACE as a functional tool. The goal of this study is to explain the effect of ACE on passenger air transport service performances in the instance of Ethiopian Airlines Group Ground Handling Division utilizing ACE as an operating system.

To determine the explanatory or independent variables and dependent variables, a thorough literature review was conducted on the performance of the passenger air transport service and the ACE operating system. As independent variables, the four ACE constructs—process improvement tools, waste elimination tools, decision-making tools, and problem-solving tools—are taken into consideration. The performance of the passenger air transport service was the dependent variable. The study employed descriptive analysis, namely percentage, mean, and standard deviation, to characterize the variables. Meanwhile, inferential analysis, specifically correlation and regression analysis, was carried out to ascertain the impact of ACE on the performance of the passenger air transport service. Data was gathered for the study using questionnaires and interviews furthermore a purposive sampling interview with five operational management team members of the passenger air transport service section yielded 279 completed and returned questioners, or a 93% response rate, out of a total of 300 questioners distributed to be filled out by passenger service operational employees from the boarding gate, check-in, and baggage service sections furthermore descriptive analytic techniques were employed. Based on the data, tests for multicollinearity and reliability were also carried out. In terms of the research findings, the study concluded that there was a statistically significant positive relationship.

Keywords: ACE (Achieving Competitive Excellence), ACE Operating system, passenger air transport service

CHAPTER ONE

1. INTRODUCTION

This chapter includes definitions of important terms as well as the study background, problem statement, research question, scope, and research limits.

1.1. Background of the Study

Today's business environment is constantly changing due to competition, which has forced companies to adopt quality management practices (QMP) to continuously improve their work processes (Chhabra, 2000), cut waste to save costs (Manzouri et al., 2014; Rahman et al., 2010), have strong and organized problem-solving processes (Jovanović et al., 2009), and be able to make decisions (Vuorinen, 2014). When it comes to Airline Industry Organizations operate within an increasingly VUCA (volatile, uncertain, complex and ambiguity) environment and are obliged to be in a state of constant change. The pressure to change stems from a variety of internal and external sources such as political, economic, social and technological factors (Boojihawon & Segal-Horn, 2006). Some of the major forces contributing to this scenario are globalization (which has greatly increased competition), Airlines technological advancements, and shifts in consumer tastes and changes in culture. All these factors demand airlines to be in the way of adaptation to maintain their position in the market. In this sense, organizational leaders are striving to establish quality management systems that are seamlessly connected with the organization's strategic goals to bring about the necessary change. According to Dean and Bowen (2013) many academics concur that executives can apply TQM and QMPs in any type of organization in any industry, including government, education, manufacturing, and services.

Having the very challenging competitive environment and volatile industry, Ethiopian airlines (ET) adopting a business process reengineering as per recommended airline best practice coupled with efficient project management and change management approaches to insure user acceptance of new work practice. Therefore, ACE tool was adopted by Ethiopian Airlines collectively, and the study's emphasis was Ethiopian Ground Service (GRH) at the strategic business unit (SBU) level. Ethiopian airlines adopted the ACE tool for maintaining an effective and efficient passenger air transport

service operation which is essential for a corporation to survive in the fiercely competitive Airline business world. One of the most important factors to consider improving performance across the board for the passenger air transport service operation is the effectiveness and efficiency of the service's functions.

A review of the literature reveals that there aren't many studies on the relationship between quality systems and the performance of passenger air transport services utilizing ACE methods. This study focused on Ethiopian Airlines, a passenger air transport company that owns and manages its own terminal with a cutting-edge airport that can accommodate more than 10 million people annually. Achieving Competitive Excellence (ACE), a tool for continuous quality improvement, was implemented by the organization.

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1.2 Background of the organization

The Ethiopian Airlines Group has gained a lot of recognition recently for being the fastest-growing airline in Africa as well as the largest carrier on the continent thanks to the unveiling of its 2010 vision 2025. At present, it manages around 126 aircraft, with an average age of under six years. Additionally, 47 aircraft are on order. As of January 2024, Ethiopian Airlines—one of the biggest alliances, Star Alliance—serves 130 international and 22 domestic destinations throughout 75 countries.

With nine strategic business units—Ethiopian International, Ethiopian Express (regional), Ethiopian Cargo, Ethiopian MRO, Ethiopian Catering, Ethiopian Aviation Academy, Ethiopian Ground Handling, Ethiopian Airports, and Skylight Hotel—the airline, operating under the Vision 2025 plan, evolved into the largest aviation group in Africa. Ethiopian Ground Handling Services (GRH) is one of these strategic business units. According to its 15-year development road map, Vision 2025, GRH expects to transport over 10 million passengers to 130 destinations, using its state-of-the-art passenger terminal facility as a central hub, and generate more than $10 billion in revenue.

Vision

By 2035, ETG aims to rank among the top 20 most competitive and prestigious aviation groups in the world by offering aviation training, airport management and ground services, MRO and

aerospace manufacturing, safe, secure, market-driven, and customer-focused passenger and cargo transport and logistics services, as well as travel and tourism services.

Mission

- Why To rank among the top 20 airline aviation groups in the world by offering aviation training, in-flight catering, MRO, ground services, and passenger and cargo transportation that is safe, affordable, and dependable, as well as a "value proposition" that consistently outperforms that of competitors
- To maintain being the aviation company of choice for its clients, the employer of choice for its staff, the investment of choice for its owners and stakeholders, and the partner in mutually beneficial business partnerships.
- To make significant contribution in the socio-economic development of Ethiopia and the countries it operates in general by undertaking its corporate social responsibilities and providing vital global air connectivity.

Retrieved from (https://portal.ethiopianairlines.com)

1.3 Statement of the Problem:

In the context of the global economy, the role of airlines in the commercial passenger air transport sector has grown significantly. As people want to interact outside of their local area, pursue further education overseas, conduct business, and other activities, distance becomes a barrier. For similar reasons, freedom of movement of people, raw materials, spare parts, semi-finished, and fully finished goods are all impeded by distance (Zondag, 2006). Therefore, such barriers are feasible and minimized by the air transportation services that carriers offer. With this regard, The Ethiopian airlines a proud and national carrier put a lot of effort and success into becoming the most prosperous and powerful airline serving and connecting both passenger and cargo flights throughout Africa and beyond. One of the key business divisions of the Ethiopian Group (ETG), Ethiopian Ground Service owns and runs a state-of-the-art terminal that can accommodate more than 10 million passengers annually. In terms of the money the ET Aviation Group generates, it is likewise the best. Clearly, several things have contributed to this outstanding accomplishment.

Among these variables, the study's researcher was particularly curious about how the performance of the passenger air transport service will be affected by the adoption of the ACE operating system,

a participatory continuous quality improvement system. ACE (Achieving Competitive Excellence) is an ET operating system that has been deployed across the entire company. It offers quality and value to its clients while concentrating on improving internal business procedures. "Changing the system and processes that control its operation is the only way improvement gain can be effectively and permanently embedded in the fiber of a company," says Harrington (2002).

So, the statement of the problem considers below major issues:

- Review of ACE activity report generated by the ET-corporate change management section shows that there are still difficulties in integrating the ACE operating system into the workplace, using its resources appropriately, and reaching the necessary level of expertise for staff members.
- Ethiopian Airlines is known to have experience in the passenger air transport service sector, but it struggles to involve the airport community's stakeholders by utilizing the ACE tool and collaborating as a team to provide smooth customer service.
- From the review of literatures, it is quite evident that very few research has been carried out in using ACE tool practices and Passenger air transport service performance especially in Ethiopian Ground handling Division (ET-GRH).
- This study focuses on the investigation of the effect of Achieving competitive excellence (ACE) Tool on Passenger air transport service.
- On the other hand, the purpose of this study is to clarify the crucial elements of ACE that contribute to the effective operation of Ethiopian Airlines' ground handling service (GRH).
- The current study seeks to fill gaps in existing literatures by investigating the effect of Achieving competitive excellence (ACE) Tool practices on Passenger air transport service performance in Ethiopian Ground handling Division (ET-GRH).
- Based on the finding, recommendations were forwarded to solve problems in this area of ACE Tool practices on Passenger air transport service

Therefore, the purpose of this study is to ascertain how each of the chosen important factors affects the effectiveness of the passenger air transport service.

1.4 Research Questions:

The following research questions are formulated based on the problem descriptions listed above and the previously discussed issues:

1. What effect does ACE process improvement tools have on passenger air transport service performance?

2. What is the effect of ACE waste elimination tools on passenger air transport service performance?

3. What effect does ACE Decision making tools have on passenger air transport service performance?

4. What effect does ACE Problem solving tools have on passenger air transport service performance?

1.5 Objectives of the study

1.5.1 General objective

This study is dedicated to finding out the effect of ACE on Passenger air transport service performance in Ground service division from ET-GRH employees' (operational management and non-management) and internal customers perspective.

1.5.2 Specific objectives

This research has the following specific objectives**:**

. Examining the effect that ACE process improvement tools have on the performance of the passenger air transport service from the viewpoint of the ET-GRH employees.

. To determine, from the viewpoint of ET-GRH employee, how the performance of the passenger air transport service was affected by ACE waste elimination technologies.

. To evaluate, from the viewpoint of ET-GRH employee, how the operation of passenger air transport services was affected by ACE decision making tools.

. Testing the effects of ACE problem-solving tools on the performance of passenger air transport services from the viewpoint of ET-GRH employee.

1.6 Scope of the Study:

Geographically: Even though the ACE operating system is a broad concept and a corporate quality management system, the purpose of this study is to describe how ACE affects the performance of

passenger air transport services in case of ET-GRH at Terminal 2 at Bole International Airport in Addis Ababa, Ethiopia.

Conceptually: It will focus solely on the function and operation of the passenger air transport service and provide a thorough explanation of how it affects the execution of that service.

Methodologically: The study employed mixed research approach (quantitative and qualitative) and it was used both descriptive and explanatory research design.

As they are also involved in the day-to-day operations of ACE, only permanent operational staff (Customer Service Agents, Members of Operational Management) and internal customers participate as respondents in this study.

1.7 Significance of the Study:

The purpose of this study is to investigate how Ethiopian Airlines Ground Services' (GRH) passenger air transport service performance is affected by the ACE operating system. The study's conclusions, which represent a micro-level analysis of the case organization, are thought to have a substantial effect on the organization overall, especially on the Ground Handling Service Division. The literature study on the subject indicated that there is a lack of research on the effect of continuous improvement approaches such as ACE on the performance of passenger air transport services. This study will attempt to close the gap that has been noted in this regard. To expand the study's relevance to other businesses, the researcher thinks that it will inspire additional research on the ACE operating system and passenger air transport service operation. Furthermore, the researcher anticipates that the example company, which is the Ground Handling Division's Passenger Service Section, will obtain valuable insights that will aid in the development of future business plans.

1.8 Organization of the study:

This investigation of how ACE Toll affects ground handling service, namely the performance of passenger air transport services, will include five distinct chapters where the researcher explains the full study process in detail. The introduction section of the first chapter covers the following topics: the study's background, the organization's background, the problem statement, the study's objectives, the fundamental research questions, the study's scope, and significance, organization, and term definitions. Chapter 2 of the study covers the theoretical and empirical reviews, conceptual frameworks, and identification of gaps in the literature that are relevant to the proposed study.

Chapter 3 of the study describes the research methodology, including the study area description, research approach, research design, population size, data source and type, data collection process, data analysis and presentation method, reliability and validity test, and ethical considerations. The study's results, including data analysis, interpretation, and discussions of the results, are covered in Chapter 4. Chapter five concludes with a summary, recommendation, and a conclusion.

1.9 Limitation of the study:

Only Ethiopian Ground Handling Service (ET-GRH) at T2- Bole International Airport Head Quarter was permitted to use input data for this investigation. Due to time, financial, and resource constraints, other EAL's ACE cells outside of the headquarters, such as all ticket offices nationwide, Domestic stations, and international outstations (outside Ethiopia), are not included in this research study.

2.0 Operational definitions of Terms:

ACE: is an abbreviation for Achieving Competitive Excellence, a tool used in quality management systems.

CSA-Customer service agents are Staff members with training in passenger service.

CHAPTER TWO

2. Literature Review

2.1 Quality Management System Practice (QMP)

There is growing demand for commercial enterprises worldwide, which has led to the development of different quality management systems. Scholars characterize quality management practice as an executive-agreed management style and guiding philosophy intended to boost organizational performance and competitiveness. The majority of these procedures, which include benchmarking and six-sigma, are predicated on the idea of total quality management, or TQM.

Any firm operating in any sector of the economy, such as manufacturing, services, education, etc., can use TQM.A review of the literature reveals that the development of many quality management

practices has been largely attributed to the work of quality leaders, including Deming (1986) and Juran (1988), who highlighted the significance of the quality philosophy as a crucial competitive tool for improving an organization's performance. "Multidimensional to produce a product and/or deliver a service that meets the customer's expectations to ensure customer satisfaction" is how Deming defines quality (Deming, 1986).

2.2 Review on ACE operating system and its Tools

Achieving competitive Excellence (ACE) and organizational performance:

The United Technology Corporation website document (UTC, 2012) makes it very evident that the drivers of competitive excellence—people and work process—are the main emphasis of achieving competitive excellence (ACE). The leadership of UTC collaborates with its empowered workforce to integrate the ACE practice into every aspect of UTC business operations. Benefits from ACE can only be realized when empowered workers use it as an operating system to direct their actions, including ACE's continued development (Roth, 2010).

George David, the previous CEO of UTC, discovered that ACE is responsible for the company's excellent success. According to Roth (2010), following the introduction of ACE, United Technologies Corporation (UTC) reported a doubling of revenue accompanied by a drop in workstation square footage. This demonstrates how efficiency and effectiveness in the process can greatly boost the profitability of each passenger air transport service performance as well as ACE defines procedures for converting strategies into actions, directs the establishment of strategic priorities, and creates feedback systems for evaluating success and improvement.

The researcher went on to explain that, according to the UTC case study, ACE helps UTC satisfy its staff, satisfy shareholders, and thrill customers furthermore, UTC and other businesses that have used these exclusive tools for continuous improvement have succeeded in reaching the performance targets they set for themselves. UTC has been developing and using ACE as a predictive operating system since the early 1990s. It is one of the platforms for continuous development. UTC's organic growth of 7% to 9% between 2004 and 2007 and 5% in 2008 was made possible by ACE.

A study comparing ACE and Six Sigma by Image results for Massachusetts Institute of Technology (MIT) reveals that while ACE is less data oriented than Six Sigma, it is more broadly based. The same report went on to explain that ACE was centered on four main categories: tools for process improvement, tools for waste elimination, tools for decision-making, and tools for problem-solving.

Since 2007, ETG has been granted permission to use ACE, a quality management system that it directly adopted from UTC. The choice made by ETG to work with UTC to install the ACE operating system demonstrates the potency of ACE as an “operating system" when properly administered and utilized.

According to Thomas C. Hutton's (2014) research, quality management system and improvement are crucial factors in all spheres of the global economy. Since quality plays a significant role in consumer happiness, it is therefore essential to the majority of organizations, if not all of them. The report went on to clarify that in certain businesses quality extends beyond customer satisfaction and includes crucial domains like public and customer safety.

"Management and empowered employees need to work together to remove barriers that hinder improvements in order to provide our customers with high quality products and services," according to the CEO of UTC, who was quoted in a case study by Roth (2010) on the ACE operating system. "The ACE successful journey requires the commitment from the passionate leadership and engaged employees." "Achieve a level of quality and productivity improvement that will delight our customers and allow us to satisfy increased workload more efficiently," reads the mission statement of UTC ACE.

By the early 1980s and 1990s, ACE had been built on the foundation of total quality management (TQM), and businesses had begun to build their own quality systems on the same principles. Since ACE is a proprietary quality management system, it can only be used with a UTC license. Because it is an idea that outlines a method of management, it qualifies as an operating system (Roth, 2010).

“ACE as an “operating system” defines the management system used by individuals and organizations across UTC to delight customers, provide returns to its shareholders, and satisfy its employees. ACE Guides the setting of strategic priorities, establishes for translating strategies into actions and setup feedback mechanisms for assessing improvement and performance.”

It defines the management system having three elements namely, culture, tools, and competency (Huang, n.d.).

Culture: From a cultural point of view, ACE is a specially designed method that hasn't worked well in other firms. Organizational culture, corporate resources, and the availability of a quality management system all play a major role in its implementation. It necessitates an organizational

culture that uses the appropriate competency when employing the ACE tools. Various case studies demonstrated that ACE is not limited by language or country culture. ACE should be implemented in a way that makes it a process-focused culture in order to achieve the necessary degree of performance (Roth, 2010).

ACE Tools: The instruments for process improvement, waste elimination, issue solving, and decision making are applied systematically in ACE. ACE techniques and methods were derived from lean, quality, and statistical process control practices, as stated by Roth (2010). These tools aid in problem identification and resolution, process improvement, and the timely, effective, and cost-effective making of strategic decisions by an organization. The ACE operating system is driven by the organizations to close gaps between real results and business goals and to get rid of waste. (Thomas 2004 and Roth 2010)

ACE is an integrated improvement program that applies lean and Six Sigma best practices, including waste, kaizen, TPS, SPC, and value stream mapping (AF Themes ACE). After he assumed control of the Quality department at Otis Elevator, Yuzuru Ito was referred to be the organization's founder. Additionally, Otis and Pratt & Whitney developed a foundation of lean principles in the early 1990s with backing (Roth, 2010b).

Competency: This is a concept that emphasizes the need for all employees to have competency in utilizing ACE tools. This could be achieved by detailed training provided to employees. It is described in ACE manual that leadership have a responsibility to bring this competency to their team through training (ET ACE Handbook 2007 and Davis 2008).

The several stages that an ACE cell attains inside an organization, especially Qualifying, Bronze, Silver, and Gold, demonstrate the cell's progress. For cells to reach these levels, they must have qualified staff members who have received ACE tool training and who uphold ACE as a culture. And what distinguishes an operating system is how all its components interact daily.

According to (Roth, 2010; Thomas, 2004), The following are the primary business outcomes that come from implementing the ACE Tool operating system:

- Turn-around time reduction/speed.
- Improved internal process of check-in and boarding.

- Maintain Et organizational excellence in passenger air service in Ground service division.
- Improved costs
- Improved quality
- Regulatory adherence
- Increased business levels
- Customer delight and satisfaction/On time performance (OTP)

- To meet company objectives
- To improve the company's performance
- It is the constant improvement of the value that we deliver to our customers and investors.
- Synergize
- Sharpen the saw as per United technology corporation (UTC)
- Enterprise transformation as per Ethiopian airlines ACE Document

The ACE stands on below foundations:

The ACE Document, 2003 by Pratt & Whitney Canada outlines several key components: a competitive excellence philosophy; an operating system equipped with tools that facilitates process improvement, waste elimination, problem solving, and decision making; and the ability, dedication, and participation of the entire organization to embody the philosophy and implement the operating system in all aspects of our work.

ACE Philosophy: "A company's systems and procedures must be altered in a comprehensive and long-lasting manner to incorporate improvement gains into its operations. Jeremy Harrington "Workers are responsible for 15% of quality problems, while systems (processes) account for 85% of them." Jura, John M.

Process: Sequences of actions that start with an input, enhance it, and end with an output. It is repetitive, foreseeable, and measurable.

Process Management: a methodical strategy that uses preventive techniques to boost the efficacy, efficiency, and flexibility of operations.

Process management guarantees: Dependable goods delivered on schedule each time.

- Flexible procedures sustain efficacy and efficiency when client demands, and external circumstances evolve. Better understanding of the whole process and of the impact of our work on customer delight
- Clearly defined responsibilities and roles.
- Integration of new hires is made easier.
- Decreased exasperation taken from the ACE Document (Pratt & Whitney Canada, 2003).

2.2.1 ACE Process improvement tools

Included in this group are the following instruments:

a. 5S+1 or 6S- Visual control: Visual control is the basis for this tool's operation. It aims to make the workspace so orderly that all employees can see and comprehend the stages, the operational environment, and the flow of work or materials. This allows for the immediate identification of any deviations. It is a philosophy centered on organizing, maintaining, and cleaning the workplace to make it comfortable for employees.

Originally derived from the five Japanese words seiri (organization), seiton (tidiness), seiso (purity), seiketsu (cleanliness), and shitsuke (discipline), the acronym 5S stands for Sort, Straighten, Shine, Standardize, and Sustain in the context of modern ACE.

Sort: Remove anything that is unnecessary.

Straighten: Arrange the remaining items.

Shine: Tidy up the workspace

Standardize: Frequent upkeep and cleaning

Sustain: Adopt the 5S lifestyle

According to studies, when people employ all five of their senses, they often develop a sixth sense that alerts them to problems. A workplace where individuals achieve high levels of productivity, service quality, and efficiency is created by achieving this visual technique.

When we say workplace there are physical and electronic workplace. For physical workplace 5S encourages labeling drawer contents, designated work areas, and the locations of tools for visual

effects. The term "electronic workplace" refers to workstations with several work files on them. Files must be maintained in an orderly and policy-compliant manner.

Since 5S makes changes easier to see right away, it is typically the initial step in starting adjustments. It encourages individuals to tidy their workspace, recognize unnecessary items, and take them out of the office so that work may be done more quickly.

b. Process Management: Enhancements beyond gathering data, identifying, mapping, and putting process modifications into practice can be achieved through certification and process maturity development, which raises the processes' capacity to deliver what is needed when it is needed. Six steps make up UTC's process maturation methodology. ACE establishes methods for turning plans into actions, provides feedback mechanisms for evaluating performance and improvement, and directs the formulation of strategic priorities. It utilizes tools and methodologies adapted from lean, quality, and statistical process control practices.

c. Standard work: Simplifying and organizing work to ensure quality, consistency, and repeatability throughout time is the goal of standard work. Standard Work in ACE cells included system and process definitions as well as documentation. Simplifying job instructions and processes and recording lessons gained. Standard Work in a manufacturing ACE cell included work steps, set inventory levels, simplified work instructions, and adherence to the standard time. For Standard Work to be effective, reliable tools and procedures are required.

The measurement of standard work time and work process observation define this ACE instrument. Standard work is put into practice by standardizing work procedures and keeping track of and monitoring the standard times for each task. To guarantee long-term quality, consistency, and repeatable outputs, it streamlines and organizes work.

2.2.1.1 Relation between Process improvement and organizational performance

According to Ashogbon (2012), a process is an action carried out with the intention of reaching a goal that is anticipated to occur gradually. A process often consists of multiple sub-activities that ensure the desired results are reached in between its start and finish points. The goal of process improvement is to move a procedure from its current state to the ideal one, with performance and significant quantitative improvements that support the accomplishment of the desired goal or goals.

2.2.2 ACE Waste elimination tools

Manufacturers are switching to a new production method known as lean manufacturing across all industries. Its idea is to alter the way that manufacturing is seen, rather than developing novel methods for creating goods (Abdullah, 2003). The idea behind lean manufacturing is that all staff members should collaborate to get rid of waste. Since the beginning of the industrial revolution, all engineering-related businesses, industrial technologists, and other similar firms and managements have tried this. Waste is anything that does not improve the product or service from the perspective of the customer.

Gay (n.d.) defines waste as any activity or expense that is undertaken but does not result in the transformation of raw materials into a product that a consumer is willing to pay for. Each stage of the production process can have value added to it by streamlining the process and getting rid of waste. According to research by Abdullah (2003), Japanese manufacturers had to deal with a severe lack of raw materials, capital, and labor following World War II. The lean manufacturing concept emerged because of these circumstances. In the middle of the 1940s, American corporations were surpassing their Japanese counterparts by a factor of ten. Toyota Motor Company, under the leadership of its president, Toyota, realized this trend. Japanese pioneers like Shigeo Shingo and Taiichi Ohno developed a new, methodical, process-oriented methodology that is now referred to as the "Toyota Production System" or "Lean Manufacturing" to start the improvement process early.
Below ACE tools are available in this category:

a. Value stream mapping (VSM): One of the main ideas of lean is the development and enhancement of customer value. Products and services are created with the requirement that every step in the process contribute value to the final product or service. Value stream refers to both the "stream" of the process that was used to develop the product or service and the "value" that we offer to the consumer. To provide dependable service, VSM necessitates a focus on consumer values as well as an endeavor to arrange activity sequences and enhance these procedures. To reap the benefits, this calls for an organizational restructuring of activities and procedures. VSM aids in locating assets and personnel that do not provide value. "Management is the art of performance and management's mission," claims Magretta (2002).
According to (Milanoi, 2013), the following are the essential actions in carrying out a VSM:

1. To identify a product or product family: A product family is a group of items that share a set of processes in the production process.
2. Gathering relevant information for quality reports, audits, and reports on maintenance and inspections along the value chain. Next, specify the VSM exercise's scope.
3. Create a value stream map of the current state, which can serve as a starting point for improvement.
4. After Analyze the Current State Value Stream Map, identify the non-value adding activities or wastes which become evident after analysis.

5. To create a value stream map of the future state to remove activities that do not contribute value.
6. A strategy will be put into place to create and carry out the necessary adjustments that deal with the non-value-adding activities. This entails establishing quantifiable goals, establishing milestones, establishing an order of work to be completed, and getting approval from all relevant parties to reach the desired future state.

It is important to choose departmental and activity structures that will increase customer satisfaction. Reviewing past organizational structure priorities reveals that they have consistently clashed with the idea of VSM. UTC achieved process efficiency by utilizing this all-encompassing perspective of VSM (Roth, 2010). By adopting a system-level perspective and concentrating on building lean processes by reducing waste, VSM seeks to identify and improve the set of processes that provide the necessary values to the client. This approach finds and enhances the value for clients by locating and enhancing the value-creating process. The VSM technique can only be utilized as an effective and efficient

b. Total Preventive Maintenance (TPM): TPM strives for equipment maintenance with the idea that well-maintained equipment encourages high quality. It is centered on the machine's safe, dependable, and effective operation, which will maximize the equipment's usable life and enable productive labor. The TPM approach boosted machine dependability and decreased unscheduled downtime through data collection, cooperation, and root cause investigation. The procedure comprised disassembling, inspecting, and rebuilding the equipment in addition to creating a program for preventative maintenance, daily operator inspections, and frequent audits.

c. Setup redaction: is the process of minimizing the amount of time needed to begin the next operation after the first step in the work process is completed. Typically, setup reduction identifies and removes tasks that cause the next tasks to be delayed.

2.2.2.1 Effect of Waste elimination on Airline passenger air transport service performance

According to (Lumsden & Harvey,2014).in the context of airlines passenger service refers to the reduction or elimination of any unnecessary or inefficient processes, activities or resources that have a negative impact on the overall performance of the service. This can include anything from streamlining check-in procedures to reducing flight delays and improving customer service.

As per (Al-Mahmoud & Al-Mudimigh,2018) the effect of waste elimination on airlines passenger service performance can have several positive impacts.

1. Improved Customer Satisfaction: By eliminating waste, airlines can provide a more efficient and streamlined service to their passengers. This can lead to increased customer satisfaction as passengers experience a smoother and more pleasant travel experience.

2. Reduced Costs: Waste elimination can help airlines cut down on unnecessary expenses, such as fuel consumption, maintenance costs, and unnecessary staff hours. This can lead to improved profitability and financial performance for the airline.

3. On-time Performance: Waste elimination can also improve the punctuality of flights, reducing delays and cancellations. This can lead to a more reliable and efficient service, which can enhance the overall passenger experience.

4. Increased Efficiency: By identifying and eliminating waste in processes, airlines can improve the efficiency of their operations. This can lead to faster turnaround times, improved flight schedules, and better utilization of resources.

5. Competitive Advantage: By providing a more efficient and satisfactory service, airlines can gain a competitive advantage over their competitors. This can help attract and retain customers, leading to improved business performance.

2.2.3 ACE Problem solving tools.

a. Market feedback analysis (MFA): Through MFA, user feedback was integrated into ACE. Like other ACE tools, MFA was a fact-based, methodical approach to addressing escapes, or problems that escaped to the customer, with strict requirements for customer reaction timeframes. MFA's primary strength was informing the manufacturing/service work cell about customer concerns regarding product quality and involving the operators in the resolution process.

b. Quality clinic process chart (QCPC): The QCPC methodology applies a data gathering system to detect issues within a cell. Anything that keeps an employee from completing a task correctly the first time is considered a turn back in ACE Benefits. One tool for identifying quality issues, such as waste, inefficiencies, and defects, is the QCPC. By using it, you can make sure that opportunities for continuous improvement are not lost. There are six steps in the implementation process: Start the QCPC Process at Step 1. Step 3: Evaluate the Opportunities for Improvement After Step 2: Summarize the Detailed Turn Back Data Step 4: Identify Enhancement Initiatives Step 5: Clinic/QCPC Activities Step 6: Present the Findings.

c. Relentless root cause analysis (RRCA): The aim of Root Cause Analysis (RRCA) was to investigate an issue in an organized, fact-based way. Gathering information, generating causes, and identifying connections with the aid of tools like fishbone diagrams, cause-and-effect diagrams, and the "Five Whys" were all necessary for a successful RRCA. Instead of focusing on a short-term fix, the RRCA method sought a long-term one. It was applied as a subset of TPM, QCPC, and other ACE tools as well as a standalone problem-solving tool. The "Five Why's" approach entailed posing the question "Why?" five times in a row to probe further into the origin of an issue and identify its actual fundamental cause.

d. Mistake proofing Mistake Proofing: involved creating a work method, part, tool, or work instruction that cannot be completed in any other manner than the proper way. Like the other ACE tools, mistake proofing required a methodical, organized team approach to pinpoint and take into account every contributing element. When developing the Mistake Proofing solutions, inventiveness and creativity were still highly valued despite the structure and rigor. Like RRCA, mistake proofing was employed as a stand-alone tool as well as a subset of other ACE techniques like QCPC and TPM.

2.2.3.1 Relation between problem solving capabilities and organizational performance.

To address issues and eradicate inefficiencies once and for all, businesses and organizations require a certain set of talents. A 2016 study by Smith led those with professional problem-solving training. According to Rouse et al., reported in Smith (2016), efficiency is then determined by comparing the actual and ideal values of a producer's inputs and outputs. Solving problems is a crucial challenge to be overcome. To solve problems, information is needed, and the issue must be stated as a set of facts. Finding effective answers requires giving the analytical person relevant knowledge (Condell et al., cited in Smith, 2016).

As (KAl-Ajmi and H. Al-Ajmi,2013) states that problem solving tools can have a significant impact on the performance of airline passenger service. These tools help identify, analyze, and resolve issues efficiently, leading to improved customer satisfaction and overall service performance. Some of the major effects of problem-solving tools on airline passenger service performance include:

1. Faster resolution of customer issues: With the use of problem-solving tools, airlines can quickly identify and address customer complaints and issues. This leads to faster resolution of problems, which can improve the overall customer experience.

2. Improved customer satisfaction: When customer issues are resolved in a timely and efficient manner, it leads to higher levels of satisfaction. This can result in positive word-of-mouth, repeat business, and an improved brand reputation for the airline.

3. Increased operational efficiency: Problem solving tools can also help identify and eliminate inefficiencies in the airline's processes and operations. This can lead to cost savings and improved productivity, which in turn can positively impact on the overall service performance.

4. Better decision-making: These tools provide airlines with data and insights to make informed decisions about their service offerings. This can help them identify areas for improvement and make strategic changes to enhance the passenger experience.

5. Enhanced communication and collaboration: Problem solving tools often involve a collaborative approach, where different departments within the airline work together to address issues. This can

improve communication and teamwork, leading to a more cohesive and efficient service performance.

2.2.4 ACE Decision making tools.

2.2.4.1 Passport process: Scholars have produced a variety of decision-making theories. The classical and neo-classical organizational theories, for example, offer a wealth of helpful knowledge for designing decision-making processes in corporate organizations. In particular, the decision-making process in diversified working activities where specialist staff can generate superior economic results might be divided according to Adam Smith's concept of the "division of labor."

A process intended to streamline an organization's strategic decision-making, passport review is one of the ACE tools and is mainly utilized throughout the design and implementation stage of new product development. To guarantee that all issues were found as early in the new product development process as feasible, the Passport System was created as a collection of evaluations or checkpoints.

New product development teams could accomplish their quality, reliability, cost, and time targets by using the Passport System to integrate all feedback on past product failures into the new product design. Furthermore, concerning ACE specifically, the ACE operating system developer, United Technologies corporation (UTC), notes that “management and empowered employees need to work together to remove barriers that hinder improvements in order to provide our customers with highest quality products and services.” According to Thomas (2004), "ACE takes its roots from both the quality improvement teachings of Dr. W. Edward Deming and the lean methodology of the Toyota production system."

The tools of the ACE operating system fall into four categories: decision-making, waste elimination, process improvement, and problem-solving. With the aid of these instruments, the Crater UTC was able to better identify and address issues, streamline operations, get rid of waste, and make wise strategic choices. To ensure that personnel are adequately trained, UTC has produced training modules and skilled teachers. According to UTC, the ACE tools are rather simple to use and learn, in keeping with the ACE principle.

This UTC concept demonstrates that staff must receive thorough training on ACE tools in order to reap the benefits of ACE deployment. In his research, Thomas (2004) defined ACE as a border-based

quality system that combines lean manufacturing and quality improvement philosophy, without requiring as much data as conventional quality systems.

2.2.4.2 Effect of Decision making on organizational performance

(Forman E. & Selly M., 2001) define decision making as the process of selecting an option from a range of possibilities to accomplish predetermined objectives and goals. One of the most crucial and vital business skills that managers should master is decision-making. It has been demonstrated that businesses can significantly improve performance through effective decision-making by learning the right techniques (Vuorinen, 2014). Decision making is a three-step process that includes identification, creating options, and selection, according to Forman E. & Selly M. (2001). Determining if a decision or analysis is necessary is the first step, identification. Creating the options, a procedure that includes planning and searching. When one realizes that there is a discrepancy between what is sought and what is obtained, a decision may become necessary. The decision-maker must, nevertheless, try to understand or recognize from the information that is readily available. The plan is to process the current information that is accessible and attempt to obtain some new ones. Searching and planning are steps in the process of developing the alternative, which is the second phase. Planning and looking for alternatives are the foundation of finding answers (Vuorinen, 2014). The selection stage is the final and third step.

Following a thorough screening of the options acquired in the preceding process, the alternatives that remain are assessed, and the selected ones are then validated by obtaining management approval. In this case, there are three distinct approaches to evaluation: negotiation, analysis, and judgment. While bargaining refers to a group of people utilizing their judgment to reach a consensus, judgment refers to the internal decision-making process among individuals (decision and org performance).

According to (M. Fok and W. H. Li, 2019) decision-making tools play a crucial role in the performance of an airline's passenger service. These tools help airlines make informed decisions and improve their service delivery, which ultimately leads to better customer satisfaction and loyalty. Below are some of the effects of decision-making tools on airlines passenger air transport service performance:

1. Improved Operational Efficiency: Decision-making tools such as operational forecasting, demand planning, and scheduling software help airlines optimize their operations. This leads to better resource allocation, reduced delays, and improved on-time performance, all of which contribute to a better overall passenger service experience.

2. Enhanced Customer Experience: By using data-driven decision-making tools, airlines can better understand their customers' needs and preferences. This enables them to tailor their services and offerings to meet the expectations of their passengers, resulting in a more satisfying experience for the customers.

3. Cost Reduction: Decision-making tools such as cost analytics and optimization software help airlines identify areas where they can reduce costs without compromising the quality of their services. This can help airlines offer competitive pricing, which can attract more customers and ultimately improve their overall performance.

4. Improved Safety and Security: Decision-making tools can also assist airlines in enhancing safety and security measures for their passengers. For example, predictive maintenance tools can help identify potential issues with aircraft, allowing airlines to take proactive measures and ensure safe and reliable operations.

5. Real-time Decision Making: With the help of advanced decision-making tools, airlines can make real-time decisions based on real-time data. This enables them to respond quickly to changes in demand, weather conditions, or other factors that can impact on their service performance.

In conclusion, the use of decision-making tools has a significant impact on the performance of an airline's passenger service. These tools not only help improve operational efficiency and reduce costs but also contribute to a better overall customer experience. Airlines that effectively utilize decision-making tools are more likely to succeed in today's highly competitive air travel industry.

2.3 Passenger service in airlines industry:

Passenger air transport service: refers to a mode of transportation for people that uses aircraft, such as planes and helicopters, to provide air transportation services for passengers, including

scheduled and non-scheduled air carriers, to facilitate fast travel with improved security and to be used in emergency situations and operations (passenger air transport global market report 2024).according to the report the passenger air transport market size has grown strongly in the recent years.it will grow from 862.29 billion to 919.43 billion dollar in 2024 at a compound annual growth rate (CAGR)of 6.6%.the growth in the historic period can be attributed to the increased demand for air travel, the increased demand for customized tours for groups of travelers and the growing number of airport expansion projects. According to this report the passenger airport market is expected to see strong growth in the next few years.

The following problems illustrate the Global Quality Protocols that airlines must adhere to successfully implement the pertinent quality parameters during the check-in and boarding procedures in ground operations, according to Rehan & Naeem (2023). This guarantees that, from a legal, operational, and global perspective, all necessary steps are consistently and effectively taken to ensure safety, security, and efficiency in an airport.

2.3.1 Check-in process and standards:

Check-in service in passenger air transport service:

Airport check-in: is the process whereby an airline approves airplane passengers to board an airplane for a flight. Airlines typically use service counters found at airports for this process, and the check-in is normally handled by an airline itself or a handling agent working on behalf of an airline. Passengers usually hand over any baggage that they do not wish or are not allowed to carry in the aircraft's cabin and receive a boarding pass before they can proceed to board their aircraft.

Check-In Standards:

The following Quality Protocols of check-in and its details have been mentioned by (Rehan & Naeem,2023) in their Quality Management Practices During Check-In and Bording.

Airport parking services: Without enough room for a parking lot, an airport cannot function. Although they are not always free, parking spots are convenient for those dropping off or picking up passengers in most nations.

Maintenance of trolleys, buggies, and wheelchair assistance: Trolleys should always be provided outside and at the airport entry to unload luggage from private cars, taxis, buses, or trains

and transport it to the check-in desks. Furthermore, larger airports provide buggies to passengers who need them, including families with little children. Wheelchairs for special customers who require help have to be offered at the entry.

Maintenance of screens and boards: An airport's screen displays are an essential component. Information on flights, airlines, delays, and check-in counter numbers for the different flights that are open for check-in should be updated on screens on a regular basis.

Airport cleanliness: It is imperative that airport hygiene be upheld as a baseline of service excellence. The maintenance crew of an airport is responsible for making sure that it is always kept clean enough. This includes cleaning the flooring, seating spaces, restrooms, baggage belts and check-in counters.

Information desk: A traveler should always be able to get assistance from an employee and obtain information about flights, procedures, routes, etc.

Ticketing and reservation desk: There has to be a ticket desk adjacent to the check-in desks. Reservation agents are necessary for travelers to be able to purchase additional airline offers, adjust their tickets, book last-minute flights, etc.

Baggage handling: Services related to baggage handling include personnel who help handle passenger bags carefully so as not to damage any property, check-in agents who make sure the bags are tagged with the correct destination and passenger names, and ramp service units that carefully handle baggage when transferring the bags to and from the aircraft.

Queue coordination: At the check-in desks, there should always be a few staff members on hand to manage the line and guarantee excellent service quality. While waiting in line, the staff members assist the customers by giving them more information, responding to their questions, and ensuring that they do not miss their flights. Prioritizing travelers based on the times of their flights speeds up the check-in procedure and reduces conflict.

Self-check-in kiosks: The presence of at least fifteen kiosks close to the check-in desks will assist airline employees in managing busy operating hours. Employees ought to be on hand to help in areas like Asia where travelers don't often choose the kiosk service.

Security questions: Passengers must be asked mandatory security questions by check-in personnel, who must also display a board or paper that lists things that pose a risk to aircraft and airport security. Among the inquiries are: was this bag packed by you, and is it yours? Do you have any of the objects shown on this board with you?

Document verification: In difficult circumstances, a Document Verification Unit should always be on hand to help with cross-checking documents. The personnel at the check-in counter typically accurately confirm the authenticity of the documents being presented, the information being supplied, and the data being entered into the system.

Baggage drops for online check-in: Passengers who have already checked in and have a boarding pass (via online check-in) should have special counters at the check-in area. These travelers want to use the speedier route and only drop off their bags. They shouldn't have to wait in line with passengers who haven't checked in as a result.

Segregation of ticket class: Passengers travelling in Economy and Business classes are not permitted to check in at the same counter. Authorities from the airline and airport should create a clear division.

Accuracy and speed: Employees working on the ground must make sure that data input is accurate, and that each passenger is checked in within the allotted time. By adhering to this quality criteria, passengers in the queue can wait less time and processes can be streamlined.

Privacy of passenger data: In aviation operations, confidentiality is crucial. Passenger data, such as passport details, contact information, personal information, ticket details, requests from passengers, whereabouts, etc., should always be protected.

Efficient use of technology and innovation: It is the duty of an airline, in cooperation with airport authorities, to stay abreast of technological developments and integrate pertinent technology into an airport and its fleet for the benefit of travelers and staff.

Passenger comfort: For the comfort of all travelers, airport waiting rooms and sitting sections should be routinely inspected and maintained.

Language interpretation / support: An airport is a heterogeneous place. All backgrounds and races are welcome, and cultural differences shouldn't be used as an excuse to lower the level of services provided. Therefore, airlines should hire linguistically competent and varied staff. Furthermore, airline management needs to emphasize the need to provide impartial and consistent customer service.

Health and safety measures: It is important to follow health and safety regulations, especially considering potential global health threats like pandemics.

Quality checks / minimized margin of error: Audits and quality checks should be conducted on a regular basis to evaluate the procedures used at the check-in counters. This will help to find areas for improvement and reduce errors.

Lost and found services: Every airport ought to have a lost and found department where travelers may look for misplaced belongings they may have left in the check-in area.

Feedback and surveys: It is the right of passengers to express opinions, both favorable and negative. To enhance quality measurements, their input should be routinely gathered and examined.

2.3.2 Boarding process and global standards:

Boarding service in passenger air transport service: Boarding refers to the process of allowing airline passengers to enter the aircraft and take their assigned seats before a flight takes off. It is one of the crucial stages of air travel that ensures the smooth transition of passengers from the airport terminal to the aircraft.

Global Boarding Standards:

As per Rehan and Naeem's (2023) quality management practices during check-in and boarding, the following boarding quality protocols and their specifics have been provided.

Security checks: Every person must have their bags thoroughly inspected. Furthermore, travelers must go through metal detectors and submit to additional inspections as needed. The personnel carrying out the search ought to be polite and competent.

Updated screen displays and Screen displays and signage around the airside areas should be adequate signage: updated frequently with accurate and lucid information, such as terminal directions, gate numbers, flight delays, and gate changes.

Premium lounge facilities: Since first and business class passengers are the only ones allowed entry to the premium lounges, passengers have high expectations of the airline staff working there. As a result, lounge amenities and catering should be exceptionally good.

Gate announcements: Pre-boarding, gate changes, boarding, and last-call announcements are just a few of the frequent and unambiguous gate announcements that must be made.

Queue management: As soon as boarding starts, a boarding agent should be assigned to oversee the line, helping travelers prepare the necessary paperwork and making sure there is no disturbance.

Airline staff professionalism and customer service: giving real-time updates on boarding status and/or any changes, upgrading passengers, updating miles, responding to inquiries, helping with seat change requests, and so on.

Studying the flight and conducting pre-flight briefing: To be properly prepared with the flight information, boarding gate agents should extensively review the flight before arriving at the gate. This covers the number of passengers in need of help, the type of aircraft, the departure and arrival times, the seat map, and the load on the flight. The lead gate agent should brief the boarding team on the boarding plan while keeping all pertinent facts in mind.

Maintenance of the boarding gate bridge and buses: In an airport, there are two kinds of boarding gates. Passengers must be put onto a bus and transported to the aircraft by means of the bus gates. The buses' capacity, availability, and quality shouldn't be sacrificed. Conversely, remote gates necessitate that boarding agents supervise bridge maintenance and halt boarding when necessary to avoid overloading the bridge.

Passport and boarding pass verification: The boarding agent must quickly and accurately verify each passenger's passport and boarding permit.

Priority boarding: A divided system of priority should be used for boarding. First and Business class passengers board first, followed by families with small children and passengers in need of special assistance. Finally, people in Economy class board last.

Cabin baggage compliance: The dimensions of the permitted cabin baggage are specified. Oversized or heavy bags must be checked in rather than being brought on board.

Flight documentation: The flight manifest, gender zone counts, and freight details are among the documents. These must be promptly printed, signed, and given to the appropriate staff members.

Effective team collaboration: Efficient communication and collaborative efforts are essential for seamless operations. The duty operations manager, cabin manager, and flight dispatcher should all actively work together with boarding gate agents.

Efficient zonal boarding: Zones should be used during boarding, particularly on wide-bodied aircraft. Broadcasting announcements about the zones being boarded is required at the gates. First to board are those seated in the designated area at the end of the aircraft. This helps maintain order and expedites the boarding procedure.

Chasing missing passengers: Travelers who fail to appear at the gate will be pursued. In addition to assigning a team member to try finding the passengers within the airport, the boarding gate agent will try to get in touch with the passengers over the phone. Additionally, announcements containing the passengers' names, flight numbers, and gate numbers should be made to summon them.

Timely offloading of passengers and baggage: To enable the flight dispatcher to hold the luggage, offload information (such as baggage tag numbers) must be provided on time. The information should be given out 20 minutes before departure, and the luggage should be unloaded from the system 10 minutes prior to departure, after the absent passenger has been removed from the system.

Generating and submitting the gate report: A report summarizing the flight details must be created, including the start and finish times of boarding, the quantity of passengers and bags offloaded, the aircraft pushback and departure times, and the reasons for any delays.

List of processes in passenger air transport services in ET Ground service division:

Table 1 List of Process in ET Passenger Service section

Name of Major processes	Sub processes
	Pre-check in
	Check in
Counter Service	**Post check-in**
	Pre-Boarding services
	Boarding
Boarding Service	**Post departure Handling**

Source: Passenger air transport service ET Ground service division with own modification.

2.4 Empirical review:

Few studies have been done on the ACE quality improvement operating system, despite a large body of research on quality improvement methods like six-sigma and their impact on organizational performance. This is mostly because only UTC-owned or related businesses use ACE, a proprietary quality improvement system that UTC developed and owns (Thomas, 2004). A study on the performance of cargo warehouses is being undertaken in Ethiopia (ET). Investigated how ACE affected warehouse productivity (Andinet, 2020). (Yonatan, 2022) attempted, however, to see the process and difficulties of Achieving Competitive Excellence (ACE) as a method of process enrichment on maintenance, repair, and upkeep (MRO) and discovered that all the criteria were productivity, quality, and time. As Roth (2010) expounded, ACE provides direction for prioritizing initiatives, creates procedures for converting plans into action, and sets up systems for collecting feedback on performance and areas for improvement. The researcher went on to explain that, according to the UTC case study, ACE helps UTC satisfy its staff, satisfy shareholders, and thrill customers. According to case studies, UTC and other businesses that have used these exclusive tools for continuous improvement have succeeded in reaching the performance targets they set for themselves. George David Cardites, the former chairman and CEO of UTC, credits ACE with playing a big part in the company's noticeably better performance. Even though Ethiopia (ET) has been using the ACE operating system for more than ten years, research still needs to be done on the impact it had on the country's overall performance and, more specifically, on the performance of the ground service division's passenger air transport service.

2.5 Literature Gap:

Gaps in literature are missing pieces or insufficient information in the published research on a topic. These are areas that have opportunities for further research because they are unexplored, under-explored, or outdated. There isn't much literature on ACE, thus the areas of ET that have been studied in relation to ACE are the MRO, Cargo, and Catering sections. The study thinks that ET's secrecy concerns and UTC's proprietor quality management system are understudied areas because of ACE. A few empirical research on ACE and its contribution to better business success are also available. Like this, there is a research vacuum concerning the impact of using and utilizing ACE on the performance of passenger air transport services.

2.6 Conceptual Framework:

The primary subjects, important variables, and the presumptive link between them are all explained by the conceptual framework (Voughan, 2008). There hasn't been much research done on the relationship between ACE operating systems and passenger air transport services in the airline industry, specifically ACE in the airlines industry. This means that there hasn't been much research done on how much operating system, particularly ACE in the airline industries, will affect passenger air transport service in the ground handling service division.

According to Roth (2010), during Kaizen events, the ACE operating system's tools might be used. All these techniques are described in several books, many of which trace their roots to techniques employed by Toyota and other Japanese automakers. Courses on Kaizen methods are offered by Ito University and various consultants and training organizations. Teams are formed using the Kaizen method, and they use lean tools to gather information, perform analysis, and implement changes. Even if Kaizen isn’t included in UTC’s list of ACE tools, as a philosophy, it is part of ACE.

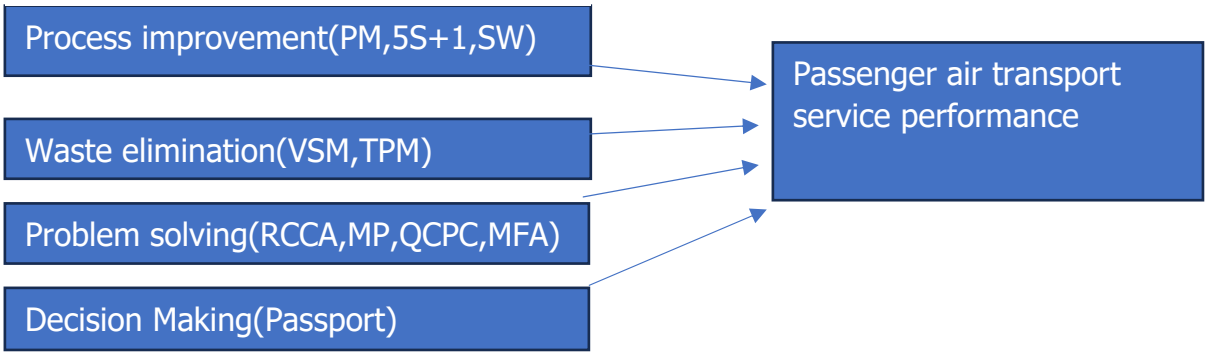
ACE tools have a significant impact on the process improvement of the passenger air transport service, as evidenced by the assessment of ACE practice at UTC, the adoption of ACE tools, and the review of ground handling service division enablers.

Related research on lean and kaizen in Ethiopian manufacturing and service organizations focuses on organizational growth (Samuel, 2012), product, quality, and profit improvement (Alebel, 2016), and operational effectiveness and efficiency (Getu, 2016) as dependent variables. They also examine operating system tools as independent variables.

Consequently, the conceptual framework of this research includes one dependent variable and four (4) independent variables, along with the relationships between:

Independent Variables: **Dependent Variable:**

Figure 1 Conceptual framework of the study



Source: Modification from ET-GRH ACE document (2007)

2.7 Research Hypothesis:

The effect of Ace tools on passenger air transport service was hypothesized based on the conceptual framework study.

H1: ACE process improvement tools had statistically significant effect on Passenger air transport service performance

H1: An ACE waste elimination tools had statistically significant effect on passenger air transport service performance.

H1: An ACE decision making tool had statistically significant effect on passenger air transport service performance.

H1: ACE Problem solving tools had statistically significant effect on passenger air transport service performance.

CHAPTER THREE:

3. Research Methodology:

For this study, both the explanatory and descriptive designs work well. According to Saunders, Lewis, and Thornhill (2009), explanatory studies establish causal linkages between variables and explain the correlations between variables. Studies that aim to accurately depict people, events, or circumstances are known as descriptive research (Saunders et al., 2009). Descriptive research studies aim to characterize the traits of a person or a group. In order to investigate the effect of ACE on the passenger air transport service case of Ethiopian Airlines Ground Handling Service division, this study employed both descriptive and explanatory methods.

3.1 Research Approach:

To meet the study goals and maximize flexibility and dependability, a combination of qualitative and quantitative (mixed) methodologies were employed.

In this study in addition to helping the researcher contact many respondents quickly through the questionnaire, the quantitative technique will enable them to comfortably examine and evaluate the results of the survey.

To more effectively discuss, conclude, analyze, and offer recommendations based on the researcher's viewpoint and real-world experience, the qualitative data output (interview result) was used. To get qualitative data, members of the Passenger Air Transport Service operational management team who oversee operations and ACE implementation will be interviewed using open-ended questions.

3.2 Research Design:

The general strategy for gathering information to address the research question and the procedures or techniques the researcher plans to employ for data analysis is known as the study design. This

study's primary goal was to determine the impact and procedures associated with Ethiopian Airlines Company's adoption of ACE as a passenger air transport service process enrichment, specifically in the ground service division's passenger service section.

Both descriptive and explanatory research designs were used in this study. Descriptive studies, in the words of C.R. Kothari (2004), "portray accurately the characteristics of a particular individual, situation, or group," and the researcher is interested in characterizing the current condition in terms of mean and standard deviation. For these reasons, descriptive research designs are used. According to (Kumar, 2011), an explanatory study design aims to elucidate the reasons and mechanisms behind the relationship between two features of a system or phenomena, or in this case, variables.

In addition to the primary data gathered using structured questioners, this study prepared five questions for in-depth interviews that would be given to the operational managers in order to obtain a qualitative understanding of their perspectives. This will support the triangulation of the quantitative study's findings.

Questioners will be sent to the staff, who must respond in accordance with the guidelines provided. Additionally, a thorough interview will be conducted with managers of passenger air transport service operations, specifically regarding check-in, boarding, baggage handling, and team leaders. The study was carried out in 2024 between March and May.

3.3 Population and Sample size:

The population of the study includes internal customers such as operational staff (Customer Service Agents), operational managers, and operational team leaders to fully satisfy the study's aim. This is because the operational staff members are the ones that put ACE into effect daily. The sample size was established using the census approach. The overall number of operational staff (3 operational managers and 12 operational team leaders employed for the interview segment) and all 300 agents of the respondents were used in this study, and their opinions and feedback regarding the operations of the passenger air transport service were also included.

3.4 Data Sources and collection procedure:

The researcher used primary and secondary data for this investigation. Employees of the passenger air transport service operating unit provided this data. Following a thorough evaluation of the literature, the researcher created pre-designed questionnaires to gather primary data. The population

under research completed the questionnaire, which was subjected to a reliability test. To obtain qualitative data, a thorough in-depth interview was conducted with the operation management teams responsible for passenger services. Secondary data were gathered from company webpages, ACE Cells portal page, airline reports, operational HR department of passenger air transport service, and ACE paperwork.

3.5 Data Analysis Method:

This phase of the study was crucial since it was here that the vast amount of data that had been gathered was transformed into a form that made sense and demonstrated how ACE affected the enhancement of passenger air transport service performance.

3.6 Measurements:

According to Roth (2010), Davis (2008), and the ACE Handbook (2005), there are four sections and levels that make up ACE. Tools for waste elimination, problem solving, process improvement, and decision-making.

Process improvement tools: Are strategies and tactics that companies should employ to enhance performance and quality while focusing on internal business operations.

This variable according to Roth (2010), Davis (2008), and the ACE Handbook (2005) is measured by Gap analysis, root cause analysis, PDCA (plan, do, check, act)

Waste elimination ACE tools: Waste can be eliminated by utilizing tools like “Value stream Mapping, Kaizen,5S, Standard work, pull systems, JIT (Just in time), monitoring with KPI’s, and involving employees. This leads to increased efficiency, cost reduction, quality improvement, and customer satisfaction.

Problem solving tools: This variable according to Roth (2010), Davis (2008), and the ACE Handbook (2005) is measured commonly by benchmarking, Five Whys.

Decision making tools: the commonly used measurement tools are cost benefit analysis’s analysis.

The variable of passenger air transport service is widely measured by means of service quality dimensions, security and check-in, airport environment and access, arrival, on-time performance, customer happiness, and minimum queue, as stated by Roth (2010), Davis (2008), and the ACE Handbook (2005)

3.7 Reliability test results

The instrumentalism of several data collection instruments (such as questionnaires and interviews) was used to perform the study. Participants received their hard copy surveys both in person and by printed copy. To address the non-return rate, 279 out of the 300 questionnaires that were given to the designated respondents were collected; this represents a 93% response rate overall. Of the 300 questionnaires that were distributed, 21 were non-returned; of these, 8 were not returned at all, 4 were incorrectly filled out, 6 were due to vacation, 2 were due to maternity leave, and 1 staff member was transferred to another section.

Additionally, Cranach's Alpha is employed to assess the item's internal consistency in the data gathering method. Cronbach's Alpha, according to George and Mallery (2003), is a measure of how internally consistent a scale is. More consistency is indicated by a higher coefficient; >0.9 refers to Excellent; >0.8 to Good; >0.7 to Acceptable; >0.6 to Questionable; >0.5 to Poor; and <0.5 to Unacceptable. Thus, as the reliability test result indicates in the table below.

Table 2 Reliability test result

Variable	N of Items	Cranach’s Alpha
Process improvement	6	.831
Waste elimination	5	.746
Problem solving	4	.778
Decision making	4	.834
Counter service-related performance	10	.718

Boarding service-related performance	5	.826
Baggage delivery service related	3	.817
Overall passenger air transport service performance	18	.799

Source: survey data, May 2024

Therefore, the reliability test is consistent (excellent) or acceptable.

3.8 Ethical considerations:

Considering the significance of ethics in research, the investigator endeavored to thoroughly examine ethical considerations.

CHAPTER FOUR

4.1 Data Presentation, Analysis, and Interpretation:

Following analysis of the gathered quantitative and qualitative data, the following results are shown.

4.2 Quantitative and Qualitative Analysis:

For processing quantitative data, the data were edited, coded, and imported into Statistical Package for Social Science (SPSS) version 24 for analysis after being gathered in a way that allowed the researcher to have specific information to address the study's goal. Regarding the examination of qualitative data, a one-on-one interview was conducted with management personnel selected from the ranks of ACE team leaders and ACE managers in the passenger service division. Most of the interviews took place during off-peak hours and were scheduled in advance, which allowed for more in-depth discussions while still adhering to business protocols.

4.2.1 Demographic Characteristics of the Respondents

Respondents' characteristics were collected and analysed to understand their background. This includes respondents' sex category and work experience.

4.2.2 Gender composition of respondents

Table 3 Gender composition of respondents

		Frequency	Percent
Gender	Male	198	71.0
	Female	81	29.0
	Total	279	100.0

Source: Survey data, May 2024

Of the 279 respondents, 198 (71%) were men and the remaining 81 (29%) were women, as the gender profile by frequency and percentage in Table 3 above illustrates. Thus, it is evident that there is a high male proportion; as a result, the organization should encourage the participation of women.

4.2.3 Respondent's Work Experience

One (36)12.9% of the respondents had less than a year's experience in the business, as Table 4 below shows. The scenario allows for the viewpoints of highly experienced personnel, of which 72 (25.8%) have 1-2 years of experience, 117 (41.9%) have 3-5 years of experience, and 54 (19.4%) have more than 5 years of experience.

Table 4 Work experience of respondents

		Frequency	Percent
How long have you worked in Ethiopian Airlines (ET-GRH)?	Less than 1 year	36	12.9
	1-2 years	72	25.8
	3-5 years	117	41.9
	Above 5 years	54	19.4
	Total	279	100.0

Source: survey data, May 2024

4.2.4 Descriptive statistical Analysis

The descriptive analysis portion of the study is described in this section. The researcher utilized frequency, percentage, mean, and standard deviation to illustrate the findings from the original data sources. As per Tom Parker's (2008) findings, it can be inferred that respondents strongly disagreed with the statement if their mean score fell between 1 and 1.80, disagreed between 1.90 and 2.60, were unsure between 2.70 and 3.40, agreed between 3.50 and 4.20, and had a mean score of more than 4.30 and above. A standard deviation greater than 0.9 indicates a considerable degree of variability when considering the given statement.

4.2.4.1 Descriptive analysis for Measurement Process improvement tools

Table 5 Descriptive analysis for Process improvement tools

		Frequency	Percent	Mean	SD
Work process is structured to ensure maximum quality to employees	Disagree	9	3.2	3.77	0.65
	Uncertain	72	25.8		
	Agree	171	61.3		
	Strongly Agree	27	9.7		
Key processes identified and prioritized	Strongly Disagree	27	9.7	2.74	0.98
	Disagree	99	35.5		
	Uncertain	72	25.8		
	Agree	81	29.0		
Standard operating procedures (SOPs) are so simplified that instructions/procedures are easy for employees to use them	Disagree	9	3.2	4.19	0.69
	Uncertain	18	6.5		
	Agree	162	58.1		
	Strongly Agree	90	32.3		
Service level agreement (SLAs)are in place with major stakeholders who have impact on passenger air transport service	Strongly Disagree	63	22.6	2.16	0.80
	Disagree	117	41.9		
	Uncertain	90	32.3		

operation (Example: Customs, Maintenance, Security etc.…) and their performance is monitored	Agree	9	3.2		
Cross functional meeting held appropriately to interface process between inter departmental/Cells	Strongly Disagree	9	3.2	3.41	0.87
	Disagree	36	12.9		
	Uncertain	72	25.8		
	Agree	153	54.8		
	Strongly Agree	9	3.2		
There is high compliance to regulatory requirements (IOSA, Star alliance)	Disagree	27	9.7	3.87	0.87
	Uncertain	45	16.1		
	Agree	144	51.6		
	Strongly Agree	63	22.6		
Grand mean				3.357	

Source: survey data, May 2024

Table 5 demonstrates that many respondents (mean value of 4.19) agreed that employee instructions and procedures are straightforward and that standard operating procedures (SOPs) are simplified. Likewise, most staff members (mean value: 3.87) concurred that there is good adherence to legal criteria (IOSA, Star alliance). With a mean score of 3.77, nearly all workers felt that there is a well-organized, streamlined work process that results in quality, consistency, and worker safety. With a mean score of 2.74, most employees felt that key procedures are identified and given priority. Employees also agreed (with a mean score of 3.41) that cross-functional meetings are appropriately convened to facilitate departmental and cell interaction processes According to the respondents, stakeholders have a major impact on the overall effectiveness of the operation of the passenger air transport business. Many respondents (mean score: 2.16) don't agree. The claim that service level agreements (SLAs) are in place with key stakeholders who affect the operation of passenger air transport services (such as customs, maintenance, security, etc.) and that their performance is monitored is contested by a sizable portion of the workforce. Additionally, respondents agreed that much work needs to be done on VSM with airport stakeholders. This result is also found to be compatible with data gathered through interviews.

Interviewees were asked in the qualitative section how they would assess the current state of value stream mapping (VSM) as a team within the interdepartmental level and with other stakeholders (customs, NISS Security, immigration) on the corporate level in terms of passenger service performance. When most of the management operational team in charge of passenger service responded, they discovered that VSM thinking, and implementation still need attention and improvement on the part of the business in order to provide seamless customer service. This can be achieved by collaborating with other stakeholders like NISS security, Customs, Immigration, and airport communities as an airport team to improve customer satisfaction. Since the operational management teams acknowledged that close collaboration with airport stakeholders is necessary to align the VSM concept at the division level to achieve the desired level of performance.

Descriptive analysis for Process improvement can be summarized as, since aviation is a highly standardized and regulated industry, respondents found that processes and standards have matured due to this. The overall grand mean of 3.357 for process improvement tools indicates that processes have a well-established process management. On the other hand, based on the information gathered from management interviewees and non-management operational teams, the organization still has to concentrate on the adoption of VSM thinking with stakeholders.

4.2.4.2 Descriptive analysis for Measurement waste elimination tools

Table 6 Descriptive analysis for Measurement waste elimination tools

		Frequency	Percent	Mean	SD
Employees are reporting wastes they identified to eliminate waste.	Disagree	81	29.0	3.16	0.84
	Uncertain	72	25.8		
	Agree	126	45.2		
All passenger service equipment's are safe to use and operate	Strongly Disagree	18	6.5	2.58	0.87
	Disagree	126	45.2		
	Uncertain	99	35.5		
	Agree	27	9.7		
	Strongly Agree	9	3.2		
	Strongly Disagree	108	38.7		

Operational disruptions due to equipment Downtime (failures) are minimized	Disagree	117	41.9	1.90	0.96
	Uncertain	36	12.9		
	Agree	9	3.2		
	Strongly Agree	9	3.2		
There are still people that do not add value in the passenger service operation	Strongly Disagree	36	12.9	2.58	1.01
	Disagree	108	38.7		
	Uncertain	81	29.0		
	Agree	45	16.1		
	Strongly Agree	9	3.2		
There are still resources that do not add value in the passenger service operation	Strongly Disagree	36	12.9	2.77	1.07
	Disagree	81	29.0		
	Uncertain	81	29.0		
	Agree	72	25.8		
	Strongly Agree	9	3.2		
Grand mean				2.598	

Source: survey data, May 2024

Table 6 shows that a sizable portion of respondents disagree, even though most respondents (mean score of 3.16) stated that they are eager to report errors, wastes, and inefficiencies. While many respondents agreed that there are more operational disruptions because of equipment failures, they also disputed that all passenger service handling equipment is dependable, safe, and effective to use and operate, with mean scores of 2.58 and 1.90, respectively. It was also noted that respondents' opinions on this matter differed significantly. Similarly, many respondents (mean score: 3.16) concurred that ACE aided in the identification and removal of trash in the passenger service operation. Many respondents (mean score of 2.58, 2.77, respectively) dispute that resources and people still do not contribute value to the passenger service operation. Because unplanned downtime can negatively impact a company's ability to operate on a daily basis, the grand mean value of 2.598 indicates that waste elimination tools are an essential area that must be examined for the existence of very efficient resource utilization, primarily involving manpower and equipment. In accordance with this, the company also needs to consider the maintenance management of automated machinery,

facilities, and equipment. As a result, this conclusion is also found to be in line with the management interview, wherein they concurred that for each cell (team) to function at the highest levels possible in all areas of their work—from creating new products to figuring out how to better serve their clients—they must utilize the ACE operating system. They also discussed in the interview how the management of the passenger service division needs to establish a culture by creating an environment and offering the proper leadership.

4.2.4.3 Descriptive analysis for Measurement problem solving tools.

Table 7 Descriptive analysis for Measurement problem solving tools.

		Frequency	Percent	Mean	SD
System is in place for regularly collecting improvement opportunities from customers and employees for effective service	Disagree	18	6.5	4.06	0.71
	Uncertain	9	3.2		
	Agree	189	67.7		
	Strongly Agree	63	22.6		
Turn-back collection from both employees and customers are well documented and prioritized	Strongly Disagree	9	3.2	3.74	1.01
	Disagree	36	12.9		
	Uncertain	27	9.7		
	Agree	153	54.8		
	Strongly Agree	54	19.4		
Identified corrective actions for these prioritized opportunities are usually get effective solutions and their effectiveness is monitored	Strongly Disagree	90	32.3	2.16	1.02
	Disagree	90	32.3		
	Uncertain	63	22.6		
	Agree	36	12.9		
The solutions identified are effectively implemented, all similar processes are standardized and incorporated to SOPs to prevent problems from reoccurring	Strongly Disagree	99	35.5	2.03	1
	Disagree	108	38.7		
	Uncertain	36	12.9		
	Agree	36	12.9		
Grand mean				2.99	

Survey data, May 2024

Table 7 demonstrates that respondents strongly agree that there is a system in place to routinely gather feedback from customers and staff in order to provide better and more efficient service; that employee and customer turn-ins are properly documented, prioritized, and identified corrective actions for these opportunities are typically met with workable solutions; and that the effectiveness of these actions is tracked with mean score values of 4.06, 3.74, and 2.16, respectively. Even though the problem solving is well understood and used by employees with, most respondents disagreed (mean value of 2.03) that the solutions identified are not effectively implemented and that similar processes are not standardized and incorporated to SOPs to prevent problems from reoccurring. The grand mean value of 2.99 for problem-solving tools indicates that a robust system is in place to handle client feedback as part of the problem-solving mechanism. Root cause analysis methodologies yield successful solutions, but the process also revealed areas that still require development in terms of avoiding problems from recurring. The qualitative portion of the study also supports this finding. Interviewees were asked how to assess staff engagement and management involvement in ACE activities and practices related to passenger service. The operational management staff responded to the interview by saying that they had not met the ACE target as specified in the ACE protocol manual standard and that the managerial engagement of ACE in the day-to-day activities of the ACE concept was not fully applied. They stated that a cultural issue (doing things the same way as always), insufficient ongoing training, full staff involvement initiatives, and a reluctance to take ownership and accept responsibility by management and staff were also noted. There is a lack of support for the program and a lack of importance for ACE efforts from middle to top management. It should be mandatory for senior management to participate in the improvement program, and this must be verified. The fact that each section of ACE lacks a director-level manager is a sign that the staff is not driven and encouraged to use ACE for daily operations, which is necessary to maintain ownership. Ultimately, they concluded that, in order to maintain ACE engagement activity and practice in the passenger service section and produce the necessary level of result, every management staff member in the section must be committed to engaging both themselves and every employee under their supervision to discharge the responsibility and sustain ACE in the section without fail.

4.2.4.4 Descriptive analysis for Measurement decision making tools.

Table 8 Descriptive analysis for Measurement decision making tools.

		Frequency	Percent	Mean	SD
Your ACE section use passport concept to key business decision making process properly	Strongly Disagree	9	3.2	3.61	0.94
	Disagree	45	16.1		
	Uncertain	9	3.2		
	Agree	198	71.0		
	Strongly Agree	18	6.5		
Smart and timely decisions are made by management on passenger air transport service operational issues	Strongly Disagree	117	41.9	1.77	0.75
	Disagree	108	38.7		
	Uncertain	54	19.4		
Problems that need management involvement escalate on time for higher management decisions	Strongly Disagree	45	16.1	2.70	1.17
	Disagree	99	35.5		
	Uncertain	36	12.9		
	Agree	90	32.3		
	Strongly Agree	9	3.2		
The leadership is highly committed to make ACE a culture in passenger service	Strongly Disagree	108	38.7	2.22	1.26
	Disagree	81	29.0		
	Uncertain	18	6.5		
	Agree	63	22.6		
	Strongly Agree	9	3.2		
Grand mean				2.575	

Survey data, May 2024

While the majority of respondents (mean score of 3.61) strongly agree that the section uses the passport concept to key business decision making process properly so that decision makers/managers will be aware of them, some respondents (mean score of 1.77) disagree, citing the failure of management to make timely decisions on operational issues and the lack of timely and intelligent decisions on escalated passport issues. These responses highlight the need for improved management decision making approaches. With a mean score of 2.22, many respondents

were mostly in agreement that the leadership is working to instill an ACE culture in the passenger air transport industry. However, issues that require management involvement rise quickly enough for higher level management decisions (mean score of 2.70) suggest that management should prioritize making decisions involving management involvement when they are brought up by staff members. The grand mean value for decision-making tools is thus rather low (mean score of 2.575), which amply illustrates the absence of good leadership practice in terms of goal-oriented leadership, the development of flexible and informed decision-making capability, the adoption of a quick and flexible decision-making approach, and a high degree of project management. This finding is also found to be consistent in the Qualitative part, Interviewees were asked about the major challenges for ACE to bring the required level of passenger air transport service performance in Ground handling service division particularly in passenger service section? Most interviewees concurred during the session that: "As a result of cross-functional staff utilization, inconsistent ACE training practices were found from the data acquired through the interview. As a result, there are knowledge and skill gaps when new employees are hired by the organization and when staff reshuffling occurs from non-operation section." Instead of focusing on the means to an end and more on the final result and sake of reporting on paper without considering the actual reality on the ground, operational management's inadequate and strict follow-up of ACE activity and ACE are not appropriately considered and viewed as a change instrument and vehicle for change. They also talked about how ACE is internalized in the workforce. Issues with customization throughout the implementation of ACE, disengagement of management across the board, and inadequate time allotment for ACE activities by the upper management team. During the interview, a majority of the passenger service management team stated that there is a lack of consistency in the implementation, upkeep, and continuous process. This indicates that the use of ACE as an operating system has decreased over time, and reaching the next level of the ACE movement is becoming more difficult. The team also addressed the other ACE difficulty, which is that the ACE operating system likes to choose and use agents with a variety of educational and experiential backgrounds. This is related to team dynamics. They need to have greater experience since they are chosen to serve as specialists in assisting the organization in learning how to utilize the operating system tools and because they oversee facilitating the ACE activities to guarantee the success of ACE in their cells. Less experienced ACE agents, they said, will prevent ACE from being implemented at the cell level, which will directly affect the corporation as a whole and the passenger service.

This clearly shows that, to maintain ACE engagement activity and practice in the passenger service section to bring about the necessary level of result, every management staff member in the section must be committed to engaging both themselves and every employee under their supervision in order to discharge their responsibilities and sustain ACE in the section without fail. This finding and issue was also found to be consistent with data obtained through interviews, as acknowledged by the operational management teams.

4.2.5 Descriptive analysis on Passenger air transport service performance

4.2.5.1 Descriptive analysis on Counter service-related performance

Table 9 Descriptive analysis on Counter service-related performance

Counter Services Related		SD	D	UN	A	SA	Mean	SD
In pre-check-in activities the Passenger Entrance(X-Ray) Facilitation is on time	N	81	117	54	27	0	2.09	0.92
	%	29	41.9	19.4	9.7	0		
in pre-check-in activities the security check of Passengers is safe at Entrance(X-Ray) Facilitation.	N	0	9	0	171	99	4.29	0.63
	%	0	3.2	0	61.3	35.5		
There is developed process and mechanism for Flight Information, Guidance to check-in counter, ticket office immigration, assigned gates	N	45	45	36	153	0	3.06	1.16
	%	16.1	16.1	12.9	54.8	0		
Queue management is effective while facilitating check-in counter service	N	108	90	27	54	0	2.09	1.11
	%	38.7	32.3	9.7	19.4	0		
self-service check in (Kiosk check in) is helpful in facilitating check-in counter service	N	9	9	18	153	90	4.09	0.89
	%	3.2	3.2	6.5	54.8	32.3		
check in counter is per standard when facilitating check in	N	9	18	36	135	81	3.93	0.98
	%	3.2	6.5	12.9	48.4	29		
passengers requesting special assistance (PRSA) handled properly	N	144	99	27	9	0	1.64	0.78
	%	51.5	35.5	9.7	3.2	0		
proper acceptance and delivery of early check-in passengers and baggage on flight	N	0	18	0	198	63	4.09	0.69
	%	0	6.5	0	71	22.6		

proper apologize and inform flight schedule change, acceptance of passengers on protection flight, protect passenger by giving hotel accommodation	N	18	9	18	189	45	3.83	0.95
	%	6.5	3.2	6.5	67.7	16.1		
Queue for the appropriate immigration counters during post check in	N	117	90	36	27	9	2	1.10
	%	41.9	32.3	12.9	9.7	3.2		
Grand mean							3.111	

Source: survey data, May 2024

As per Table 9 majority of the respondents in the pre-check in activities agreed (with mean score of 4.29, 3.06 and 2.09) that the security check of Passengers is safe at Entrance (X-Ray) Facilitation and There is developed process and mechanism for Flight Information, Guidance to check-in counter, ticket office immigration, assigned gates but the Passenger Entrance (X-Ray) Facilitation is not timely which needs improvement. In the other side most of the respondents in check- in activities agreed (with mean score of 4.09, 3.93, 2.09 and 1.64) that the self-service check in (Kiosk check in) is helpful in facilitating check-in counter service, check in counter is per standard when facilitating check whereas(with mean score of 1.64) there should be an improvement Queue management to be effective while facilitating check-in counter service and there should be a proper handling for passengers requesting special assistance (PRSA) with better facilities and equipment's. In addition to this there is a proper acceptance and delivery of early check-in passengers and baggage on flight (with a mean score of 4.09) moreover there is a proper apologize and inform flight schedule change, acceptance of passengers on protection flight, protect passenger by giving hotel accommodation (with a mean score of 3.83) whereas there majority of respondents disagreed with mean score of 2.0) there is high queue in immigration counters during post check in

Overall, counter service related with the grand mean of 3.111 for passenger air transport service performance shows that there is a good passenger service performance with regard to passenger safety, self-check-in kiosk, per standard during check-in ,proper acceptance and delivery of early check-in passengers and baggage on flight, giving proper apologize and inform flight schedule change, acceptance of passengers on protection flight, protect passenger by giving hotel accommodation are among the effective management techniques that promote productivity, quality, speed, and cost reduction. The study also revealed that low performance areas, such as pre-check-in

activities, passenger entrance (X-ray) facilitation, lengthy lines at check-in counters, handling passengers requesting special assistance (PRSA) incorrectly, and long lines at immigration counters during the post-check-in procedure, need to be improved. This is also found to be compatible with information gathered through interviews, as the operational management teams acknowledged that close collaboration with airport stakeholders is necessary to align the VSM concept at the division level to achieve the desired level of performance.

4.2.5.2 Descriptive analysis on boarding service-related performance

Table 10 Descriptive analysis on boarding service-related performance

Boarding Services Related		Frequency	Percent	Mean	SD
Flight clearance and manpower allocation during pre-boarding activities	Disagree	18	6.5	3.87	0.70
	Uncertain	36	12.9		
	Agree	189	67.7		
	Strongly Agree	36	12.9		
There is good airport facility in the airport terminal (signage, screens, Boarding pass, Ticket print, clear Announcement, bank, toilet, shower, waiting area)	Strongly Disagree	54	19.4	2.80	1.20
	Disagree	72	25.8		
	Uncertain	27	9.7		
	Agree	126	45.2		
Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during gate boarding	Strongly Disagree	27	9.7	3.35	1.06
	Disagree	36	12.9		
	Uncertain	36	12.9		
	Agree	171	61.3		
	Strongly Agree	9	3.2		
	Strongly Disagree	117	41.9		

Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during bus boarding	Disagree	135	48.4	1.77	0.87
	Agree	27	9.7		
Flights are departed timely (OTP)	Strongly Disagree	18	6.5	3.29	1.11
	Disagree	72	25.8		
	Uncertain	18	6.5		
	Agree	153	54.8		
	Strongly Agree	18	6.5		
Grand mean				3.016	

Source: survey data, May 2024

As per Table 10 in the Boarding Services Related activities, even though majority of the respondents in the pre-boarding activities agreed (with mean score of 3.87) that Flight clearance and manpower allocation during pre-boarding activities is good, the airport facility in the airport terminal (signage, screens, Boarding pass, Ticket print, clear Announcement, bank, toilet, shower, waiting area) should be in a manner of the customer demand. In the other side ,even though most of the respondents in boarding activities agreed (with mean score of 3.35) that there is Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during gate boarding but there is low performance that Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during bus boarding(with a mean score of 1.77) which is one of the improvement area in passenger service performance. Finally, the respondents agreed in post departure handling activities that Flights are departed timely (OTP) (with mean score of 3.29).

Overall, in the Boarding Services related (with the grand mean of 3.016) for passenger air transport service performance shows that there is a good passenger service performance with regard to Flight clearance and manpower allocation during pre-boarding activities, Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during gate boarding and Flights are also departed timely (OTP) during the post departure activities. These are a few examples of effective management techniques that increase production, quality, speed, and cost effectiveness. In parallel the study also showed that there should be an improvement needed in the low performance

areas like lack of enough airport facility in the airport terminal (signage, screens, Boarding pass, Ticket print, clear Announcement, bank, toilet, shower, waiting area), poor in Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during bus boarding due to bus shortage to accommodate the current increasing number of passengers.

4.2.5.3 Descriptive analysis on Baggage delivery services related performance.

Table 11 Descriptive analysis on Baggage delivery services related performance.

Baggage Delivery Services Related		**Frequency**	**Percent**	**Mean**	**SD**
Time taken for baggage delivery is up to standard and minimal	Strongly Disagree	117	41.9	2.03	1.15
	Disagree	90	32.3		
	Uncertain	27	9.7		
	Agree	36	12.9		
	Strongly Agree	9	3.2		
Baggage delivery is safely and without damage	Strongly Disagree	45	16.1	2.80	1.25
	Disagree	90	32.3		
	Uncertain	45	16.1		
	Agree	72	25.8		
	Strongly Agree	27	9.7		
Fair Baggage compensation during damage and lost	Strongly Disagree	27	9.7	3.67	1.17
	Disagree	18	6.5		
	Uncertain	36	12.9		
	Agree	135	48.4		
	Strongly Agree	63	22.6		
Grand mean				2.833	

Source: survey data, May 2024

According to Table 11, the majority of respondents agreed (mean score of 3.67, 2.8) that there is reasonable compensation for lost or damaged baggage and that the baggage is delivered safely and

undamaged. On the other hand, the majority of respondents (mean score of 2.03) disagreed that the time required for baggage delivery is not acceptable or minimal. In terms of quality, speed, productivity, and cost minimization, the baggage delivery services related grand mean of 2.833 in passenger air transport service performance indicates some degree of good passenger service management practice. The study also indicated that, to bring the baggage delivery time down to a minimal and standard procedure, improvements must be made. Therefore, the findings with regard to counter service, boarding service and Baggage delivery time related activities, were also found to be consistent in the Qualitative part, Interviewees were asked how do they think ACE implementation brought the required passenger service performance excellence in terms of Quality, safety, speed, productivity, and cost? In response, the operational management team stated that although ACE is being fully implemented in the passenger service department, there are still certain obstacles, problems, and hurdles in maintaining the advancements brought about by its tools, culture, and philosophy. They also spoke openly about quality and safety, which, as stated in the airline core values, is the top priority in the aviation industry. They think that ACE plays a significant role in preserving the company's excellence, and that all employees should give these areas their full attention without fails. It is recommended that the passenger section take this advice further to keep the momentum going.

Finally, this finding is also found to be consistent in the Qualitative part; Interviewees were asked about the mechanisms to make ACE operating system a culture in passenger air transport service section? In response, the operational management teams stated that the passenger service division has to promote a continual improvement culture. To reach the highest standards of performance in everything they do—from creating new goods to figuring out how to better serve their clients—each cell needs to employ the ACE operating system. In the interview, they also discussed the need for the passenger service section's management to give the proper leadership and foster an environment that eventually becomes a culture. Finding possibilities for development, resolving issues, and maintaining continual improvement will be simple once ACE is ingrained in society. Lastly, the management team of the passenger service division concurred and emphasized that creating an ACE culture demands a strong commitment from the leadership.

Both the quantitative and qualitative data clearly demonstrate that all members of the operation staff, including the management staff, must adhere to the following guidelines in order for the integration of all ACE operating tools to produce a consistent and positive outcome. This involves a broad,

comprehensive process that involves all employee levels in efforts to improve productivity, minimize costs, and ensure quality, safety, and speed in the passenger service area.

4.2.6 Inferential analysis Results: Regression and correlation analysis are used in inferential data analysis, and SPSS is the statistical program of choice. The outcomes are discussed below based on this.

4.2.6.1 Analysis of Correlation Results:

The degree to which the pattern of change in one variable mirror is measured by correlation. The Pearson product-moment correlation field analysis is used to predict membership of only continuous outcomes (2009). To evaluate the link between objectively measured independent and dependent variables, Pearson product-moment correlation coefficients were computed**.**

Table 12 Correlations

		PI	WE	PS	DM	Performance
Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	279				
WE	Pearson Correlation	.801**	1			
	Sig. (2-tailed)	.000				
	N	279	279			
PS	Pearson Correlation	.804	.230**	1		
	Sig. (2-tailed)	.684	.000			
	N	279	278	279		
DM	Pearson Correlation	-.608	.215**	.279**	1	
	Sig. (2-tailed)	.905	.000	.000		

	N	279	279	279	279	
PI	Pearson Correlation	.807**	.637**	.458**	.465**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	279	279	279	279	279

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Survey data, May 2024

The Pearson's correlation values between the independent and dependent variables are shown in Table 12, along with the corresponding significance value. It displays the sample size (N) for each r, along with the Pearson r's and their respective significance.

A relationship is considered extremely weak if it is between 0 and 0.20, weak if it is between 0.21 and 0.40, moderate if it is between 0.41 and 0.60, strong if it is between 0.61 and 0.80, and very strong if it is between 0.81 and 1.00 (Cohen, 2003). Regardless of the correlation coefficient's sign—positive or negative—these guidelines are applicable.

Thus, based on the table above, the waste elimination tool's r value is 0.800 and its p-value is less than 0.05 (0.000). This indicates that the process improvement tool has a strong and positive correlation as a factor (it falls between 0.61 and 0.80, indicating a strong and positive relationship), and the problem-solving tool has a strong and positive correlation (r-value of 0.804, p-value<0.05(0.000)) as a factor (it falls between 0.61 and 0.80, meaning a strong and positive relationship). In a similar vein, the decision-making factor acts as a favorably and strongly correlated factor with an r-value of -0.607 and a p-value of less than 0.05 (0.000); this indicates that the link is strong and positive, as it falls between 0.61 and 0.80. Furthermore, the process improvement component in the preceding table has a r value of 0.807 and a p-value<0.05(0.001), indicating that it is favorably and strongly associated (a strong and positive relationship is indicated by a value between 0.61 and 0.80).

4.2.6.2 Multiple Regression Analysis

Multiple regressions were used in this study to investigate and quantify the extent to which the aforementioned predictors explained the variability in the outcome (in this example, passenger air transport service Performances). The following presumptions need to be investigated:

Multicollinearity

When a variable is regressed on all other independents without considering the dependent, the tolerance for that variable is equal to 1 - R-squared. The B and Beta coefficients will be unstable when the tolerance is near to zero since the variable has a high degree of multicollinearity with other independents. But in this instance, the tolerance is substantially greater than 0, as shown by the coefficient table (0.874 - 0.946). Therefore, the study's core conclusions are unaffected by multicollinearity, and the beta and B coefficients remain consistent. The Variance Inflation Factor, or VIF, is just the reciprocal of tolerance, or (1.057 -1.145). In this instance, multicollinearity poses no threat to the study's important findings because VIF are larger than 1 and less than 10, and the B and beta coefficients are constant. There is no heteroscedasticity issue with the dataset. Constant variance, the null hypothesis, is accepted.

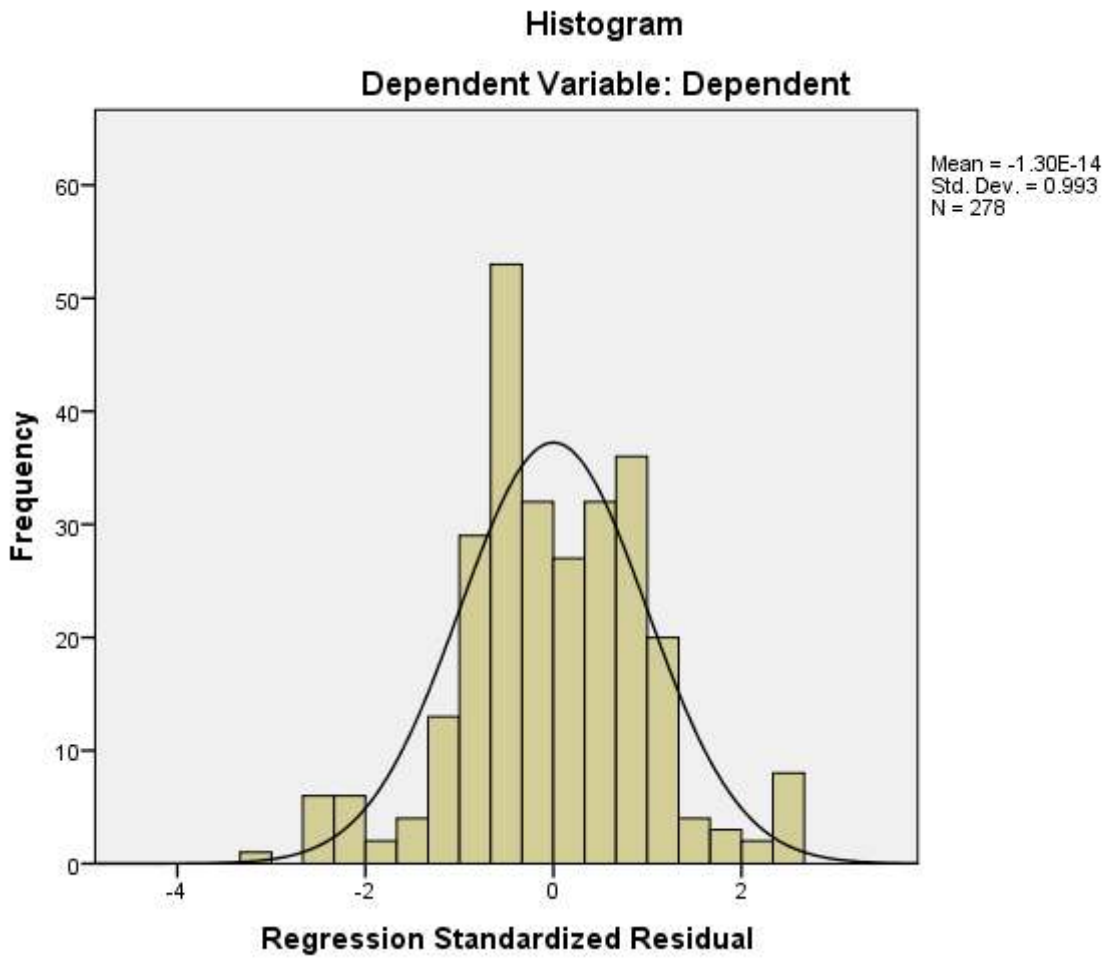
		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	PI	.946	1.057
	WE	.874	1.145
	PS	.892	1.122
	DM	.896	1.116

Source: Analysis of survey data, May.2024

Normality test:

The graph below demonstrates that the assumption of normality is accepted; hence, the assumption of normality is satisfied since the histogram supports this assumption.

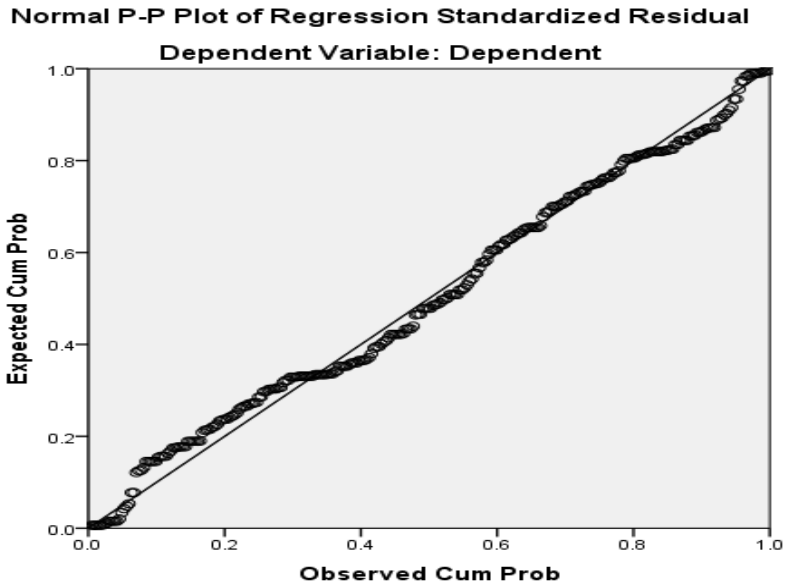
Figure 2 Regression assumption.



Source: Analysis of survey data, May.2024

Additionally, an SPSS regression graph is used to plot a graph to verify linearity. The graph below illustrates that the linearity assumption is satisfied.

Figure 3 Normal P-P Plot of regression standardized residual dependent variable.

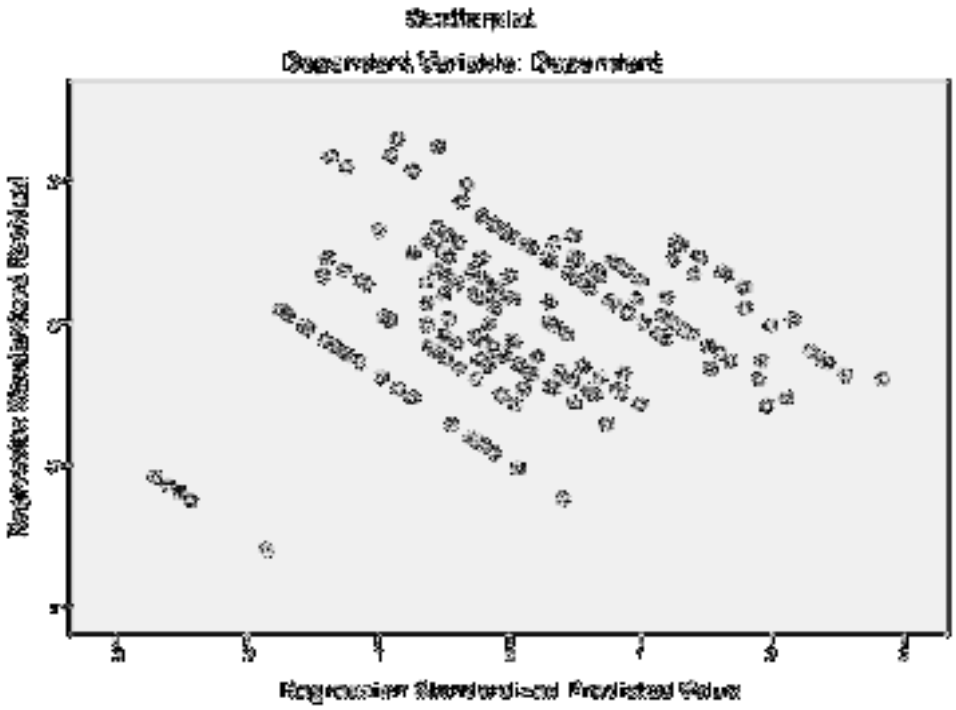


Source: Analysis of survey data, May 2024

Homoscedasticity

The graph reveals that most of the dispersed data are compacted in a single area in a homogenized pattern.

Figure 4 Scatterplot dependent Variable.



Source: May 2024 survey data analysis

The graph demonstrates the validity and normal distribution of the assumptions of linearity, normalcy, and homoscedasticity.

4.2.6.3 Multiple Regression Model summary

A detailed inferential statistical study and its findings are presented in this chapter. Linear regression analysis, which is based on statistical software SPSS24, is also used for inferential analysis. The approach is referred to as linear regression when it is used to predict membership of just continuous outcomes.

Table 13 Model summary of critical factors with the dependent variable Passenger Air transport service Performances

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.778[a]	.605	.600	.19036	.605	104.674	4	273	.000	1.586

a. Predictors: (Constant), DM, PI, PS, WE

b. Dependent Variable: Performance

Source: Analysis of survey data, May 2024

Table 13 above also reveals that R2 is a metric indicating the extent to which the predictors (factors) explain for the variability in the outcome (in this case, passenger air transport service performances). Table 13 illustrates that the R2value is 0.605, indicating that the significant parameters listed collectively account for 60.5% of the variation in the performance of passenger air transport services. Other factors not covered in this study account for the remaining 39.5% of the variance.

4.2.6.4 ANOVA table summary of critical factors with the dependent variable – Passenger Air transport service Performances

Table 14 ANOVA table summary of critical factors with the dependent variable – Passenger Air transport service Performances

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	15.173	4	3.793	104.674	.000[b]
	Residual	9.893	273	.036		
	Total	25.066	277			

a. Dependent Variable: Performance

b. Predictors: (Constant), DM, PI, PS, WE

Source: Data analysis from the May 2020 survey

The sig. value in Table 14 of the ANOVA results above is 0.000. This implies that the deviations can be explained by the model, which is highly significant. The substantial link is supported by the significance results at $p< 0.05$ (0.000).

Coefficients[a]

able 15 The coefficients of multiple regressions.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	1.433	.096		14.884	.000
	PI	.118	.027	.168	4.296	.000
	WE	.200	.017	.476	11.713	.000
	PS	.123	.019	.263	6.532	.000
	DM	.125	.017	.290	7.212	.000

a. Dependent Variable: performance

Source: May 2024 survey data analysis.

The multiple regression coefficients are shown in Table 15 above. The beta (standardized and unstandardized) values of the several independent variables are displayed in detail, along with the corresponding significance value.

The result of the regression analysis examining the relationship between determinants of ACE tool and passenger air transport service performance reveal insightful findings. The variable process improvement in the above Table 15 shows a statistically significant positive relationship with passenger air transport performance, evidenced by the beta coefficient of 0. 168.this finding resonates with prior research on ACE on UTC by Roth (2010). The variable waste elimination tool in the result reveals a statistically significant positive relationship with passenger air transport performance, evidenced by the beta coefficient of 0. 476.this finding resonates with prior research on ACE on UTC by Roth (2010). The variable problem-solving ACE tool in the result yields a statistically significant positive relationship with passenger air transport performance, evidenced by the beta coefficient of 0. 263.this result aligns with prior research on ACE by Roth (2010). The variable decision making ACE tool in the result demonstrates a statistically significant positive relationship with passenger air transport performance, evidenced by the beta coefficient of .290.this finding resonates with prior research on ACE by Roth(2010)Thus, all of the four ACE variables' results are consistent with earlier research, which stated that "because of the competitive landscape, today's business environment is continually taking shape and has forced business firms to implement quality management practices (QMP) so they can consistently improve their work process (Chhabra, 2000), eliminate waste to reduce costs (Manzouri et al., 2014; Rahman et al., 2010), have a robust and systematic methodologies for solving problems (Jovanović et al., 2009), and make decisions (Vuorinen, 2014). In this sense, organizational leaders are striving to establish quality management systems that are seamlessly connected with the organization's strategic goals in order to bring about the necessary change. Moreover, Roth's (2010) research further clarified that, according to the UTC case study, ACE helps UTC satisfy its workers, satisfy shareholders, and thrill customers. According to case studies, UTC and other businesses that have used these exclusive tools for continuous improvement have succeeded in reaching the performance targets they set for themselves.

The studies, when summarized, demonstrate and bolster the notion that these four criteria are important determinants of passenger air transport service performance. Additionally, the study demonstrates that 60.5% of the difference in passenger air transport service performance may be attributed to the four dimensions. As a result, it was discovered that the two dimensions—the waste elimination tool and the decision-making tool—were the most reliable statistical indicators of how well the passenger air transport service performed. It is established that the following

fundamental research problems will be addressed by this study: This study provides an answer to the first research question, "What effect do ACE process improvement tools have on passenger air transport service?" by demonstrating that the organization has a well-developed process management system that has a positive and significant relationship with the performance of the passenger air transport service. In the same way, study questions two and three ask, "What influence do ACE waste elimination tools have on the performance of passenger air transport services? and "What effect do ACE Decision Making Tools have on the performance of passenger air transport services? is addressed by the fact that, according to the regression analysis with a matching p-value of p=0.000, both waste elimination and decision-making tools are determined to be significant contributors to the performance of the passenger air transport service. What effect do ACE problem-solving tools have on the performance of passenger air transport services? is the last research question. Answers demonstrate that a system is in place to consistently gather suggestions for improvement from both customers and staff in order to provide excellent service, that turn-back requests from both parties are prioritized and thoroughly recorded, the correlation analysis demonstrates a positive and strong relationship between the performance of passenger air transport services and the identified corrective actions for these prioritized opportunities. The identified corrective actions typically result in effective solutions that are monitored for effectiveness. The solutions are implemented effectively, and all similar processes are standardized and incorporated into SOPs to prevent problems from reoccurring.

Therefore, organizations seeking to enhance their entire performance should prioritize their efforts to assess, refine and optimize their internal process, ensuring they align with ACE objectives and contribute to the overachieving goal of achieving quality outcomes by improving their internal processes.

CHAPTER FIVE:

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The primary research findings are outlined in this section, along with conclusions on the most important findings. Based on the research findings, recommendations are made, and the study's shortcomings are noted. Ultimately, the study provided several recommendations for additional research.

5.1 Summery of the finding

The following key conclusions were made based on the analysis and interpretation of the data acquired using all the instruments.

- Overall, because of the use of ACE, process improvements in passenger air transport have been successful, well-established, and mature. This may be because the aviation industry is a highly standardized and controlled industry. On the other hand, it is discovered that the organization still needs to concentrate on the thinking and application of VSM in order to provide seamless customer service by collaborating as a team with stakeholders including NISS, Customs, Immigration, and airport communities.
- Waste elimination tools require careful consideration in order to maintain the results obtained through continual development, as they significantly and favorably impact the operation of the passenger air transport service. It is also mentioned that, given the rise in passenger demand, a particularly efficient use of resources—primarily labor and equipment—is required.
- The outcome of using problem-solving tools demonstrates that a robust system is in place to handle customer feedback as a component of the mechanism for solving problems. For problem solving to be more effective, root-cause analysis methodologies must yield solutions. Thus, the outcome also made it abundantly evident that there was room for improvement, particularly in the way that abnormalities like consumer complaints were routinely addressed through the process of problem-solving processes.

- The outcome of the decision-making process indicates the presence of effective leadership practices in the areas of goal-oriented leadership, the creation of flexible and informed decision-making capabilities, quick and adaptable decision-making techniques, and high project management standards.
- The outcome also demonstrated the presence of an effective service management procedure for passenger air travel in terms of productivity, quality, speed, and cost reduction. Concurrently, the study demonstrated that for ACE to be more successful, timely decision-making concerns need to be improved. and needs to pay it more attention.
- Numerous employees concurred that the introduction of ACE assisted the passenger air transport service in identifying and eliminating waste, as evidenced by the results of the descriptive study presented in the preceding chapter.
- However, the results also indicated that some respondents did not agree with some of the points, highlighting the strong commitment needed on the part of the leadership to make ACE a culture. The results also indicated that most employees were not familiar with the VSM method, which is essential to providing value to the customer, and that while there is an ACE team for each ACE tool, they are not operating at the required level due to a variety of operational issues. Finally, a small number of respondents expressed concern about equipment outages, the lack of resources, and the lack of airport infrastructure that can handle the current volume of passengers. Some respondents expressed concern about the promptness with which decisions are made on operational issues.

5.2 Conclusion

The study concludes that the ACE operating system factors—process improvement tools, waste elimination tools, problem solving tools, and decision-making tools—all work together and are significant in influencing the performance of passenger air transport services accounting for 60.5% of the variation in performance. The outcome also demonstrated the necessity for further development of the value stream mapping (VSM) idea to increase customer happiness and value by collaborating with all airport community stakeholders as a team.

Table 6 indicates that there are several gaps in the ACE process's waste elimination tool, which should be fixed to maintain employee safety, consistency, and quality. If resources, facilities, equipment, available labor, etc., are not used effectively, it can have a significant impact on performance indicators like the throughput of the passenger service. The study revealed gaps in this area, and it is necessary to monitor machine performance in order to take corrective action before malfunctions or breakdowns occur. Given how strictly regulated the airline industry is, it is advised that the ground service division's passenger service always complies with this criterion by providing management with better and faster decision-making.

The study also demonstrated that, since employee empowerment and engagement are fundamental to the ACE operating system, staff members should be trained and encouraged to report errors, wastes, and inefficiencies seen in work processes in order to achieve the best possible level of performance. Given the importance of data quality in the management of passenger air transport services, it is urged that certain concerns be addressed. The passenger carrier is recommended to give it more thought because safety, as stated in the airline core values, is the first priority in the aviation industry and very few respondents had any issues in that area.

With respect to the ACE decision-making tools, the outcome suggests that, even in cases where strategic decision-making is applied in a suitable manner, prompt and intelligent decision-making is still necessary, necessitating policy deployment, program management, and portfolio management. incorrect implementation, which is usually connected to a disregard for the very straightforward methods and/or procedures that form the basis of ACE tools.

This data unequivocally demonstrates that middle and upper management prioritize operations above ACE adoption

Overall, the majority of respondents agreed that the effect of ACE Tools in the performance of the passenger air transport service is extremely satisfactory.

5.3 Recommendations

According to this study on the effect of ACE on the Performance of passenger air transport services,

- The ET-GRH needs to investigate its Waste elimination tool regarding maintenance management of automated machinery, airport facilities, and equipment since unforeseen system outages have an impact on daily operations.
- The ET-GRH needs to focus on applying all Ace tools in their day to activity with more follow up and enforcement form the management is mostly recommended for this concern which includes taking a measuring action for those who fails to lead staff and staff who do not working as per required.

- Although many respondents felt that the passenger service operation had a satisfactory safety record, very few disagreed. Given that safety always comes first, it is advised that the business assess its procedures to reduce any safety issues to zero.
- The demographic data provided indicates a low number of female employees; hence, the organization is encouraged to boost female involvement.
- To sustain ACE, employees need to get ongoing training across divisions and classes on the subject.
- Management needs to be dedicated to the successful implementation of ACE and should be active in ACE practices.

5.4 Limitation and Suggestions for Future Studies

Within its parameters, this study attempted to elucidate how ACE affected the performance of passenger air transport services. There may have been an inherent bias in this study because it attempted to explain how ACE affected the performance of passenger air transport from the viewpoint of operational staff, or internal consumers. Subsequent studies might evaluate the opinions of outside clients as well.

The study is exclusive to the example company and focuses on the ACE quality tool and operating system, which are licensed for implementation. As a result, the system's applicability to other organizations will be limited. Ultimately, the study found that, according to employees' perceptions, the correct application of ACE operating system tools considerably contributes to 60.5% of the performance of the passenger air transport service because all ACE tools are used together. This analysis also showed that the performance of the passenger air transport service is influenced by other factors (39.5%). Consequently, additional research in this field of ACE tools is urged for other scholars.

It is important to consider the study's limitations when evaluating the findings. Future research is left to address these constraints. Other benefits and functions of ACE operating tools deployment, such as firm performance, financial benefit, employee satisfaction, and integration with an external supply chain, were not included in this study.

Considering that the research only discussed the company and made no reference for any other companies. The study's findings are therefore not transferable to other ACE-using businesses across the globe. Concerns over property rights and confidentiality—especially in relation to ACE—made it difficult for the researcher to get the comprehensive data and pertinent material required for this study.

Respondent perceptions of the roles played by ACE on ET GRH were a determining factor in part of the research.

There is concern about bias in the research's results because the researcher worked at ET, the organization where the study was done.

Absence of empirical studies in the same field.

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QUESTIONNAIRES:

Addis Ababa University

College of business and economics –FBE

Dear Respondents, the objective of this questionnaire is to secure the necessary and relevant first-hand information that may be useful to conduct a thesis regarding "Effect of Achieving Competitive Excellence (ACE) Tool on Passenger air transport service Performance the case of Ethiopian airlines group Ground handling service division" which will be used to prepare a thesis required for my MSc degree in Management, specialization in Quality management and Organizational Excellence. Therefore, your response in this regard helps a lot to undertake the study. The result of this survey will be treated with confidentiality and will be strictly used for academic purposes only. The researcher thus appreciates in advance your cooperation and sparing your valuable time in filling this questionnaire.

Thank you!

General Instructions:

Writing your name is not necessary.

Put tick mark **(√)** for each question as required.

Part One: Respondent Profile of ET-GRH (Ethiopian Ground Handling Service Division)

1. Sex

Male: ☐ Female: ☐

2. How long have you worked in Ethiopian Airlines (ET-GRH)?

a) less than1-year ☐ b)1-2 years ☐ c)3-5 years ☐ d) >5years ☐

Part Two: Question on ACE practice in Ethiopian Airlines passenger air transport service operation. On the following scale, please tick (√) the appropriate number under the space provided that best represents your opinion. The scale is as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, and 5 = Strongly Agree

A	**Process improvement**	1	2	3	4	5
1	Work process is structured to ensure maximum quality to employees					
2	Key processes identified and prioritized.					
3	Standard operating procedures (SOPs) are so simplified that instructions/procedures are easy for employees to use them					
4	Service level agreement (SLAs)are in place with major stakeholders who have impact on passenger air transport service operation (Example: Customs, Maintenance, Security etc…) and their performance is monitored					
5	Cross functional meeting held appropriately to interface process between inter departmental/Cells					
6	There is high compliance to regulatory requirements (IOSA, Star alliance)					
B	**Waste Elimination**	1	2	3	4	5
1	Employees are reporting wastes they identified to eliminate waste.					

2	All passenger service equipment's are safe to use and operate.					
3	Operational disruptions due to equipment Downtime (failures) are minimized					
4	There are still people that do not add value in the passenger service operation					
5	There are still resources that do not add value in the passenger service operation					
C	**Problem Solving**	1	2	3	4	5
1	System is in place for regularly collecting improvement opportunities from customers and employees for effective service					
2	Turn-back collection from both employees and customers are well documented and prioritized					
3	Identified corrective actions for these prioritized opportunities are usually get effective solutions and their effectiveness is monitored					
4	The solutions identified are effectively implemented, all similar processes are standardized and incorporated to SOPs to prevent problems from reoccurring					
D	**Decision Making**	1	2	3	4	5
1	Your ACE section use passport concept to key business decision making process properly					
2	Smart and timely decisions are made by management on passenger air transport service operational issues					
3	Problems that need management involvement escalate on time for higher management decisions					
4	The leadership is highly committed to make ACE a culture in passenger service					

Do you have any other comments about ACE practices in passenger air transport service service division?……

Part Three: Question on Effect of ACE practice in Ethiopian Airlines passenger air transport

F	**Counter service related**	1	2	3	4	5
1	in pre-check-in activities the Passenger Entrance(X-Ray) Facilitation is on time					
2	in pre-check-in activities the security check of Passengers is safe at Entrance(X-Ray) Facilitation.					
3	There is developed process and mechanism for Flight Information, Guidance to check-in counter, ticket office immigration, assigned gates					
4	Queue management is effective while facilitating check-in counter service					
5	self-service check in (Kiosk check in) is helpful in facilitating check-in counter service					
6	check in counter is per standard when facilitating check in					
7	passengers requesting special assistance (PRSA) handled properly					
8	proper acceptance and delivery of early check-in passengers and baggage on flight					
9	proper apologize and inform flight schedule change, acceptance of passengers on protection flight, protect passenger by giving hotel accommodation					
10	Queue for the appropriate immigration counters during post check in					
G	**Boarding service related**	1	2	3	4	5
1	Flight clearance and manpower allocation during preboarding activities					
2	There is good airport facility in the airport terminal (signage, screens, Boarding pass, Ticket print, clear Announcement, bank, toilet, shower, waiting area)					
3	Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during gate boarding					
4	Priority and zonal boarding with proper flight status on screens and dispatch the flight timely (OTP) during bus boarding					
5	Flights are departed timely (OTP)					
H	**Baggage delivery services related**	1	2	3	4	5
1	Time taken for baggage delivery is up to standard and minimal					

2	Baggage delivery is safely and without damage					
3	Fair Baggage compensation during damage and lost					

Do you have any other comments about passenger air transport service?

……

APPENDIX B. IN-DEPTH INTERVIEW QUESTIONS

Interview questions for passenger air transport service operations management Team.

How do you evaluate that ACE has become an integral part of passenger service continuous quality improvement system?

1. How do you evaluate the status of value stream mapping (VSM) within interdepartmental level as a team and with other stakeholders (customs, NISS Security, Immigration) on passenger service performance as a corporate wise?

2. How do you evaluate management involvement and staff engagement on ACE activity and practice in passenger service?

3. Do you think ACE implementation brought the required passenger service performance excellence in terms of Quality, safety, speed, productivity, and cost?

4. What are the major challenges for ACE to bring the required level of passenger air transport service performance in Ground handling service division particularly in passenger service section?

5. What do you think are mechanisms to make ACE operating system a culture in passenger air transport service section?