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on
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On

Public Sector Transformation and Development

Edited By:
Dr Zerihun Doda, RPCO Director

Layout and Design:
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The 8th National Research Conference on Public Sector Transformation and Development, Ethiopian Civil Service University, May 11-12, 2023

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Table of Contents

Message from the Vice President for Research & Community Services

Ethiopian Civil Service University (ECSU) was established to support the transformation drive of building capacity of the public sector both at federal and regional levels through providing specialized education, training, research and consultancy programs and services. The University has been organizing scientific forums such as workshops and conferences with the aim of disseminating scientific research outputs and enriching the same to maintain its quality at different times.

Against this backdrop, the 2023 conference was organized under the theme, 'The Seventh National Research Conference on Public Sector Transformation and Development.' A total of about 168 abstracts were collected by the 8th National Research Conference Organizing Committee. Of these, 125 were collected from higher education and training institutions, while 42 were funded by ECSU in the 2013 E.C. (2020/2021) calendar year. A total of 82 full papers were further reviewed for conference presentation eligibility, of which 40 were approved, passing through a rigorous review process. Of these, 36 papers were successfully presented at the conference.

Vol. 2 of this proceeding contains 17 papers of the 36 that were successfully presented during the two-day conference and passed rigorous post-conference presentation revision process. The papers have been enriched through incorporation of comments and suggestions gained during the conference. The papers in this volume are categorized into the thematic areas of the HRM, Leadership and Development, Environment and Development and Cross-cutting Issues.

Finally, the VPRP presents this proceeding with a great pleasure and sense of honor to all relevant stakeholders.

Dr. Alemayehu Debebe

July 2023

1. HRM, LEADERSHIP & DEVELOPMENT

1.1. Discharging Corporate Social Responsibility by Bole Lemi and Adama Industrial Parks, Ethiopia

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ABSTRACT

The concept of corporate social responsibility has become a major issue in the modern world. The idea behind this concept is that business organizations should play a positive role in the community and consider the environmental and social impact of business decisions. To overcome global economic challenges, the government of Ethiopia has set up and launched industrial parks in various parts of the country. Among these parks Bole Lemi and Adama industrial parks were the major ones committed to produce and export textile and garment products. Although most of the industries in these parks are set up to make profit, they are also responsible to protect the environment and contribute the social benefit of the community at large. Due to these facts, this study examined the current practice of corporate social responsibility, the major reasons for discharging corporate social responsibility and its effect of the sustainable competitive advantage of the industries. To achieve these aims, the study used a concurrent mixed research approach with descriptive and explanatory research designs. Data was collected from 612 sample respondents who were selected randomly from different industries running in the industrial parks. Both descriptive and inferential statistics with structural equation modeling were used to analyze the data. The findings of the study confirmed that, the environmental and economic dimensions of corporate social responsibility practices are well implemented in the parks; however, the philanthropic, legal and ethical dimensions are not practiced well in the parks. One of the surprising findings of the study was, employee aspects of corporate social responsibility are not practiced in the parks. Based on these findings, the study recommends that, the industries running in the parks should focus on doing business in an ethical manner by considering the norms and standards of the local community. Moreover, the industries in the parks better to give due attention for their employees by creating conducive working environment, paying fair and competitive salary as well as supplying training and education opportunities. The government is also responsible to design a policy to decide minimum wage in the country to make the salaries paid fair and fair.

Key Words: *Corporate Social Responsibility, Sustainable competitive advantage*

INTRODUCTION

Over the years and across the globe, there has been an increasing discussion on Corporate Social Responsibility (CSR) policies in the business sector since after Bowen (1953) in his book "Corporate Responsibility of the Businessman" promoted the idea that companies should take social obligations in the community where they are working. While the idea of CSR has been around for some five decades by now, the last 15 years have seen an unprecedented rise of CSR language, tools, actors, strategies and practices in industry all over the world.

Corporate social responsibility (CSR) promotes a vision of business accountability to a wide range of stakeholders, besides shareholders and investors. Key areas of concern are environmental protection and the wellbeing of employees, the community and civil society in general, both now and in the future. The concept of CSR is underpinned by the idea that corporations can no longer act as isolated economic entities operating in detachment from broader society.

Traditional views about competitiveness, survival and profitability are being swept away. CSR is an organization's obligation to engage in activities that protect and contribute to the welfare of society, including general communities, customers, shareholders, the environment and employees. The adoption and implementation of CSR leads to higher level of credibility, improved image or reputation of the organization, higher employee retention (low turnover) and build customer relations (Eyasu & Endale, 2020; Kim & Park, 2011; Lin, Chen, Chiu, & Lee, 2011).

In recent years, corporate social responsibility (CSR) has attracted increasing attention from policymakers, which has been reflected in the increased level of corporate accountability and transparency toward the consequences of corporations' operational activities for the environment and society at large (Jamali & Mirshak, 2007; Mehedi & Jalaludin, 2020). The topic of corporate social responsibility (CSR) has been the subject of much research attention in the last two decades particularly in developed nations. Although the concept of CSR has been developed and attracted much research, the implementation is still in an embryonic stage in most of developing countries, particularly in Africa (Jamali & Mirshak, 2007).

Traditionally improving the living standards and wellbeing of the society was solely imposed on the government and the sole purposes of corporations were maximizing profit for the interest of shareholders. Corporations have long been criticized for irresponsible actions such as pollution, unfair treatment of employees and suppliers, selling shoddy products to consumers and a host of other activities (Eyasu & Endale, 2020).

However, according to Oberseder, Schlegelmilch, and Murphy (2013), businesses are expected at once to be profitable, socially and environmentally responsible, humane employers and globally good citizens. This involves being clear about the company's purpose and taking into accounts the needs of all the company's stakeholders: shareholders, customers, employees, business partners, governments, local communities, and the public (Eyasu & Arefayne, 2020).

Due to globalization and climate change, governments across countries have been forced to address societal concerns and to be responsible and accountable to our planet. The principle of CSR focuses on organizations must incorporate proper social, environmental and economic actions to satisfy the concerns of stakeholders and the financial requirements of shareholders. In this regard, the activities of organizations should have a positive impact on customers, suppliers, environments, communities and employees (Nadaf & Nadaf, 2014).

In this regard, the government of Ethiopia has launched the construction of industrial parks in various parts of the country to transform and meet the country's aspirations to be industrialized. The industrial parks of Ethiopia are a core part of the Government's plan to make the country a leading exporter of manufactured goods in Africa. Among the industrial parks built and owned by the government, Bole Lemi and Adama Industrial parks are well-established in terms of creating employment opportunities and exporting manufactured outputs.

Bole Lemi industrial park (BLIP) has two phases 172 hectares and 181 hectares respectively, the park is specialized in Apparel & Textile. Currently, the park is producing 100% exportable products and sheds are fully occupied. On the other hand, the Adama industrial park situated in 120 hectares and started operation in 2018. The park specializes in Apparel and Textile and is producing 100% exportable products. The Adama industrial park also produces leather and machinery equipment's.

One of the major research gaps identified is, according to Crifo and Forget (2015) as cited in Newman, Rand, Tarp, and Trifkovic (2020) there is no consensus among scholars in the literature about the effect of CSR on sustainable business performance. Thus, this research is expected to fill this gap by empirically confirming the effect of CSR on sustainable operational business performance of the industrial parks. Moreover, the need for ability building and technology transfer to less developed countries, such as Ethiopia, stays an important developmental agenda. Unfortunately, from the environmental dimension, there is inadequate information on corporate environmental management in developing countries, especially on the African continent (Amare, 2019).

Now a day the topic of CSR in Ethiopia has become the major aspect of managing industries like food processing, beverages, textiles and leather (Eyasu & Endale, 2020). In Ethiopia little effort has been made to scientifically investigate the concept of CSR. According to Hailu and Nigatu (2015), in the Ethiopian context there is a lack of empirical research work in CSR concept and practices.

Finally, numerous earlier studies used descriptive statistics using frequency, percentage, mean, standard deviation, content analysis and binary logistic analysis of determinants of CSR practices for selected Industries in Ethiopia. However, empirical studies that address the observed variables that contribute to the respective factor of CSR and measure of a causal relationship between the factors and CSR practice for selected industries in Ethiopia context using structural equation modeling via exploratory and confirmatory factor analysis is not well documented.

Hence, the major purpose of this study was to examine the current practices and challenges of CSR. The study also aims to explore the factors that affect the adoption and implementation of CSR and its effect of operational performance in two selected industrial parks.

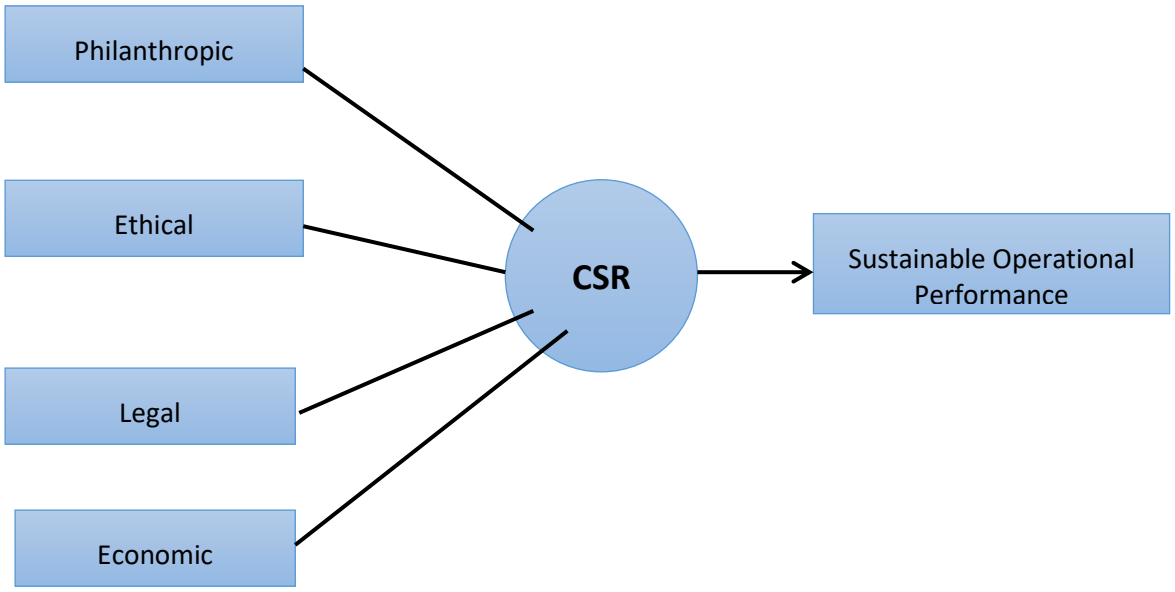
Research Questions

1. What are the current practices and challenges of CSR in the selected industrial parks?
2. What factors determine the implementation of CSR in the selected industrial parks?
3. What is the effect of CSR on sustainable operational business performance of the industrial parks?

Conceptual Framework

Source: Carroll (1991) and Hansel et al. (2011)

Figure 1: Conceptual Framework of the Study



METHODOLOGY

Research Approach and Design

Since combining both quantitative and qualitative data yield a more complete analysis and complement each other, a mixed research approach was used in this research. Consequently, based on the mixed method research approach a concurrent research approach was utilized in this study (Ivankova, Creswell, & Stick, 2006). Concurrent mixed method research approach involves the collection of both qualitative and quantitative data simultaneously and merging the data and using the results to understand the research problem under study (Creswell, 2008). Finally, based on the concurrent mixed research approach, a descriptive and explanatory research designs were applied in combination to answer the research questions of the study. This is because; descriptive research design helps to understand the current practice about the adoption and implementation of CSR practices in the selected industrial parks. On the other hand, explanatory research helps to examine the relationships between research constructs.

Study area, Population and Sampling Technique

Study Area and Population

This study was conducted in two selected industrial parks. Thus, Bole Lemi and Adama Industrial parks were the research areas which are in Addis Ababa city and Adama city, respectively. The study population forms all employees and management officials of public Bole Lemi and Adama industrial parks.

Sampling Strategy and Procedure

Accurate sampling methods and a comprehensive sampling frame are the foundation of empirical surveys (Creswell & Clark, 2017). Hence, in this study probability sampling technique was applied. The probability sampling technique that was used to collect quantitative data through survey questionnaires was simple random sampling technique. In this research a multi-stage

sampling technique was used to divide the research areas into two research sites (Addis Ababa and Adama). Multi-stage is a sampling technique which is useful to choose a limited number of smaller geographic areas in which simple or systematic random sampling can be conducted. Based on the multistage sampling, the researcher used a simple random sampling technique to select sample respondents from each research sites.

Sample Size

Since to total population of the study is unknown, the sample size of the study was determined by using the formula suggested by Cochran (1977)

$$n = \frac{z^2 pq}{e^2}$$

Where:

- e is the desired level of precision (i.e. the margin of error)
- p is the (estimated) proportion of the population which has the attribute in question,
- q is 1 – p.

$$n_x = \frac{1.96^2\ (0.5)(1-0.5)^{\ 2}}{(0.05)^2} = 384 \quad \rightarrow \quad \text{Bole Lemi}$$

$$n_x = \frac{1.96^2\ (0.5)(1-0.5)^{\ 2}}{(0.05)^2} = 384 \quad \rightarrow \quad \text{Adama}$$

Based on the above sample size determination calculations, the total sample size of this study was 768 employees and management officials working different divisions of Bole Lemi and Adama industrial parks. To get the big picture, the questionnaires were distributed to proportionally to manufacturing firms running in both industrial parks.

Data Types, Sources and Data Collection Techniques

To achieve the aims of the study, both quantitative and qualitative data types were collected and used in this research. On the other hand, both primary and secondary data were collected. Primary sources of data were collected via self-administered questionnaires distributed to selected sample respondents. On the other hand, secondary sources of data were collected from documents such as strategic plan, annual reports, and guidelines of the industrial parks. To collect large amount of data, survey questionnaires were used as a data collection instrument. This is because; survey questionnaires supply a relatively cheap, quick and efficient way of obtaining large amounts of information from a large sample of people. Data can be collected relatively quickly because the researcher would not need to be present when the questionnaires were completed. Consequently, to collect both quantitative and qualitative data, the survey questionnaires were both closed-ended and open-ended.

Data Analysis Techniques

Data analysis consists of examining the database to address the research questions and hypotheses (Almquist, Ashir, & Brännström, 2014). Data analysis in a mixed methods research relates to the type of research strategy chosen for the procedures (Gelo, Braakmann, & Benetka, 2008). Therefore, data collected via self-administered questionnaires was analyzed by using relevant data analysis and statistical techniques. In this regard, both descriptive and inferential statistics were used to answer the research questions of the study empirically. Thus, descriptive statistics such as

frequency, percentage, mean and standard deviation were used in order to describe the demographic variable of respondents. To find the underlying dimension of the variable, exploratory factor analysis was used with principal part factoring and varimax rotation. To test and fit the data with the proposed model, a confirmatory factor analysis with structural equation modelling was used.

RESULTS

Demographic Characteristics of Respondents

Based on this data, preliminary analysis was conducted. So, out of the collected data, 317 (51.8%) and 295 (48.2%) was gathered from Bole Lemi and Adama Industrial parks, respectively. Regarding gender distribution of respondents, the majority are female with a frequency of 397 (64.9%) and male respondents with a frequency of 215 (35.1%) as proved in table 1 below. Moreover, table 1 below shows the education level and the current positions of the participants. As per the result, most of the respondents were diploma holders with a frequency of 287 (46.9%) closely followed by degree holders with a frequency of 283 (46.25). 37 (6.0%) and 5 (0.8%) of the respondents are master and PhD holders, respectively. Out of the total respondents 176 (28.8%) were leaders either plant managers, first line managers and top-level executives while, 436 (71.2%) are experts either technical experts, senior experts or administrative support experts. Finally, a descriptive statistic was also performed to check the age and work experience distribution of respondents. Based on the results, the minimum age was 18 years, and the maximum age was 58 years with a mean value of 24.47 and standard deviation of 4.189. Concerning the work experience of participants, the minimum was 1 year of experience and the maximum was 35 years with a mean value of 2.79 and standard deviation of 2.273.

Based on the results of the demographic variables, it can be concluded that most of the respondents are literate holding the minimum educational level which is college diploma. The other implication of the demographic characteristics of the respondents was the gender distribution. Most of the respondents working in both industrial parks were female which shows the commitment of the government of Ethiopia to promote gender equality in all sectors of the country.

Table 1: Demographic Variables

Variables	**Category**	**Frequency**	**Percent (%)**	
Name of Industrial Park	Bole Lemi	317	51.8	
	Adama	295	48.2	
Gender	Male	215	35.1	
	Female	397	64.9	
Education	Diploma	287	46.9	
	Degree	283	46.2	
	Experts	37	6.0	
	PhD	5	0.8	
Position	Leader	176	28.8	
	Expert	436	71.2	
	Mean	**SD**	**Minimum**	**Maximum**
Experience	2.79	2.273	1	35
Age	24.47	4.189	18	58
Total (N)	612			

Results of Exploratory Factor Analysis on CSR Dimensions

To reduce data to a smaller set of summary variables and to explore the underlying theoretical structure of the phenomena exploratory factor analysis was performed with principal part factoring and varimax rotation on the five dimensions of corporate social responsibility. But, before conducting the exploratory factor analysis, the data was checked whether it is sufficient for factor analysis. Thus, the results of the KMO measure of sampling adequacy and Bartlett's test of Sphericity as indicted in table 2 below proved the factorability of the data.

Table 2: Results of KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.938
Bartlett's Test of Sphericity	Approx. Chi-Square	12265.735
	df	406
	Sig.	.000

After checking the factorability of the data through KMO and Bartlett's test, the next step was to conduct exploratory factor analysis on the dimensions of CSR practices. In this research CSR practices were measured on six (6) dimensions namely environment, legal, ethical, philanthropic, employee and economic dimensions. Hence, a total of 29 items were used to measure CSR practices in the industrial parks. Thus, to confirm the unidimensionality of the scale items, exploratory factor analysis with varimax rotation and principal part factoring was made on these six dimensions of CSR practices.

The original results of the exploratory factor analysis produced a five-factor part in which ethical and legal dimensions loaded in a single factor part. From the philanthropic dimension item four loaded below the smallest threshold value and removed from the analysis. In addition, from the employee dimension 3 items either crosses loaded or scored below the minimum threshold value and removed from the analysis. The next step was to perform exploratory factor analysis on the revised items of CSR dimension measurements. Based on this result, a four-factor model was produced which explained 70% of the total variance in CSR practices and based on this further analysis was performed.

Table 3: Rotated Component Matrix of CSR Practices

Items	Env't	Legal	Eco	Phila
Our company is committed to sustainability of environment protection (e.g. Planting trees).	.850			
Our company has environmental management systems and environmental audit	.784			
Our company keeps a healthy environment free from all sorts of pollution in and around the business area	.769			
Our company implements environmentally friendly product and processing system	.744			
Our company promotes environmental awareness by supplying information to employees and stakeholders	.723			
Our company compiles with the environmental laws, rules, and regulations of the country to protect the environment	.648			
Our company follow various federal, state, and local regulations		.774		
Our company fulfill all legal obligations to societal stakeholders		.773		
Our company supplies goods and services that at least meet minimal legal requirements		.718		
Our company perform its activities in a manner consistent with expectations of government and law		.663		
Our company recognizes and respects new or evolving ethical/moral norms adopted by society		.625		
Our company prevents ethical norms from being compromised to achieve business goals		.615		
Our company has fair and regular return on investment			.890	
Our company distributes resources to improve long term profitability			.874	
Our company strives to lower its operational costs			.855	
Our company produces goods and services that are needed/ wanted by the customers, at a reasonable price.			.758	
Our company aids private and public institutions.				.865
Our company commits resources to support culture and arts				.846
Our company is committed to voluntary and charity activities				.839

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

Based on the results of the confirmatory factor analysis, the industrial parks are not committed to implementing CSR practices related with the employee dimension. However, the result displayed in figure 2 above revealed that the parks are committed to the protection of the environment in which all the items except one loaded in a single part above the smallest threshold value. The study also confirmed that industrial parks are engaging in voluntary and charitable activities to some extent which is known as philanthropic dimension of CRS.

Results of Exploratory Factor Analysis on Sustainable Competitive Advantage

An exploratory factor analysis with varimax rotation was performed on sustainable competitive advantage items. The results of the factor analysis confirmed that the five (5) items used to measure performance explained 71.488% of the total variance which produced a single factor part. The table below displays the produced one factor part matrix with the factor loadings of each item. As it can be seen from the table below all the items have scored above the smallest threshold value which is recommended in social science research.

Table 4: Component Matrix of Competitive Advantage Scale Items

Items	Component Matrix [a]	Competitive Advantage
Our company enhanced its goodwill and reputation		.891
Our company supplies high quality products/service		.889
Our company commits itself in time to market		.885
Our company improved its market share and sales volume		.865
Our company provides goods and services with reasonable prices		.678

Extraction Method: Principal Component Analysis. a. 1 components extracted.

Factors that Initiate Industrial Parks to Engage in CSR Practices

A descriptive statistic was performed to examine and find the factors that start industrial parks to engage in CSR practices. The findings of the study revealed that, both industrial parks are participating in CSR practices due to; commercial code/rule and regulation of the country forces to do so, competition in the industry both from domestic and international firms and the parks have their own rules and regulation to discharge corporate social responsibility (CSR). The details of the results are displayed in the later tables below.

Table 5: Reasons for Discharging in CSR Practices

No	Variables (Items)	Category	Freq.	Percent
1	Commercial code/rule and regulation of the country forces to do so	Yes	452	73.9
		No	160	26.1
2	Competition in the industry both from domestic and international firms	Yes	428	69.9
		No	184	30.1
3	The company has own rules and regulation to discharge CSR	Yes	409	66.8
		No	203	33.2
4	Discharging CSR affects the profitability of the company	Yes	302	49.3
		No	310	50.7

Based on the above table, the majority of the respondents from the two industrial parks confirmed that, one of the major factors that initiate the parks to engage in CSR practices was the commercial rule and regulation of the country forces them to do so with a frequency of 452 (73.9%). The competition in the industry from both local and global companies has also significantly influenced the parks to engage in CSR practices with a frequency of 428 (69.9%). Designing and implementing CSR policy by the parks has also contributed to take part in CSR practices with a

frequency of 409 (66.8%). However, the most surprising finding of the study was engagement of the parks in CSR practices has nothing to do with the profitability of the companies. As displayed in the table above, out of the total respondents 310 (50.7%) replied that discharging CSR doesn't affect the profitability of their companies.

The Effect of CSR on Companies Sustainable Competitive Advantage

Based on the above figure all the four dimensions of CSR practices positively affect sustainable competitive advantage of the industrial parks. However, when the dimension was individually entered in the structural model, only economic and environmental dimensions were significantly and positively related with the company's sustainable competitive advantage. Philanthropic dimension was significantly and negatively related with the park's competitive advantage. However, legal and ethical dimensions were insignificant as displayed in the table below.

Table 6: Results of Regression Analysis

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.969	.148		13.349	.000
	Environment	.216	.049	.215	4.357	.000
	Economic	.404	.031	.473	12.953	.000
	Legal_ Ethical	.010	.053	.010	.195	.845
	Philanthropic	-.134	.034	-.151	-3.959	.000

a. Dependent Variable: Sustainable Competitive Advantage

Table 6 above displays the results of regression analysis about the effect of CSR practices on the industries sustainable competitive advantage. As it can be seen from the table the economic dimension and environmental dimension have a positive and significant effect on the industries competitive advantage with a beta value of .47 and .21 respectively at P = .000. On the other hand, the philanthropic dimension of CSR has a significant and negative effect on sustainable competitive advantage of the firms running in the industrial parks. However, the legal and ethical dimensions of CSR have no relationship with sustainable competitive advantage.

Discussions

The concept of corporate social responsibility (CSR) has become noticeably salient in the modern-day global business environment. The interest in CSR, however, is not limited to the world of business and academia as it extends to everyday life. In this regard, corporates need to feel responsibility beyond return to shareholders to include an acknowledgment of its responsibilities to a broad range of stakeholders throughout society such as employees, customers, business

partners, communities, and the environment. Big corporates need to have faith in the idea that not only public policy but companies, too, should take responsibility for environmental and social issues in their sphere. They should seek for the responsible action to be undertaken for the environmental protection as well as meeting self-interest beyond the legal compliance (Grossman, 2005).

Currently, industrial parks in Ethiopia have interested to implement CSR activities. Consequently, most industrial parks are becoming responsible to protect the environment and contribute the national economy of the country. Earlier empirical evidence on the status of corporate social responsibility (CSR) in Ethiopia show the lack of a well-developed culture of CSR and its integration into corporates.

Due to these facts, this study examined the current practices of CSR in two selected industrial parks. The study is based on Carroll's pyramid which has four dimensions; however, two added dimensions were added on the original model namely employee and legal dimensions. Based on the exploratory factor analysis result, the employee dimension didn't load on any factor and the ethical dimension loaded with the legal dimension. Thus, the results of the study confirmed that both industrial parks are committed to protect the environment by implementing environmental related CSR practices. Environmental responsibility mainly refers to company's commitment to reduce pollution, greenhouse gas emission, the use of single-use plastics, water consumption, and general waste. It also addresses, increasing reliance on renewable energy, sustainable resources, and recycled or partially recycled materials. Thus, in this regard, it can be concluded that both companies are seriously engaged in environmental protection activities and responsibilities.

Moreover, the results of the study also confirmed that both industrial parks are making profits side by side implementing CSR practices. The economic dimension of CSR refers to the practice of making financial decisions based on a commitment to doing well. In this regard, Business executives are pushed to look beyond operational cost reductions and instead place their responsibilities to corporate citizenship at the center of all financial choices to uphold economic responsibility. On the other hand, the study also tried to investigate the implementation of philanthropic aspect of CSR. Philanthropic dimension refers to a corporation's aims, goals, and aims for actively bettering society. One huge aspect of corporate philanthropy is donating money from company earnings to worthy causes within the local community, often in the form of a trust or foundation. The results of the study revealed that, the industrial parks are engaged in voluntary and charitable donations to help the local community at large. However, these activities have a negative and significant effect on the sustainable competitive advantage of the industries running in the parks.

CONCLUSION AND RECOMMENDATION

The study tried to empirically examine the current practices of CSR and its effect of firm's competitive advantage in two selected industrial parks. The findings of the study confirmed that, the environmental and economic dimensions of corporate social responsibility practices are well implemented in the parks; however, the philanthropic, legal and ethical dimensions are not practiced well in the parks. The major reasons for discharging corporate social responsibility practices were the business regulation of the country forced them to do so and they have also their own policy to discharge corporate social responsibility practices. One of the surprising findings of the study was, employee aspects of corporate social responsibility are not practiced in the parks.

Additionally, the study also revealed that environment and economic dimensions of corporate social responsibility have a positive and significant effect on sustainable competitive advantage. On the contrary, philanthropic dimension has a significant but negative relationship with sustainable competitive advantage of the industries. Legal and ethical dimensions have no relationship with sustainable competitive advantage of the industries.

In general, there has not been any visible government commitment in the form of national CSR policies and organized efforts to integrate them into its own socio-economic development efforts. In addition, most businesses in Ethiopia are privately owned, and corporate governance is at a stage where it is only a centre of academic discussions and not afforded much attention. Therefore, to enhance the contribution of corporate social responsibility to national development, the government needs to have clear policies and strategies. It is also crucial to increase public awareness and strengthen civil society's role in voicing society's needs and concerns, and their expectations from corporates in terms of social contribution.

The regulatory and institutional framework for CSR implementation of industrial parks should be improved by designing policies. This study also suggested that managers of businesses should prioritize the welfare of their workforce, as this will boost workers' commitment to supporting and taking part in the industry's CSR implementation. In this regard, the industrial companies running in both parks should create conducive working environment, should also design a policy to protect the safety and wellbeing of their employees and need to supply training and educational opportunities to build the ability of their employees.

In addition, although the philanthropic aspect of CSR has a negative effect on the company's competitive advantage, they must continue investing in voluntary and charitable donation to help the local community at large. Besides, they must also give focal attention in keeping the ethical norms and standards of the community while doing business and making profits. Moreover, the business companies are paying salaries by setting their own minimum wages. However, as it was confirmed from the results of the study, the wages are not sufficient to cover basic needs of employees. Thus, the government should design a policy framework to decide the minimum wage.

Finally, this study is one of the few that examines the actual issues that industrial parks are having with the implementation of CSR in the Ethiopian setting. Additionally, based on the data the study it also contributed to the theoretical and empirical literature of measures of CSR implementation.

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1.2. Internationalizing the Curriculum in Ethiopian Research Universities

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ABSTRACT
To meet the purpose of this study, a convergent-parallel mixed method design was employed. Quantitative data was gathered from 415 randomly chosen academics taken from a sample frame of 6808 through a questionnaire. Qualitative data was collected from 16 purposefully selected participants through a semi-structured interview. The reliability and validity of the instruments were checked. The quantitative data was analyzed using descriptive (frequency, percent, mean, and standard deviation) and inferential statistics (Chi-square, Cramer's-V test, and One-way ANova). Bell's "Spectrum of Acceptance of Internationalizing Curriculum," integrated with Ellingboe's "Great Divide," was used to identify the positions of the academics in their beliefs. The qualitative data was analyzed using descriptive statements and presented thematically based on research questions. Hence, major findings revealed that academics' representations based on their demographic variables were not as expected; their variation was practically not significant among universities; most academics had crossed Ellingboe's "Great Divide"; significant differences among disciplines and/or universities were not observed in this study. Finally, mobilizing academics to internationalize their respective curricula, making internationalization of higher education curricula a national priority, and conducting comprehensive national research were some of the major recommendations forwarded for the Ethiopian Research Universities, Ethiopian Ministry of Education, and future research areas, respectively.

Keywords: *Academics, Beliefs, Curriculum Internationalization, Research Universities*

INTRODUCTION

Since we live in a globalized society, the people who were once far away are now our students, coworkers, and neighbors. This occurred because of "Globalization" (Leask, 2015). For the sake of this fact, universities are increasingly being called upon to educate the youth for global labor markets and societies. In response, many have integrated international and intercultural ways of knowing into their work, a phenomenon known as "internationalization" (Knight, 2004; Altbach and Knight 2007, as cited in Buckner, 2019, p. 6).

Hence, at this time, internationalization in general and internationalization of curriculum (IoC) is on the agenda of many nations (Kirk et al., 2018; Svensson and Wihlborg, 2010, as cited in Zou et al., 2019). The reason is that it is one of the major forces affecting and shaping higher education as it evolves to meet the challenges of the 21st century. According to Zou et al. (2019), for a long time, internationalization was primarily associated with recruiting international students and sending domestic students abroad—a notion that is now under criticism. Currently, a new area of

internationalization focus being advocated on a global basis is the internationalization of curriculum (de Wit, 2016). Agnew and Kahn (2014), as cited in Lyu (2022, p. 95) justifies that, apart from these traditional pathways, internationalization of the curriculum could be a comprehensive model to ensure all students have opportunities to be exposed to a global and intercultural learning environment and promote their intercultural competence. Leask (2015, p.9) defined internationalization of curriculum as "the incorporation of international, intercultural, and/or global dimensions into the content of the curriculum as well as the learning outcomes, assessment tasks, teaching methods, and support services of a program."

Today, the extent, to which university education can produce potential employable graduates in the competitive 21st century world, is attracting the attention of scholars and policymakers globally (Oliver, 2015; Pitan, 2015). One of the concerns as Lee (2002) argues is that current university curricula are not producing graduates with the professional and lifelong learning skills required to succeed in the competitive and changing world of work. For this concern, various scholars (Aklilu & Nekatibeb, 2014; Artess et al., 2017; Mohamedbai, 2014) have provided their own empirical evidence.

Hence, Ethiopia is not alone in the global trend to promote and prioritize the internationalization of curricula. However, as far as the knowledge of the researchers is concerned, studies regarding the internationalization of higher education are rare, and IoC is even rarer. The researchers could find three published articles and one unpublished paper concerning the internationalization of higher education in Ethiopia. One is conducted on "Internationalization of Higher Education in Ethiopia: Evidence from Public and Private Institutions" (Wondwosen, 2015). The dominant aspects, rationales, benefits, frameworks, policies, and regulations, as well as the risks and barriers to internationalization in Ethiopian higher education institutions, were the focus of this study. The second study was about "Internationalization of Higher Education and Research in Ethiopia: Considerations for Institutional Strategy," (Ayenachew, 2017). This study focused on institutional strategies for improving the international nature of research within the broader frame of IoHE. The third study was on "Internationalization of the Higher Education System in Ethiopia: A Review of Education Policies and Strategies," (Ermyas and Abiot, 2021). This study was a review article that analyzed the supportive role that could be played by national educational policies and strategies towards internationalization of higher education institutions (HEIs) in Ethiopia. The fourth study, which was unpublished and sponsored by the Higher Education Strategy Center (HESC), a department under the Ministry of Education of Ethiopia, was about "Internationalization of Ethiopian Higher Education: Towards Policy Framework" (Tesfaye et al., 2019). The focus is on studying the status of internationalization and drafting a policy framework and strategy to pave the way for how to join, take part in, and enhances the internationalization of higher education in the country.

From the above-mentioned domestic studies, it is possible to see that the area of this study has either received less emphasis or is underexplored in our context. Particularly, the researchers could not find a single independent study about curriculum internationalization. Thus, it is these gaps that trigger the researchers to investigate and contribute to filling the theoretical and practical gaps via examining the academics' beliefs about curriculum internationalization in Ethiopian Research Universities. As a result, this study differs from previous domestic and/or international studies in that it focuses on (a) academics' beliefs at the tertiary level of education, (b) internationalization of curriculum, (c) academic staff, and (d) more than one institution or disciplinary case study, which many of the studies of IoC to date have not.

Research Questions

To analyse the gaps, this study was guided by the following fundamental questions:

1. How well were academics represented in the selected universities in terms of demographics, experiences, and qualifications?
2. Was there a significant difference among these universities in terms of these demographic variables?
3. What are the academics' beliefs in Ethiopian Research Universities about the importance of internationalizing the curriculum in their disciplines?
4. Are there any substantial differences in academics' beliefs about IoC among disciplines in one institution or in the same discipline at different institutions?

METHODOLOGY

Description of the Study Area

Brief descriptions of the study areas were offered based on the Strategic Plan Documents (2020) of each study area as follows.

Addis Ababa University (AAU), which was established in 1950 as the University College of AddisAbaba (UCAA) is the oldest and the largest higher learning and research institution in Ethiopia. It is found in the capital city of Ethiopia, Addis Ababa. Since its inception, the university has been the leading center in teaching-learning, research, and community services. Jimma University is in the city of Jimma, situated around 352 kilometers southwest of Addis Ababa. The establishment of the university dates to 1952 when Jimma College of Agriculture was founded. Hawassa University is in the Southern Nations, Nationalities, and Peoples Region. The university is found in Hawassa city which is the capital of the region. It is found at 270 Kms away from Addis Ababa. Bahir Dar University is also found at 557km from Addis Ababa. Bahir Dar University was established by merging two former higher education institutions, namely the Bahir Dar Polytechnic and Bahir Dar Teachers' College. The Bahir Dar Polytechnic Institute, which has transformed itself into Technology and Textile institutes, was established in 1963. The Bahir Dar Teachers' College, by then known as the Academy of Pedagogy, was established in 1972. Bahir Dar University is now among the largest universities in Ethiopia. Currently, these four universities are among the eight research universities in Ethiopia.

Approach

The study adopted the Convergent Parallel Mixed Methods Design. The target population of this study was the academic staff of the eight research universities as differentiated by Ministry of Education of the Federal Government of Ethiopia (FDRE) (MoE, 2020). The reason is that, because IoC is a new global practice, the selected universities may be assumed to have more exposure and experiences than the others. These universities are Addis Ababa University, Haramaya University, Jimma University, Hawassa University, Arba Minch University, Bahir Dar University, University of Gonder, and Mekelle University (MoE, 2020). Their total population was 15,710 of which the sample frame was 6808 (University Strategic Plan, 2020). However, Mekele University was left out of this study due to security problem during the study.

Hence, four universities (Addis Ababa University, Bahir Dar University, Hawassa University, and Jimma University) were taken as a sample by using a simple random sampling technique (lottery system). In addition, the academic disciplines were classified as hard/pure, hard/applied,

soft/applied, and soft/pure. Then, "the sample size was determined by using published tables and a formula for determining sample size" (Israel, 2012, p. 2). Based on this, Krejcie and Morgan's (1970) formula and a table that was constructed using this formula were used for this study. Based on this, the sample size was 364. However, Israel (2012) noted that these determined sample sizes reflect the number of obtained responses and not necessarily the number of surveys mailed (this number is often increased to compensate for non-responses). For this reason, the sample size of this study was increased to 450. Then, to have equal representations of samples from each of the four universities and clusters of disciplines, their sample sizes were proportionally decided as presented in table 1.

Table 1: populations and samples taken from the four universities and clusters of disciplines.

S.N.	Universities	Cluster	Population*	Sample	Sampling technique
1	Addis Ababa	Hard pure	273	18	Proportional Systematic random sampling
		Hard applied	481	32	
		Soft applied	446	29	
		Soft pure	467	31	
		Total	1667	110	
2	Jimma	Hard pure	175	12	
		Hard applied	1107	73	
		Soft applied	298	20	
		Soft pure	194	13	
		Total	1774	118	
3	Bahir Dar	Hard pure	327	22	
		Hard applied	829	55	
		Soft applied	355	23	
		Soft pure	245	16	
		Total	1756	116	
4	Hawassa	Hard pure	232	15	
		Hard applied	978	65	
		Soft applied	251	16	
		Soft pure	150	10	
		Total	1611	106	
Total			**6808**	**450**	

Note. *=Did not include technicians, assistant graduates, study leaves, or sabbatical leaves

Source: The University's third-quarter report (2022).

For the qualitative part of this study, participants were selected using a purposive sampling technique. Hence, academic directors, department heads, program coordinators, and senior academics participated in this study. In a nutshell, four participants, one from each category of a discipline at each sample university purposefully chosen because they play significant roles in developing, leading, and managing the IoC strategic plans and activities at various levels. Thus, a total of 16 participants were interviewed.

Data Collection Instruments

The instruments used in this study were questionnaire for the quantitative data and interview guide for the qualitative data. The questionnaire was adopted from Bell's (2004) four levels of academics' positions along the Spectrum of Acceptance of Internationalizing Curriculum. For each of the four level major scales a 5-point Likert scale items were used to find academics' beliefs on the relevance of internationalizing the curriculum within their disciplines. The second data

collection instrument used was a semi-structured interview format, for senior academics, department heads, coordinators, and directors of the selected universities.

The validity of the questionnaire (face validity, content validity, and construct validity) was checked. To check the reliability of the questionnaire, a pilot study was done by distributing to 76 academics at Haramaya University, which was not included in the main study. Then, a reliability analysis was carried out on the academics' beliefs scale comprising 24 items. Cronbach's alpha showed the questionnaire to reach acceptable reliability, $\alpha = 0.78$ (Cohen et al., 2018). For the qualitative part (interview guide questions), the "trustworthiness" was also checked via triangulation, multiple methods, multiple data sources, external audits, and low-inference descriptors. After the quality of the instruments was checked, 450 questionnaires were distributed to the respondents (academics) at the four sample universities. Twenty-one of the 450 questionnaires distributed were not returned, and 14 were deemed unusable. Hence, a total of 415 questionnaires were appropriately completed and returned, which is a 92.2% response rate. A semi-structured interview was also conducted with 16 participants selected purposefully from the four selected universities.

Methods of Data Analysis

Both descriptive and inferential statistics were used to analyze the quantitative data in this study. Therefore, descriptive statistical methods (the frequency, mean and the standard deviation), were used. Chi-square and Cramer's V tests were used to test the significance variations and their effect sizes of respondents' demographic variables, respectively. One-Way-Analysis of Variance (One-way-ANOVA) was also used to determine whether there were any statistically significant differences between the means of the four academic disciplines at the same university and/or the same discipline at different universities about the academics' beliefs about IoC.

For the qualitative data of this study, thematic analysis was chosen for interpreting the meanings of the collected data (Creswell & Poth, 2018). The findings were then linked to the results of the quantitative data analysis. In safeguarding confidentiality, the identity of the participants remained anonymous; in doing so, certain abbreviations combined with a code were used. For instance, PI06, AAU, 5/23/2022 indicates; participant, interview, order of the participant being interviewed, and name of the participant's university, month, date, and year of the interview. Finally, the whole process of data analysis was carried out manually.

RESULTS AND DISCUSSION

Respondents' Demographic Representations among Universities

The relative representation of respondents in terms of some demographic characteristics, were examined and presented in table 2. These demographic characteristics were sex, discipline, nationality, experiences, academic position, and rank. This was for the purpose of answering the first and second research questions.

Table 2: Respondents' representations and differences of the demographic information among universities

Demographic variables		University				Total	Chi-Square Tests	
		Hawassa University	Bahir Dar University	Addis Ababa University	Jimma University		Pearson Chi Square value	Asymp. Sig. (2-sided)
Sex	Male	79	90	86	93	348	2.53	.47
	Female	21	16	13	17	67		
Total		100	106	99	110	415		
Discipline	Hard/Pure	15	19	18	12	64	38.33	.00
	Hard/Applied	62	51	28	71	212		
	Soft/Applied	13	20	26	17	76		
	Soft/Pure	10	16	27	10	63		
Total		100	106	99	110	415		
Nationality	Ethiopian	86	97	83	100	366	4.16	.24
	Non-Ethiopian	14	9	16	10	49		
Total		100	106	99	110	415		
Experiences International								
	Yes	15	18	7	20	60	2.39	.50
Intercultural	Yes	63	73	64	72	272		
Both	Yes	22	15	28	18	83		
Total		100	106	99	110	415		
Having Academic position	No	93	88	88	93	362	5.63	.13
	Yes	7	18	11	17	53		
Total		100	106	99	110	415		
Academic rank	Lecturer	60	70	23	58	211	54.00	.000
	Assistant professor	28	24	35	28	115		
	Associate professor	8	7	30	15	60		
	Professor	4	5	11	9	29		
Total		100	106	99	110	415		

Table 2 shows that when the four selected research universities were compared, 79–87% of the academics at each of the four universities were male. A chi-square test result revealed that there was no significant difference in the frequency distribution of academic respondents in terms of

their sex among these universities; $\chi 2$ (3, N = 415) = 2.53, p >.05. This means that the proportion of female academics was lower than that of males throughout the four universities in this study. In terms of discipline categories, academic respondents were distributed in different proportions among the four research universities. The four universities are more evenly distributed in the hard/applied category. The chi-square test result confirmed that the variation in the respondent distribution was significant: $\chi 2$ (9, N = 415) = 38.33, p < 05. The effect size of Cramer's v (V) of .17 and degree of freedom of 3 suggest that the finding was practically small.

From the nationality aspect of the respondents, the non-Ethiopians were small in their proportion, ranging from 8% (Bahir Dar University) to 16% (Addis Ababa University). The chi-square test result shows that the variation in the distribution of the non-Ethiopian academics among the four universities was not significant: $\chi 2$ (3, N = 415) = 4.16, p >.05. This means the frequency count and the percentage distributions of the non-Ethiopian academic respondents compared to their Ethiopian counterparts were evenly distributed. In line with the international experience of respondents, most of them, ranging from 93% (Addis Ababa University) to 82% (Jimma University), had no international experience within the four universities. The chi-square test also confirms that the variation of the distribution in this regard was not significant; $\chi 2$ (3, N = 415) = 2.39, p >.05. In contrast, most of the academics, ranging from 69% (Bahir Dar University) to 63% (Hawassa University), had intercultural experience within the four research universities. Their distributional difference was statistically significant; 2 (3, N = 415) = 13.49, p =.05. However, the effect size of Cramer's V.14 and the degree of freedom of 1 indicate that the significance was small.

Regarding the respondents' academic position in the university, most of them, ranging from 83% (Bahir Dar and Addis Ababa Universities) to 93% (Hawassa University), did not have positions. Their distribution in this regard was statistically not significant among the four research universities: $\chi 2$ (3, N = 415) = 5.63, p >.05. Concerning the last demographic variable, which is academic rank, it can be seen from table 4 that going from the lower level (lecturer) to the higher level (professor), their distribution was decreasing. Addis Ababa University was exceptional in that the assistant professor rank (35 respondents) had a greater distribution than that of the lecturer rank (23 respondents). In addition to this, Addis Ababa University had higher frequency counts for the highest two academic ranks (associate professor and professor) than the other three research universities, followed by Jimma University. This distribution variation was statistically significant; $\chi 2$ (9, N = 415) = 54.00, p < .05. The practical effect size of Cramer's V of .21 and degree of freedom of 3 is medium.

Profile of the Participants in the Semi-structured Interview

Semi-structured interviews were conducted with sixteen participants (one from each discipline) from the four universities. The demographic information was summarized and presented in table 3.

Table 3: Characteristics of the participants in the interview

Characteristics	Category	No. of participants	Type of Participants
University	Addis Ababa	4	Academics, Department Heads, Program Coordinators, and Directors
	Bahir Dar	4	
	Hawassa	4	
	Jimma	4	
	Total	16	
Discipline	Hard/Pure	4	
	Hard/Applied	4	
	Soft/Applied	4	
	Soft/Pure	4	
	Total	16	
Sex	Male	14	
	Female	2	
	Total	16	
Nationality	Ethiopian	13	
	Non-Ethiopia	3	
	Total	16	
Experience	International	4	
	Intercultural	9	
	Both	3	
	Total	16	
Academic position	With position	7	
	Without position	9	
	Total	16	
Academic rank	Lecturer	2	
	Assistant professor	3	
	Associate professor	8	
	Professor	3	
	Total	16	

participant from each of the four categories of discipline and the four universities were involved in the interview. Sex-wise, most of the participants (87.5%) were male. The majority (81.3%) of the participants were Ethiopians by nationality. Even if most participants (69.2%) have intercultural experiences, the others have international experiences or both international and intercultural experiences. Some participants had academic positions (directors, department heads, and program leaders). Finally, about the academic rank of the participants, 87.5% were those under the rank of professorship (assistants, associates, and full professors). This was purposefully done for the reasons mentioned under the method section.

Academics' Beliefs Regarding Internationalization of Curriculum

In line with academics' beliefs, the results obtained through the analysis of both the quantitative and qualitative data were presented as follows. These beliefs were categorized under four levels as presented in table 6 through table 9. In doing this, the evaluation criteria of a 5-point Likert scale (table 5) were also used.

Table 5: The evaluation criteria of Likert scale (5-point) questions

Score Interval (Mean)	Evaluation Criteria
1.00 - 1.79	Almost never/Strongly disagree
1.80 - 2.59	Not often/Disagree
2.60 - 3.39	Sometimes/Undecided
3.40 - 4.19	Often/Agree
4.20 - 5.00	Almost always/Strongly agree

Source; (Çelik and Oral, 2016; GENÇ et al., 2017, as cited in Genc, 2021)

Level one of academics' belief has a major belief scale which is said as "internationalization would have a negative impact", this in turn included sub scales of beliefs (see table 6).

Table 6: Mean and Standard Deviations of respondents (n= 415)

Level 1: Internationalization would have a negative impact	N	Minimum	Maximum	Mean	Std. Deviation
Belief Level 1 Subscale1	415	1	5	3.47	1.25
Belief Level 1 Subscale2	415	1	5	3.62	1.31
Belief Level 1 Subscale3	415	1	5	2.72	1.25
Belief Level 1 Subscale4	415	1	5	3.32	1.24
Belief Level 1 Subscale5	415	1	5	2.66	1.07
Belief Level 1 Subscale6	415	1	5	2.52	1.34
Belief Level 1 Major Scale Mean Score	415	1	5	3.05	.73
Valid N (listwise)	415				

Based on the evaluation criteria of Likert scale, it can be seen from table 6 that majority of the mean scores of the sub scale items for the major scale were less than the upper limit (3.39) of the undecided level of interval scale. The major scale mean score of the level (M=3.05, SD=.73) also confirmed the same result. The interpretation of this result is that most of the respondents could not decide whether 'internationalization would have a negative impact'.

In the same manner, the result obtained about academics' belief of level two was presented in table 7.

Table 7: Mean and Standard Deviations of respondents (n= 415)

Level 2: Internationalization is not appropriate	N	Minimum	Maximum	Mean	Std. Deviation
Belief Level 2 Subscale 1	415	1	5	3.56	1.30
Belief Level 2 Subscale2	415	1	5	3.31	1.34
Belief Level 2 Subscale3	415	1	5	2.49	1.16
Belief Level 2 Subscale4	415	1	5	2.83	1.26
Belief Level 2 Subscale5	415	1	5	2.45	1.19
Belief Level 2 Subscale6	415	1	5	2.98	1.24
Belief Level 2 Major Scale Mean Score	415	1	5	2.94	.65
Valid N (listwise)	415				

It can be seen from table 7 that almost all level two sub scales and the major scale mean scores were less than the lower limit of "agree" scale (M=3.40, SD= .65). That means alike the level one of academics' belief, most of the respondents could not decide 'whether 'internationalization is not appropriate'.

In line with this, the data obtained from a few participants in the interview indicates that they occupied the position on the left side of the 'Great Divide'. One of the participants expressed his disbelief as follows:

> *I was disappointed with the so-called internationalization of the curriculum. The reason for this is that what can Africans in general, and Ethiopians in particular, contribute? Even Africa produces a fraction of the world's global knowledge. In so doing, the continent relies heavily on the knowledge produced by others. The rest of the Global South also falls into this unenviable category. For instance, most books, journals, databases, and other information and data are produced in the Global North. Even the format and style of intellectual writing and academic communication refer to institutions in the north—the American Psychological Association (APA), Harvard Style, and Modern Language Association (of America)—demanding that every college student from virtually anywhere in the world follow these international norms (PI10, BDU, 5/30/2022).*

According to the above-mentioned information, the participant's focus in conceptualizing IoC is twisted toward the international dimensions, undermining the intercultural dimension. About academics' beliefs of level three, the result was also indicated in table 8.

Table 8: Mean and Standard Deviations of respondents (n= 415)

Level 3: Internationalization is possible	N	Minimum	Maximum	Mean	Std. Deviation
Belief Level 3 Subscale1	415	1	5	3.79	.96
Belief Level 3 Subscale2	415	1	5	3.91	.93
Belief Level 3 Major Scale Mean Score	415	1	5	3.85	.77
Valid N (listwise)	415				

It was seen from table 8 that all academics' belief level three sub scales and major scale mean scores were between the scale range of 3.40 and 4.19. The implication is majority of the respondents were agreed with the major scale mean score of belief that 'internationalization is possible' from the perspective of their respective discipline. Similarly, the result of academics' belief of level four was showed in table 9.

Table 9: Mean and Standard Deviations of respondents (n= 415)

Level 4: Internationalization is integral	N	Minimum	Maximum	Mean	Std. Deviation
Belief Level 4 Subscale1	415	1	5	3.69	1.05
Belief Level 4 Subscale 2	415	1	5	3.84	1.02
Belief Level 4 Subscale3	415	1	5	3.92	.98
Belief Level 4 Major Scale Mean Score	415	1	5	3.82	.74
Valid N (listwise)	415				

Table 9 showed that the mean scores of all the sub scales and the major scale of academics' belief of level four were found to be within the scale range of 3.40 and 4.19, which is categorized under the level of 'agree'. This means, respondents believed that internationalization is 'an integral' part of their teaching activities.

The data obtained from the interview also supported this right side of the 'Great Divide'. For instance, most of the participants believed that internationalizing their curriculum was mandatory. Their justification is that they are living in a global, borderless world. As a result, they doubted their ability to be an island. But what they repeatedly raised was how to keep global and local balance. This is similar with Gwakwa's (2016, p. 85) finding. In line with the doubt of the respondent, Teferra (2020, p. 73) argued that "all internationalization, that is, smart internationalization, ought to be locally grounded and internationally flavored."

Mean Differences among Disciplines in one Institution

In this study, the second and the last research question was included to find whether significant differences exist among diverse groups concerning academics' belief regarding IoC. About the four categories of disciplines in one institution, One-Way-Analysis of Variance (One-Way-ANOVA) was conducted, and the results were presented in table 11.

Table 11: One-way-ANOVA for the four universities with the same discipline (n = 415)

ANOVA

			Sum of Squares	df	Mean Square	F	Sig.
Mean Score	ABMS	Between Groups	.058	3	.019	.12	.95*
		Within Groups	68.179	411	.166		
		Total	68.237	414			

The independent variable, academics' belief, included four groups of disciplines: Hard/Pure (M = 3.40, SD = .452, n = 64), Hard/Applied (M = 3.41, SD = .375, n = 212), Soft/Applied (M = 3.44, SD = .386, n = 76), Soft/Pure (M= 3.41, SD= .483, n= 63). There was homogeneity of variances, as assessed by the Levene's test for equality of variances, for disciplines, $p > .05$. The computed one-way ANOVA was not significant at $p > .05$ ($F(3, 411) = .12$, $p = .95$). Hence, there is no considerable evidence from which to conclude that there were differences in academics' beliefs among the four categories of disciplines. This finding seems to contradict with Leask's (2015, p. 14) finding, which believed that "many, but not all, of the academics in the hard/pure disciplines are often less open to accepting IoC than their colleagues in the soft/applied disciplines." However, as Leask's finding showed, other academics in the same discipline argue against those who make such claims by justifying that they are working within a culturally defined frame of reference.

Mean Differences among Institutions with the Same Discipline

Concerning the four universities with the same discipline, the result of One-Way-Analysis of Variance (One-Way-ANOVA was presented in table 12.

Table 12: One-way-ANOVA for the four universities with the same discipline (n = 415)

ANOVA

			Sum of Squares	df	Mean Square	F	Sig.
Mean Score	ABMS	Between Groups	.377	3	.126	.76	.52
		Within Groups	67.860	411	.165		
		Total	68.237	414			

The independent variable, academics' belief, included three universities: Hawassa University (M = 3.40, SD = .468, n = 100), Bahir Dar University (M = 3.40, SD = .367, n = 106), Addis Ababa

University (M = 3.47, SD = .285, n = 99), Jimma University (M= 3.39, SD= .470, n= 110). Homogeneity of variances was violated for the institutions, $p < .05$. This could be due to the reason that "small sample sizes are more likely to conclude that the population variances are equal than their counterparts with large sample sizes" (Cribbie and Kim, 2017, P.6). Moreover, Blanca et al., (2017) argued that when the variance ratio of the groups is equal to or less than 1.5, in which in the case of this study is 1.26, F-test can be performed with confidence, P.945.The computed one-way ANOVA was not significant at $p > .05$ ($F (3, 411) = .76$, $p = .52$). Hence, there is no considerable evidence to conclude that there were differences in academics' belief among the four universities. Since "many of the existing studies of the IoC focus on one institution or a disciplinary case study" (Leask and Bridge, 2013, as cited in Robson, 2015, p.50), the above finding of this study could not relate with other findings.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the relative representations of academics from the perspectives of their demographic variables of this study were not to the expected level in the selected universities. Furthermore, their variation with this respect was practically not significant. The broad range of beliefs that exist amongst academic staff as to the relevance of "internationalizing the curriculum" within their discipline was also revealed in this study. However, most academics had crossed Ellingboe's 'Great divide'. Hence, it is possible to conclude that academics at Ethiopian Research Universities believe in the importance of internationalizing their respective disciplines, with a strong emphasis on keeping the balance between international and local tensions. With this regard, significant differences were not observed among disciplines or institutions. This may create a favorable environment for these universities to practice IoC based on their context. This is since (a) the academics' role is central, (b) one of the major challenges of the IoC is the academics' resistance, and (c) the academics' beliefs regarding the IoC influence their actual practices.

Based on the conclusions made, some major recommendations were forwarded. These were: Ethiopian research universities should take initiatives to promote the importance of internationalizing higher education curricula; the Ethiopian Ministry of Education should make internationalizing the curriculum of higher education a national priority; other scholars should conduct a comprehensive study to capture the national image regarding the issue of IoC.

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1.3. Practices and Challenges of Banking Services Inclusiveness to Persons with Special Needs in Selected Banks in Addis Ababa; Implications for Customer Satisfaction

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ABSTRACT

In countries development, service sections play key roles. Services are expected to address diversity in interest, demographics and exceptionalities such as persons with disabilities. The main purpose of this study was to assess practices and challenges of banking services to persons with special needs (Persons with Disabilities) in selected banks in Addis Ababa. Various sources show that there are more than 15 million people who live with impairment. This segment of the population should be integrated, and inclusive works are needed in the financial sectors, especially in Banking. The population of this study include bank workers in different departments and customers with certain disabilities. Simple random sampling was used for recruiting 364 participants of the study. The research design was concurrent triangulation mixed design was used. Likert-scale was constructed, confirmed, and used to gather quantitative data. The qualitative data was gathered by using semi-structured interview. SPSS 25 was used for analyzing quantitative data (Pearson's Product Moment Correlation Coefficient, One ANOVA, and Multiple Linear Regression were done). Thematic analysis was used for analyzing qualitative data. The finding revealed that the banking systems have gaps in addressing service provision for persons with special needs. Though there are efforts in making the physical environment modification such as using ramp, there are needs which are not yet addressed. Interviewed bank customers have shown that the services did not yet meet customer satisfaction of persons with disabilities. As per the findings, it is recommended that banks should create service packages for persons with disabilities. Infrastructures and facilities should meet all utility aspects for persons with special needs.

***Key words**: Banking, Customer Satisfaction, Persons with Disabilities, Inclusiveness, Service Provision, Saving*

INTRODUCTION

In the development of countries, service sectors play vital roles. Services are expected to address diversity in interest, demographics and exceptionalities such as persons with disabilities (PWDs). Banking services are part of this sector (Khan, & Fasih, 2014). In the general sense, banks supply capitals for the business, and contribute for development of a country through encouraging and transaction too. To mention main roles of banking; firstly, it inspires saving habits and makes funds obtainable for productive use. Secondly, it serves as an intermediate between persons having added money and others who are needful for different business activities. Thirdly, it promotes business dealings through receipts, and payments. The other role is provision of loans and advancement to businesspersons for short-term and long-term purposes. Moreover, banks ease export-import transactions. Generally, banks help levitation of living standard through bringing national development at large (Bamlak, 2022; Navamani, & Saravanakumar, 2015). Though such purpose

is embodied in the service, there are questions in meeting banking service expectations of diversified needs from different people.

The Convention on the Rights of Persons with Disabilities and Optional Protocol (n.d.), in Article 9 which is about "Accessibility", it is heralded as:

> "*To enable PWDs to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas*" (CRPD, n.d., PP9).

The Ethiopian banking service sector has above hundred years of history (Metasebia, Rong, &Tekle-Gebremedhn, 2019). However, technological advancements and banking of the unbanked segment of the country remained as gap in the service especially for persons with special needs. For addressing such gaps, making inclusive banking services plays irreversible role at individual and/or country level. Service inclusiveness refers to addressing wider needs of customers in meeting expectations. It is also a means for delivering services to exceptional customers who have special needs (Ainscow, 2005).

The main purpose of this study was to assess practices and challenges of banking services to persons with special needs (Persons with Disabilities) in selected banks in Addis Ababa. Various sources (such as WHO, 2011) show that there are more than 15 million, which is 17.6% of the total population at the time, people who live with impairment. This segment of the population should be integrated, and inclusive works are needed in the financial sectors, especially in Banking. Financial sector needs to strive for serving communities with special needs.

In view of banking services for PWDs, Bamlak (2022) on the financial services for persons with special needs. Bamlak heralded as there are the inconvenience of finance sector for persons with disabilities. It has been added that the financial sector in general, and the banking sector in particular lags in addressing needs. But the study was mainly on visual impairment only. Numerous studies strongly recommended that the financial sector should work for creating wide scope of inclusive services in meeting very speckled needs of diverse customers.

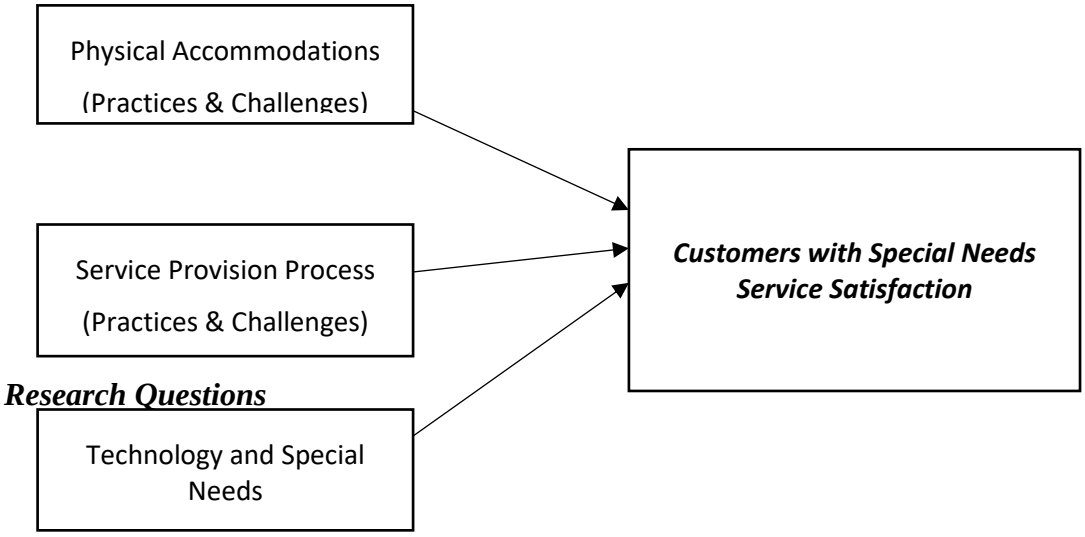
Microfinances play vital role in filling immediate needs of PWDs and traditional finance sources such as equb and edir (Karafo, 2017) are serving as alternative ways for filling the gaps in banking service limitations and challenges. So, failure to create enabling and convenient banking service system may lead to make the unbanked community to stay away from banks.

Regardless of the public-private dichotomy, different research articles indicated that customer service satisfaction is affected by numerous factors including the employees, infrastructures, timeliness, physical nearness, access, network, communication, and the like (Khan, & Fasih, 2014; Maiyaki, Noor, & Mokhtar, 2011; Navamani, & Saravanakumar, 2015; Siddiqi, 2011).

Majority of earlier works on customer satisfaction (such as Siddiqi, 2011; Arasli, Katircioglu, Mehtap-Smadi, 2005; Belay, 2012) were centered on the convention service provision and SERVQUAL model. The issues of services to PWDs or persons with special needs are under studied. This was one of the triggering factors which made this study to be conducted.

This research was mainly geared to uncover banking service provision practices and challenges to persons with special needs or PWDs.

Conceptual Framework



Research Questions

The research was done in pursuit of the following research questions.

1. How is the inclusiveness of banking service in the physical infrastructures and facilities?
2. What are the practices and challenges of rendering inclusive banking services for persons with disabilities?
3. How are technologies assisting banking services to individuals with special needs?
4. How is satisfaction on the services in relation to customers (bank users) with disabilities?

The main purpose of this study was to assess banking service delivery practices for customers with disabilities and pertinent challenges in offering services for persons with disabilities.

METHODOLOGY

Study Design

The research design was concurrent triangulation mixed design was used. Data gathering process was done at a point in time for both quantitative and qualitative data.

Locale and Population

The population of this study include bank workers in different departments and customers with and without impairment are in the domain of population.

Sampling Techniques and Sample

After selecting banks and branches in Addis Ababa from 11 sub-cities by using multistage sampling, simple random sampling was used for recruiting 370 participants of the study from which 364 were feasible for analysis. To get persons with disabilities (PWDs), purposive sampling was used, and they were participants in filling questionnaires, as interviewee, and part of focus group discussion. The Federation of Ethiopian National Associations of Persons with Disabilities (FENAPD) and other associations of PWDs were not included in a structured manner.

Data Sources and Instruments

Likert-scale was constructed, content validity was checked by expert ratings. In the reliability measurement the Chronbach Alpha was found to be (α=0.91) which is excellent to use. The qualitative data was gathered by using semi-structured interview.

Methods of Data Analysis

SPSS 25 was used for analyzing quantitative data (Pearson's Product Moment Correlation Coefficient, One ANOVA, and Multiple Linear Regression were done). Thematic analysis was used for analyzing qualitative data.

Analysis and Results

Respondents' Background

From the total participants of 364, 67.6 (246) were persons with disabilities, and the remaining 32.4% (118) are persons without disabilities. In view of gender, 69% (251) were male and 31% (113) females. Majority of them are males due to the source proportion. In references to age of respondents, 61% (222) were below 30 years old, 25 % (91) from 31 to 40 years old, and 14% (51) are in the age range of above 41 and above. In terms of occupation of respondents, 14.6% (53) of the participants were employees in government sector, 22.3% (81) were workers in different NGOs, 37.6% (137) are from confidential business, and 25.5% (93) unspecified. In view of the income of respondents the followings are shown as monthly basis, 48.6% (177) gain below 2,000 Birr, 15.4% (56) from 2001 to 5000 Birr, 34.3% (125) from 5001 to 10000 Birr, and 1.6% (6) above 10,000 Birr.

Practices of Banking Service Provision for Persons with Disabilities (PWDs)

This part of the analysis has participants' reaction towards banking service Security, Reliability, Responsiveness, Empathy, Tangibles, Customer Loyalty, Service Quality, and Customer Satisfaction by the special needs of persons with disabilities.

Security

Most participants, i.e. 69.8% (254) feel unsafe when using banks (***M=2.08; SD=0.95***). Since the five likert scale lasts from strongly disagree (1) to strongly agree (5), the average or mean shows that there is disagree in the safety issues of bank use among PWDs. While 20.6% (75) chose neutral, only 9.6% (35) agreed that they feel safe.

In the wellness of performance of staff, 31% (113) strongly disagreed, and 38.7% (141) disagreed showing that performance of the staff is not well and feel that they may lose their transactions (*M=1.99; SD=0.79*). 29.7% showed their reservation, and only 0.5% (2) agree.

For an item whether the bank is concerned the security for my transactions 27.9% (108) of the participants are not sure, and 70.1% (256) disagreed, but one respondent agreed.

70% (255) of the participants indicated that they would feel more secured if the bank has legitimate oversight board for persons with disabilities or other mechanisms even when they leave the bank since thieves my perpetrate their wellness. On the other hand, 31% (109) of them have chosen undecided option.

Reliability

In response to the items for measuring reliability of banking service for persons with disabilities is extremely poor (***M=1.99; SD=0.37***). Participants of interview session showed that most banks presume that "service is on the spot or treatment through the window with customer office." But challenges begin from accessing the location of the building of bank's branch and reaching the service interface or service line.

In view of the timeliness of the service 73.6% (268) of said that the banks are not fulfilling their promise at the time showed or the time they advertise. The rest 26.4% (96) chose neutral.

For an item which was asked as "*The bank show a keen interest in solving your problems*", 24.7% (90) strongly disagreed, 50% (182) disagreed, and 25.3% (92) undecided. There are also problems of keeping promise in terms of timeliness too. One respondent showed the following:

> "*Most banks especially CBE has made account to account transfer by using mobile banking for certain amount of money. This by itself is creating much inconvenience in getting services. Leave alone mobile network, even their system while we are in bank faces much interruption. [ሲስተም የለም፣ሲስተም ፈጣን አደለም]. It is common to listen to such pretexts in the service….*".

The above-mentioned response is an example of service reliability challenge. It was added that sometimes even branch managers are cooperative for supporting. However, this is still under the roof of the branch.

Assurance

Assurance is the extent of confidence and trust that the customers feel whether service supplier is proficient to bring in the inclusive service. In this regard, only 10.4% (38) agreed that bank's staff behavior instills confidence in delivering inclusive service for persons with disabilities. 44.8% (163) of the participants disagree and equivalent percent of the sample remained to be neutral.

From the sample of the study, 41.5% (151) showed as they do not feel safe in their transaction with the bank. Whereas 16.2% (59%) feel safe and the remaining 42.3% (154) chose undecided. This shows that there is safety related problem about banking service to persons with disabilities. In terms of courteousness of the staff/bank workers, 8% (29) showed agreement, 43.1% (157) were not sure, and 48.9% (178) disagreed.

For a question on the knowledge of bank's workers to answer question of customers with special needs, 53.3% (194) disagreed, and 46.7% (170) of the participants were not certain. Responses to the interview also showed that service assurance problems are so demanding.

Responsiveness

In the service sector, the operational definition of responsiveness connotes the willingness, and ability of service giver to address and adapt to customers' special needs. Above half of the participants, i.e. 52.7% (192) disagreed to a sentence as "Bank's fulfill its promise at the time indicated". On the other hand, 29.4% (107) of the sample agreed, and 17.9% (65) were neutral. This implies that there is a need to actuate the promises/pledges in delivering banking services for diverse customers.

From the sample of 364, 53.6% (195) of them wrote down as the banking services show less keen interest in solving problems of persons with disabilities. 21.2% (77) affirmatively respond and the remaining 25.3% (92) were neutral.

Since persons with disabilities have special needs, the responsiveness to this exceptionality is quite needed. However, the finding of the study showed that banking services have gaps in the responsiveness towards customers with disabilities.

Empathy

In quest of empathy in the banking service for PWDs, 11.3% (41) participants agreed that the bank where they go to get service gives them special attention, but 44.8% (163) respondents disagreed. Others, i.e. 44% (160) were in the undecided option.

For a question whether the bank's staffs understand specific/special needs, 46.4% (169) disagreed, 9.3% (34) agreed, and 44.2% (161) have chosen neutral. For another item which goes as "Bank operating systems and branch location are convenient to persons with disabilities", 45.3% (165) of participants disagreed, and 44.7% (163) chose neutral. For this question, only 9.9% (36) agreed.

The responses on problems related with empathy were also backed by interviewees as most bank services are dominated by sympathy that empathy. This has psychological impact due negative implications.

Tangibles

In service, tangibles include physical facilities, appearances, and equipment (Andersson, 1992). In response to the sub-themes, participants have shown their agreement level as presented here. Though 27.2% (99) of the participants showed that the bank's employees have neat and professional appearance, this by itself is not the immediate special need of PWDs. 48.1% (175) of the sample disagree and 24.7% (90) were neutral to the theme mentioned.

From the sample of the study, 45.9% (167) of the participants have disagreement to an item which goes as "*Material associated with the service like advice slip, statements are appealing to persons with disabilities*". On the other hand, 22.5% (82) agreed and 31.6% (115) chose neutral. The qualitative data backed that there are problems in relation to advice slip and statements especially for persons with visual impairment.

In quest of the agreement level to the item which was said as "Bank's physical facilities appealing for persons with disabilities", 48.6% (177) disagreed, 30.5% (111) were not sure, and only 20.9% (76) agreed.

In addition, 49.2% (179) of the participants showed as the bank has no modern equipment and tools (computer, printer, fax & etc.) for accommodating special needs of PWDs, 25.8% (94) disagree and 25% (91) respondents undecided.

Customer Loyalty

According to Maikayi, and others (2011), customer loyalty can be secured through finding the customer needs, managing and fulfilling them. In this study, participants were asked whether they will always use this Bank in their bank activities/ transactions. While 68.1% (248) of the respondents disagree, only 11.8% (43) agreed. The rest 20.1% (73) were neutral.

64.6% (235) disagree to a question said as "*I will verbalize positive things about the bank to other people*". Only 11% (40) agree, and 24.5% (89) were neutral. This shows that there are problems

in creating positive impression. 44.8% (163) of the participants seldom consider switching away from the bank, 32.1% (117) chose neutral, and 23.1% (84) showed as loyal. On the other hand, 55.8% (203) of the participants put condition that if the bank offers special service for persons with special needs, then their level of loyalty will be enhanced. For this theme 30.5 (111) respondents were neutral, and only 13.7% (50) set no condition for being customer.

Service Quality

Quality is mainly meeting the standard and expectations of customers. In view of service quality in banks, 73.9% (269) of the participants showed that Banks are not offering fast, reliable, and efficient services for Persons with Disabilities. Only 6.3% (23) affirmatively respond and 19.8% (72) chose neutral. For an item which goes as "The bank has friendliness of bank personnel", 67.3% (245) disagree, 29.1% (106) neutral, and 3.6% (13) agree. This shows that there is challenge related with the workers.

As far as the agreement level of participants towards "Physical facilities, accessibility and convenience of location", 70.1% (255) disagree, 27.7% (101) chose neutral, and only 2.2% (8) agreed. This shows that there are problems in the physical setting.

Customer Satisfaction

The table below depicts the responses towards satisfaction related questions.

Table 4.1: Responses on Customer Satisfaction

Qn	Item		SD	D	N	A	SA	Total
1	This Bank is exactly what I need.	f	43	180	121	20	-	364
		%	11.8	49.5	33.2	5.5	-	100
		M = 2.32***; SD = 0.75***						
2	The information that presented by this Bank is correct	f	23	173	161	7	-	364
		%	6.3	47.5	44.2	1.9	-	100
		M =2.42***; SD = 0.64***						
3	I know, there are privacy policies in this Bank	f	17	175	163	9	-	364
		%	4.7	48.1	44.8	2.5	-	100
		M = 2.45***; SD = 0.63***						
4	There are guarantees of this Bank	f	42	164	149	9	-	364
		%	11.5	45.1	40.9	2.5	-	100
		M = 2.35***; SD = 0.71***						
5	Banks give breadth and depth customer service that can meet expectations	f	65	184	99	16	-	364
		%	17.9	50.5	27.2	4.4	-	100
		M = 2.18***; SD = 0.77***						
6	The physical infrastructures are satisfactory for persons with disabilities	f	88	186	79	11	-	364
		%	24.2	51.1	21.7	3.0	-	100
		M = 2.04***; SD = 0.76***						
7	The respectful behaviour and communication of employees meet expectations of persons with disabilities	f	9	193	159	3	-	364
		%	2.5	53.0	43.7	0.8	-	100
		M = 2.43***; SD = 0.56***						
8	I will be more satisfied if the bank offered special service for persons with disabilities	f	86	92	101	85	-	364
		%	23.6	25.3	27.7	23.4	-	100
		M = 2.51***; SD = 1.09***						

Source: - *Study Survey, 2022*

**SD (1) – Strongly Disagree; D (2) – Disagree; N (3) – Neutral; A (4) – Agree; SA (5) Strongly Agree.*

Most customers, i.e. 61.3% (223) showed that the bank is not exactly what they need. In view of information presented by the gap is problematic, as 53.8% (196) of the participants conveyed, especially for PWDs and/or special needs. In the finding, it is unveiled that the banking services is not meeting expectations about persons with disabilities. This has an impact on customer satisfaction.

The finding revealed that the banking systems have gaps in addressing service provision for persons with special needs. Though there are efforts in making the physical environment modification such as using ramp, there are needs which are not yet addressed. Interviewed bank customers have shown that the services did not yet meet customer satisfaction of persons with disabilities.

As it is found from Analysis of Variance (ANOVA), there are no statistically significant differences among banks in service delivery for persons with disabilities. It is conclusive that the problems in service conveyance are analogous. Therefore, much work is needed at country level.

Challenges of Banking Service Provision for PWDs

According to the findings, banking service provision for PWDs has numerous challenges. The first is related with disabling physical setting which limits mobility and reaching service provision locations. The second challenge embodies socio-emotional and attitudinal problems from service providers and service receivers. The third challenge is communication problem in getting services in banks (absence of braille guideline, nonexistence of sign language instruction, etc). The fourth challenge in banking service usage is security related problem. Participants uttered that they are exposed to theft and feel insecure.

The above screen shot was taken from the telegram poll. Almost all participants indicated as the banking services are not convenient for persons with disabilities.

DISCUSSION

The findings of this study adhere with Bamlak (2022) that the banking service has numerous challenges in rendering services to PWDs. The challenges emanate from the physical settings, employees' related gaps such as skills gaps in sign language and empathy hitches.

It was found that banking services are inconvenient for PWDs regardless of the type of disabilities. The persons with physical impairment suffer from mobility related problems due to setting related complications. Even though, there is a need for promotion and provision of accessible and usable products, services and environments (Department of Economic and Social Affairs (DESA) of the United Nations Secretariat, 2013), the actual practices are contradictory the claim as the findings of this study revealed.

Persons with visual impairment get deprived of experiencing posted guidelines including the location of branches, and service windows. These include problems in using order slips in banks for deposit and withdrawal. This finding is similar with the finding of Bamlak (2022).

Individuals with hearing impairment get difficulty in receiving banking services due to sign language gap among majority of workers in bank. This creates communication discrepancy and leads to limited responsiveness.

Siddiqi (2011) showed the importance of the service quality attributes in influencing customer overall quality feelings. Though it is strongly believed that service quality attributes (empathy,

assurance, responsiveness, reliability, and tangibility) are much correlated with customer satisfaction, there is less work of addressing all these in persons with special needs who are exceptional to be treated in the conventional banking service delivery.

It is well articulated that service customers often have expectations about the extent to which the service provider appears to understand and be concerned about their individual needs and wants (Siddiqi, 2011). But the findings of this study showed that there are problems in the efforts of addressing special needs of PWDs in Ethiopian banking practices as far as the investigator found.

As far as the assurance is concerned, the degree of confidence that the customers with special needs have in the service provider's staff is questionable. As showed in Siddiqi (2011), the problem in assurance later affects customer satisfaction.

It has been prefigured that customers want a friendly bank, which is willing to help in their banking maneuvers. In contrary to this, daily practices see that banking services have less advocacy towards attraction and reception of PWDs. In the same way, the reliability is questionable, that implies poor practices in the extent to which the service is conveyed to the standards expected and promised.

Like Bamlak (2022), in this study it was found that on the service encounter for persons with visual impairment there is high inconvenience due to the request to bring at least two people to witness transactions at banks. Participants with visual impairment indicated that they feel high discomfort during the time they appeal for filling withdrawal or deposit forms, and this creates insecurity and dependency too amongst blind people. Correspondingly, studies indicated that banking services lack evenhandedness towards serving persons with special needs or PWDs. PWDs become victim of robbery and other issues that demand confidentiality. Problems or deficiencies in the banking services are also evident in the contemporary or technology assisted services including mobile, internet, and ATM banking, amongst others. Generally, there are problems of banking service for persons with special needs in terms of access, communication, security, and friendliness/ease of services.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The findings of the study revealed that the efforts of fostering banking services for persons with disabilities are very minimal.

Physical Accommodations

In headquarters and big branches, there are ramps as good practices. But, in most cases, absence (or available but inaccessibility) of ramps for wheelchair, nonexistence of sign language interpreter, and nothingness of tactile communicative devices are major challenges.

Service Provision Process

Banking service provision for Persons with Disabilities (PWDs) is at its infancy in most banks. Service provision process is more sympathetic than being empathetic. The sympathetic reaction and "*lip services*" deride service users.

Technology and Special Needs

In use of technology for banking services, there is less focus on the service utility for persons with disabilities. In principle, it is strongly believed that technology can bring assistive advantage for addressing diverse needs of individuals with certain type of impairments. But the practices in the augmentation of services for persons with special needs remained questionable.

RECOMMENDATIONS

As per the findings, it is recommended that banks should create service packages for persons with disabilities. Infrastructures and facilities should meet all utility aspects for persons with special needs.

There is a need for reconfiguration of banking services with special segmentation for addressing the special needs of persons with disabilities through putting target market niche. But it should be done in a manner that avoids discrimination and stereotypic service provision which may end up with maltreatment. So, need based accommodations should be done for better service delivery that can overcome the challenges in the physical and psychosocial aspects.

Operation of accessible banking by using Talking ATMs through plugging headphones or earphones into the jack could help visually impaired persons to use ATMs. The talking ATM will help to automatically switch to accessibility mode and prompt the visually impaired with audio instructions on the keypad layout of the machine and how he/she can use it to complete various banking transactions privately and securely. But still, this is demanding of close supervision for functionality and security. Tactile keyboards could also be used for using ATM. Sign language interpreters and guides should be augmented in the banking services for persons with hearing impairment. Rendering special banking services help building reputation. So, it is recommended to extend special saving, credit platforms, and other service packages for persons with disabilities considering as sources of diversity among service users.

Assistive technology alternatives should be figured out and implemented for the purpose of supporting persons with disabilities to use banking services.

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3.4. The Effect of organizational Justice on organizational citizenship behavior of Instructors in the Public universities in Amhara region through the mediating role of Organizational commitment

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ABSTRACT

The purpose of this study was to examine the effect of organizational justice (OJ) on organizational citizenship behavior (OCB) through the mediating role of organizational commitment (OC) in the public universities in Amhara region. Explanatory mixed research design was employed. The size of the population was 2170. Of these, 620 instructors were selected as samples using a proportional stratified random sampling technique. Five interviewees took part in the qualitative part of the study. The collected data were analyzed using both quantitative and qualitative techniques. The result of one sample t-test showed that OC and OCB were moderately saw while OJ was less likely found in the workplace. There were positive and statistically significant relationships among OJ, OC, and OCB. Concerning the causal relationships, the value of R^2 indicated that OJ significantly predicted 44.3 % of the variance in OC with a standardized regression coefficient of (β = .667) at p<.05, while 29.2 % of the variance in OCB was significantly predicted by the joint effects of OJ and OC with standardized regression coefficients of (β = .341) and (β = .164) respectively at p<.05. Therefore, it is concluded that OJ had a significant effect on OCB through the mediation of OC.

Key words: *Organizational Commitment; Organizational Citizenship Behavior; Organizational Justice; Public Universities.*

INTRODUCTION

Though varied factors have their own contributions to improving the function of organizations, organizational justice (OJ), organizational commitment (OC) and organizational citizenship behavior (OCB) play important roles in enhancing the success of organizations. Specifically, OJ is concerned with employees' feeling of fair treatment in the organization which is conceptualized in terms of distributive, procedural, and interactional justice (Cohen-Charash & Spector, 2001). Whereas OC is viewed as the desire of employees to stay in the organizations defined in terms of affective, continuance, and normative commitment which are related to each other (Allen & Meyer, 1990). Concerning OCB, it is discretionary behavior neither in the job description nor recognized in the formal reward system understood in altruism, conscientiousness, sportsmanship, courtesy, and civic virtue (Organ, 1988).

The findings of the earlier studies showed that significant relationships are found among OJ, OC, and OCB. For instance, Karanja (2016) found that OJ had a significant effect on employees' levels of commitment. Furthermore, studies conducted by Khan and Rashid (2012) and Crow, Lee, and Joo (2012) showed that employees' feeling of justice significantly influenced their OC. In the same

way, Karriker and Williams (2009) found that employees' engagement in citizenship activities benefits the organizations to be effective. Other researchers found that employees' level of engagement in citizenship activities was significantly decided by OJ (Lilly, 2015; Shin & Sohn, 2015). This means that employees who perceive fairness in the treatment of their leaders are more likely to engage in citizenship behaviors. Moreover, the findings of several studies showed that OC had a significant effect on the OCB of employees (Alotaibi, 2001; Carmeli, 2004; Harwiki, 2013; Kwantes, 2003; Liu, 2009). This shows that there are causal relationships among OJ, OC, and OCB.

Based on the discussions made so far about OJ, OC, and OCB as well as the relationships among these variables, the researcher synthesized a new conceptual framework for this study as showed in Figure 1. This framework considers OJ as an independent variable that affects OCB. It also explains OC as the mediating variable in the relationship between OJ and OCB. OCB is considered a dependent variable that is affected by OJ directly and indirectly.

OJ, OC, and OCB are important variables linked with the effectiveness of any organization including higher education institutions. The findings of many studies wrote down that employees show distrust towards the goals of the organization (Dean, Brandes, & Dharwadkar, 1998) and exhibit workplace aggression (Kennedy, Homant, & Homant, 2004) due to lack of fair treatment in the organization. These situations lead to increase turnover intention and interpersonal deviance (Cohen-Charash & Spector, 2001), exhibit counter-productive work behavior (Spector & Fox, 2002) and low commitment, and eventually, they may pursue to leave the organization (Aslam, Ilyas, Imran, & Rahman, 2016). These show that employees who are deprived of justice in the organization will be susceptible to stress and burn-out leading to low productivity.

Concerning commitment, the findings of many studies showed that a low level of commitment leads to turnover and attrition (Joiner & Bakalis, 2006), absenteeism (Farrell & Stamm, 1988), counter-productive behavior (Dalal, 2005), and decline in altruism and compliance (Schappe, 1998). A survey conducted by Bosman, Buttendach, and Laba (2008) showed that an elevated level of employee turnover was associated with poor function of the organization and increased costs involved in selecting and training replacements. These can cause a loss of work progress, productivity, organizational status, and poor relationship with customers (Alzubi, 2018). High turnover rates can increase the cost of recruitment, training, and retention of staff (Al-Hussami, 2008), as well as negatively affect the success of the organization in attaining strategic objectives, sustaining competitive advantage, and keeping the morale, productivity, and quality of work in the organization (Alzubi, 2018). Similarly, shortage of professionally capable, motivated, and committed leaders is another challenge in Ethiopian universities (Mulu, 2012).

OCB is another critical issue that maximizes the performance of the organizations by encouraging employees to exert extra effort. Though OCB contributes to the development of employees and organizational effectiveness, it is not officially recognized by many organizations (Organ, 1988). Due to this reason, research has not been conducted on OCB in Ethiopian higher education institutions in general and in public universities in particular. Bez (2010) also believed that shortage of studies related to OCB undermines the contribution of employees in the organizations. Discrimination, organizational injustice, and habituation are considered as the major factors that discourage employees to engage in OCB (Zhang, 2011). This will not only lead to decrease in the participation of employees in OCB but also enable them to engage in counterproductive behavior

such as theft and absenteeism (Marcus & Schuler, 2004). This suggests that organizations will be effective if employees are willing to involve in OCB.

Although several studies have been done on OJ, OC, and OCB in various organizations, sufficient studies have not been conducted on the effect of OJ on OCB in the context of higher education institutions. Despite limited studies have been done on the direct causal relationship between OJ and OCB (Chahal & Mehta, 2011; Iqbal, Aziz, & Tasawar, 2012; Shin & Sohn, 2015; Spector & Che, 2014), a study has not been conducted on the indirect effect of OJ on OCB through the mediation of OC in the context of Ethiopian public universities in general and in the public universities of Amhara region in particular. As a result, this study examined the effect of OJ on OCB through the mediating role of OC in the public universities in Amhara region.

Research Questions

1. *What is the perception of instructors towards OJ, OC, and OCB in the public universities in Amhara region?*
2. *What are the relationships among OJ, OC, and OCB in the public universities in Amhara region?*
3. *What is the effect of OJ on OC and OCB in the public universities in Amhara region?*
4. *What is the effect of OC on OCB in the public universities in Amhara region?*
5. *What is the indirect effect of OJ on OCB of mediated by OC in the public universities in Amhara region?*
6. *Are there significant differences among instructors in their perception of OJ, OC, and OCB in the four generations of public universities in Amhara region?*

METHODOLOGY

Research Design

Based on the nature of the study, explanatory sequential mixed design (QUAN $\rightarrow$ qual) was employed to understand the quantitative results in depth using the qualitative data. Explanatory sequential mixed design has a strong quantitative orientation in which the researcher first gathers the quantitative data and analyzes the results, and then plans the qualitative phase of the study using the quantitative results (Creswell, 2014). This design will capitalize on the strengths and minimize the limitations of quantitative and qualitative research approaches (Creswell & Clark, 2007; Johnson & Onwuegbuzie, 2004). A simplified illustration of explanatory sequential mixed design is shown in Figure 2.

Population, sample, and sampling techniques

There are 10 public universities in Amhara region. These universities are categorized into four generations based on the year of establishment. Initially, six universities were selected out of 10 from the specified strata. That is, the University of Gondar from the 1st generation, Wollo and Debre Markos Universities from the 2nd generation, Debre Tabor University from the 3rd generation, and Injibara and Debarq universities from the 4th generation were selected using a stratified random sampling technique. These stratifications also allowed us to ensure the representation of universities from each generation and make comparisons among respondents in their feeling of servant leadership, OC, and OCB.

Then, 21 colleges were selected from the six universities to determine the size of the population and subpopulations of the study. Specifically, five colleges from the University of Gondar, four

colleges from Wollo University, four colleges from Debre Markos University, four colleges from Debre Tabor University, two colleges from Injibara University, and two colleges from Debark University were selected using a simple random sampling technique mainly lottery method. In this regard, a total of 2170 instructors in the selected universities were taken as the population of the study. Of these, 731 from the 1st generation, 710 from the 2nd generation, 427 from the 3rd generation, and 302 from the 4th generation were considered as the subpopulations of the study.

Different sampling techniques are used to decide the sample size of numerous studies. Item-respondent proportion requirement is highly recommended by different authorities to determine the size of the sample to undertake factor analysis. Though there is no single criterion that decides the necessary sample size, Comrey and Lee (1992) suggested that a sample size of 500 and above would be good to carry out factor analysis. Based on the recommendations of Everitt (1975), Ho (2006), and Kline (2011), 10 respondents per each item were used as a method to determine the sample size of this study. So, the sample size of this study was 620 since the number of items under the dimensions of the latent variables in the questionnaire was 62.

After deciding the total sample size of the study, the sample size of each stratum was decided based on the size of their population using a proportionate stratified sampling method developed by Pandey and Verma (2008). This helps to select representative samples from each stratum with the assumption that the number of instructors in the selected strata was significantly varied. Hence, the researcher determined the sample size of each stratum by dividing the population size of the k^{th} strata by the total population size and multiplying by the total sample size using Pandey and Verma's (2008) formula as given below. i.e.

$$n_k = \left(\frac{Nk}{N} \right) * n$$

Were.

n_k = Sample size of k^{th} strata

N_k = Population size of the k^{th} strata

N = Total population size

n = Total sample size

Of the total sample of 620 instructors; 209 from the 1st generation, 203 from the 2nd generation, 122 from the 3rd generation, and 86 from the 4th generation were taken into the sample using the above-given formula. This helped to avoid the miss-representation of some members of the population in the study. These samples were selected using a simple random sampling technique. The summary of population and sample of the study are shown in Table 1 below.

Table 1: Summary of population and sample of the study

Strata	Name of universities	Population size of each university (N_k)	Sample size of each university (n_k)
1st generation	University of Gondar	731	209
	Wollo University	280	80
2nd generation	Debre Markos University	430	123
3rd generation	Debre Tabor University	427	122
	Injibara University	145	41
4th generation	Debark University	157	45
	Total	N= 2170	n= 620

About the qualitative phase of the study, five department heads were included in the sample using purposive sampling techniques to collect the qualitative data through semi-structured interviews to further explain the quantitative results.

Data Gathering Instruments

The researcher used a standardized questionnaire to collect the quantitative data. The questionnaire has four parts having close-ended items. The first part dealt with respondents' characteristics related to sex, educational qualification, work experience, and universities in which they have been working. The second part of the questionnaire has 19 items developed by Moorman (1991) and Niehoff and Moorman (1993) to assess respondents' perceived OJ in terms of distributive, procedural, and interactional justice. The third part of the questionnaire measured respondents' feeling of OC using 18 items organized into three dimensions – affective commitment, continual commitment, and normative commitment developed by Meyer et al. (1993). The fourth part of the questionnaire has 25 items developed by Lee and Allen (2002) to measure respondents' OCB in universities. This scale consists of five dimensions such as altruism, conscientiousness, sportsmanship, courtesy, and civic virtue to fully understand the status of OCB in the universities.

Finally, respondents were asked to rate items using five points of Likert-type items ranging from 1 (*not at all*) to 5 (*very great extent*) to measure, OJ, OC, and OCB in the universities.

About qualitative data, a semi-structured interview was conducted to assess the status of OJ, OC, and OCB in the study area.

Pilot Test

A pilot test was conducted on 90 selected instructors of Bahir Dar University to assess the reliability of the questionnaire. The distribution of the sample for the pilot test followed the same procedures as in the main sample of the study. Cronbach Alpha was used to test the reliability of items. The reliability coefficients of the instrument with Cronbach Alpha (α) = (.92, .87 & .94), (.83, .82 & .88) and (.83, .85, .90, .86 & .88) for items about the dimensions of OJ, OC, and OCB, respectively. This shows that items in the respective dimensions of latent variables with reliability coefficients $\geq$.80 were found internally consistent to measure OJ, OC, and OCB (George & Mallery, 2010).

Data Collection Procedures

Firstly, the researcher got a permission letter from Bahir Dar University to collect the data from the research sites. Based on the given permission, the list of the target respondents was accessed, and determined the required sample size. Respondents were supplied information about the purpose of the study before they took place in the study. Participants were also informed about the absence of potential risks and benefits due to participation in the study. Then, the questionnaire was distributed to the respondents, and they were given three days to complete the questionnaire.

After the questionnaire was returned to the researcher and analyzed the data, face to face interview was conducted with each respondent inside the compounds of the universities.

Data Analysis Techniques

Both quantitative and qualitative analysis techniques were used to analyze the data. Specifically, a one-sample t-test was used to measure OJ, OC, and OCB (Research question #1). Structural equation modeling (SEM) was used to assess the relationships among OJ, OC, and OCB (Research question #2). SEM was employed to analyze the effect of OJ on OC and OCB of instructors (Research question #3). The effect of OC on the OCB of instructors was analyzed using SEM (Research question #4). SEM was also used to analyze the indirect effect of OJ on the OCB of instructors mediated by OC (Research question #5). One-way ANOVA was employed to assess whether there are significant differences among instructors in their feeling of OJ, OC, and OCB in the four generations of public universities in Amhara region (Research question #6). Moreover, the data collected through semi-structured interviews were analyzed qualitatively with the intent to further understand the quantitative results in depth.

RESULTS AND DISCUSSION

This section presents the results of the study according to the themes of the research questions. It began with testing the construct validity of the respective dimensions of latent variables and measurement model fit through conducting exploratory and confirmatory factor analyses.

Factor Analyses

Although there is no clear criterion to decide what is large or small, items with factor loadings ±.33 and above are considered to satisfy the minimum level of threshold based on the recommendation of Ho (2006). The result of the exploratory factor analysis showed that 55 items in the respective dimensions of OJ, OC, and OCB had high factor loadings above the cutoff point of ±.33 were kept. Specifically, the factor loading values of these items range from .628 to .914 which explained more than 50 % of the variance in the constructs was kept. However, seven items with low factor loadings were rejected from the analysis for they suppressed the reliability of the results. The result of the principal part analysis also showed that the factor loadings of OJ, OC, and OCB dimensions with eigenvalues ranging from 1.464 to 3.896 are higher than the smallest threshold of 1.

Based on the results of construct validity, the researcher developed the measurement model using the dimensions of OJ, OC and OCB.

Though there is little agreement among scholars on the type of fit indices and their thresholds, the researcher used relative chi-square (CMIN/DF), goodness fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), incremental fit index (IFI), Tucker-Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA) to assess the degree to which the measurement model fits the observed covariance matrix using AMOS as indicated in Table 2.

Table 2: AMOS outputs on the fitness indices against the criteria of the measurement model

Criteria	Obtained values	Threshold
Relative chi-square (CMIN/DF)	3.036	<5
Goodness of fit index (GFI)	.964	>.90
Adjusted goodness of fit index (AGFI)	.942	>.90
Normed fit index (NFI)	.940	>.90
Incremental fit index (IFI)	.959	>.90
Tucker-Lewis's index (TLI)	.945	>.90
Comparative fit index (CFI)	.959	>.90
Root means square error of approximation (RMSEA)	.047	<.05

As it has been shown in Table 2, the measurement model satisfied all the fit indices. That is, the results showed that the measurement model fits the observed variance–covariance matrix by the chi-square test (CMIN/DF), $\chi 2$ (N = 620, df = 41) = 124.464, p< .05. In addition, the fit indices of GFI (.964), AGFI (.942), NFI (.940), IFI (.959), TLI (.945) and CFI (.959) were higher than the threshold of .90 and RMSEA (.047) was lower than the cutoff of point .05 with p= .000.

The maximum likelihood estimates of the unstandardized repression and standardized regression weights also confirmed that all the path coefficients in the measurement model are significant at p < .05 as shown in Table 3.

Table 3: Unstandardized and standardized regression weights of the measurement model

Parameters/dimensions			Unstandardized				Standardized
			Estimate	S.E.	C.R.	P	Estimate
Distributive justice	<---	OJ	.472	.072	6.529	***	.329
Procedural justice	<---	OJ	.859	.082	10.535	***	.709
Interactional justice	<---	OJ	1.000				.659
Affective commitment	<---	OC	.582	.048	12.044	***	.538
Continuance commitment	<---	OC	.823	.054	15.175	***	.731
Normative commitment	<---	OC	1.0000				.857
Altruism	<---	OCB	1.000				.653
Conscientiousness	<---	OCB	1.070	.075	14.196	***	.690
Sportsmanship	<---	OCB	1.088	.073	14.922	***	.737
Courtesy	<---	OCB	1.172	.076	15.338	***	.766
Civic virtue	<---	OCB	1.147	.076	15.095	***	.749

As shown in Table 3, the regression weights of all the dimensions of OJ, OC, and OCB were significant with the critical ratio test greater than ±1.96 at p< .05. From this, it is possible to conclude that the critical ratio tests of the 11 dimensions were extremely far from the threshold of ±1.96 shows a significant path at p<.05. Likewise, the standardized regression weights of all dimensions in the measurement model were significantly represented by their respective latent variables. Specifically, the standardized regression weights of the observed variables in the measurement model range from .329 (distributive justice) to .857 (normative commitment). In

other words, the observed variables explained the respective latent constructs ranging from 10.8 % (distributive justice) to 73.4 % (normative commitment). This showed that the observed variables were significantly represented by their respective latent variables at p<.05.

Therefore, the measurement model analysis confirmed that all dimensions were internally consistent and structurally valid to measure OJ, OC, and OCB in the context of this study.

Status of Organizational justice, commitment, and organizational citizenship behavior

Table 4: A one-sample t-test for the dimensions of OJ, OC, and OCB

Dimensions	Mean	Std.	Test value	Mean difference	t-value	Sig.(2-tailed)
Organizational justice						
Distributive justice	13.64	2.934	12	1.635	13.878	.000
Procedural justice	11.08	4.051	15	-3.924	-24.121	.000
Interactional justice	19.22	4.133	21	-1.777	-10.709	.000
Total	43.934	8.446	48	-4.066	-11.987	.000
Organizational commitment						
Affective commitment	22.80	5.281	18	4.805	22.653	.000
Continuance commitment	16.04	4.778	18	-1.956	-10.196	.000
Normative commitment	14.13	3.116	12	2.132	17.037	.000
Total	52.981	8.054	48	4.981	15.398	.000
Organizational citizenship behavior						
Altruism	14.16	2.756	12	2.160	19.509	.000
Conscientiousness	13.92	4.943	15	-1.082	-5.451	.000
Sportsmanship	14.07	4.509	15	-.929	-5.131	.000
Courtesy	14.50	4.800	15	-.505	-2.619	.000
Civic virtue	14.72	2.207	12	2.719	30.680	.000
Total	71.363	10.433	69	2.363	5.639	.000

N=620, df = 619, *Sig. <.05

As showed in Tale 4, the result of one sample t-test revealed that the mean score of distributive justice (13.64) was greater than the test value at (t = 13.878) at p<.05, df = 619. This means that instructors fairly perceived the state of distributive justice in the workplace. On the other hand, the mean scores of procedural justices (11.08) and interactional justice (19.22) were less than the respective test values at (t = -24.121) and (t = -10.709) respectively at p<.05, df = 619. Hence, the mean score of OJ (43.934) was lower than the t value (48) with (t = -11.987, df = 619) at p<.05, showing that OJ was seen to a little extent in the respective universities. This result is quite like the qualitative result obtained through the interview. The finding of this study is supported by other researchers. For example, a more recent work of Wajdee, Gurvinder, and Shehadehmofleh (2018) revealed that employees had good feelings of OJ in public universities, which is congruent with this finding. However, the findings of Cohen and Spector (2001), Spector and Fox (2002), and Vardi and Wiener (1996) showed that employees are exposed to stress, turnover, dissatisfaction, low commitment, distrust, and violence leading to low productivity due to lack of OJ in the organizations.

About OC, the mean scores of affective commitments (22.80) and normative commitment (14.13) were higher than the respective test values at (t = 22.653) and (t = 17.037) at p<.05, df = 619. This implies that instructors were moderately committed to carrying out their job due to their emotional attachment to the universities and sense of responsibility to serve the universities. Conversely, the mean score of continuance commitment (16.04) was lower than the test value at (t = -10.196).

Thus, the mean score of OC (52.981) was higher than the t value (48) with (t = 15.398, df = 619) at p<.05, showing that instructors in the research sites were committed to some extent to performing their job. A similar result was also found in the interview. This result is supported by Jafri (2010) that academic staff had a moderate level of commitment to keeping membership in the organization. Consistent with this result, Alemu (2014) at Adama Science and Technology University revealed that instructors had a moderate level of commitment. Research also conducted by Salami and Omole (2005) and Temesgen (2011) revealed that employees in the organizations were fairly committed to carrying out their job. However, the result of this is contradicted by the finding of Madsen, Miller, and John (2005) that employees had a higher level of OC and show a willingness to invest substantial effort on behalf of the organizations and are loyal to it.

Moreover, the results of one sample t-test showed that the mean scores of altruisms (14.16) and civic virtue (14.72) were higher than the respect test values at (t = 19.509) and (t = 30.680) respectively. This implies that instructors were to some extent volunteers to support their coworkers and universities by offering important suggestions. On the contrary, the mean scores of conscientiousness (13.92), sportsmanship (14.07), and courtesy (14.50) were less than the respective test values at (t = -5.451), (t = -5.131), and (t = -2.619) respectively at p<.05, df = 619. Hence, the mean score of OCB (71.363) was higher than the t value (69) with (t = 5.639, df = 619) at p<.05, showing that instructors were engaged in citizenship activities to some extent to support the function of their universities. This result is supported by the qualitative result that was found through the interview. This result is quite similar with the findings of (Akyuz, 2012; Oguz, 2011; Polat & Celep, 2008) on the presence of moderate levels of OCB in workplaces. The finding of this study also supported by Turnipseed and Murkison (2000) that OCB contributes to the organization by creating positive workplace environments. Extra-role behaviors are also essential for an organization, as they are likely to promote more effective communication, which allows best practices to be shared among employees (Ren-Tao & Heung-Gil, 2009). Employees who engage in OCB can enhance organizational effectiveness and efficiency by exerting extra effort beyond one's duties.

Relationships among Organizational justice, Organizational commitment, and Organizational citizenship behavior

Table 5: Correlation coefficients of OJ, OC, and OCB

Latent variables			Unstandardized				Standardized
			Estimate	S.E.	C.R.	P	Estimate
OJ	<-->	OC	.479	.052	9.211	***	.671
OJ	<-->	OCB	.678	.089	7.617	***	.452
OCB	<-->	OC	.332	.096	3.458	***	.212

As showed in Table 5, positive and statistically significant relationships are seen among OJ, OC, and OCB with standardized correlation coefficients ranging from .212 to .671. Specifically, OJ had positive correlation coefficients with OC (r = .671) and OCB (r = .452) by the critical ratio greater than ±1.96 at p<.05. This finding is congruent with the result of Ghafori and Golparvar (2009) that OJ had positive and significant correlation with OC because staff perceived their leader to be fair, respectful and unbiased in their dealings. Kıray (2011) and Shekari (2011) also found a meaningful relationship between OJ and OC. Similarly, Damirchi, Hazrati, and Poushaneh (2013) reported that a meaningful relationship was found between OJ and OCB. This result is also

supported by Nastiezaie and Jenaabadi (2016) also showed that OJ was significantly related to OCB. There is also a positive and significant relationship between OC and OCB with a significant correlation coefficient ($r = .212$) at $p < .05$. Studies conducted by Gurbuz (2006), and Wasti (2003) showed that OC was significantly associated with OCB. Similarly, the findings of other researchers proved the presence of a meaningful relationship between OC and OCB (Hannam & Jimmieson, 2002; Ibrahim & Aslinda, 2013; Williams, Rondeau, & Francescutti, 2007). This shows that instructors were committed to supporting the function of their universities without expecting rewards in return. This means that the three latent variables in the measurement model are significantly related to each other.

Path analysis/causal relations

Based on the measurement model, the researcher developed a structural model to examine how much of the dependent variables in the structural model are predicted by independent variables as shown in Figure 4.

Table 6: Unstandardized and standardized regression weights of the latent variables in the structural model

Latent variables			**Unstandardized**				**Standardized**
			Estimate	S.E.	C.R.	P	Estimate
OC	<---	OJ	.841	.144	5.856	***	.667
OCB	<---	OJ	.489	.162	3.018	***	.341
OCB	<---	OC	.196	.162	1.210	.226	.164

The results in Table 6 showed that except for the causal relationship between OC and OCB, the unstandardized regression weights of the latent variables were found significant by the critical ratio tests greater than ±1.96 at $p < .05$. The standardized regression coefficients of the latent variables in the structural model ranging from .164 to .667.

After testing the structural model fit, the direct and indirect effects of the independent variables on the dependent variables in the structural model were analyzed to examine how much of the variance in the dependent variables, both latent and observed, was predicted by the independent variables that are presented in the following subsections.

Direct effects

As shown in Figure 4 and Table 6, the paths pointing from OJ to OC ($\beta = .667$, $p<.05$) and OCB ($\beta = .341$, $p<.05$) have positive standardized regression coefficients showing that OJ significantly predicted both OC and OCB. The standardized regression coefficients also showed that OJ had a more direct effect on OC than OCB. Thus, the value of R^2 indicated that OJ significantly predicted 44.3 % of the variance in OC. Like this study, Imamoglu (2011) reported that OJ had a significant effect on OC. Other researchers also supported the considerable influence of OJ on employees' level of commitment in the workplace (Cropanzano, Bowen, & Gilliland, 2007; Demir, 2011). The result of this study is also consistent with the works of other researchers on the significant effect of OJ on OCB (Ishak & Alam, 2009; Sjahruddin & Sudiro, 2013). Moreover, Hassan (2002) also reported that OJ had a significant effect on the organizations' OCB. This implies that employees are inclined to show OCB when they are fairly treated in the workplace.

The path that links OC and OCB with a standardized coefficient (β =.164, p>.05) also shows that OCB was not significantly predicted by OC. The value of R^2 also revealed that 29.2 % of the variance in OCB was predicted by the joint effects of OJ and OC, while the rest 71 % of the variation in OCB was attributed to the residual that couldn't be explained by the model. In contrast to this result, Alotaibi (2001) and Carmeli (2004) found that OC had a significant effect on OCB which is like the result of the study. This result is also supported by the findings of other earlier studies (Cirka, 2005; Harwiki, 2013; Liu, 2009; Robbin & Judge, 2008).

Indirect effect

Table 7 revealed that OJ had an indirect and significant effect on OCB through the mediation of OC with a standardized regression coefficient (β = .107, p<.05). This shows that OJ had a significant direct and indirect effect on OCB. This finding is congruent with the finding of Ali (2016) that employees' feeling of justice indirectly and significantly influenced employees to engage in citizenship activities to support their coworkers and organization through the mediating role of OC. Similarly, Jehanzeb and Mohanty (2019) found that OC was significantly mediating the effect of OJ feeling on the OCB of employees.

Table 7: Summary of the direct and indirect effect of OJ and OC on the OCB

Effect	**Variables**	**OJ**	**OC**	**OCB**
Direct effect	OC	.667	-	-
	OCB	.341	.164	-
Indirect effect	OCB	.107	-	-
R^2			.443	.292

Generations of universities as the variances of OJ, OC, and OCB

Table 8: One-way ANOVA in OJ, OC, and OCB scores of instructors based on the four generations of universities.

Variables	**Generations of universities**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
OJ	Between Groups	84.092	3	28.031	132.833	.000
	Within Groups	129.990	616	.211		
	Total	214.082	619			
OC	Between Groups	2.334	3	.778	3.163	.024
	Within Groups	151.496	616	.246		
	Total	153.830	619			
OCB	Between Groups	10.493	3	3.498	19.071	.000
	Within Groups	112.975	616	.183		
	Total	123.468	619			

*Significance level at .05 level

As shown in Table 8, the result of one-way ANOVA indicated that there were statistically significant differences among instructors in their perception of OJ at F(3,616) = 132.833, and OC at F(3,616) = 3.163, and OCB at F(3,616) = 19.071, p = .000 based on the four generations of

universities in Amhra region. This shows that instructors in the four generations of universities of Amhara region had different views about the status of OJ, OC, and OCB.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on the results obtained from the empirical study, the following conclusions are drawn.

- The results of one sample t-test revealed that OC and OCB were seen to some extent while OJ was found to a little extent in the universities as perceived by instructors.
- There were positive and statistically significant relationships among OJ, OC, and OCB.
- OJ had a significant effect on the OC and OCB of instructors with standardized regression coefficients of ($\beta = .667$) and ($\beta = .341$) respectively.
- OC had a statistically significant effect on the OCB of instructors with a standardized regression coefficient of ($\beta = .164$) at $p<.05$.
- The result of R^2 indicated that OJ predicted 44.3 % of the variance in OC, while 29.2 % of the variance in OCB was predicted by the joint effects of OJ and OC.
- OJ had also an indirect and significant effect on OCB mediated through OC with a standardized regression coefficient of ($\beta = .107$) at $p<.05$. This shows that OJ had significant direct and indirect effects on OCB.
- Significant differences were found among instructors in their feeling of OJ, OC, and OCB based on the four generations of public universities in Amhra region.

RECOMMENDATIONS

- The universities need to improve the status of OJ by focusing on procedural justice and interactional justice through confirming the fairness of methods used to make the decision.
- It needs to give high attention to the commitment of academic staff to achieve the goals and aims of the universities effectively.
- Motivate instructors to engage in OCB by creating awareness about the benefit of OCB in supporting the function of the universities. Especially, academic leaders need to encourage instructors to be conscientiousness, sportsmanship, and courteous.
- Universities need to institutionalize OCB for the successful attainment of their mission. This means that every instructor should have an obligation to engage as part of his/her duty.
- Further studies need to be conducted on OJ, OC, and OCB at the Ethiopian universities level to generalize the results.

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3.5. Interplay of organizational culture, job satisfaction, organizational citizenship behavior and organizational

performance in the Ethiopian Public Sector

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ABSTRACT

The purpose of this study was to analyze the interplay among organizational culture, employees' job satisfaction, organizational citizenship behavior and organizational performance in selected public organizations ranked as high, medium and low-level performers. An explanatory research design with mixed methods approach was used. Data were collected via questionnaire, interview and document review. Structural equation modeling was done using AMOS. MANOVA was also conducted using the SPSS software. Likewise, the qualitative data were analyzed thematically. Findings of the analysis revealed that organizational culture has a positive and significant direct effect on employees' job satisfaction and organizational citizenship behaviour. The effect of organizational culture on organizational citizenship behavior mediated by employees' job satisfaction is also positive and statistically significant. Therefore, the researcher concluded that the theoretical assumptions about the interaction among organizational culture, employees' job satisfaction and organizational citizenship behaviour are confirmed. Even though there is statistically significant difference in the studied organizations' nature of organizational culture and levels of employees' job satisfaction, there is no practical difference in the organizations' practical reality. This finding leads to the conclusion that the studied organizations' difference in their level of organizational performance was not caused by their differences in organizational culture, levels of employees' job satisfaction and organizational citizenship beaviour, but by flaws in the performance measurement mechanisms.

Key words: *organizational culture, employees' job satisfaction, organizational citizenship behavior, organizational performance*

INTRODUCTION

The main concern of both private and public sector leaders is to enhance organizational performance (OP) and keep their organization competitive. Among other factors, organizational culture (OC), employees' job satisfaction (EJS) and organizational citizenship behavior (OCB) are determinants of performance of an organization (Sinek, 2014, Simonsen, 1997).

Organizational culture (OC) is a concept which connotes the widely shared and strongly held assumptions and believes of organization members about the way they do their day-to-day activities in the organization. All organizations sail in their own cultures, but they may not notice this reality like the fish that comes to know water is its life only after it gets out of it (Quinn & Cameron, 2006, Schein, 2004). Hence, the main responsibility of leadership is to find the type of culture they should build for their organization; cultivate and change it when some of its components get obsolete.

Employees are the most vital assets of an organization that could either make or break it (Aamodt, 2010, Westover, 2014). Professionals on human resource management have long advised that both extrinsic and intrinsic employee motivational mechanisms should be continuously applied to satisfy the employees and enable the organization to get the best out of them (Sinek, 2014, Mullins, 2016).

Employees satisfied with their jobs dedicate themselves to realization of their organization's mission and vision via achievement of the planned goals (Sinek, 2014). However, due to continuous dynamism in the organization's task environment, employees' high performance measured against their formal job descriptions could not enable the organization to meet its

planned goals and set aims; instead, it requires them to go extra-miles. This extra effort exerted by employees towards the organization's success is known as Organizational citizenship behavior (OCB) (Organ, 1997).

OCB is the positive psychological and emotional bond created between an organization and its employees. OCB make employees intrinsically feel obliged towards all aspects of the organization and drive them to play extra-role duties (Champoux, 2011). In organizations where OCB is well entrenched; there is smooth achievement of organizational goals, absence of deviant behavior, low levels of absenteeism and turnover (Susanto, Kurniaty, Priyono, Nusbantoro, 2020, Polat, 2009).

However, to embed OCB in any organization, the OC should be people oriented which emphasizes on empowerment, career development, involvement, integration, provision of support and welfare services to employees. Studies show that employees working with in such cultures are well satisfied and ready to go extra-miles to ensure their organizations' high performance (Sinek, 2014, Simonsen, 1997).

Organizational culture (OC) is considered as a measure of excellence of an organization contained in the common ways by which its members have learned to think, feel, and act (Schein, 2004). Different authors support the point that employees' job satisfaction (EJS) is a factor in employee motivation, employee goal achievement and positive employee morale in the workplace (Westover, 2014, Sinek, 2014). Earnestly speaking; ensuring EJS demands crafting and cultivating an OC, which is compatible with the organization's mission and the employees' interests.

These days, due to dynamism in customers' and stakeholders' interest, the concept of a positive workplace behavior that goes beyond the scope of traditional performance indicators is getting attention in organizations. Such a behavior is expected to boost organizational performance (OP) by driving employees go extra-miles towards helping their organizations and themselves as well (Van Dyne, Graham & Dienesch, 1994, Organ, 1997).

For almost the past three decades, different human resource and institutional capacity building interventions have been undertaken in the Ethiopian public sector in order to improve the public sector's performance (Kassa & Zekarias, 2020). Besides, OP measurements are enforced with the intention to reward the best performers and encourage others find their gaps (Worku, 2019). These efforts have resulted in increasing the number of employees with higher educational qualifications, restructured process and automations; but the change obtained in the organizations' way of doing their actual businesses is not as expected.

Different studies found out that problems related with lack of a "servant mind set" and employees' belongingness to the organization are still pervasive in the sector. These problems are resulting in service delay, mistreatment of customers, lack of emotional attachment to the organizations' mission and values and misuse of the office resources (Solomon, 2013, Aklilu, Tadele, Mulugeta, Usman, Alemu, Abdela, Hailemariam, & Birhanu, 2020). On top of that, studies conducted on employee satisfaction in the public sector found out that low level of reward, lack of reasonably adequate benefit packages and lack of reward have resulted in serious turnover of public employees (Worku, 2019, Selam & Belay, 2018).

Another study by Dereje, Mirkuzie, Ayinengida and Fitsum (2020) on public sector OC and EJS revealed that the OC of public organizations is characterized by formal rules, and procedures, hierarchical structures and controlling leadership style. This type of OC has negative relationship with the organization's level of EJS (Cameron & Quinn, 2006). Kassa and Zekarias (2020) also

studied determinants of public servants' performance in Ethiopia and found out that both organizational climate and individual factors affect employees' performance.

Nonetheless, the researchers do not address the interaction among OC, EJS, OCB and OP in a full-fledged manner. Therefore, this study is intended to find out how the prevailing OC, mediated by EJS could affect the level of OCB which again decides the level of OP in the selected federal organizations.

Research hypothesis

1. OC has a statistically significant direct effect on OCB.
2. OC has a statistically significant direct effect on EJS.
3. EJS has a significant mediation effect on the relationship between OC and OCB.
4. The studied organizations' variation in OP is caused by their statistically significant various levels of OC, EJS and OCB.

REVIEW OF RELATED LITERATURE

The notion of organizational culture (OC)

Organizational culture (OC) is considered as the most crucial factor behind a range of organizational effectiveness issues such as employees' commitment, motivation, prioritization, resource allocation, comparative advantage and organizational change (Cameron & Quinn, 2006, Schein, 2004). Schein (2004) defined OC as the way things are done around here, the basic assumptions and beliefs that are shared by members of an organization and the collective mind set of organization members. Similarly, Denison (1990, p. 2), defined OC as "*the underlying values, beliefs, and principles that serve as foundation for an organization's management system as well as the set of management practices and behaviors that both exemplify and reinforce those basic principles*."

The definitions have some communality which tells us that the driving force behind every aspect of organizational behaviour is its culture; developed based on its past experiences. In fact, for OC to serve as a comparative advantage of the organization, it should be designed with utmost care, focusing on the mission and mandates of the organization and the dynamic interest of its customers, stakeholders and employees. Since the 1990s, scholars interested in the area exerted a lot of effort to find features of OC that promote success of organizations (Umrani, Memon, Samo, & Shah, 2016). Denison (1990) said that an OC which emphasizes on mission, consistency, involvement and adaptability could serve as a competitive advantage for organizations. Schein (2004) conceptualized OC as having three layers by which the visible part is only 10% of cultural compositions while 90% is buried beneath the day-to-day realties of organizations. This author said that the surface level reflections of OC should be congruent with the values and beliefs as well as the underlying assumptions of the organization. Otherwise, there will be discrepancy between the espoused values and the values in use which may lead to lack of trust and failure to meet organizational aims (Argyris & Schon, 1978).

Employees' Job satisfaction (EJS)

Employees' job satisfaction (EJS) is one of the most studied constructs in the fields of organizational behavior and organizational psychology. According to Sree and Satyavathi (2017, p.85), EJS is defined as "*the delightful emotional state resulting from the appraisal of one's job as achieving or easing the achievement of one's job values and "the extent to which people like or*

dislike their jobs." It is more of an attitude related with internal feelings of the employee towards the job and the organization (Mullins, 2016, Riggio, 2013). Satisfied employees will have positive views about the job which again serves as a competitive advantage to the organization (Westover, 2014, Sageer, Rafat, & Agarwal, 2012, Champoux, 2011).

These days, organizations could not afford to have dissatisfied employees. Dissatisfied employees are de-motivated, and they could not enable the organization to meet its goals. As a result, such employees will get fired and the act of firing underperforming employees will cause memory loss, recruitment and familiarization costs on the organization. On top of that, firing dissatisfied employees will have a threatening effect on the retained employees which may gradually result in low performance and emotional detachment of employees from the organization (Sinek, 2014; Simonsen, 1997).

According to Aamodt (2010), the antecedents of EJS are individual predisposition, satisfaction with life, job expectations, organizational fit, feelings of fairness, coworkers, stressors and the job itself. These factors are assumed to affect the level of EJS which again affects organizational citizenship, turnover, absenteeism, tardiness, and counterproductive behaviors. Though their influence may vary from organization to organization; presence of friendly interpersonal relationships, reciprocal job interdependence and relational work designs are common determinant factors of EJS (Grant, 2007, Bachrach, Powell &Bendoly, 2006).

The notion of organizational citizenship behavior

These days, due to dynamism in customers' and stakeholders' interest, the concept of a work behavior that is beyond the scope of traditional performance indicators is getting attention in organizations (Alex, 2020, Organ, 1997). Such behavior is known with different names as organizational citizenship (OCB), pro-social behavior, organizational spontaneity and extra-role behavior (Van Dyne, Graham & Dienesch, 1994). OCB is literally defined as the willingness of participants to exert effort beyond the formal obligations dictated by their positions (Thruvenkadam & Duraraj, 2017, Polat, 2009). It is also considered as a combination of interpersonal and volunteer actions and behavior that keep the social and psychological environment in which the tasks of the organization are performed (Organ, 1997).

OCB plays multi-dimensional role, and it is beneficial to both the organization and to employees. For the organization, it eases change, environmental concerns, resource usage and savings, reduces costs, and improves quality and increase customer satisfaction. For individual employees, OCB enables them to practice collaboration, voluntary participation, responsibility and interdependence (Polat, 2009).

Even though there are various models of OCB, the one developed by Organ (1997) composed of altruism, courtesy, conscientiousness, sportsmanship and civic virtue is used in different studies (Kittilertpaisanea, Chanchiprechab, & Khatiwat, 2014; Andrade, Costa, Estivalete, & Lengler).

Organizational performance

Organizational performance (OP) deals with the actual output of an organization measured against intended aims and goals (Sadeghi, Ahmadi, and Yazdi, 2016). Many scholars in the area agreed that public sector performance is a multi-dimensional concept which needs to be measured from different angles. However, there is no communality in the number and nature of performance dimensions developed by different authors. According to Trade (2000, cited in Ondoro, 2015, p. 716), public sector OP could be measured in terms of six general categories: effectiveness,

efficiency, quality, timeliness, productivity and safety. Likewise, Meyers and Verhoest (2006) argued that public sector performance should be measured in terms of quality and quantity of outputs, efficiency, equity, outcomes, value for money and consumer satisfaction.

In 1992, Kaplan and Norton came up with the view that performance should be measured using multidimensional constructs so as to cover both financial and non-financial aspects of the organization. Hence, they developed the Balanced Score Card (BSC) with four perspectives viz. financial, customer, internal process and innovation. These perspectives are expected to be derived from the organization's mission, vision and strategy.

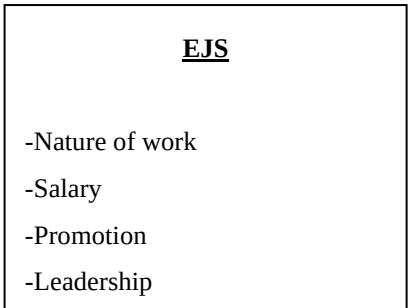
It is believed that BSC could enable organizations link their performance measures with strategies of each unit. It is considered applicable to any knowledge-based organization to manage and evaluate business strategy, check operation efficiency, and communicate the entire process to its members (Balaboniene & Vicerskinie, 2015). In addition to serving as a diagnostic tool, BSC enables organizations to install interactive system whereby different stakeholders could overcome information asymmetries in decision making (Gao, 2015).

In fact, Ondoro (2015) and Ömürgönülşen (2002) agree on the point that there is no single 'one best' approach to measuring organizational performance. But what matters most is that there should be balance between what the results of quantitative performance measurement reveals and what qualitatively is told or saw in the measured organizations. Besides, problems occurred during operation, the effect of the results of the measurement on service seekers, stakeholders and the organization itself should also be assessed qualitatively.

Conceptual framework

As it is clearly depicted by Figure 2.1, the appropriate type of OC defined in terms of Denison's (1997) four dimensions namely: adaptability, involvement, consistency and mission is expected to directly influence the level of OP which is measured from the perspectives of implementation of good governance and reform tools (FCSC, 2020). However, the direct effect of OC on OP is mediated by two intervening variables: EJS and OCB. Prevalence of a proper type of OC is expected to create higher levels of EJS, measured by Mullins' (2016) and Hackman and Oldham's (1976) dimensions (colleagues, leadership, pay, promotion, and autonomy, working conditions, training and development).

Then, the higher level of EJS will make positive influence on the level of the organizations' OCB which is measured from the perspectives of Organs (1997) five dimensions namely: altruism, courtesy, conscientiousness, sportsmanship and civic virtue. This smooth interaction among OC, EJS and OCB is presumed to have positive effect on the level of OP.



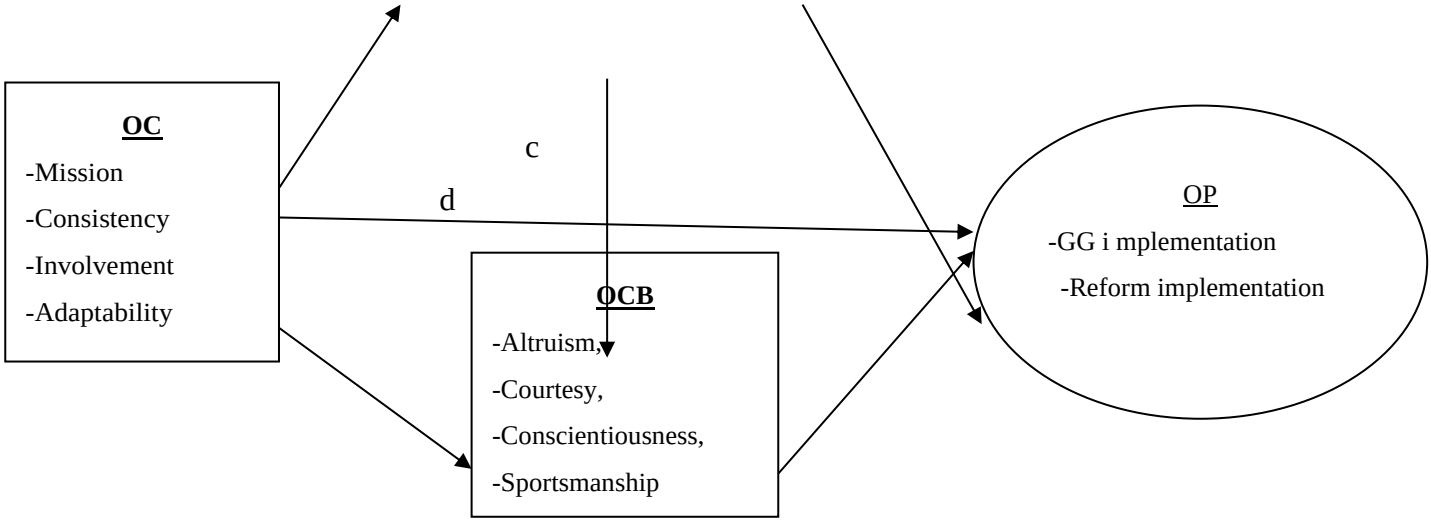


Figure 2.1: Conceptual framework of the study

Source: Developed by the researcher based on literature review, (2021).

Data type, research design and approach

Both primary and secondary data types were used for the purpose of this study. Primary data were collected from leaders and employees of the selected organizations. Besides, secondary data were taken from the FCSC's performance evaluation report (2020). This study adopted explanatory research design and an explanatory sequential mixed methods approach. In the first phase, quantitative data were collected and analyzed. The second phase begins by designing questions for interview based on results of the quantitative data analysis.

Population, sample size and sampling technique

The population for this study was the number of employees of the three selected organizations. The total population size is 2,096. Sample size was calculated using Yamane (1967, p. 886, cited in Israel, 2003, P.4), which runs as: $n=N/1+N\ (e^2)$. So, 727 employees were sampled. Then elements of this sample size were selected using simple random sampling technique. Likewise, purposive sampling technique was used to decide resourceful individual's vis-a-vis the questions set to be answered by this research. In view of that, Directors of the three organizations' human resource directorates were selected for key informant interviews.

Instrumentation

Three types of validated questionnaires were used. The OC questionnaire was adapted from the works of Umrani, Memon, Samo, and Shah, (2016). Similarly, the items of the EJS questionnaire were adapted from three validated scales. Major components were taken from the work of Ahmad, RenJye, Zulkifli and Bujang (2020). Besides, the items that measure promotion are adopted from Sharma, Rajnish, Misra, and Mishra, (2017). Whereas items that measure job autonomy were adapted from the work design questionnaire developed by Morgeson & Humphrey (2005). And finally, the OCB questionnaire developed by Habeeb (2019), with organs' five dimensions was adopted for this study. On top of that, the secondary data on the studied organizations' performance was used as it is.

Validity of the instruments was checked via critical scrutiny of the literature and expert reviews.

Besides, reliability test was conducted using Cronbach's alpha which saw that the overall alpha result of the questionnaire is .914.

Techniques of data analysis, presentation and interpretation

First, all the quantitative data were encoded into SPSS and imported into the AMOS software. Then, data analysis was done by employing both descriptive and inferential statistics. From the tools of descriptive statistics, mean was used to calculate the overall mean scores of the constructs. This was needed in to make the data more convenient and ready for inferential analysis. Next, structural equation modeling (SEM) was conducted by using AMOS. Besides, the multivariate analysis of variance (MANOVA) was used to investigate presence of a statistically significant difference in the studied organizations' nature of OC and levels of EJS and OCB. Results of the quantitative data analysis are presented using Tables and Figures. On the other hand, the qualitative data were classified and categorized as per the thematic areas drown in the interview guides. Then, these data are presented textually and interpreted in a narrative manner.

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

Fitness of the structural model

Model fitness was checked and assured in terms of the model chi-square discrepancy, RMSEA, CFI and SRMR. As it is visible from Table 4.1, all measures of model fit were found within the acceptable margins.

Table 4.1: Model fit indices

Name of the measure	**Value**	**Level of acceptance**
Chi-square discrepancy	2.93	< 5
Root means square error of approximation (RMSEA)	.05	<.08
Comparative fit index (CFI)	.97	>0.95
Standardized root means square residual (SRMR)	.04	<. 08

Source: Kelin (2005, p. 269-278).

Organizational culture has a statistically significant effect on organizational citizenship behavior.

The structural model in Figure 4.1 shows that the effect size of OC on OCB is .16 (16%). As it can be grasped from Table 4.2 this result is statistically significant at P<.05.

Table 4.2: Regression weights

Construct	Estimates	S. E	C.R	P-value
OCB_DV ⟶ OC_IV	-.156	.073	-2.145	.032
EJS_M ⟶ OC_IV	.459	.034	13.302	.000
OCB_DV ⟶ EJS_IV	.752	.156	4.821	.000

Source: Own calculation using AMOS, (2022).

Therefore, the hypothesis 'OC predicts the level of OCB in an organization' is s confirmed. This finding is similar with that of Mohanthy and Rath (2012), who concluded that OC is the powerful determinant of OCB in organizations.

Organizational culture has a statistically significant effect on employees' job satisfaction.

Both the structural model in Figure 4.1, and the regression weights said in Table 4.1 revealed that the effect size of OC on EJS is .46 (46%), which has perfect level of significance at p<.05. Hence, the hypothesis is confirmed. This finding aligns with that of Mahmood and Ahmed (2015) which says that OC has positive and significant effect on EJS.

Employees' job satisfaction has a statistically significant effect on the level of organizational citizenship behavior.

Once again, results both in the structural model, Figure 4.1, and Table 4.1 displayed that the effect size of EJS on OCB is .75 (75%); which is perfectly significant at P<.05. This finding is similar with that of Andrade et al (2017) and Kittilertpaisanea, Chanchiprechab, and Khatiwat (2014), who concluded that work related values and job satisfaction influences the level of an organization's citizenship behaviour.

Organizational culture has a statistically significant effect on organizational citizenship behavior via mediation of employees' job satisfaction.

The mediation effect is calculated by the formulae (a*b=y), whereby 'a' =.46 (OC → EJS), and 'b'=.75 (EJS → OCB). Then: OC → EJSO → OB=.46 *.75=.35 or 35%. To check whether this result is statistically significant or not, a Soble test analysis was conducted using the Web calculator and the results presented in Table 4.3 showed that the mediation effect is perfectly significant at (p<.05).

Table 4.3: Results of Soble test on significance of the mediation effect

Test name	Test statistic	Standard error	P-value
Soble test	4.530	.076	.000
Aroian test	4.519	.766	.000
Good man test	4.541	.076	.000

Source: Own calculation using the Soble test Web calculator, (2022).

Therefore, it could be concluded that OC could better affect the level of OCB in an organization when it gets mediated by EJS. In other words, it is only when employees get satisfied with the various aspects of their organization's culture that they could reflect OCB. Organizations that have employees who practice OCB are guaranteed for high performance (Sadeghi, Ahmadi & Yazdi, 2016).

The studied organizations have statistically significant difference in their nature of organizational culture and levels of employees' job satisfaction and organizational citizenship behavior.

The fifth hypothesis of this study was the point that MoE, FEACC and MoM scored high, medium and low levels of performance respectively due to the variation they have in the nature of their OC and the levels of EJS and OCB. MANOVA was conducted to check if such significant difference exists among the studied organizations.

Table 4.4: Multivariate tests

Multivariate Tests[a]						
Effects	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared

Intercept	Pillai's Trace	.983	13089.004[b]	3.000	687.000	.000	.983
	Wilks' Lambda	.017	13089.004[b]	3.000	687.000	.000	.983
	Hotelling's Trace	57.157	13089.004[b]	3.000	687.000	.000	.983
	Roy's Largest Root	57.157	13089.004[b]	3.000	687.000	.000	.983
Organization	Pillai's Trace	.081	9.664	6.000	1376.000	.000	.040
	Wilks' Lambda	.919	9.849b	6.000	1374.000	.000	.041
	Hotelling's Trace	.088	10.035	6.000	1372.000	.000	.042
	Roy's Largest Root	.087	19.851c	3.000	688.000	.000	.080

Source: Own calculation using SPSS, (2022).

a. Design: Intercept + Organization

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

The Wilk's Lambda row of Table 4.4 shows a value of .919 with Sig. level of .041, which is less than P=.05. Hence, there is a statistically significant difference among the studied organizations' OC, EJS and OCB. However, this result does not show the wherea bouts of such difference. Hence, a test of between subjects' effects was conducted which revealed that the studied organizations have perfectly significant difference in terms of their OC and EJS (P=.000). However, they do not have difference in their level of OCB (P=. 525).

The next step is to find out whether the difference in OC and EJS exists among the three studied organizations or between two of them only. A post hoc test using one way ANOVA with Bonferroni adjusted alpha level of .017 was employed to search for the differences. And results are presented in Tables 5 and 6.

Table 5: Post hoc test on OC

Multiple comparisons					
Tukey HSD					
Studied	(J) Studied	Mean	Std. error	Sig.	95% confidence

organization	organization	difference (I-J)			interval	
					Lower bound	Upper bound
MoE	FEACC	.11503	.08695	.383	-.0892	.3193
	MoM	-.37146	.06218	.000	.2254	.5175
FEACC	MoE	-.11506	.08695	.383	-.3193	.0892
	MoM	.25640	.08197	.005	.0639	.4489
MoM	MoE	-.37146	.06218	.000	-.5175	-.2254
	FEACC	-.25640	.08197	.005	-.4489	-.0639

Source: Own calculation using SPSS, (2022).

Table.6: Post hoc test on EJS

Multiple comparisons Tukey HSD						
Studied organization	(J) Studied organization	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
MoE	FEACC	.04880	.07041	.768	-.1166	.2142
	MoM	.30383*	.05035	.000	.1856	.4221
FEACC	MoE	-.04880	.07041	.768	-.2142	.1166
	MoM	.25504	.06637	.000	.0991	.4109
MoM	MoE	-.30383	.05035	.000	-.4221	-.1856
	FEACC	-.25504	.07041	.000	-.4109	-.09091

Source: Own calculation using SPSS, (2022).

The multiple comparisons made on OC and EJS indicated that there is statistically significant difference between MoE and MoM and FEACC and MoM. Nonetheless, MoE and FEACC have similar levels of OC and EJS.

At this stage, it is clearly found that MoM differs from MoE and FEACC in its nature of OC and level of EJS. However, unless the effect size is of a standardized value, the statistical significance could not be meaningful in the real settings of the studied organizations. Practical significance of this difference is tested by the effect sizes and mean scores of the studied organization on OC, EJS and OCB as presented in Table 4.7.

Table 7: Tests of between subject effects

Tests of Between-Subjects Effects							
Source	Dependent	Type III	df	Mean Square	F	Sig.	Partial

	Variable	Sum of Squares					Eta Squared
Corrected Model	Total OC	20.413a	2	10.206	18.851	.000	.052
	Total EJS	14.566b	2	7.283	20.514	.000	.056
	Total OCB	.264c	2	.132	.644	.525	.002
Intercept	Total OC	5090.046	1	5090.046	9400.908	.000	.932
	Total EJS	5036.867	1	5036.867	14186.846	.000	.954
	Total OCB	7286.043	1	7286.043	35555.551	.000	.981
Organization	Total OC	20.413	2	10.206	18.851	.000	.052
	Total EJS	14.566	2	7.283	20.514	.000	.056
	Total OCB	.264	2	.132	.644	.525	.002

Source: Own calculation using SPSS, (2022).

So, the effect size on OC is .052, on EJS, .056 and on OCB is .002. According to Cohen's (1988, pp. 284-287) categorization of effect sizes; .2 as small, .5 as medium and .8 as large for group comparisons; the effect sizes of all the dependent variables of the current study are trivial. This leads to the conclusion that the difference in the studied organizations' level of performance might not be caused by their difference in OC or the levels of EJS and OCB, but by other factors that are not included in this study.

Moreover, the above conclusion is supported by the moderate level mean score values of the studied organizations (Andrew, 2017) on OC (MoE =3.241, FEACC=3.126) and MoM =2.869). On EJS (MoE=3.180, FEACC= 3.131, and MoM=2.867). Nonetheless, the organizations' mean scores on OCB are relatively high (MoE= 3.673, FEACC= 3.667, and MoM=3.710).

The qualitative data gathered via interview also supports the quantitative findings. Due to frequent introduction of various change tools and leadership reshuffling, there is system disruption and lack of consistency. The studied organizations have adaptability problems. Even though a need for intervention is found, there are delays in taking measures. Likewise, the mission is not well-communicated to staff members to the extent that makes it a guiding compass for their day-to day activities. In other words, the mission does not seep into the daily routines of every employee. Employees' involvement in strategic decisions is also very weak. The studied organizations focus more on following formalities and routines instead of scanning the task environment and acting accordingly.

The main cause of employees' dissatisfaction in the organizations is the low pay scale and lack of fringe benefits. On top of that the FCSC's job evaluation and grading (JEG) design raised a lot of grievances on the organizations. To address issues of employees' dissatisfaction, the organizations are taking different measures such as setting up credit associations and supplying subsidized cafeteria services.

The interviewees also explained that, even though employees are not satisfied, they always give

positive feedback that could improve the organization's performance. They have strong belief in their organizations' ability to make positive and fundamental impact on the lives of citizens.

DISCUSSIONS

The intriguing finding of this study is that the studied organizations' have moderate level mean scores on the nature of their OC and levels of EJS; but they have relatively higher mean score values on their level of OCB. This finding is inconsistent with theories that assume presence of the right OC and higher levels of EJS as determinants of higher levels of OCB. This inconsistency was reconciled by further scrutiny and analysis of antecedents of OCB. So, it was found out that the cause of the relatively higher mean scores on the studied organizations level of OCB is not presence of the right culture and employees' satisfaction with their jobs (Cascio, 2003). Instead, it was derived by the interdependent nature of the jobs' design (Bachrach, Powell & Bendoly, 2006, Procter & Currie, 2004), employees' personal dispositions, the public serving nature of the jobs and content of the public sector values which are highly intertwined with humanity and altruism (Rayner, Lawton, & Williams, 2012, Grant, 2007). However, even though public organizations could have higher levels of OCB no matter what the nature of their OCs or levels of EJS are; this scenario could not perpetuate sustainably and maximize OP unless supported by the public sector leaders' act of designing a contextually right OC and ensuring EJS as much as possible.

Another critical finding of this study is that the studied organizations were ranked as high, medium and low-level performers in reform and good governance (FCSC, 2020). However, given the absence of practically significant difference among the organizations' nature of OC and levels of EJS and OCB, there could not be such difference in their levels of performance. As said by Diefenbach (2009), such difference in performance could have been resulted from the flaws in measurement characterized by limited depth, breadth and inability to absorb organizational complexities. Technically, the measurement focuses on hard and orthodox in dicatros such as efficiency, productivity, cost and technical performance (Ömürgönülşen, 2002). What makes it worse in the case of the studied organizations is that the subject measured was not achievement of the organizations' main aims and goals, but the procedural issues on the implementation of reform and good governance.

CONCLUSION

Results of the SEM analysis revealed that, OC has a positive and statistically significant direct effect on OCB. Besides, the indirect effect of OC on OCB via the mediation role of EJS is found positive and statistically significant. Despite presence of statistically significant differences in OC and levels of EJS between MoE and MoM and FEACC and MoM, all the studied organizations have relatively higher levels of OCB. Nonetheless, the effect sizes and standardized mean score values of OC, EJS and OCB of the studied organizations show that there is no practically significant difference among the studied organizations' nature of OC and levels of EJS and OCB.

This finding leads to the conclusion that the difference in the studied organizations' level of OP was not mainly caused by nature of their OC and levels of EJS and OCB. Rather, it happened due application of flawed measurement indicators. What makes it worse is that the performance results were not cross-checked via various techniques such as employees' reflections, comments of the over sighting bodies and comparisons with the practical reality of the organizations. The implications of these findings are that the flawed performance reports may mislead decision makers and affect moral of members of those organizations whose performance is rated as low.

Besides, findings of such flawed performance measurements could not serve as means of organizational learning and development.

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3.6. Users Intention Towards Digital Financial Service Adoption in Ethiopia

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ABSTRACT

In recent times, mobile money services have become a fashioned service following to the rapid development of mobile technologies and increasing demand for cashless business transactions. Such demand has also ushered a new era to the banking industry and bank users. However, the bank users' intensions to adopt the services, particularly in Ethiopia, were not studied yet. To fill this study gap, data was collected from 384 users of banks branching in Addis Ababa and analyzed by integrating the modified extended unified theory of acceptance and use of technology (UTAUT2) and with the structural equation model. According to the path analysis, the study found performance expectancy, effort expectancy, facilitation conditions, hedonic motivation and price value to be a positive and strong predictor of the bank user's behavioral intension to adopt the mobile money services followed by the exogenous predictors such as perceived security and trust on the technology. Another interesting finding is that the users' behavioral intention to adopt such services is significantly transformed into actual behavior. But none of the moderating variables have significant effect on the users' behavioral intension to adopt the services and they are excluded from the path. Based on the finding, the study advice the mobile money service providers to use an aggressive approach to strengthen positive trust drivers, cut insecurity dimensions, and design aesthetically appealing services with an ultramodern technology which have multi-purpose operational interfaces.

Keywords: *Mobile Money, UTAUT2, Users Intension, Banking in Ethiopia*

INTRODUCTION

Now a days, digital financial services and the technologies that power them are becoming the new normal. The banking industry is also changing for good. A study by Pazarbasioglu, et al. (2020) points out that innovative and disruptive technologies from new startups are changing the financial services industry. Realizing this, different countries are developing and customizing their regulations to allow small startup Fintechs companies.

Particularly, the mobile money (MM) has ushered a new era and been growing phenomenally over the banking industry globally and it has become an integral banking channel alongside Internet banking, ATMs, and POS terminals. As an innovative banking service, MM enables users to undertake financial transactions such as saving, credit, payment, transfer, mobiletop-up, etc using smartphones, mobile devices, biometric devices, tablets, and any other digital system anytime and anywhere where there is an internate connectivity. MM is also better digital alternative than the other traditional bank channels such as ATMs, internet banking and physical branches (Puschel et al, 2010).

Ethiopia, with its significant population size and significantly limited formal financial services, is a big opportunity for existing financial institutions or new Fintech companies who could supply MM services. Unfortunately, the adoption MM in Ethiopia is at its infancy. According to a market scoping study by the World Bank Group in 2019, the state of Ethiopia's digital financial ecosystem is characterized by poor adoption. In contrast, eastern African countries like Kenya, Uganda, and Tanzania have excelled in the use of digital financial services. A study by Bereket and Hwang, (2020) confirms that although 22% of the population in Ethiopia have bank accounts and most of them uses mobile phones but the MM adoption rate is very poor.

Another assessment by world bank conducted in 2019 has also claimed that the current state of MM adoption in Ethiopia is poor. Similarly, the National Bnak of Ethiopia's (NBE) financial inclusion strategy showed that Ethiopia has extremely limited financial inclusion percentages that could be significantly improved using digital financial services NBE (2017). Although, NBE's strategy has found the use of MM services as a major pillar, it potential, however, has not been realized due to the lack of technology and innovation, enabling government policy and regulatory environment, and infrastructure improvements are the key catalysts for advancing financial inclusion (Ndiwulira, 2017).

In line with global trends, contemporary trends are being seen in Ethiopia. First, NBE who has so far been accused of not supporting the adoption with proper regulatory framework has issued a new directive at the end of March – Licensing and Authorization of Payment Instrument Issuers Directive No. ONPS/01/2020 and is on the verge of issuing a second directive that promotes the use (NBE, 2020). Second, the Ethiopian House of Peoples' Representative has approved the Electronic Transaction Proclamation ('the Proclamation) in its session of 29th May 2020 (Alemu, 2020). On contrast, user behavioural intensions to adopt MM in Ethipia was not studied yet and was begged to be researched.

The adoption of digital technologies like MM displays different behaviors in different contexts. Several models and frameworks have been developed to explain user adoption of modern technologies and these models introduce factors that can affect user acceptance. Some of the popular models are Theory of Reasoned Action Fishbein and Ajzen, (1975), Theory of Planned Behavior (Ajzen, 1985), Technology Acceptance Model (Davis, 1986), Unified Theory of Acceptance and Use of Technology (Venkatesh, et al., 2003) and Diffusion of Innovation theory (Rogers, 2003). Theory of Reasoned Action is the broader theory from which theory of planned behavior has emanated however, these theories are better suited for behavioral changes and health research.

Despite the model's limited number of determinants, perceived usefulness, and perceived ease of use, the Technology Acceptance Model (TAM) however is the most popular and most often used theoretical framework in modern technology adoption research (Lai, 2017). Another framework used to explain the adoption of technology is the unified theory of acceptance and use of technology (UTAUT) which suggests four core constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) are direct determinants of behavioral intention and ultimately behavior, and that these constructs are in turn moderated by gender, age, experience, and voluntariness of use (Venkatesh et al., 2003).

However, these models were not without limitations. The adoption of MM in Ethiopia could be decided by many other factors other than the above four core constructs. Other insinuating or causing factors like trust and security could also be a major factor. So, Venkatesh et al., (2012) has

developed UTAUT2 which is an extension of UTAUT to allow the analysis of user's intension to adopt MM in a voluntary setting with the integration of the users demographic characterstics (age, gender and experience) as a moderating factor. To prove the stability UTAUT2 and test hypothesizes, this study has applied structural equation modele (SEM).

Theoretical Framework and Hypothesis Development

The adoption of digital technologies like digital financial technologies shows different behaviors in different contexts. Several models and frameworks have been developed to explain user adoption behavior of modern technologies. Some of the popular models are Theory of Reasoned Action Fishbein and Ajzen, (1975), which is an extension to the Theory of Planned Behavior, (Ajzen, 1985), Decomposed Theory of Planned Behavior, (Taylor and Todd, 1995); Technology Acceptance Model, (Davis, 1986), Technology Acceptance Model2(Venkatesh and Davis, 2000), and Unified Theory of Acceptance and Use of Technology, UTAUT (Venkatesh *et al*,. 2003). UTAUT model is relatively new model which is developed by aggregating eight theoretical models including above models and other models such as Triadis's Model of PC Utilization, (1979), Rogers' Diffusion of innovations, (1983), Deci & Ryan's Motivational Model, (1985), and Bandura's Social Cognitive Theory, (1989).

According to (Venkatesh *et al*, 2003), UTAUT model is composed of four core constructs of usage such as performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitation conditions (FC)significantly predict intention. Factors such as PE, EE, and SI have a direct effect on behavioral intention of using modern technology (Mobile Money service (MM services) hereafter), while FC is direct determinant of usage behavior of MM services. These factors are moderated by demographic constructs such as sex, age, experience, and voluntariness of use.

PE is the stronges predictor of attitude toward behavioural in tension of using technology (Venkatesh *et al*, 2003). In this study, this extrinsic element can show the degree to which the bank customers expect that using the adopt MM services will help them to reach some gains in job performance. The variable includes fitness to the purpose (job-fit), perceived usefulness, and outcome expectation, which are used to describe the extent to which users perceive the use of the adopt MM services to help the work. In theory, gender, age and experience can influence the relationship between performance expectancy and behavioural intention to adopt MM services. Effort Expectancy (EE) is considered as an intrinsic element which decides individuals' feeling in relation to easiness to use modern technology. In our context, it measures the amount of effort that the bank customers expect to invest in using the MM services. On the other side, SI directly decides effect of social factors such as friends, colleagues, family members on an individuals' intention to adopt modern technology. UTAUT recognizes the importance of considering social elements into the model. In this study, strong relationship between using the adopt MM services and initial stages of user experience is expected. This is because many studies have demonstrated a positive and significant relationship between SI and a behavioural intention adopt new technology (Alshehri, Rutter and Smith, 2019). Finally, the FC is connected to the technical infrastructure, including adopt MM services (Venkatesh *et al*, 2003). In this context, it is the bank customer's feeling of how well the internet and Fintech supplies support in using the adopt MM services.

However, the adoption of adopt MM services could also be decided by many other factors other than these core determinant factors. Other insinuating or causing factors like trust and security could also be a major factor. Moreover, the model has been criticized by many researchers.

Because it is based on an organizational setting and built estimate adoption of technology among employees (Ooi & Tan, 2016; Venkatesh et al., 2012). Another study also argues that technology adoption behaviour outside organizational setting or work environment differs on various dimensions such as differences in kinds of tasks and complexity of communications (Brown et al., 2006; Ooi & Tan, 2016).

As a result, Venkatesh et al., (2012) has developed UTAUT2 which is an extension of UTAUT to allow the analysis of user's intension to adopt technology in a voluntary setting with the integration of the users demographich characterstics (age, gender and experience as a moderating factor. The extended model incorporates three more constructs into UTAUT: hedonic motivation, price value, and habit. The inclusion these new consytructs have produced produced a substantial improvement in the variance explained in behavioral intention and technology use (Chang, 2012). The effect of these constructs on user intentions to adopt technology are hypothesized to be moderated by age, gender, and experience.

Hedonic motivation (HM) refers to pleasure or enjoment derived from using a technology, and it plays a key role in defining technology acceptance and use (van der Heijden 2004; Thong et al 2006, Brown and Venkatesh 2005). Another study also shows that hedonic motivation is among the critical determinants of consumer intentions to use mobile shopping services (Yang, 2010).

Price Value (PV) refers to the monetary cost and pricing structure of using technology which may have a significant impact on consumers' technology use. Venkatesh et al. (2012) have defined cognitive as a trade-off between the perceived benefits of using modern technology and the monetary cost of using it. A study by Mallat, et al., (2006) have also shown that Price Value plays a crucial role in shaping customers' willingness to adoped modern technology.

Habit (HB) is defined as an extent to which people tend to to perform behaviors automatically because of learning (Limayem et al. 2007). It is aslo defined as an extent to which a people or individuals believes the behavior to be automatic (Kijsanayotin et al. 2009).

Likewise, the inclusion of demographics moderators in the framework can add another imperative value to the model. Many studies have also prized the model as most proper model in scholarly studies in relation to information system adoption and technology acceptance.

Inaddition to the above critical variable, researchers, e.g. Cheng et al., (2011) and Qasim & Abu-Shanab, (2016) recommends that the need amend the model to accommodate behavioral differences between countries. In this regard, the researcher proposes the incorporation of "trust on the MM services" and "perceived security in using MM services". User's trust on the MM services is a critical construct that is strongly associated with financial transactions. Likewise, trust becomes extremely essential factor when it is associated with monetary transactions performed through a wireless network (Qasim & Abu-Shanab, 2016). Given that the MM services involve monetary transactions that are mobile phone-based among users, trust is considered vital. Moreover, much research, e.ge. Loh et al., (2020) and Ooi & Tan, (2016) has proven that trust is a salient predictor of user intentions to adopt technology.

Based on the above conceptual framework, the following hypothesis are developed:

Hypothesis 1 (H1): PE has a positive influence on user intensions to adopt MM services.

Hypothesis 2 (H2): EE has a positive influence on user intensions to adopt MM services.

Hypothesis 3 (H3): SI has a positive influence on user intensions to adopt MM services.

Hypothesis 4 (H4): FC has a positive influence on user intensions to adopt MM services.

Hypothesis 5 (H5): HM has a positive influence on user intensions to adopt MM services.

Hypothesis 6 (H6): PV has a positive influence on user intensions to adopt MM services.

Hypothesis 7 (H7): HB has a positive influence on user intensions to adopt MM services.

Hypothesis 8(H8): TR has a positive influence on user intensions to adopt MM services.

Hypothesis 9(H9): TR has a positive influence on user intensions to adopt MM services.

Hypothesis 10(H10): SE factor significantly affects user intensions to adopt MM services.

Hypothesis 11 (H11): Users' behavioral intension has a positive influence on User actual behavior to use MM services.

METHODOLOGY

The use of the extended unified theory of acceptance and use of technology (UTAUT2) offers a structured approach with a tentative hypothesis as well as offers a chance to incorporate a new variable like 'trust' and 'Security'. This research was designed as an explanatory (casual) research.

The choice of a research approach also emanates from the philosophy adopted. This research borrows a post-positivist lens to explain the topic at hand. The accepted approach to research by post-positivists is that it begins with a theory, collects data that either supports or refutes the theory, and then makes necessary revisions and conducts added tests. So, the data was collected from customers of fifteen commercial banks branching in Addis Abbab and supplying MM services in Ethiopia. However, the number of the service users was unknown, and the researcher used the largest sample size of 384 as suggested by Krejcie and Morgan (1970) for unknown population. Due the non-availablity of the sampling frame, the study uses convenience sampling was be used.

To analyse both interesnsic and exterensic factors that influence bank user intensions to adopt the MM services a theoretical model of UTUAT2 model were employed. The model claims that seven core constructs (performance expectancy, effort expectancy, social influence, easing conditions, hedonic motivation, price value and habit) by incorporating 'trust' as 'security' as added constructs. To evaluate the measurement model fit, a data analysis was performed through confirmatory factor analysis (CFA) and to evaluate the hypothesized relationships, structural equation modeling (SEM) is employed. Using the SEM enables to explore the path and significance of causal relations between latent variables. Considering that the model is sensitivitive to data multicollinearity, normality, and systematic missing data diagnostic tests were performed (Chen and Chang, 2012),

DATA ANALYSIS AND DISCUSSION

Following to the suggestion by Krejcie and Morgan (1970) for unknown population, 384 questionnaires were distributed to potential respondents but only 356 questioners were returned. This response rate is 92.3% of the sample which is higher than the minimum acceptable survey response rate of 50%. As shown in table 4.1 below, the sample was dominated by male respondents (58.4%) while 41.6% were females. Regarding age, the highest distribution (55.9%) is between 18 and 30 years old which are relatively youngsters while the remaining are 34.4%, 7.6% and 1.7% are between 34 and 40, 41 and 50, and above 50 years old respectively. With reference to the respondent's educational level, the most prominent educational level (42.1%) was the first degree followed by Certificate (29.5%) and second degree and above (19.9%).

In relation to the experience in using MM services, it was noticed that the great mass of respondents (53.9%)were observed to have an experience ranging from one year up to 3 years but 29.5% of respondents also have less than one year of experience which is significant proportion comparing with those who have above 5years experience (7.9%) in using the service. About the type of MM service that the respondents use, 61% of the respondents uses CBE-Birr while the remaining uses Amole Wallet, Hello cash, H-Birr, M-Birr, and/or Telebirr services. However, most of them (54.5%) use the service occasionally 7.9 % have never used the service (only registered). Additionally, most of the respondents reported a monthly income ranging between Birr 5,000 and Birr 20,000 (72.2%).

Reliability and Validity of the Constructs

When we employ SEM for testing and evaluating multivariate causal relationships, it is essential to measure reliability and validity of the instruments used in the survey. So, Cronbach's alpha is computed for setting up the consistency of the constructs and the result shows alpha is greater than 0.7 for all constructs used in the model except for easing conditions (0.657) which is a good indicator of reliability according to Henseler, Ringle & Sinkovics (2009). The factor loadings (λ) for all the items under each construct also found to be higher than 0.50. This was estimated to evaluate the correlation between the indexes, and it satisfies the convergent validity criteria as per Byrne (2016). It is also shown that, the value of average variance extracted (AVE) and the coefficient of composite reliability (CR) are greater than 0.4 and 0.7 for all the constructs, respectively. According to Hair (2010), AVE's value is recommended to be above 0.5 and all constructs are above this cute-off except for effort expectancy, easing conditions and actual use behavior which are above 0.4.

Table 1. Respondents' profile.

Table 4.1. Respondent's demographic data

Variable	**Category**	Frequency	Relative (%)	percentage
Sex	Males	208		58.4
	Females	148		67.4
Age (year)	18-30	199		55.9
	31-40	124		34.8
	41-50	27		7.6
	>50	6		1.7
Level of education	High school or below	30		8.4
	Certificate	105		29.5
	First Degree	150		42.1
	Second degree or above	71		19.9
Experience (year)	Less than one year	105		29.5
	From 1 up to 3 years	192		53.9
	From 4 up to 5 years	31		8.7
	above 5years	28		7.9
Occupation	Government Employee	129		36.2
	Private employee	144		40.4
	NGO employee	21		5.9
	Self-employed	36		10.1
	Unemployed	26		7.3
Type of MM service	CBE-Birr	217		61.0
	Amole Wallet	11		3.1
	Hello Cash,	7		2.0
	H-Birr	5		1.4
	M-BIRR	4		1.1
	Telebir	17		4.8
	Other two and more services	95		26.6
Monthly Income	<=3000	24		6.7
	3001-5000	36		10.1
	5001-1000	134		37.6
	10001-20000	123		34.6
	>=20000	39		11.0
Frequency	Occasionally	194		54.5
	Very often	134		37.6
	Never (only registered)	28		7.9

Source: own survey, 2022

Table 2.

Reliability and Validity of the Constructs

Construct	Item	Factor loading(λ)	Cronbach's α value	CR	AVE
Effort expectancy (EE)	EE1	.765	0.754	0..822	0.481
	EE2	.776			
	EE3	.629			
	EE4	.805			
	EE5	.674			
Performance expectancy (PE)	PE1	.861	0.803	0.840	0.641
	PE2	.746			
	PE3	.721			
	PE4	.723			
	PE5	.746			
Social influence (SI)	SI1	.684	0.797	0.812	0.592
	SI2	.788			
	SI3	.674			
	SI4	.626			
Facilitating conditions (FC)	FC1	.615	0.657	0.701	0.392
	FC2	.702			
	FC3	.737			
	FC4	.704			
	FC5	.629			
Hedonic Motivation (HM)	HM1	.765	0.772	0.784	0.565
	HM2	.820			
	HM3	.815			
Price Value (PV)	PV1	.714	0.801	0.822	0.612
	PV2	.669			
	PV3	.628			
Habit (HT)	HT1	.845	0.750	0.764	0.496
	HT2	.677			
	HT3	.704			
Trust (TR)	TR1	.890	0.755	0.770	0.511
	TR2	.771			
	TR3	.775			
	TR4	.698			
	TR5	.687			
Security (SE)	SE1	.639	0.756	0.778	0.534
	SE2	.648			
	SE3	.684			
	SE4	.585			
SE5		.56			
Behavioral Intention to use (BI)	BI1	.712	0.781	0.794	0.590
	BI2	.792			
	BI3	.811			
	BI4	.831			
	BI5	.794			
Actual use behavior (UB)	UB1	.724	0.701	0.717	0.414
	UB2	.695			

Source: own survey, 2022

Structural equation model analysis

To confirm the extended UTAUT model presented in chapter two, and to test the research hypotheses, SEM was employed using AMOS23. Because it is much realistic and powerful model than the standard multivariate statistics and multiple regression models. Moreover, AMOS23 is relatively new, powerful and graphical, easy-to-use software for structural equation modeling and to present the in an intuitive path diagram in a way that can show relationships among variables. Moreover, it is widely used software to get confirmative and interpretive results.

Structural model fit test

The first assessment of the model showed that the model fit between the data and UTUAT2 wasn't satisfactory. To improve the model fit statistics, modification index values were reviewed and possible covariance among constructs was formed (see diagram 4.1). Following to the covariance adjustment, the statistics showed satisfactory fit of the model to the data as per the desirable range recommended by several scholars such as Hair et al., (2010) and Schreiber et al (2006) and Anderson and Gerbing, 1988. Because all indices were found to be above the cut-points (desirable ranges) as shown in table 3 below.

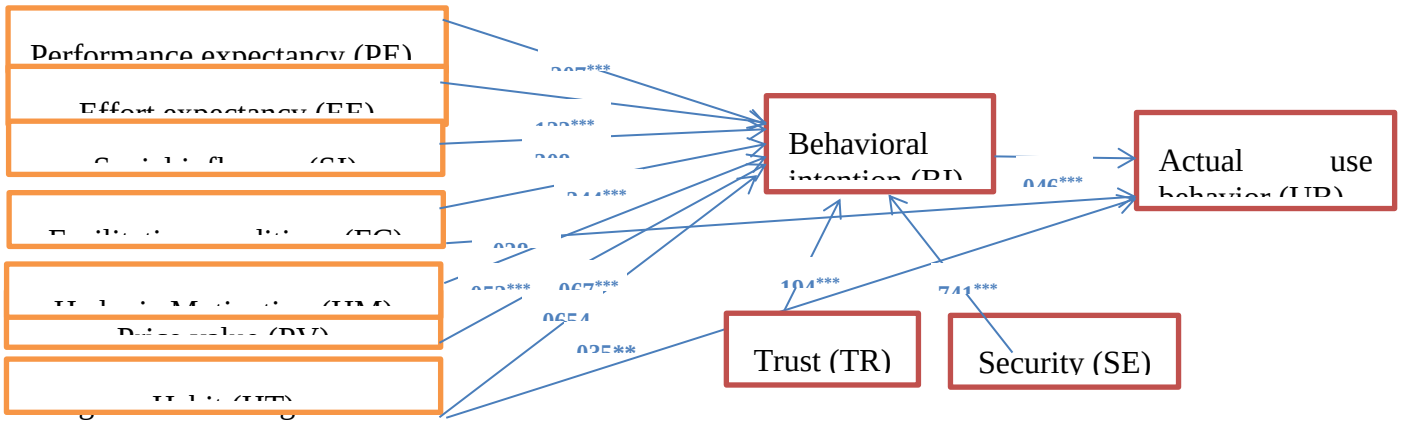
Table 3. Structural Model fit test

Fit indices	Indicator	Desirable range
$\chi 2$ (CMIN)/df	2.356	1.0 ≤CMIN/df≤3.0
TLI	0.924	≥0.8～0.9
CFI	0.944	≥0.8～0.9
RMSEA	0.62	≦0.08
GFI	0.889	≥0.8～0.9
AGFI	0.863	≥0.8～0.9
NFI	0.930	≥0.8～0.9

Source: own survey, 2022

Structural path analysis

After proving that the model fit index satisfies all acceptance criteria, the estimated path analysis of the SEM was then examined to explore the path and significance of causal relationships between latent variables and thereby to appraise the hypotheses. As shown in figure 1 and table 4.4, the result shows that the bank user's behavioral intention to adopt MM services (BI) was positively and significantly influenced by PE (β =0.207), EE (β =0.122), FC(β =0.344), HM (β =0.052), PV (β =0.067), TR (β =0.194) and SE (β =0.741) statistically at less than 0.001 probability level. The bank user's actual MM adoption behavior (UB) was also affected by BI (β =0.046) positively and significantly at less than 0.001 probability level.



NB: ***stands for P-value significant at < 0.001.

Likewise, FC (β =-0.028) and HT (β = 0.035) affects the UB negatively and positively, respectively but only HT statistically significant at less 5% probability level.

Table 4. Regression Weights

			Estimate	Std. Error	t-Value	p-Value	Label
BI	<---	EE	.122	.272	.448	***	
BI	<---	PE	.207	.073	2.828	***	
BI	<---	SI	.308	.715	.432	.291	
BI	<---	SE	.741	.529	1.400	***	
BI	<---	HM	.052	.216	.242	***	
BI	<---	PV	.067	.047	1.407	***	
BI	<---	TR	.194	1.532	.126	***	
BI	<---	HT	-.654	2.106	-.310	.184	
BI	<---	FC	.344	.770	.447	***	
UB	<---	BI	.046	.112	.414	***	
UB	<---	FC	-.028	.067	-.421	.213	
UB	<---	HT	.035	.078	.452	.045**	

Source: own survey, 2022

Results hypothesis testing

The outcome of all hypotheses testing, as shown in Table 4.5 below, proves that the estimation has supported 10 out 12 of the hypotheses. FC influence on users UB of MM services negatively and HT affects users BI to adopt MM. Even though, both results are contrary the researcher's hypothesis, their effect on the respective variables is not statistically significant even at 10% probability level.

Table 5. Results of Hypotheses Testing

Hypothesis	Supported
Ha1: PE has a positive influence on users BI to adopt MM	Yes
Ha2: EE has a positive influence on users BI to adopt MM	Yes
Ha3: SI has a positive influence on user BI to adopt MM	Yes
Ha4: FC has a positive influence on user BI to adopt MM	Yes
Ha5: HM has a positive influence on user BI to adopt MM	No
Ha6: PV has a positive influence on user BI to adopt MM	Yes
Ha7: HB has a positive influence on user BI to adopt MM	Yes
Ha8: TR has a positive influence on user BI to adopt MM	Yes
Ha9: TR has a positive influence on user BI to adopt MM	Yes
Ha10: Users' BI has a positive influence on user UB of MM services	Yes
Ha11: FC has a positive influence on user UB of MM services	No
Ha12: HT has a positive influence on user BI to adopt MM	No

Source: own survey, 2022

DISCUSSION, CONCLUSIONS AND PRACTICAL IMPLICATIONS

In this study, the researcher has empirically confirmed the theoretical research model, UTUAT2, developed by Venkatesh et al., (2012) by integrating with users perceived security and trust on the MM services. According to the inferential results presented above, it seems obviously that the proposed model has been able to reach an accepted level in the terms of predictive power in most of the endogenous factors. All fit criteria related to measurement model such as model fitness, construct reliability and validity are also successfully achieved. Particularly, the performance expectancy which can be explained by variable such as fitness to the purpose, perceived usefulness, and outcome expectation is strong predictor of the bank user's behavioural intension to adopt MM services. This result is in harmony with the theoretical literature of Venkatesh et al., (2003) and empirical evidences by Ismail et al., (2017), from Uganda, by Lubua & Semlambo, (2017) and Lema, (2017) from Tanzania, and Tobbin, (2011) from Ghana. Similarly, the estimation result for show effort expectancy and facilitation conditions (infrastructure) shows positive and significant effect on the user's behavioural intension to adopt MM services. These findings are in line with the above-mentioned empirical evidence and the theoretical literature by Venkatesh et al., (2003). Particularly, the result about the facilitation conditions is in line with the theoretical literature by Alshehri, Rutter and Smith, (2019) too.

Amongst all the exogenous variables, perceived security exerts a maximal effect on user's intention to adopt MM services followed by facilitation condition, performance expectancy, trust on the technology and effort expectancy. This finding is also in harmony with several studies, for example Kumar et al., (2020) and Lema, (2017), undertaken in the area of behavioural intentions to adopt of new technologies. The potential reasons for security and trust on the service are reported as an instrumental factor could be since it can reduce the perceived risk associated with

technology and creates a positive attitude towards it. This is also in harmony with the justification provided by Shankar & Datta (2018) and Silic &Ruf (2018). More importantly, the users' behavioural intention to adopt MM services is significantly transformed into actual behavior. However, the user's behavioural intension to adopt the service is not significantly affected by social influence which is contrary with the findings by Murendo et al., (2018) conducted in Uganda. This suggests that user's intention to adopt the service in Ethiopia is not mainly associated social image building or recommendation from family members, friends or other associates. But it is decided by the factors such as performance expectancy, perceived security, trust on the technological services, effort expectancy, infrastructure, hedonic motivation (entertaining ability of the service), and cognitive trade-off between the perceived benefits of using the service and the monetary benefits from using it. Moreover, factors such as sex, age, and user's experience of using mobile technology which were considered in the construct as a moderator following to the suggestion by Venkatesh et al., (2012) are excluded from the path. Because no direct or indirect effect of the moderators on the user's behavioral intension to adopt the service were seen.

PRACTICAL IMPLICATIONS FOR POLICY

As the MM services continues to become a fashioned service following to the swift development of mobile technologies and increasing demand for cashless monetary transactions, the banking system is also enhanced instantly in many countries including in Ethiopia. However, the introduction of new MM services cannot fully achieve the expected benefits if it is not used by all banking account holders. Regarding the users' behavioral intension to adopt the services, the following practical implications are derived from the results of this paper.

First, the institutions engaged in supplying MM service should use an aggressive approach to strengthen positive trust drivers. Such approach can create positive attitudes towards to the adoption of MM services by reducing trust inhibitors such as discomfort and insecurity dimensions which are sources of users' reluctance to adopt technology. Therefore, those banks and non-bank organizations offering MM services should aggressively promote better knowledge and attitudes towards their services through marketing activities. They should also strive to simplify their services interfaces and make it user-friendly that can avoid instances of user's discomfort and frustration. Besides, they must set realistic goals by users' trust and security and aid them in overcoming difficulties when using the services. Because assisting, guiding, and educating users can help to promote acceptance. Reliable, simple and user-friendly MM interface design can also ease transitions; thereby it can attract many more bank account holders to adopt the services with increasing varied services.

Second, the MM service providers should examine their service quality dimensions to increase their services users' hedonic motivation (enjoyment) and habit of using the MM services. To maximize, users' satisfaction and behavioral intentions to adopt the service, the service providers should offer a MM interface design which is reliable and easy to understand and operate with engaging functions. To do so, the service providers should design aesthetically appealing services with a state-of-the-art technology which have multi-purpose operational interfaces such as text messaging, hold-to-talk voice messaging, one-to-many messaging, video games, video and audio calls and conferencing, photograph and video sharing, moment sharing, location sharing, card repay, loans, mobile top up, utilities (bills) payments, documents and emojis transfer, article paywalls, online and spot shopping payments, red envelopes payments, and rail, air flight, taxi, movie and hotel bookings functions.

Finally, this research sets up new theoretical relationships which were not reflected on the extended UTAUT (UTAUT2) model developed by Venkatesh et al., (2012). The new paths involve Trust → BI, Security → users' BI, and then BI → Actual use behavior (UB). Therefore, the MM service providers should work to eradicate security concerns of the service users by designing a strong service application with useful security features. Moreover, the service should be designed in a way that proves that the users' data and transactions are safe guarded from hackers. In this regard, a money pay back surety policy and third-party security certificates for all transactions can minimize transaction risks and boost users' confidence on the service.

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3.7. The Effects of Organizational Culture on Employee Commitment as Mediated by Job Satisfaction in Addis Ababa City Administration

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ABSTRACT

The purpose of this study was examining the effects of organizational culture on employee commitment through the mediating role of employee job satisfaction in public institutions of Addis Ababa city Administration. To this end, descriptive design with deductive approach was employed to test the hypotheses. For this study, 606 employees were selected by simple random sampling being both Woredas and sub-cities for quantitative data. The standardized questionnaires forming 30-items measuring organizational couture (OC), 20- items measuring employee job satisfaction and 22-items measuring employee commitment were used for data collection. After data collection, three composite score/variables were generated during data analysis to analyze at interval scale. Hayes macro process model (4) along with SPSS (V.23) was used to analyze simple mediation. Prior to mediation analysis reliability of the instrument and normality of data were set up. In this regard, the instrument was confirmed to be reliable on the basis of alpha Cronbachs coefficient greater than 7; and also, the data were normal in distribution as of the results of kurtosis and skewness. The results show that organizational culture affects both employee satisfaction and employee commitment significantly. In the same way employee job satisfaction positively and significantly affects employee commitment. Overall, mediation role of job satisfaction between organizational culture and employee commitment was confirmed; and all hypotheses were supported. 11.6% of variation of employee commitment was explained by a mediating variable. The study result further implies that organizational culture has partial mediation role as it affects employee commitment directly. The study, therefore, recommends that managers in the public organizations need to design and set up organizational cultures that are more suitable to staff as they are confirmed to be significantly affecting employee job satisfaction and commitment.

Keywords: *Organizational Culture, Employees, Commitment, Satisfaction, Mediation*

INTRODUCTION

In today's competitive world, every organization is confronted with new challenges about sustained productivity and creating committed workforce. Hence, it is important to understand the concept of commitment and its feasible outcome (Dixit & Bhati, 2012). It is no longer good enough to have employees who come to work faithfully every day and do their jobs independently. Employees are the greatest resource in organizations and play an important role through their involvement and commitment to make the organization competitive (Roodt et al., 2002). Employees who are committed are liable to increase their performance and devote their time to the organization's success. Organizational commitment is often described as the key factor in the relationship between employees and organizations (Raju & Srivastava, 1994). Satisfied employees by means of an affective orientation or a positive attitude, achieve a positive result in relation to his/her job, in general, or to specific personal aspects (Stanton et al., 2002). This results in

improved communication among employees and workforce support for the organization, organizational commitment and job satisfaction (Lok & Crawford, 2004).

The existence of job satisfaction is the result of organizational culture that forms innovative approach of leadership style, the value, and belief and feeling practice in the organization. Organizational culture is the shared understanding of the beliefs, values, norms and philosophies of how things work in the organization (Wallach, 1983). Employee behavior (their commitment and job satisfaction), their expectations and their performance would decide the successful implementation of plans, policies and strategies that enhance the competitiveness of organizations.

This study thus examined the influence of organizational culture on employees' commitment and a kind of mediating effect of job satisfaction on this relationship within employees of public organizations. It can be clearly realized that the success of organization can nearly always be ensured through the contribution of unreserved efforts of employees who are working within it. This is possible if the organization has employees who have been satisfied in their current jobs and show the highest committed for ensuring their organizational competitiveness. It also shows that how strongly employees are involved in and identify with the organization highly depends on conducive culture within the organization (McCunn & Gifford, 2014). Many researchers have discussed the positive aspects of organizational commitment and its effects on work productivity, motivation, turnover intention, and absenteeism, and that it is a powerful tool for employees and organizations to increase productivity and effectiveness (Genevičiūtė-Janonienė & Endriulaitienė, 2014).

The commitment of employees traced directly back to the good organizational culture practiced. Therefore, having effective and good organizational culture for the organization is critical to retain competent employees to ensure the competitive survival of organizations. Also Ashraf et al. (2012) depicted that employee commitment can be affected by the quality of the leadership exercised, and culture practiced in the organization. In this regard, the current study aims to systematically examine the influence of organizational culture on employees' commitment which is critical for competitive and productive survival of public organizations. In addition, it addresses how job satisfaction can determine the relationship between organizational culture and employees in context of public institutions in Addis Ababa.

Organizational culture has received a lot of attention in recent decades due to its possible impact on organizational success. This means that an organization's ability and success in achieving its aims and objectives may be influenced by its culture. In addition, an individuals' commitment from employees is also essential to ensure that the organization's policies and strategies are implemented successfully (Tsai, 2011). Individuals who are more enthusiastic about their jobs are more likely to participate in organizational activities and demonstrate positive in-role and extra-role behaviors (Meyer & Allen, 1991).

Allen and Meyer (1993) noticed that an individual's relationship with their workplace is described by organizational commitment, regardless of the company's great or negative situations, which is psychological conditions, which allows a loyal employee to stick with it. Also the study result of Pinho et al. (2014) confirmed the impact of organizational culture on employee commitment. More recently, Karem et al. (2019) established the fact that individuals who are passionate about and satisfied with their jobs, on the other hand, are more likely to work hard and exhibit positive work habits.

Changes in organizational culture will certainly have an impact on enterprises and governments' broad patterns and established institutions. Managers are becoming more conscious of organizational culture elements such as traditions, rules and processes, regulations, and standards, which will help employee, perform better. Both organizational culture and commitment are being investigated because they have an impact on organizational performance and can influence organizational outcomes Pinho et al. (2014).

In support to this ideas, a study result of Grein et al. (2020) highlighted that organizational culture is crucial in establishing a set of fundamental ideas, understandings and a healthy workplace environment in which dedicated people contribute positively to the organization's success. Public organizations are becoming increasingly devoted to make meaningful change in response to the increasing demand for services such as raising customer service quality requirements and setting up efficiency and effectiveness. In this context, the adoption of different reforms as to human resource incentive package, redeployment of employees based on job evaluation appraisal and grading; and improving workplace conditions by public organizations in Ethiopia generally, and Addis Ababa particularly are considered as critical components playing roles in improving organizational performance. However in reality, most civil service organizations in Ethiopia have been obliged to hold less satisfied and committed employees and this is because of poor remuneration and benefit package (Getahun et al., 2016; Mariam et al., 2020; Kefyalew et al., 2020; & Aklilu et al., 2020). This could make the public organizations to hold employees who are not committed and losing well experienced employees from time to time. This would adversely affect the competitive survival of organization in meeting the changing service demand of citizens (Kassaw & Golga, 2019; Kefyalew et al., 2020; Gebru, 2021; & *Warga , 2019*, 2019).

Previous researches on employee commitment have mainly focused on organizational culture dimensions rather than including the mediating role of job satisfaction as mediating variable and determining its effects on employee commitment (Dima et al., 2019; Elizabet & Anggrain, 2021); Inanlou & Ahn, 2017). However, almost a few scholars such as Nigusie (2018) have studied the effect of organizational culture on employees' commitment with mediating role of job satisfaction in this relationship by considering employees in a public enterprise Oromia Forest and Wild Life Enterprise.

Therefore, the study about the impact of organizational culture on employees' commitment with mediating role of job satisfaction for employees across different public institutions is very scant. Thus, examining the existing organizational situations and supplying solutions to improve employee satisfaction and commitment, calls for rigorous empirical study. Furthermore, this study aims to enrich the body of knowledge in public organizations under study settings and to find the impact of organizational culture on employees' commitment through the mediating role of employee job satisfaction. To realize the aim of this study, the researcher set the following four hypotheses to be tested.

H1. Organizational culture significantly predicts employees' job satisfaction.

H2. Employee job satisfaction significantly employee commitment

H3. Organizational culture significantly predicts employee commitment.

H4. Employee job satisfaction would mediate the impact of organizational culture on employee commitment.

This chapter covers the definitions for basic concepts, the organizational culture, job satisfaction, employees' commitment and the mediating role of job satisfaction in the relationship between organizational culture and employees' commitment.

Concept of Organizational Culture

According to Shahzad et al. (2013), organizational culture is defined as a set of acceptable values is always right, which helps a person in the organization to understand the actions that are unacceptable and which actions are unacceptable and values are communicated through stories and other symbolic ways. Meanwhile, according to Schein (2010), organizational culture can be considered as what the organization has or what the organization is depending on whether it is being treated as a construct or a metaphor. Sithi-Amnuai (1996) limits the understanding of organizational culture as a pattern of basic assumptions and beliefs held by members of an organization from the process of learning to the problems of external adaptation and internal integration problems. Organizations have cultures through learning, inheritance, adaptation and verification of the value adopted or termed Schein (1983) considered an invalid value is proven benefits.

According to Sashkin and Rosenbach (1990), elements of organizational culture include: Managing change, coordinated, teamwork, goal achievement, customer orientation, and building strong culture.

Managing change: - This area of action concerns how well the organization can adapt to and deal effectively with changes in its environment. All organizations are open, to some extent, to be influenced from their environments; that is what it means when we refer to organizations as "open systems." This fact has become even more obvious today, in times of rapid technological and social change, than it was in the past. In earlier times it was possible to ignore the organization's environment and the effects it had on the organization; this is no longer possible.

Achieving goals: - All organizations must achieve some aims or goals for clients or customers. Having a clear focus on explicit goals has been proven repeatedly to have an extraordinarily strong relationship to actual success and achievement. Goal achievement is also eased when the goals of the organization's members are "in line" or aligned with one another and with the overall goals of the organization. When organization members share the belief that is important to be doing and achieving, this will help the organization to reach its goals.

Coordinated teamwork: Long term organizational survival depends on how well the efforts of individuals and groups within the organization are tied together, coordinated and sequenced so that people's work efforts fit together effectively. What is less obvious is that it can be equally counterproductive to try to have everything carefully planned from the top, down to the smallest detail. With work and the world becoming increasingly complex, what is needed are more effective ways of meeting unpredictable coordination demands, ways for organization members to "mutually adjust" their actions to consider unplanned and unpredictable circumstances.

Customer orientation: **-** While organizations often have specific product or service goals or a standard of quality or a type of product or service for which the organization is known, the crucial question is whether these internally derived and defined goals match or fit with what clients or customers want of the organization. No matter how strong the culture and no matter how well the other functions are performed, if no one wants what the organization produces or does, then the organization is not likely to prosper.

Cultural strength: - A strong culture will supply greater stability of organizational functioning. When the culture is based on values that do not support the functions of managing change, organizational achievement, customer orientation, and coordinated teamwork--or when the values work against the effective performance of these functions--then a "strong" culture might hamper organizational survival.

The Concept of Employees' Job Satisfaction

Job satisfaction can be defined as a positive effect towards employment (Mueller & McCloskey, 1990) and it is arguably a fairly stable evaluation of how the job meets the employee's needs, wants, or expectations (Fisher, 2003). In research, job satisfaction has been assessed using global aspects as well as multiple facets like salary, career progression, supervisor (Fisher, 2003). Job Satisfaction has been playing a leading role in management research (Petty et al., 1984; Fisher, 2003). Many studies share that satisfied employees will perform their work more effectively, which is the basis of many theories of performance, reward, job design and leadership (Shipton et al., 2006). Simply put, job satisfaction is the extent to which people like their jobs (Spector, 1997).

Job satisfaction, a concept that is widely studied in organizational behavior research, is 'commonly conceptualized as an affective variable that results from an assessment of an individual's job experience' (Fritzsche & Parrish, 2005). In a simpler term, job satisfaction is 'the extent to which people like their jobs'(Peterson & Wilson, 1992). Accordingly, Armstrong, (2006) defined the term job satisfaction as the attitudes and feelings people have about their jobs. For Armstrong, positive or favorable attitudes about the work and the work environment show job satisfaction, and the inverse, referring to negative or unfavorable attitudes towards the work to show job dissatisfaction. Job satisfaction may also refer to the fulfillment bought by individuals in respect of the various job activities, and the rewards for their jobs and job-related matters.

Saiyadain and Khanna (2007) viewed job satisfaction as an employee's end-state of feeling after carrying out a task. This feeling may lead employee to have either a positive or a negative attitude towards the job. According to Spector (1997), job satisfaction refers to the extent to which employees or individuals like or dislike their jobs and the various aspects of their jobs. For Spector (1997), job satisfaction can be a diagnostic indicator of how a person is doing in one of the major domains of his or her life-role. Spector further stated that the absence of job satisfaction suggests that a problem exists either in the job or in the person, whereas job satisfaction is indicative of good work-adjustment and positive well-being. Falkenburg and Schyns (2007) agree with the definition given by Spector and argue that the term job satisfaction is seen as satisfaction with various aspects of the job and the work environment/situation.

Employee job satisfaction refers to the overall attitude and views of teachers toward their working conditions and profession (Xuetao et al., 2008). The definitions given above suggest that the job satisfaction of employees in Ethiopia includes the overall feeling they may have about their work when they evaluate their job and their job-related experiences or work factors. Work factors include salary and benefits, management, work characteristics, and interpersonal relationships.

Dimensions of Employees' Job Satisfaction

The constructs of employee job satisfaction have been approached from many directions. Contributing factors have been often identified as intrinsic or extrinsic. According to Samuel and Chipunza (2009), combinations of intrinsic and extrinsic rewards influence employee decisions to remain in the profession. Herzberg and Howe (1959) brought attention to the distinction between intrinsic and extrinsic factors in the workplace in their theory of job satisfaction. Intrinsic factors are matters related to the self-actualization of the worker, that is, the need for a sense of self-accomplishment on the job or, as commonly labeled, intrinsic job satisfaction. Intrinsic job satisfaction is derived from the composite of intrinsic factors experienced in the job. Intrinsic job factors are factors such as responsibility, self-defectiveness, skill development, and saw accomplishment associated with doing the work. Conversely, extrinsic factors are factors such as company policies, supervision, external rewards such as reflected in satisfaction with pay, and workload, which define the external context and reward system within which the worker labors. Researchers in earlier studies on the framework offered by Herzberg and colleagues found that both intrinsic and extrinsic job factors predicted levels of job satisfaction, although intrinsic factors had a stronger association with satisfaction level than extrinsic factors (Ewen et al., 1966). Also, the results of Sharoni et al. (2012) study suggest that intrinsic job satisfaction has an affective basis, whereas extrinsic job satisfaction does not. In general, this study examines the employees' job satisfaction using the following most applied dimensions of job satisfaction.

Table 2.1: Dimensions of employees' job satisfaction

Intrinsic Scale	**Description**
Ability use	The chance to do something that makes use of my abilities.
Achievement	The feeling of accomplishment got form the job
Advancement	The chances for advancement on the job.
Recognition	The praise for doing an excellent job.
Responsibility	The freedom to use own judgment
2. Extrinsic Scale	**Description**
Company policies and practices	The way company policies are put into practice
Compensation	The pay and the number of work employees do
Co-workers	The way co-workers get along with each other
Supervision-human relations	The way the boss handles his men
Supervision-technical	The competence of the supervisor in making decisions
Working conditions	The working conditions

Source: Weiss et al., (1967)

The assessment of employees' job satisfaction uses the Minnesota Satisfaction Questionnaire which was one of the outputs from the "Work Adjustment Project" at the University of Minnesota; the underlying theory is based on the assumption that work fit is dependent on the correspondence

between the individual skills and the reinforcements that exist in the work environment (Weiss et al., 1967).

Concept of employees' commitment

Commitment has been defined and measured in many different ways O'Reilly and Chatman (1986) defined organizational commitment as "the psychological attachment felt by the person for the organization; it will reflect the degree to which the individual internalizes or adopts characteristics or perspectives of the organization".

Models of organizational commitment

According to Meyer and Allen (1991), organizational commitment reflects at least three general themes: "affective attachment to the organization", "the perceived costs associated with leaving it" and "the obligation to remain with it". These three approaches are referred to as "affective", "continuance" and "normative" commitment. Common to these three approaches is the view that commitment is a psychological state that characterizes the employee's relationship with the organization and has implications for the decision to continue membership of it. These psychological states also have different implications for work-relevant behavior.

Affective commitment

Affective commitment refers to the employee's emotional attachment to, identification with, and involvement in the organization. Employees with a strong affective commitment continue employment with the organization because they want to. According to Lerner (1982), the antecedents of affective commitment generally fall into four categories: (1) personal characteristics, (2) structural characteristics (organizational), (3) job-related characteristics, and (4) work experiences. Although various research studies have been conducted to link demographic characteristics such as age, tenure, gender, and education to commitment, the relations were neither strong nor consistent, the reason being too many variables such as job status, work rewards and work values moderating the relationship.

Continuance commitment

Continuance commitment refers to an awareness of the costs associated with leaving the organization. The potential costs of leaving an organization include the threat of wasting the time and effort spent buying nontransferable skills, losing attractive benefits, giving up seniority-based privileges, or having to uproot the family and disrupt personal relationships Meyer and Allen, 1991. Apart from the costs involved in leaving the organization, continuance commitment will also develop as a function of a lack of alternative employment opportunities (Meyer & Allen, 1991).

Normative commitment

Normative commitment reflects a feeling of obligation to continue employment. Employees with a high level of normative commitment feel that they ought to remain with the organization. Wiener (1982) suggests that the feeling of obligation to remain with an organization may result from the internalization of normative pressures exerted on an individual prior to entry into the organization (family or cultural orientation) or following entry (organizational orientation). However, normative commitment may also develop when an organization provides the employee with "rewards in advance" (e.g. paying college tuition) or incurs significant costs in providing employment (e.g. head-hunting fees or the costs associated with job training). Recognition of these

investments causes employees to feel an obligation to reciprocate by committing themselves to the organization until the debt has been repaid (Scholl, 1981).

Relationship between organizational culture, job satisfaction, and employees' commitment

There are many studies investigating the relationship between organizational culture and organizational commitment that found there is a positive relationship between organizational culture and organizational commitment (Achieng'Odembo, 2013) & Gan et al., 2014). Organizational culture has been identified as a major driver behind employee longevity (Desselle et al., 2018). A corporate culture is a significant tool for improving organizational commitment, and the better the adjustment between stated and perceived values, the better the organizational commitment (Brewer & Clippard, 2002). In regard to the relationship between organizational culture and employees' job satisfaction, the study by Cameron et al. (1991) has found that organizational culture has a significant impact on several key organizational variables such as employee satisfaction, employee performance, turnover and so forth. Furthermore, in the body of literature, there is evidence that assures the impact of organizational culture on individual attitudes and behaviors of which job satisfaction has been shown to be directly affected by organizational culture. Concerning the relationship between job satisfaction and employee commitment, Huang and Hsiao (2007) stated that job satisfaction is the precursor of commitment which may benefit both changing human behavior outcomes and increasing commitment. They further explained that people will be more committed to their work if they felt satisfied and appreciated. The study by Nigusie (2018) stated that job satisfaction does act as a fully mediating role in the relationship between organizational cultures and organizational commitment and suggesting that effective improvement in job satisfaction is a critical aspect of the organizational success.

Summary of empirical studies

In fact, globally, numerous studies have been done in the areas of organizational culture and emphasized the significance setting up proper organizational culture to have a better future and performance. A study result of Achieng'Odembo (2013) established the forward and backward linkage of employee job satisfaction and organizational culture. The study result of Habib et al. (2014) proved the effect of organizational culture on job satisfaction, employee commitment and retention. Studies by Acquah et al. (2020), Zanabazar et al. (2021) and Sarpong et al. (2021) revealed a positive significant relationship between organizational culture and employee commitment.

In Ethiopian case, a study result of Getahun et al. (2016) on primary school teachers; Addisu, (2018) on college teachers; Kassaw and Golga (2019a) academic staff at university; Kefyalew et al.(2020) at education office workers proved the effect of organizational culture at education Sector. The other studies by Bekele and Mohammed (2020) on Ethiopian Airlines; *Warga (*2019) and Gebru (2021) on Commercial Bank of Ethiopia; Addisu (2018) on leather industry; Dinku (2018) on Sugar industry proved the direct effect of organizational culture on employee satisfaction and commitment. By the same token, Aklilu et al. (2020) and Yemi et al. (2020) confirmed its effect on health professionals at different levels and disciplines. As can be seen from the above studies, they have shown a strong correlation between organizational culture, organizational commitment, and job satisfaction. Nevertheless, earlier research on employee commitment have mainly focused on organizational culture dimensions rather than including the mediating role of job satisfaction as mediating variable and determining its effects on employee commitment. Subsequently, this study examines whether the employee's job satisfaction plays a

mediating role in the relationship between organizational culture and employee commitment in public institutions of Addis Ababa using the following framework.

METHODOLOGY

This study employed a descriptive design with deductive approach. The study used the questionnaire to collect the data from employees in public institutions found in Addis Ababa city Administration. For this study 606 employees, being both sub-cities and woredas, were selected using both simple and stratified random sampling techniques. The sample size was decided by the Slovin's formula before stratifying the total sample. To this end, 606 questionnaires were distributed for individual respondents selected through simple random sampling method from each stratum. In this regard, the researcher assumes that the study was designed carefully to ensure the representativeness of the employees and believes that the sampling strategy is robust to increase the likelihood of even participation; and reduces the likelihood of deriving faulty conclusions from outcomes of the investigation. So, 606 questionnaires were distributed, and the response rate was 100%. The questionnaire forms two sub sections: the first was about the demographic information of the respondents; the second section includes 72-items with 10 dimensions. Of the 72 items adopted from the previous studies, organizational couture (CO) measured by 30 items adopted from Sashkin and Rosenbach (2013), employee job satisfaction 20 items adopted from Wiss et al. (1967); and employee commitment 22 items adopted from Meyer and Allen (1991). All items were measured by a five points Likert scales during data collection and three composite score/variables were generated during data analysis to analyze at interval scale.

The study employed SPSS V.23 as a tool for analysis for both descriptive and inferential statistics. Prior to quantitative analysis, the data were classified and tabulated to enter SPSS software. Preliminary analysis was done to confirm the normality of the data, validity and reliability of the instrument before proceeding to the next analysis. In this regard, the data were confirmed to be normal as the result of kurtosis and skewness showed in table (). In addition, the instrument reliability was confirmed by the overall Cronbachs alpha coefficient greater than 7 as indicated below in Table (). Specifically, for mediation analysis, the study used Hayes macro process Model (4) which allows the bootstrapping approach for estimation of mediation effects.

RESULTS

The aims of this study were confirming whether the organizational culture predicts employee job satisfaction (H1), whether the employee job satisfaction predicts employee commitment (H2), whether the organizational culture predicts employee commitment (H3); and confirming the mediating effects of job satisfaction between organizational culture and employee commitment (H4). To these ends, mediation analysis using SPSS macro process model (4) was conducted and the results are as showed below.

RQ1/H1 Organizational culture significantly predicts employee job satisfaction.

4.2. Employee job Satisfaction (ES)

Table 4.1. Model Summary

R	R-sq	MSE	F	df1	df2	p
.7282	.5303	.1780	682.0268	1.0000	604.0000	.0000
Model	coeff	se	t	p	LLCI	ULCI
constant	.8311	.0855	9.7226	.0000	.6632	.9990
Organizational Culture (OC)	.7339	.0281	26.1156	.0000	.6787	.7891

***OC->ES

As can be seen from table 4.1 above, organizational culture (OC) is a significant positive predictor of employee job satisfaction (b=.7339, s. e=.0281, p<.001). This coefficient reflects the direct effect of organizational culture on employee job satisfaction within the path model; thus, H1 is supported. Pictorially it can be depicted as: -

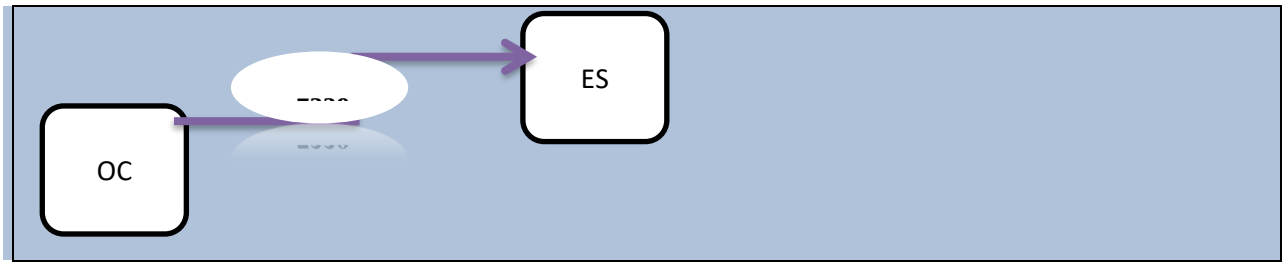


Figure 4.1 Paths OC->ES

RQ2/H2 Employee job satisfaction significantly predicts employee commitment.

4.3. Employee Commitment (EC)

Table 4.2. Model Summary

R	R-sq	MSE	F	df1	df2	p
.9087	.8257	.0685	1428.1383	2.0000	603.0000	.0000
Model	coeff	se	t	p	LLCI	ULCI
constant	.1354	.0570	2.3746	.0179	.0234	.2474
Employee Job Satisfaction (ES)	.1468	.0252	5.8188	.0000	.0973	.1964

The above summary table number 4.2 shows that employee job satisfaction (ES) is a significant positive predictor of employee commitment (b=.1468, s. e=.0252, p<.001). This coefficient reflects the direct effect of employee job satisfaction on employee commitment within the path model; thus, H2 is supported.

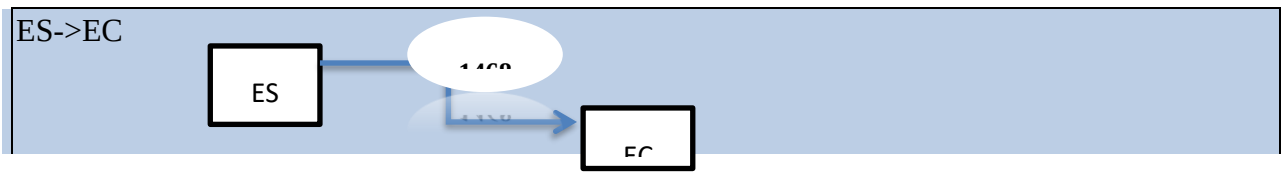


Figure 4.2 Paths ES->EC

RQ3/H3 Organizational culture significantly predicts employee commitment.

4.4. Employee Commitment (EC)

Table 4.3. Model Summary

R	R-sq	MSE	F	df1	df2	p
.9087	.8257	.0685	1428.1383	2.0000	603.0000	.0000
Model	coeff	se	t	p	LLCI	ULCI
constant	.1354	.0570	2.3746	.0179	.0234	.2474
Organizational Culture (OC)	.8182	.0254	32.1711	.0000	.7682	.8681

As can be seen from table 4.3 above, organizational culture (OC) is a significant positive predictor of employee commitment (b=.8182, s. e=.0254, p<.001). This coefficient reflects the direct effect of organizational culture on employee commitment within the path model; thus, H3 is supported.

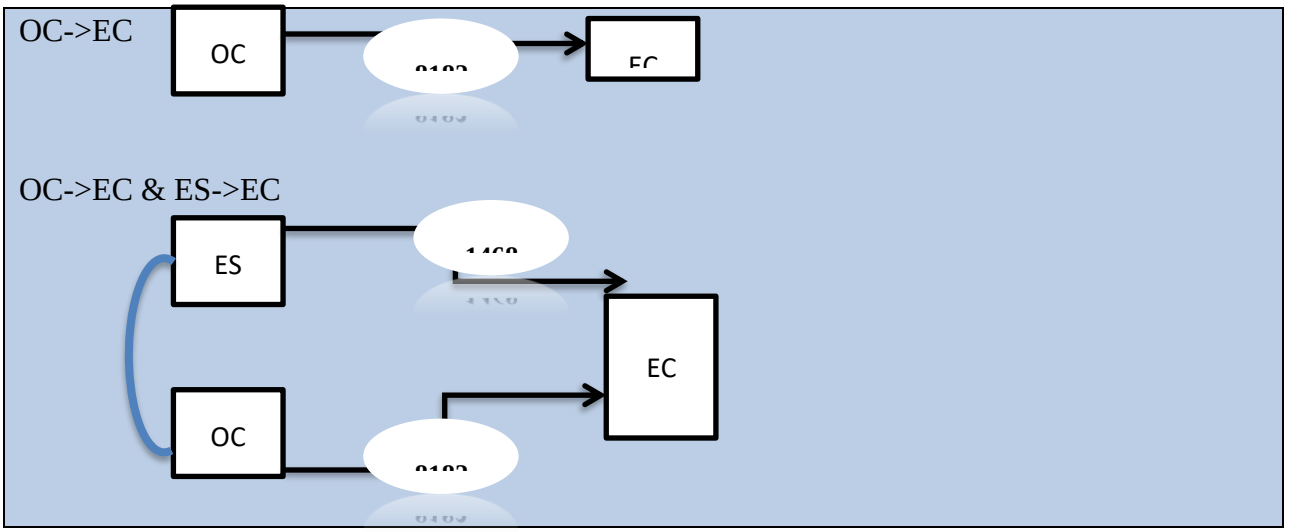


Figure 3 Paths OC->EC; and Paths OC->EC & ES->EC combined.

RQ4/H4 Employee job satisfaction would mediate the impact of organizational culture on employee commitment.

Table.4 Total effect of OC on EC

Effect	se	t	p	LLCI	ULCI
.9260	.0179	51.7378	.0000	.8908	.9611

The above table shows the total effect of organizational culture on employee commitment computed as the direct effect of organizational culture (DE=.8182) and indirect effect of organizational culture on employee commitment through employee job satisfaction (IE=.1078) add up to .9260. This total effect is positive and significant as zero (the null) does not fall between the lower (LLCI=.8980) and upper (ULCI=.9611) bound of the 95% confidence interval. From this we can infer that the total effect of organizational culture on employee commitment is significantly different from zero.

Table 5 Indirect effect(s) of OC on EC

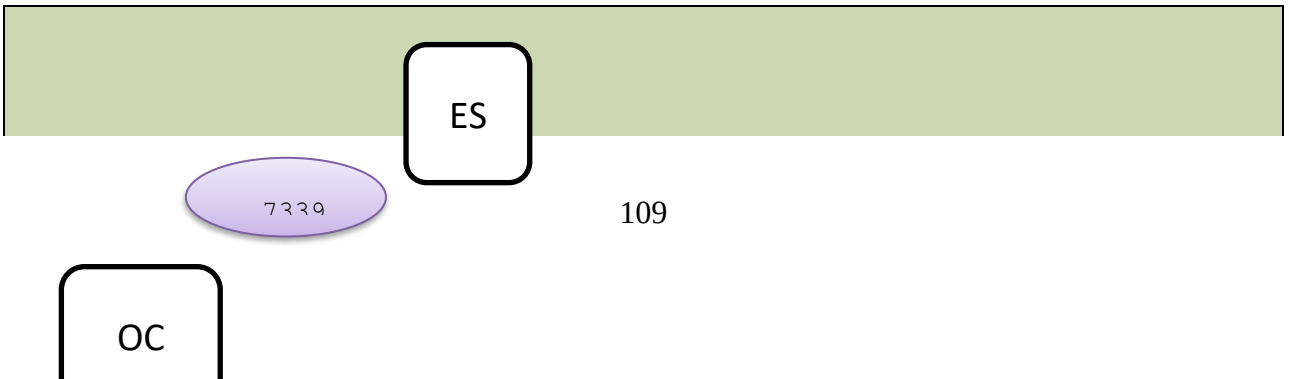
	Effect	BootSE	BootLLCI	BootULCI
ES	.1078	.0318	.0482	.1723

The unstandardized indirect effect showed in the table above, that is (.1078) is assumed to be the product of two coefficients represented by OC->EC (.8182) and ES->EC (.1468) even though the analysis was done by Hayes (2018) macro process model (4). This indirect effect is significant as zero does not fall between BootLLCI (.482) and BootULCI (.1723). Based on the evidence provided in two tables above, the researcher is keen to justify that employee job satisfaction mediates the impact of organizational culture on employee commitment in the study area. Thus, H4 is supported.

Table6 Hypothesis summary

Item summary	coeff	se	t	p	LLCI	ULCI
H1. OC->ES	.7339	.0281	26.1156	.0000	.6787	.7891
H2. ES->EC	.1468	.0252	5.8188	.0000	.0973	.1964
H3. OC->EC	.8182	.0254	32.1711	.0000	.0973	.1964
Indirect	Effect	BootSE		BootLLCI		BootULCI
H4. OC->ES->OC	.1078	.0318		.0482		.1723

****OC =organizational culture; ES= employee job satisfaction; and EC= employee commitment**



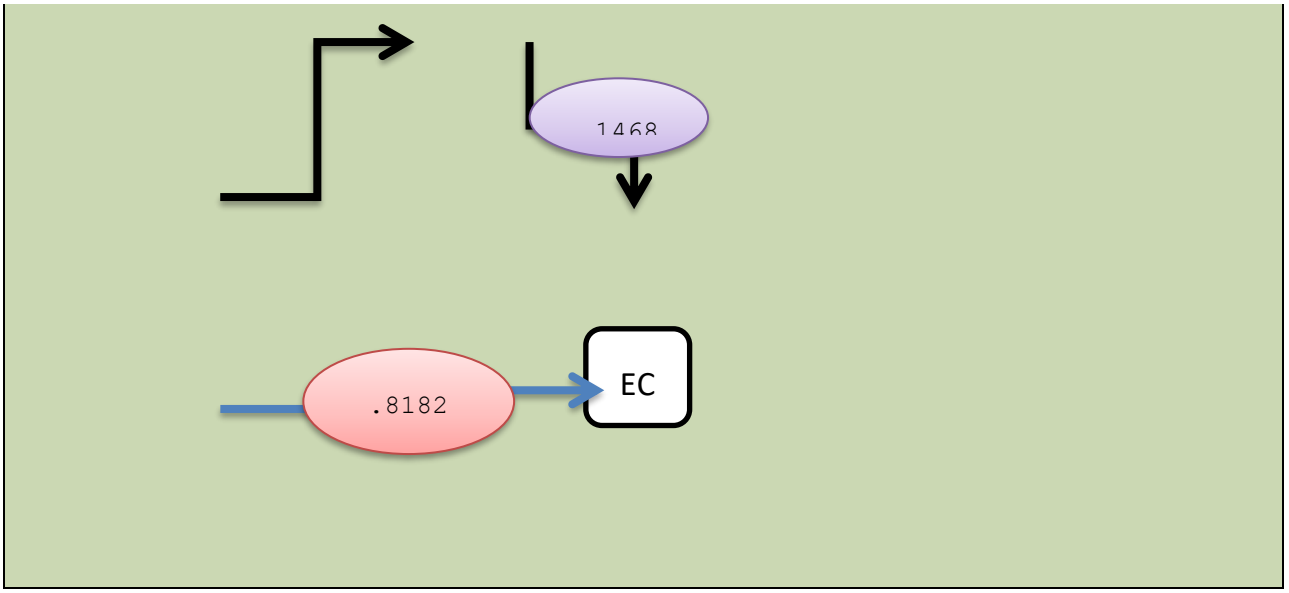


**Figure 4.4 Path Model

DISCUSSION

Now days the most important organizational asset is the human resource which decides the success of an organization. In other words, it is possible to say that the success of an organization highly depends on its employees' commitment. In this regard, any condition affecting employees' commitment will affect organizational the organizational performance in the end. From the outset of this study, the researcher posed questions and proposed four hypotheses to be confirmed after the data collection and rigorous analysis. Evidently, the purpose of the study has been achieved and substantiated as indicated below.

Firstly, the hypothesis that is the direct effect of organizational culture on employee job satisfaction was conducted and the result shows that organizational culture has significant positive effect up on employee job satisfaction in the area under study settings. The result is in line with earlier (Odembo, 2013 & Habib, 2014; Desselle, Raja, Andrews, & Lui, 2018; Cameron & Freeman, 1991).

When it comes to boosting employee job satisfaction, organizational culture is crucial. However, Organizational culture should be mandatory for all members and workers since this will foster uniformity among the organization's members. It will also improve staff productivity, commitment, and overall performance, emphasizing the importance of organizational culture in fostering consistency among employees. Thus, it may enhance group efficiency, commitment, and overall performance. Organizational culture is a set of fundamental ideas that contribute to the organization's strength and stability due to cultural transformation. The advantages of good organizational culture in the workplace include improved mutual collaboration, unity, integrity, kinship, improved communication, and increased performance. Therefore, paying more attention to organizational culture is one way to increase employee job satisfaction in the workplace. However, culture refers to an organization's values and qualities that differentiate it from its rivals. Therefore, job satisfaction is positively influenced by organizational culture. In addition, employee behavior is influenced by organizational culture, which motivates them to seek positive outcomes.

Secondly, the hypothesis that is concerned with the direct effect of employee job satisfaction on employee commitment was conducted and the result shows that employee job satisfaction has significant positive effect up on employee commitment in the area under study settings. This result is supported by several earlier results (Huang & Hsiao (2007); Odembo, 2013 Girma & Tesfaye, 2018).

Thirdly, the hypothesis that is concerned with the direct effect of organizational culture on employee commitment was conducted and the result shows that organizational culture has significant positive effect up on employee commitment in the area under study settings. This result is supported by several earlier results (Huang & Hsiao (2007); (Odembo, 2013 & Habib, 2014 (Desselle, Raja, Andrews, & Lui, 2018) (Brewer & Clippard, 2002)). There are many studies investigating the relationship between organizational culture and organizational commitment that found there is a positive relationship between organizational culture and organizational commitment (Odembo, 2013 & Habib, 2014). Organizational culture has been identified as a major driver behind employee longevity (Desselle, Raja, Andrews, & Lui, 2018). A corporate culture is a significant tool for improving organizational commitment, and the better the adjustment between stated and perceived values, the better the organizational commitment (Brewer & Clippard, 2002). Employees with a strong organizational commitment and more innovative and stable will drive the company to greater profitability. Individuals with a high organizational commitment are vital in achieving organizational goals; those with a low commitment are more concerned with fulfilling individual interests than those of the organization. This result also illustrates individuals' commitment to making businesses successful, and respondents' strong organizational commitment proves how inventiveness and consistency help a company to be lucrative and wealthy.

Lastly, the hypothesis concerned with the mediating impact of employee satisfaction between organizational culture and employee commitment. The result shows that the employee job satisfaction partially mediates the impact of organizational culture on employee commitment in the study area and the mediation effect is significant. This result is slightly in line with the study result of (Nigus, 2018). This is because the earlier study of Nigus (2018) said that job satisfaction does act as a fully mediating role in the relationship between organizational cultures and organizational commitment and suggesting that effective improvement in job satisfaction is a critical aspect of the organizational success. However, this study is directly in line with the result of Huang and Hsiao (2007) that substantiates this study as satisfaction is the precursor of commitment which may help both changing human behavior. Similar study further explained that people will be more committed to their work if they felt satisfied and appreciated. In nutshell, numerous studies have been done in the areas of organizational culture and emphasized the significance setting up proper organizational culture to have a better future and performance. A study result of Odembo (2013) set up the forward and backward linkage of employee job satisfaction and organizational culture. The study result of Habibi (2014) proved the effect of organizational culture on job satisfaction, employee commitment and retention. Studies by Acquah et al. (2020), Jigjiddorj et al. (2021) and Sarpong et al. (2021) revealed a positive significant relationship between organizational culture and employee commitment. These all-earlier studies substantiated the result of this study. Therefore, institutions should enhance the organization culture in the workplace to increase organizational culture's impact on employee job satisfaction and commitment.

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4. ENVIRONMENT & DEVELOPMENT

4.1. Identification of Accident Black Spot Location Using GPS Technology and GIS for Yeka abado Condominium – Wesen – Megenagna Road Segment

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ABSTRACT

Road traffic accidents were unpredicted actions that occurred and left bad scenarios on the life the peoples. The main aim of this study was to analyze trends of road accidents and find the black spot's locations along the road. This study analyzed secondary road crash data between the years 2017/2018 and 2020/2021 obtained from Yeka Sub-city traffic police office. The result showed that 1,140 people involved various levels of injuries which 35(3.07%) were fatal, 113(9.91%) major injuries, and 992(87.02%) of minor injuries. The total accident of 829(18.38%) occurred in the early morning 7:00-9:00 AM on the working days of Monday and Friday. The drivers involved in the crashes were 2352(97.23%) male and 46(1.90%) female drivers with 50.50 % grade 9 to 12 education level and 73.75% employed for others regardless of their sex. On the other hand, the crash sustained 555(48.68%) private workers. The most ranked black spots road locations were Wesen Grocery and Kara junction, respectively. Generally, among other main risks of factors assessed including following to close and improper use of steering causes largely a vehicle-to-vehicle collision type on the straight road condition. From this, Driver Training Institutions should be pointed out guidance before a license is issued.

Keywords: *Road Traffic Accidents, Black spot, Trends, injuries*

INTRODUCTION

Road traffic accidents (RTAs) are increasingly being recognized as one of the greatest public health issues where everyday thousands of people are killed and injured on roads across the world. The deaths from road traffic crashes have increased to 1.35 million a year and cause up to 50 million injuries, and it is also now the leading cause of death for children and young adults aged 5–29 years (Sleet et al., 2011; WHO, 2018).in the same case that's nearly 3700 people dying on the world's roads every day. Countries in Africa and South-East Asia have regional rates of traffic death higher than the global rate with 26.6 and 20.7 deaths per 100,000 populations (WHO, 2018). Projections show that, without a new and sustained commitment to preventing such injuries, the situation will worsen with a projected increase in deaths of about 66% over the next 20 years (Kopits and Cropper, 2003).

Ethiopia has the high road crash rate in the world. A study made in Ethiopia noted that the occurrence of traffic accidents in the country was increasing as the exposure to this risk increased due to rapid motorization without appropriate regulation, rapid population growth, and an increase in the road network coupled with a poor attitude and safety culture of road users (UNECA, 2020). Know a day; the country has roads under construction, but not enough road infrastructure facilities as compared to its total coverage area and the number of users. Despite having an exceptionally low road network density and vehicle ownership level, Ethiopia has a relatively high accident record (Ahmed and Yismaw, 2015). Addis Ababa city is one of the highest numbers of road traffic crashes that occurred in the country almost sharing

above half of the accidents that occurred in this city. Among the crashes, more than 60% occur in the capital city of Addis Ababa (Abdi, et al. 2017).

The locations of road places where the traffic accidents are occurring more repeated were called black spots. Black spot identification is basically necessary to separate the locations of traffic accidents considering and evaluating risk areas dangerous location of an accident occurred and to solve the problem basically main reasons contributing for the same to garnet road transport safety. , black spots can be defined as any location that has a higher expected number of accidents than other similar locations, as a result of local risk factors (Elvik, 2007). Finding the accident factors that contribute to road traffic accidents is important in finding interventions that can reduce the accidents associated with those factors (Spainhour et al., 2005). The factors for road traffic accidents can be categorized into the following major groups, namely: Person Related Factors (e.g. driver, passenger, and pedestrian), Physical Environment Related Factors (e.g. road type and condition, location), Vehicle-Related Factors (e.g. service in a year, technical condition) and Weather Condition.

Analyzing and identification of road traffic accidents for single each major road at the sub-city level is one of the necessary steps in controlling accidents and management for countermeasure. Therefore, the current study aims the analysis the trends of traffic crashes and find the black spot locations along Megenagna to Yeka abado road based on available data obtained from Yeka sub-city traffic police offices, in-depth interviews, and field observations to recommend the remedy for the road safety issues. In addition to that, this may supply a reference for road safety engineers and traffic policies about updated black spot (dangerous) locations along the road.

METHODOLOGY

Study Area

The study was conducted in Addis Ababa, Yeka Sub city along Megenagna to Yeka abado road pass through Lambert bus station having 13.1 Km total length with median divided dual carriageways, 3 lanes in one direction as shown in Figure 1. This study of area has higher traffic volume movements.

Study Design and Approach

A research design is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately, and economically (Kumar, 2011). A descriptive design was used in this study. Also, the study used quantitative and qualitative data research approaches to get full important data, valid and realistic. As quantitative research method is based on the aspect of quantity or extent. This approach is applied to conduct in-depth analysis and process countable and empirical data along the road. The qualitative approach is concerned with a qualitative phenomenon, i.e., relating to quality or variety. The qualitative method is used to explain the situation, understand and explore in-depth using direct observation, recorded document analysis, and unstructured in-depth interviews.

2.3 Data Collection Instrument

The collision data of the study area were collected from Yeka sub-city traffic police office recorded between 2017/2018 to 2020/2021. This research study used primary and secondary sources of data. The primary sources of data were collected through un-structured interviews, site observation, and intensive field measurement for location coordinates using GPS. The secondary source data were obtained from different documents such as journal articles, unpublished and published books, Yeka sub-city traffic offices for traffic accident recorded data, and a satellite image from Ethiopian Geospatial Institute.

Sample Population and Sampling Technique

The sample population was taken out from Yeka Sub-city roads found in Addis Ababa while the method of sampling used, is purposive sampling technics. The study area sampled in this research was Megenagna to Yeka abado road segment pass through Lambert bus station as higher number of traffic accident registered and road users.

Data analysis

The main aim of this research project is to analyze the trends, find road traffic accident black spot locations, and develop a black spot road map in the study area. The descriptive statistical method was used to analyze frequencies and percentages of road traffic accidents during the study period. Finding the black spot locations was also the main goal of this study; different researchers describe methods and formulas for calculating black spots on roads. The researchers have developed a classification of black spots locations of road traffic accidents using the traffic severity index value (SI). After calculating SI, the top three were selected to find the blackest spots using the equation of (Iqbal et al., 2020; Sandhu et al., 2016).

$$SI = 6(A) + 3(B) + 0.8(C) + 0.2(D)$$

Where, SI = Severity index Value, A = Number of Fatality (Death), B= Number of Serious Injuries, C= Number of Light Injuries, D= A number of Property damages.

RESULTS AND DISCUSSION

Temporal Variation V_s Trends of Road Traffic Accidents

The summary of the trends of road traffic accident analysis from 2017/2018 to 2020/2021 is shown in Figure 2. It shows that the highest number of road traffic accidents occurred in 2013 of 993 total cases and the lowest in 2011 of 720 recorded accidents. The severity of road traffic accidents categorizes as Fatal 35(0.78%), Major injury 113 (2.51%), Minor injury 992(22.01%), and property damage only 3367 (74.7%) occurred. The number of road accident crashes during the same period range between 20% and 30.5% each year.

Table 1 shows road traffic accidents Road traffic accidents are normally higher on the weekday on Monday 742 (16.46%) followed by Friday with an accident severity of 711(15.78%) and lower on Sunday 464 (10.3%). Those days represent the first and last working days in Addis Ababa city maybe there are two reasons to cause the highest number of an accident than the other working days; the first was like the most civil servants, private workers, students, and other business people restart their work on Monday so, the occurrence of the accident along the road was highest. The second is due to the higher number of the journey on Monday from the city to neighboring regions and returns to their family on Friday to the city hence the road passes the bus station of lambert. contrary to this, the result shows on Sunday the lowest number of accidents occurred which represent the road user spend at rest with their families at their home and the government and most confidential business offices are closed. Disagrees with the study of Asegie (2018) studied in Debrebrhan city revealed that the highest number of the accident was recorded on Saturday. But the result is nearly like the U.S Department of Transportation (2012) where a higher number of accidents occur on Tuesdays followed by Fridays.

The trend of road traffic accidents was shared higher in early morning time 7:00-7:59 AM hours of 455 (10.09%) followed by 8:00 - 8:59 AM hours contributing to a total of 374(8.29%) and lowers during 24:00-00:59 hours of 12 (0.26%) accidents along the road show in Table 1. this, may be referred to the fact that institutions like schools, governmental offices, and non-governmental enterprises start their working hours of the day and the workers of those sectors

leave their homes at the same time of the early morning. In addition to the above, the road is used as an entrance and exit for the large bus traveling to regional cities from the bus station passing through. The result is basically consistent with the researchers Iqbal et.al. (2020) studied in the country of Pakistan conclude the trend of road traffic collisions is higher in the early morning time 2:00-6:00 hours (13.9%).

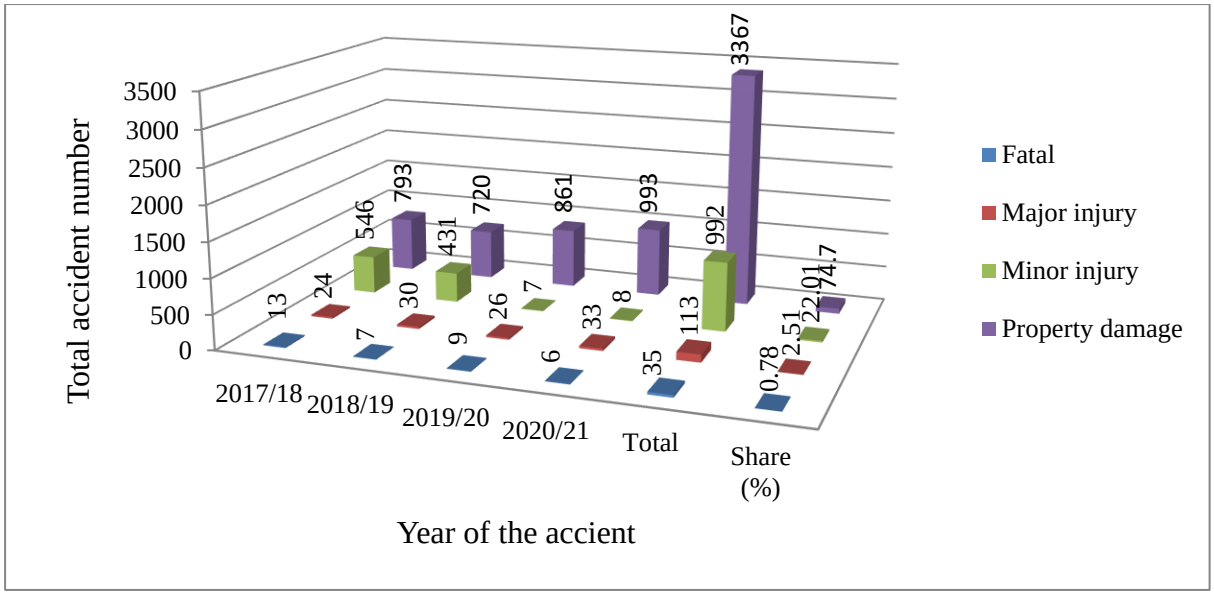


Figure 2: Yearly trend of road traffic accidents (2017/2018-2020/2021)

Drivers Characteristics V_s Trends of Road Traffic Accidents

The occurrence of RTA along with the road shows greater variations in terms of driver's gender involvement as shown in Figure 3. The higher number of Male drivers of 2352(97.23%) were involved and 46(1.90%) were female drivers. In other means, the number of male drivers involved in the cause of an accident is 51.2 times higher than females. The result shows male drivers have more power in the profession of driving rather than females. In line with this finding, Burgut et al., (2010) study findings on risk factors contributing to fast-developing countries [in the case of Qatar] revealed that among the socio-demographic factors, male drivers were found to have a higher accident involvement.

When drivers' accident victims were compared by their age category, Table 2 shows drivers with an age category 31-50 years of 2040(45.26%) were the most shared for RTAs and the lowest accident involvement the age of less than 18 years of 6(0.13%). This may be due in part to the dominancy of economic active age driver groups paid their own the cost of training and license issues. Road traffic incidences have higher accident severity of 1128(25.03%) that have been caused by those whose driving experience of the driver is between 3 to 5 years compared to the other experience. Terms of employment or relationship of driver and vehicle also contribute to the occurrence of road traffic accidents in line with the condition of RTA. 1784(73.75%) The number of drivers employed for others shared the highest involvement and 91 (3.76%) family members' drivers were least involved. So, about this output, the driver employed for others has no sense of ownership of the vehicle and has a fixed amount of lower salary per month on the side that they drive carelessly.

Table 7: Hourly variation, Day of the Week, and trends of road traffic accident

Day of the week	Year of the accident				Total	Share (%)
	2017/18	2018/19	2019/20	2020/21		
Monday	217	195	164	166	742	16.46
Tuesday	183	176	133	161	653	14.49
Wednesday	190	181	120	158	649	14.4
Thurs day	175	146	127	169	617	13.67
Friday	225	201	155	130	711	15.78
Saturday	209	143	121	148	621	13.79
Sunday	156	137	83	88	464	10.3
Undefined	21	9	0	20	50	1.11
Total	1376	1188	903	1040	4507	100
Hourly interval						
1:00-1:59	37	27	29	10	103	2.29
2:00-2:59	22	26	25	18	91	2.02
3:00-3:59	12	17	19	5	53	1.18
4:00-4:59	11	12	14	5	42	0.93
5:00-5:59	16	27	28	19	90	1.97
6:00-6:59	74	41	34	32	181	4.02
7:00-7:59	126	110	100	119	455	10.09
8:00-8:59	115	119	60	80	374	8.29
9:00-9:59	93	84	54	78	309	6.85
10:00-10:59	84	85	56	56	281	6.23
11:00-11:59	95	75	55	64	289	6.42
12:00-12:59	79	37	52	64	232	5.15
13:00-13:59	53	47	27	42	169	3.75
14:00-14:59	63	43	53	33	192	4.26
15:00-15:59	92	56	22	50	220	4.89
16:00-16:59	85	76	42	65	268	5.95
17:00 -17:59	48	81	47	50	226	5.01
18:00-18:59	61	66	41	63	231	5.13
19:00-19:59	72	76	24	55	227	5.05
20:00-20:59	49	42	35	46	172	3.81
21:00-21:59	32	16	37	33	118	2.62
22:00-22:59	24	11	23	17	75	1.66
23:00-23:59	10	4	9	3	26	0.58
24:00-00:59	1	3	6	2	12	0.26
Undefined	22	7	11	31	71	1.59
Total	1376	1188	903	1040	4507	100

The researcher also analyzed the education level of the driver versus trends of the accident. The analysis showed that the highest proportion of accident severity shared 2279(50.56%) was associated with grade 9 - 12 education level followed by grade 1-8 educated level of 732(16.24%) accidents shown in Figure 4. This result agreed with Zewude and Ashine (2016) that drivers with an elementary, junior secondary, and secondary level of education are more likely to get involved in fatal/serious injuries as compared to those with above secondary school

level of education. The reason for this, the license requirement in the country is a minimum of grade 10, and the opportunity to get a job at this stage is higher for all drivers with a brief time of training. This resulted from the largest number of drivers with education level finishing a maximum with high school as well as their lower skill of knowledge to know the traffic regulations.

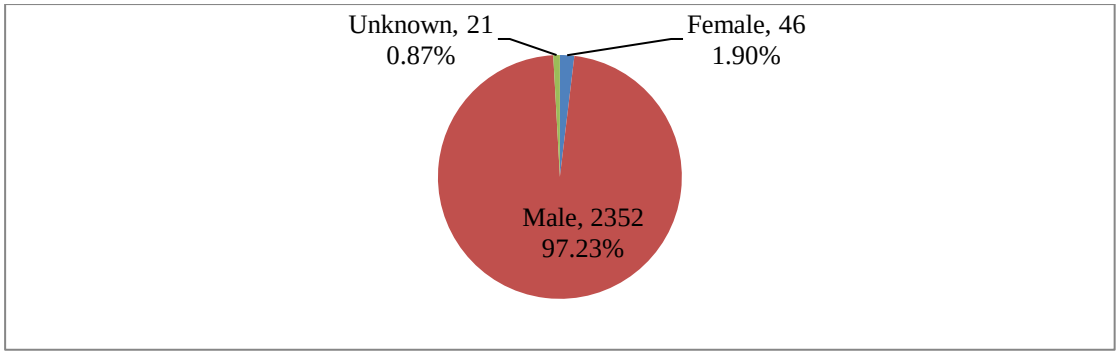


Figure 3: Driver's genders and percentage involvement

Table 8: Analysis of Age of the driver, Experience, Relationship, and trends of road accident

Age of the driver	Accident severity				Total	Share (%)
	Fatal	Major injury	Minor injury	Property damage		
< 18 years	0	2	1	3	6	0.13
18-30 years	11	48	433	1418	1910	42.38
31-50 years	14	52	420	1554	2040	45.26
> 51 years	1	6	110	324	441	9.79
Unknown	9	5	28	68	110	2.44
Total	35	113	992	3367	4507	100
Driving experience in years						
< 1 year	0	3	28	66	97	2.15
1-2 years	8	30	223	738	999	22.17
3 - 5 years	10	27	227	864	1128	25.03
6-10 years	1	22	190	727	940	20.86
11 -20 years	1	16	183	601	801	17.77
>20 years	0	5	90	241	336	7.46
Unknown	15	10	51	130	206	4.56
Total	35	113	992	3367	4507	100
Driver–vehicle relationship						
Owner	112	98	114	163	487	20.13
Employee	355	431	465	533	1784	73.75
Family member	6	30	32	23	91	3.76
Unknown	20	16	12	9	57	2.36
Total	493	575	623	728	2419	100

Job Category V_s Trends Road traffic accident

The road users and passengers that were affected by road traffic accidents along the road and have significant involvement during crash occurrences were found. Table 3 shows Private workers of 2148 (47.66%) and drivers of 1369 (30.37%) most affected people in the study.

Table 9: Analysis of job category and trends of road traffic accident

Job category type	Accident severity type				Total	Share (%)
	Fatal	Major injury	Minor injury	Property damage		
Driver	2	9	336	1022	1369	30.37
Student	3	7	3	43	56	1.24
Governmental worker	1	9	68	126	204	4.54
Private worker	16	70	469	1593	2148	47.66
Job less	3	2	10	41	56	1.24
Unknown	10	16	106	542	674	14.95
Total	35	113	992	3367	4507	100

Vehicle Characteristics V_s Trends Road Traffic Accidents

The vehicle service decides the condition of the vehicle to be engaged in a road traffic accident. The vehicle service age increases the accident number also increases throughout the study period as shown in Table 4. The riskiest vehicles having a service age of greater than 10 years and 5 - 10 service in years caused accidents of 2757(56.73%) and 689 (15.29%) respectively. hence, the life span of the vehicle usage increase decreases the quality of physical parts of the vehicle decrease to control during steering. the major types of collisions along the road are shown in Table 4. Vehicle to vehicle collisions has been a higher number of RTAs fatal, major injury, minor injury, and property damage of 3930(87.20%) followed by Vehicle to Pedestrian 249(5.52%). This result is consistent with the U.S Department of Transportation (2012) that Collision with another motor vehicle in transport was the most common first harmful event for fatal, injury, and property-damage-only crashes. On the other way, Bajaj to Vehicle collision type is the lowest proportion sharing about 3(0.07%) of accidents.

The major probable causes of road traffic accidents commonly committed faults of drivers include following too close, improper use of steering, not giving priority, and careless driving with several accidents' numbers of 1466 (32.52%), 1374(30.49%), 995(22.08%), and 206 (4.57%) respectively along Megenagna to Yeka abado road. Most of the time it may be due to their ignorance of considering the other road users' speed traveling, lack of experience of driving and getting a higher level of driving competition between them, and they have no patience to give priority for pedestrians to cross the road.

Table 10: Analysis of vehicle service, collision type, and probable causes of accident and trends

Vehicle service age in years	Accident severity type				Total	Share (%
	Fatal	Major injury	Minor injury	Property damage		
< 1 year	0	0	7	30	37	0.82
1-2 years	1	0	31	99	131	2.91
2-5 years	5	17	147	511	680	15.09
5-10 years	3	11	163	512	689	15.29
>10 years	11	68	557	1921	2557	56.73
Unknown	15	17	87	294	413	9.16
Total	35	113	992	3367	4507	100
Collision type						
Vehicle - vehicle	3	5	889	3033	3930	87.2
Vehicle - pedestrian	24	80	32	113	249	5.52
Vehicle - passenger	2	10	0	13	25	0.55
Vehicle - Bajaj	0	4	8	35	47	1.04
Motorcycle - pedestrian	0	2	0	2	4	0.09
Vehicle - motorcycle	0	4	7	20	31	0.69
Bajaj - pedestrian	1	5	1	6	13	0.29
Bajaj - vehicle	0	0	0	3	3	0.07
Vehicle-roadside object	0	2	50	114	166	3.68
Bajaj- motorcycle	0	0	1	3	4	0.09
Falling of vehicle	0	0	2	15	17	0.38
Unknown	5	1	2	10	18	0.4
Total	35	113	992	3367	4507	100
Causes of traffic accident						
Improper uses of steering	2	21	350	1001	1374	30.49
backward driving	0	3	32	94	129	2.85
Not give priority to pedestrian	11	32	11	45	99	2.2
Not give priority	14	41	205	735	995	22.08
Following to close	1	9	304	1152	1466	32.52
over speed	0	0	1	2	3	0.07
Careless driving	7	1	34	164	206	4.57
without respect right-hand rule	0	4	3	20	27	0.6
Illegal parking	0	0	22	85	107	2.37
vehicle defect	0	0	4	12	16	0.36
on turning	0	0	5	12	17	0.38
over maximum loading height	0	0	2	2	4	0.09
Inappropriate opening of the door	0	1	2	12	15	0.33
missing traffic light rule	0	0	1	4	5	0.11
on doubled over	0	0	7	14	21	0.47
No license	0	0	2	3	5	0.11
Unknown	0	1	7	10	18	0.4
Total	35	113	992	3367	4507	100

Road characteristics V_s Trends of Road Traffic accidents

The gradient of the road, curvature, and light condition have challenged effects on the occurrence of road traffic accidents. Table 5 most road traffic accidents took place on straight 4420 (98.07%) and junction 49 (1.09%) of the road. Psychologically, on the straight road, the drivers think there is no accident and safe that leads them to fail. As for light conditions were concerned, most road traffic accidents occurred at daylight 4149 (92.06 %) followed by dusky 193 (4.27%).

Table 11: Analysis of gradient type, light condition, and trends of road traffic accident

	Accident severity type					
Gradient type	Fatal	Major injury	Minor injury	Property damage	Total	Share (%)
Straight	35	111	984	3290	4420	98.07
Slightly zigzag	0	0	0	5	5	0.11
Highly zigzag	0	0	0	17	17	0.38
Junction	0	2	5	42	49	1.09
Unknown	0	0	3	13	16	0.35
Total	35	113	992	3367	4507	100
Light condition						
Day light	32	104	941	3072	4149	92.06
dusky	2	4	24	163	193	4.27
Sunset	0	1	0	2	3	0.06
Morning	0	3	22	100	125	2.77
Dark road unlighted	1	1	4	30	36	0.8
unknown	0	0	1	1	2	0.04
Total	35	113	992	3367	4507	100

Identification of RTA Black Spots Locations Analysis

The aim of this was to find the location of major road traffic accident black spot areas, and then to rank the sites and suggest engineering solutions (Black spot treatment). Table 6 shows the rank of black spot locations on the highway. Of, the thirty-three accident-prone locations from the most vulnerable top three RTA black spots are Wesen Grocery, Kara junction, and Abado Condominium having the severity value of 454, 387, and 214, respectively. Due to illegal vehicles parking on the side of the road like in front of hotels and restaurants, loading and unloading passengers, uncontrolled selling and exchanging of goods, and not well-delineated pedestrian crossing marking and installing warning of pedestrian crossing on both sides of the road. In Kara junction the main problem met such as 16% gradient, more accident collision occurred due to slope and unmarked visible pedestrian crossing signs in all directions of the junction.

Table 12: Ranking of black spots locations along Megenagna – Yeka Abado Road.

Code	Name of black spot locations	Accident severity				SI	Rank
		Fatal	Major injury	Minor injury	Property damage		
1	Wesen Grocery	4	20	268	778	454	1
2	Kara Junction	7	26	202	527	387	2
3	Abado Condominium	4	13	101	351	214	3
4	Jelisa Sefer	2	3	61	131	96	4
5	Israel Embassy	1	4	46	175	89.8	5
6	Hillside School	2	4	36	138	80.4	6
7	Abem hotel Junction	1	10	12	159	77.4	7
8	Megenagna Diaspora Roundabout	1	0	50	133	72.6	8
9	Ethio- China College	0	4	39	136	70.4	9
10	Gedera Junction	1	4	23	91	54.6	10
11	Kara Begtera	4	3	13	48	53	11
12	Kara Sanshine	2	3	19	46	45.4	12
13	Wesen Nok	1	2	9	70	33.2	13
14	Wesen Michel Junction	1	1	11	67	31.2	14
15	Condominium junction	1	2	10	50	30	15
16	Lamberet Bus station	1	0	10	72	28.4	16
17	Megenagna on above	0	0	14	65	24.2	17
18	Lamberet Roundabout	0	1	6	68	21.4	18
19	Sara Ampule	1	2	5	24	20.8	19
20	02 exit junction	1	0	10	32	20.4	20
21	Kara Daget	0	3	5	35	20	21
22	Lamberet Elfora	0	2	4	31	15.4	22
23	Wesen center of Competency	0	0	12	17	13	23
24	Kara Micheal	0	2	3	14	11.2	24
25	Yeka abado Junction	0	1	4	15	9.2	25
26	Megenagna ceminto tera	0	0	6	21	9	26
27	Ministry of mine	0	1	4	14	9	27
28	Abado G +7 roundabout	0	1	4	10	8.2	28
29	Wesen Bridge	0	1	1	7	5.2	29
30	Lamberet Nok	0	0	0	17	3.4	30
31	Kara Condominium	0	0	3	4	3.2	31
32	Kara meat Butchery house	0	0	1	9	2.6	32
33	Zobel Menafesha	0	0	0	10	2	33

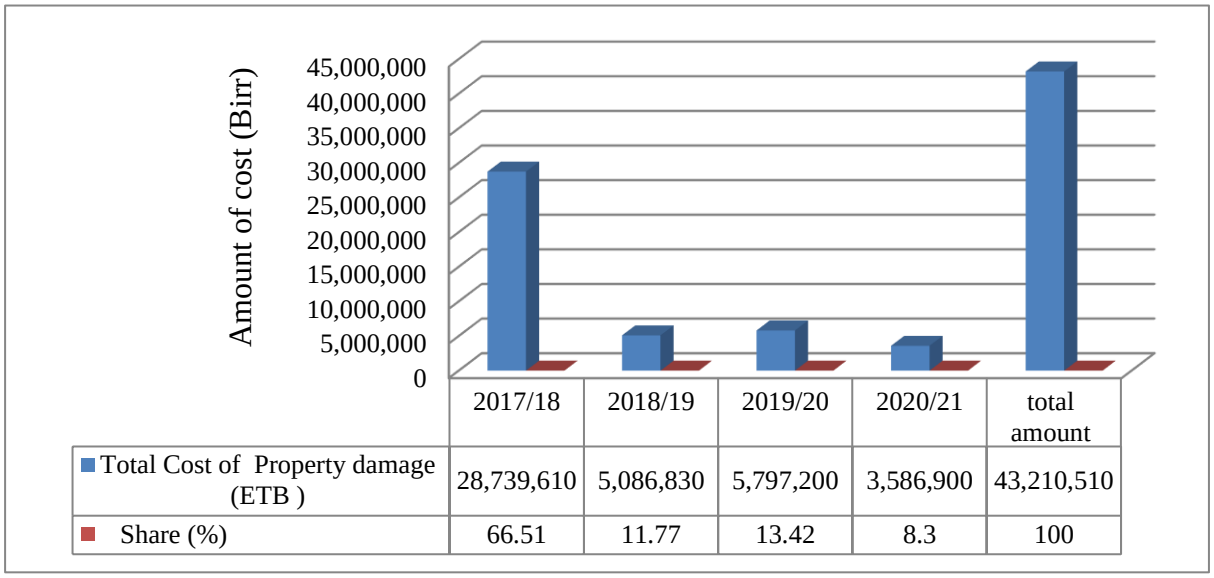
Road Accident Line Map Development using GIS software.

Geographic Information Systems (GIS) or national grid referencing systems are rarely used with RTA reporting (Downing, et al., 2000). Generally, GIS helps to integrate, visualize, retrieve and store data in a traffic accident prioritization system. The coordinate of the RTAs' black spot location was collected from the site using GPS along Megenagna to Yeka Abado to

develop the road black spot location line map with the reference of the national gird of the country and integrating the non-spatial (characteristics of traffic accident) data in GIS.

Road Traffic Accidents have multifaceted impacts on the economy of a nation. The estimated total cost of property damage from single road Megenagna - Yeka abado in the year 2017/2018 to 2020/2021 reaches ETB 43,210,510 as shown in Figure 7. Out of the total 4507 RTA occurrences along the road in the last four years, 3367 (74.70%) of the accidents have been shared with property damage. So, every single accident that occurred with property damage has led to an average monetary loss of ETB 12,833.53 in the sub-city in the study period. The city is yet struggling to fulfill the needs of its people due to financial insufficient which are a loss of an average ETB 10,802,627.50 every year from the single major roads with having 13.1 km.

Figure 4: Sample of bus damaged at the straight road geometry along the study.



	2017/18	2018/19	2019/20	2020/21	total amount
Total Cost of Property damage (ETB)	28,739,610	5,086,830	5,797,200	3,586,900	43,210,510
Share (%)	66.51	11.77	13.42	8.3	100

Note that, 52.67 ETB = 1 US Dollar

Figure 5: Estimated cost of RTA along Megenagna – Yeka abado road

Conclusions

The main goal of this study was to analyze the trends of the road traffic accident and find the black spot locations, and it was focused to propose solutions for the investigated accident along Megenagna to Yeka abado road. As a result, traffic accident recorded data and road environment condition was collected to achieve the stated aims. The number of road accident crashes during the same period range between 20% and 30.5% each year of millions of Ethiopian birrs lost from property damage only. The road traffic accidents were higher in the early morning time of 7:00-7:59 AM and the day off Monday as compared to other hours and days. Hence, on Monday the occurrence of traffic was higher due to the users ending their rest with family and started working jobs. Driver characteristics are one of the factors that cause an accident in such a scenario male driver, 31-50 years old, 3-5 years driving experience, grade 9-12, and employed for others most shared number of accident severity as compared the others. Private workers are victimized by more accidents rather than other job categories.

The vehicle service of 5-10 years and vehicle-to-vehicle collisions shared the maximum number of an accident as compared to other services and collision types. Most road traffic

collisions occurred in straight road geometry as compared to highly zigzag and junction roads. In the light condition of the road, highest occurrence in daylight as compared to Dusky and Sunset. The main causes of road traffic were more of by the behavior of the diver following too close to the other vehicle followed by improper use of steering. The hazardous and black spot locations were found in most business areas. Other black spot locations were found on junction areas due to illegal pedestrian crossing and the slope of the road. On the other hand, the traffic office it has shortage of a color for painting during the time accident happened along the road to fix the distance between the crashed vehicle verses vehicle or vehicle verses others. Hence, the nature of chalk in the summer rainy season faded fast at the time of recording that is one of the problems to measure the correct.

Based on the results and conclusions this study it is recommended Public road safety education should be provided through televisions, newspapers, magazines, books, tapes, and well-developed curricula in education centers to minimize accidents, the Road Transport Ministry and Driver Training Institutions should be pointed out guidance and implement a minimum time of driving experience before a license is issued, mobilize periodically vehicle inspection centers beyond a certain service age of a vehicle strictly by skilled manpower, The traffic police of the sub-city should be available on the site, at the time of high-frequency crash hours 7:00 - 9:00 AM and on Monday day of the week, fix specific site for loading and unloading of the passengers in the mid-block of the road, Zebra crossing should be marked with vertical signs and horizontal marking, install traffic signs that indicate slope, and develop black spot location map using GIS software integrated with the ground coordinate for the specific site of the road. Also, the traffic office of the city must have sufficient colors to paint and delineate the accident area that helps for the law enforcement and investigation Rather than painted by chalk.

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4.2. Assessing the Effect of Datum Transformation parameters on Geospatial Data for Cadastral Application: A Case of Yeka Sub-city, Addis Ababa

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ABSTRACT

Datum transformation is the transformation of coordinate points from one known coordinate reference system into another. The recent practice of geospatial data collection, management and analysis in Ethiopia is in geocentric coordinates of a point defined based on a global datum (WGS84). Currently, Ethiopia uses ADINDAN as the recognized local datum. However, the current official transformation parameters in use by the Ethiopia are slightly different from the parameters decided by earlier research and adopted in widely used geospatial software packages. The main aim of this study was to assess and evaluate the effect of datum transformation on geospatial data for cadastral application in Yeka sub-city, Addis Ababa. Molodensky-Badekas Model and Abridged Molodensky model using ten collocated ground control points used to define the seven-transformation model by using five different of height assumption scenarios like, height zero method, orthometric height method (OHM), abridged Molodensky, EGM08 and iteration methods. In addition to this, we evaluated the horizontal accuracy of the current orthophoto by static ground control survey readings. The results showed that Molodensky-Badekas with height iteration method is the best and suitable seven parameter transformation model between wgs84 and ADINDAN across the region of Ethiopia. The transformation parameters from WGS84 to Clarke1880 with inherent uncertainties of, 168.617±0.1066 14.0389±0.1066 -205.374±0.1066 in translation parameters in X, Y, and, Z respectively, 0.879ppm±9.174 of scale factor, and, 6.5083e-07±2.193e-11, 4.0254e-07±3.98e-12, 1.9298e-07±1.62e-11 in rotation parameters with the standard deviation of 1.06. On the other hand, the positional the positional shift between the current orthophoto that used as a legal reference map for urban cadaster for Yeka-sub city and static survey ground control points root mean square error in 0.63 meter in X and 0.62 meter in Y, with resultant linear error of 0.63 meter. Based on the NSSDA horizontal accuracy standard of with 95% confidence interval level of 1.09meter shift exist between the orthophoto and static ground control points.

Keywords: *ADINDAN, Cadaster, Datum Transformation, WGS84*

INTRODUCTION

A geodetic datum is the geometrical representation of the earth for uses of the coordinate reference system. Geodetic datum transformation is the process of transforming from one known coordinate reference system in to another (Dawod & Alnaggar, 2000) .The shape of the actual real earth is very complex, and consists of landmass, seas, ice lands, oceans, etc. 67 % of the surface area of the earth is covered by oceans, therefore the shape of the earth are best fits to mean sea level (MSL) or the equipotential surface of the earth (geoid). And geoid is the height reference surface for vertical leveling, which is the equipotential surface of the earth surface, Due to the actual nature of the earth, the highest point of the earth exists in Mount Everest (8848 meters above mean sea level), and the deepest is around the Pacific Ocean (11,000 meters below mean sea level). Depending on this height variation of the topography with the highest and lowest points, it is difficult to be the earth with in a simple mathematical model.

The horizontal geodetic control network of Ethiopia has been set up by different methods such as triangulation, traverse, and GPS. The geodetic control networks of the country are based on two main data, namely, Adindan, and world geodetic system 1984 (WGS 1984) datums. The Adindan Clarke 1880 datum is locally recognized in Ethiopia with the semi-major axis (a) = 6378249.145 m and inverse flattening (1/f) = 293.465 m, and the global datum that used by the country is WGS1984 with the semi-major axis (a) = 6,378,137m and inverse flattening (1/f) = 298.257 223 563 m. The horizontal and vertical geodetic control network was set up from 1957 to 1961, approximately 120,000 miles of west-central Ethiopia, and the area covers the Blue Nile River watershed. The survey has set up a network with the first order, second order, and third-order points by combined Ethiopian organization and United States personnel's (Green book, 1957-1961).

The history of aerial photography collection and processing in Ethiopia starts from in around the 1930s during the invasion of Italy, And later on by the Ethiopian mapping agency (EMA) for rapid production of topographical and plan metric maps on the northern part of Ethiopia or the current Eretria by a very small-format camera (Nyssen et al., 2016). Now day's digital Orthophoto accusation, processing, and analysis are the leading and emerging technologies that used for various field of studies, like urban and rural cadaster, Engineering Road planning and design, cities structural and grand plan, railway planning, etc.

To assess the horizontal and vertical accuracy of Orthorectified image in situ ground control points will be collected based on American Society for Photogrammetry and Remote Sensing (ASPRS) standards and The standard Federal Geographic Data Committee FGDC (1998), with different processing software packages like GAMIT/GLOBK, AUSPOS, Leica Geo-Office, and APPS (Canavosio-Zuzelski et al., 2013a).

Currently, the developments of geospatial data collection, management, and analysis need the availability of proper geodetic infrastructures for integrating diverse types and sources of coordinates without a shift in positions for multipurpose applications. Nowadays, positions are mostly collected by GNSS data collecting instruments based on WGS84 reference systems. The data are then subjected to transformations and projections to a locally used system ADINDAN Clarke 1880. The conversions between different coordinate systems should be well defined to guarantee the consistency of the coordinates on all systems and tools, and it should be compatible for every datum based on its transformation parameters.

In Ethiopia context, the geodetic data analysis and implementation do not have a consistency and well-organized standards, not kept and updated regularly, duplicated, lack of geospatial guidelines, poor data quality and incompatibility, and Geospatial Data Sharing barriers across Organizations and etc. Generally, the geodetic infrastructure and the expected positional accuracy of the existing and implemented cadaster is the multiple of zeros across the region of Ethiopia. Over the last few years Ethiopia has spent considerable resources on developing its National Spatial Data Infrastructure. However, the Ethiopian National Spatial Data Infrastructure is still not well developed due to limitation of fund for ability building, poorly organized data and outdated data. The main aim of this study will be to assess and evaluate the effects of seven parameters of datum transformation techniques on geospatial data (Orthophotos) on cadastral application through different methods. The project area is in the Yeka sub-city in the northeast part of Addis Ababa city.

METHODOLOGY

The main procedures of this study that follows are found and formulated. Primary control points are collected from GII both in WGS84 and ADINDAN Clarke 1880. Seven

transformation parameters model is decided. 20 cm high-resolution Arial photograph image for Addis Ababa city taken from GII. The Orthophoto is in WGS84 ellipsoidal height output and transformed into ADINDAN Clarke1880 in seven transformation parameters. To confirm the accuracy of the existing cadaster and newly developed cadaster, control points collected, and the comparative analysis done between two data based on their positional shift. After collecting all necessary data in both reference systems, the following basic tasks and steps used to achieve the aim of this thesis.

Orthometric to Ellipsoidal Height Conversion Methods

To define the datum transformation values, the values of both global and local datum values should be in X, Y, and Z Cartesian coordinates. The Cartesian coordinates can be computed only from the latitude, longitude and ellipsoidal heights values. But the local system does not have ellipsoidal heights (h) rather than the orthometric heights (H) which is the difficult in estimating the transformation parameters. In this study the orthometric height (H) converted to ellipsoidal height (h) using different methods like, ignoring height method, orthometric height method (OHM), abridged Molodensky, EGM08 and iteration method to compute the Cartesian coordinates for the local system.

Ignoring heights of both systems

The first scenario that performed on this study to get the Cartesian coordinate of both WGS84 datum and Adindan datum is, first assuming the height value of both systems in to zero and using only the latitude and longitude values to estimate the X, Y, and Z Cartesian coordinates.

Abridged Molodensky Model

This model used to estimate the height difference values between both global and local datums.so the ellipsoidal height of the local datum is estimated as

Where h wgs84 is GPS ellipsoidal height for WGS84 datum, and Δh is the height correction factor in abridged method using the formula (1). And finally, A_{dindan} is the estimated ellipsoidal height of Adindan Clarke 1880 datum.

Orthometric Height Method

This method is the direct conversion of the latitude, longitude, and height values of both global and local datum into the X, Y, and Z values of Cartesian coordinates as it is using standard forward equations listed as the formula (2).

Earth Gravitational Model (EGM08)

In this method, to estimate the geiod undulation between local and global datum of ten collected GCPs EGM08 model is used to estimate the geometric relation between two systems. So, the ellipsoidal height of Adindan clrack1880 datum estimated using the formula as

$$h=H+N \tag{2}$$

Where N is the geoid undulation, H is the orthometric height of Adindan datum.

Iteration Method

In this method First, pseudo–Cartesian Adindan Clarke 1880 coordinates using he = H (altitude) was processed. From this set and from Ethiopia new geodetic reference set the three

translation parameters were calculated. That is, the three translation parameters defined earlier on the orthometric height method on the above formula as [3].

Using this temporary 3 translation parameters to transform Ethiopia new geodetic reference Points into Adindan + he, then Adindan new ellipsoid heights is obtained. From these computed heights and their original Adindan plane coordinates the final Cartesian Adindan coordinates were obtained and used to compute the final three translation parameters between the Ethiopia new WGS84 datum network and the Adindan reference frame.

Computation of Transformation Parameters

First, the geodetic coordinates *(ϕ, λ, h)* of the common points in both the WGS84 and ADINDAN-Ethiopia systems will be converted into Cartesian coordinates (X, Y, Z) using the formula.

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \begin{vmatrix} (N+h)cos\ \phi cos\Lambda \\ (N+h)cos\ \phi sin\Lambda \\ (N(1-e^2)+h)rsin\ \phi \end{vmatrix} \quad (3)$$

Where 'e' denotes the first eccentricity of the reference ellipsoid and 'N' is the radius of curvature in the prime vertical at latitude ϕ.

Therefore, in this study the Orthometric height (H) converted to ellipsoidal height (h) using five different scenarios like, height zero method, orthometric height method (OHM), abridged Molodensky, EGM08 and iteration. Then, the parameters for the datum transformation between WGS 84 and ADINDAN-Ethiopia has been computed using different local height assumptions and selected transformation models via least square adjustment.

Block Shift (Geocentric) Model

(Aghamohammadi et al., n.d.). Featherstone, 1997 as

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} AD = \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{vmatrix} + \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} WGS84 \quad (4)$$

The least square solution can be obtained for data points more than one. Thus, the equation for the least square solution becomes:

$$\begin{vmatrix} X \\ Y \\ Z \end{vmatrix} AD_{--} \begin{vmatrix} \varepsilon x \\ \varepsilon y \\ \varepsilon z \end{vmatrix} = \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{vmatrix} + \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} WGS84 \quad (1)$$

$$L = \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} AD - \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} WGS84 \quad (5)$$

$$A = \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} \qquad DX = \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{vmatrix} \quad (6)$$

$$\varepsilon = \begin{vmatrix} \varepsilon x \\ \varepsilon y \\ \varepsilon z \end{vmatrix} \quad (7)$$

The equation to be solved by least square adjustment is: For one point: $L_{3x1} - \varepsilon_{3x1} = A_{3x3*}DX_{3x1}$

For more than one point:

$$\begin{vmatrix} L1 \\ L2 \\ L3 \\ . \\ . \\ Ln \end{vmatrix} - \begin{vmatrix} \varepsilon 1 \\ \varepsilon 2 \\ \varepsilon 3 \\ . \\ . \\ \varepsilon n \end{vmatrix} = \begin{vmatrix} A1 \\ A2 \\ A3 \\ . \\ . \\ An \end{vmatrix} - \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{vmatrix} \quad (8)$$

$$DX = (A^T C^{-1} A)^{-1} A^T C^{-1} L \quad (92)$$

Molodensky-Badekas Model

The molodensky-Badekas model in its matrix form, is given by Hoar, 1982, Krakwisky and Thomson (1974), Burford (1985) and Harvey (1986) (see Marzooqi et al., Featherstone, 1997), as

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} AD = \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{vmatrix} + (\mathbf{1} + \boldsymbol{\delta s})\mathbf{R}(\mathbf{rx\ ry\ rz}) \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} WGS84 - \begin{vmatrix} Xm \\ Ym \\ Zm \end{vmatrix} \quad (10)$$

The equation to be solved by least square adjustment.

$$\begin{vmatrix} X \\ Y \\ Z \end{vmatrix} A - \begin{vmatrix} \varepsilon x \\ \varepsilon y \\ \varepsilon z \end{vmatrix} - \begin{vmatrix} X \\ Y \\ Z \end{vmatrix} WGS84 =$$

$$\begin{vmatrix} 1 & 0 & 0 & XW - Xm & 0 & -(ZW - Zm) & YW - Ym \\ 0 & 1 & 0 & YW - Ym & ZW - Zm & 0 & -(XW - Xm) \\ 0 & 0 & 1 & ZW - Zm & -(YW - Ym) & XW - Xm & 0 \end{vmatrix} \begin{vmatrix} \Delta X \\ \Delta Y \\ \Delta Z \\ \delta s \\ rx \\ ry \\ rz \end{vmatrix} \quad (11)$$

$$A = \begin{vmatrix} 1 & 0 & 0 & XW - Xm & 0 & -(ZW - Zm) & YW - Ym \\ 0 & 1 & 0 & YW - Ym & ZW - Zm & 0 & -(XW - Xm) \\ 0 & 0 & 1 & ZW - Zm & -(YW - Ym) & XW - Xm & 0 \end{vmatrix} \quad (12)$$

Where the mean value can compute as$Xm = \frac{1}{n}\sum_{i=1}^{m} Xw$,

$$Ym = \frac{1}{n}\sum_{i=1}^{m} Yw,$$

$$Zm = \frac{1}{n}\sum_{i=1}^{m} Zw,$$

Abridged Molodensky Model

The Abridged Molodensky transformation is given as (D.M.A., 1987; Molnar and Timar, 2005):

$$A = \begin{vmatrix} -\mathbf{sin\emptyset w\ cos\lambda w} & -\mathbf{sin\emptyset w\ sin\lambda w} & \mathbf{cos\emptyset w} \\ -\mathbf{sin\lambda w} & \mathbf{cos\lambda w} & 0 \\ \mathbf{cos\emptyset w\ cos\lambda w} & \mathbf{cos\emptyset w\ sin\lambda w} & \mathbf{sin\emptyset w} \end{vmatrix} \quad (13)$$

Where $\emptyset$, λ, and h = geodetic coordinates with respect to the local ellipsoid

$\Delta\emptyset$, $\Delta\lambda$ and Δh = corrections to transform local datum coordinates to WGS 84

(ΔX, ΔY, ΔZ) = corrections to transform local datum coordinates to WGS 84 X, Y, Z.

(Δa, Δf) = (WGS 84 minus local) semi-major axis and flattening respectively

a = semi-major axis of the local geodetic system ellipsoid

f = flattening of the local geodetic system ellipsoid

The formulae deal only with a translation of the origin and changes in ellipsoidal size and shape, and assumes that the Cartesian coordinate axes of the two systems are parallel (Deakin, 2004; Mitsakaki, 2004)

Orthometric to Ellipsoidal Height Conversion Methods

In estimating the parameters for datum transformation, it is obvious to use the transformation models that are only accept the Cartesian coordinates. The Cartesian coordinates can be computed only from the latitude, longitude and ellipsoidal heights of a given system. However, the local systems do not have ellipsoidal heights (h) rather than the orthometric heights (H) which will be the challenge in estimating the transformation parameters. The bridged Molodensky Model and Orthometric Height methods and assumptions will be used for this thesis to get Cartesian coordinates of the local system.

Least Square Estimation of the Transformation Parameters and Residuals

Least square (LS) method, also known as least square approximation, in statistics, a method for
estimating the true value of some quantity based on the consideration of errors in observations or
measurements. A wide range of least squares adjustment techniques are known and used in geodetic sciences for coordinate transformations between geocentric and non-geocentric datums.

In this thesis, the least square method will be used to estimate the transformation parameters and residuals for Molodensky-Badekas transformation method. Specifically, the observation, the unknowns and the coefficient matrices will be prepared to be ready for handling with coding in the MATLAB program. MATLAB is the high-level language and interactive environment used by millions of engineers and scientists worldwide. The matrix-based language is a natural way to express computational mathematics. There are different uses of application for Mat lab like engineering innovative solutions, performing numerical analysis, exploring research, image processing, integration of GIS, and etc. This task will minimize the complexity and to be time effective and supplies an interactive environment for algorithm development, data visualization, data analysis, and numerical computation.

Sample selection for Accuracy Assessment of the orthophoto and cadastral parcel

To assess and confirm the geospatial data the known international standards that are used under all studies in Ethiopia Geospatial information institute are the American Society for Photogrammetry and Remote Sensing (ASPRS) and the standard Federal Geographic Data Committee FGDC (1998) FGDC. Where four common FGDC standards are(Authority, 1998; *National Standard for Spatial Data Accuracy*, n.d.)

- The checkpoints that are used to confirm are three times more correct than those being tested.
- To test positional accuracy minimum of 20 sample points is required.
- The sample points will be put in clear and visible areas, and it will be well-defined points.
- And the sample points must be in all quadrants and well distributed through the areas. 20% of the checkpoints are in each quadrant, and the distance between them will be more than $d/10$, where d is the diagonal dimension of the point on the map.

There are 50000 parcels in yeka sub-city. Among these 50000 parcels 2400 parcels are found in Wereda 09 of yeka sub-city. The parcels were purposively selected from kebele 09 due to the coordinate shift is mostly found in the above mentioned kebele. These above selected parcel corner coordinates were collected in RTK differential GPS to make comparative analysis across the same existing coordinate's points on cadaster base map.

Static GPS Survey

Data acquisition for the independent source of higher accuracy was done using the technique of static GPS for selected points that exist in Yeka sub-city. The independent source of higher accuracy shall be of the highest accuracy possible and practical to evaluate the accuracy. Sokia GRX2 instruments with accessories were used to take a detailed static measurement in the field. The 48-hour first order two points the IGSE and Kottebe campus points used as reference points. There are many zero-order geodetic network is available in the country, but none of them is available near to the project area. The detailed ground measurements were seen in selected seven checkpoints and saw static GPS data processed with licensed Leica geo-office software and with online processing tools.

The reading sessions of checkpoints were at least three hours 30 minutes and above except one point. Obtained GPS data in the field were downloaded in spectrum survey software and converted to Receiver Independent Exchange Format (RINEX) file while, Lastly, the processed check point coordinate obtained were used to evaluate the accuracy of orthophoto.

Horizontal Accuracy Assessment

The horizontal accuracy is to be assessed using root-mean-square error (RMSE) statistics in the horizontal plane as it explained by David (2015), i.e., RMSEx, RMSEy, and RMSEr. To calculate the horizontal root-mean-square error first, the x-coordinate from the reference data is recorded followed by the x-coordinate from the spatial data set being assessed. The root means square error at x-direction, y-direction, and the horizontal positions were calculated according to the equations below.

$$\mathrm{RMSEx} = \sqrt{\frac{(\mathrm{Xi} - \mathrm{Xtest})^2}{n}} \tag{14}$$

$$\mathrm{RMSEy} = \sqrt{\frac{(\mathrm{Yi} - \mathrm{Ytest})^2}{n}} \tag{15}$$

Where: x check, i and y check, i are the coordinates of the ith checkpoint in the independent source of higher accuracy, and x test, i, y test, i are the coordinates of the ith test dataset. n is the number of checkpoints tested i is an integer ranging from 1 to n.

$$\mathrm{RMSEr} = \sqrt{\frac{\mathrm{RMSEx}^2 + \mathrm{RMSEy}^2}{n}} \tag{163}$$

The second way to statistical assess horizontal accuracy using NSSDA multipliers to compute horizontal accuracy at the 95% confidence level, which is 1.7308 times RMSEr. It is assumed that systematic errors have been eliminated as best as possible.

RESULT AND DISCUSSION

Parameters Estimation between WGS 84 and ADINDAN-Ethiopia

The parameters for datum transformation between WGS84 and ADINDAN-Ethiopia were estimated with ten collocated datasets and selected transformation models. The models are mathematically defined in a Cartesian coordinates system and hence the models require only ellipsoidal heights as an input for the vertical components. However, the local system does not have the ellipsoidal heights and to solve challenges related to the transformation of leveled

height/orthometric heights/ to ellipsoidal heights, the following five methods and assumptions were used in the computation of the transformation parameters (Ahmed and Mergia, 2009; Ziggah, et.al, 2016). These approaches are:

- ✓ *the Orthometric height method (OHM),*
- ✓ *Ignoring heights of both systems,*
- ✓ *the EGM08 height,*
- ✓ *the Abridged Height and*
- ✓ *the Iteration method (dh=< 0.001m)*

Result from Block Shift (Geocentric) model

Translation parameters with three-dimensional origin shift of the geometrical center of the reference ellipsoids, with little regard for any scale changes or rotations results listed on the table (1) below.

Table 1 Block shift model result

Parameters	**h=H**	**H=h=0**	**h=$h_{EGM2008}$**	**h=h_{ABRG}**	**H=$h_{iterated}$**
ΔX (m)	168.597±0.209	166.066±0.237	167.238±0.256	168.634±0.172	168.617±0.3147
ΔY(m)	14.066±0.209	12.197±0.237	12.979±0.256	14.03±0.172	14.0389±0.3147
ΔZ (m)	-205.338±0.209	-205.830±0.237	-205.632±0.256	-205.392±0.172	-205.374±0.3147
σo (m)	1.932	2.1912	2.3610	1.7244	0.9906

Result from Molodensky-Badekas model

Based on the ten collocated dataset, the estimated parameters, standard deviations and unit weight standard errors of the Molodensky-Badekas model and Abridged Molodensky model with different heights and height assumptions are presented below: table (2) shows Molodensky-Badekas model within the Cartesian transformation results.

Table 2- Molodensky Badekas result

Parameters	**h=H**	**H=h=0**	**h=hEGM2008**
ΔX (m)	168.597±0.394	166.066±0.325	167.238±0.466
ΔY(m)	14.066±0.394	12.197±0.325	12.979±0.466
ΔZ (m)	-205.338±0.394	-205.83±0.325	-205.632±0.466
ΔS	0.9ppm±4.09	0.3ppm±4.12	0.7ppm±4.833
RX (rad)	5.512e-06±5.668e-06	8.1927e-06±5.102e-06	8.889e-06±6.703e-06
RY (rad)	-8.970e-06±4.742-06	-1.402e-05±4.621e-06	-1.0326e-05±5.608e-06
RY (rad)	9.653e-06±4.939e-06	1.447e-05±5.898e-06	-7.286e-07±5.841e-06
σo (m)	1.55	1.056	2.1714

And when ten collected ground control points both in global and local reference frames on their geographic coordinates transformation result are listed below table (3). This shows on when the height values are assumed on Abridge and iterated methods.

Table 3 Molodensky Badekas result in geographic.

Parametrs	$h=h_{ABRG}$	$H=h_{iterated}$
ΔX (m)	168.634±0.395	168.617±0.1066
ΔY(m)	14.03±0.395	14.0389±0.1066
ΔZ (m)	-205.392±0.395	-205.374±0.1066
ΔS	0.9ppm±4.094	0.879ppm±9.174 e-012
RX (rad)	-2.026e-06±5.678e-06	6.5083e-07±2.193e-11
RY (rad)	5.4430e-06±4.751e-06	4.0254e-07±3.98e-12
RY (rad)	-4.618e-06±4.948e-06	1.9298e-07±1.62e-11
σo (m)	1.5582	1.06

Result from Abridged Molodensky model

This model directly transforms geographical coordinates from one coordinate system to another by using five parameters: three origin shifts (ΔX, ΔY, ΔZ) and two shifts in ellipsoidal parameters (Δa, Δf). It simply applies the three-dimensional geocentric datum shift parameters (ΔX, ΔY, ΔZ) in conjunction with the differences between the semi-major axis (Δa) and flattening (Δf) of the local geodetic system ellipsoid and the WGS84 ellipsoid respectively (WGS 84 minus local). Table (4) shows the result of defined parameter in Abridged Molodensky model in Cartesian coordinates.

Table 4 Abridge Molodensky result.

Parameters	h=H	H=h=0	h=hEGM2008
ΔX (m)	168.599±0.634	166.094±0.719	167.239
ΔY(m)	14.111±0.634	12.219±0.719	13.024
ΔZ (m)	-205.684±0.634	-206.217±0.719	-205.979
Δa	112.145	112.145	112.145
Δf	5.475e-05	5.475e-05	5.475e-05
σo (m)	2.0046	2.2762	2.4514

And the values of the parameters for Abridged Molodensky model for two height assumption method in A bridge and iteration methods described in the table below table (5).

Table 5 Abridge Molodensky result in geographic.

Parametrs	$h=h_{ABRG}$	$H=h_{iterated}$
ΔX (m)	166.0938±0.7198	166.094±0.7198
ΔY(m)	12.2187±0.7198	12.219±0.7198
ΔZ (m)	-206.2171±0.7198	-206.217±0.7198
Δa	112.145	112.145
Δf	5.475e-05	5.475e-05
σo (m)	2.2762	2.2762

Horizontal Accuracy Assessment Result

Assessment Based on Static Survey Data

This study specifically assesses the horizontal accuracy of orthophoto. With the reference to the static GPS survey result. To do these ten independent checkpoints coordinates were obtained and each checkpoint was independently compared with the coordinates obtained from orthophoto. The accuracy (RMSE) of the tested data set or orthophoto, as compared to the GPS data or independent data bought from AUPOS processing, is approximately 1.97125meter and 1.71449 meter in x and y-direction, respectively as shown in Table (6) below. The overall RMSE of orthophoto was having 2.61252 meter. In other words, the positional accuracy of orthophoto evaluated for ten checkpoints is estimated as 4.52176 meter at a 95 % confidence level. The NSSDA statistic is decided by multiplying the RMSE by a value that is the standard error of the mean at the 95 percent confidence level: 1.7308 when calculating horizontal accuracy (NSSDA, 1998). From the above result the RMSE of orthophoto coordinates and in-situ static GPS coordinates of similar checkpoints in x and y-directions and 95% confidence level.

Table 6 horizontal accuracy result in all pints

PT. ID	GPS EASTING	GPS NORTHING		Δ Easting	ΔNorthing	Orthophoto EASTING	Orthophoto NORTHING
GCP1	475241.214	1002232.411		0.03500	-0.02600	475241.2	1002232
GCP2	479644.963	1002218.961		0.04600	-0.03100	479644.9	1002219
GCP3	482578.083	998523.608		0.04900	-0.05200	482578	998523.7
GCP4	488402.876	998293.815		0.03200	-0.08200	488402.8	998293.9
GCP5	475275.108	1002245.536		-0.24200	-1.16900	475275.4	1002247
GCP6	475264.893	1002240.118		-0.27300	-1.42400	475265.2	1002242
Krlo	485447.4	998986.8		-0.05100	-0.02700	485447.5	998986.8
Diaspora	478063.8	997029.9		0.14100	0.09500	478063.7	997029.8
CMC1	483666.4	996945.3		-5.90000	4.80000	483672.3	996940.5
			max	0.14100	4.80000		
			Min	-5.90000	-1.42400		
			Std	1.86684	2.23000		
			rmse	1.97125	1.71449		
			rmser	2.61252			1.7308
			95%	4.52176			

as we have seen on Table (6) the maximum values of the residual errors are 0.14 and 4.8 meter in X, and Y coordinate, respectively. Whereas the minimum values are -5.9 and -1.42 meter in X and Y coordinates, respectively. All the residual values between X and Y coordinates are clearly listed in the next fig (1) below.

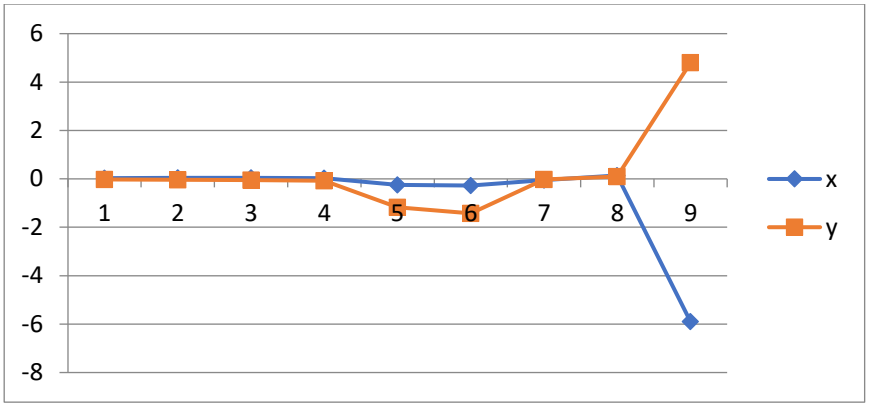

Figure 1 errors distributions for all points

The above fig (1) is with including the station of CMC1 point reading on the field. But this station is existed in CMC circle road. But the circle is reconstructed at the time of railway road constructed. Due to this the position of the benchmark shifted from the original position. So, for the analysis of this study were processed by excluding this point and the overall accuracy of orthophoto evaluated for nine checkpoints is estimated is approximately 0.630476meter and 0.616005 meter in x and y-direction, respectively as shown in Table (7) below. The overall RMSE of orthophoto was having 0.630475746meter. In other words, the positional accuracy of orthophoto evaluated for ten checkpoints is estimated as 1.091227422 meter at a 95 % confidence
level.

Table 7 horizontal accuracy in selected points

PT. ID	GPS EASTING	GPS NORTHING		Δ Easting	ΔNorthing	Orthophoto EASTING	Orthophoto NORTHING
GCP1	475241.2	1002232		0.035	-0.026	475241.2	1002232.437
GCP2	479645	1002219		0.046	-0.031	479644.9	1002218.992
GCP3	482578.1	998523.6		0.049	-0.052	482578	998523.66
GCP4	488402.9	998293.8		0.032	-0.082	488402.8	998293.897
GCP5	475275.1	1002246		-0.242	-1.169	475275.4	1002246.705
GCP6	475264.9	1002240		-0.273	-1.424	475265.2	1002241.542
Krlo	485447.4	998986.8		-0.051	-0.027	485447.5	998986.827
0001(Diaspora)	478063.8	997029.9		0.141	0.095	478063.7	997029.805
			max	0.141	0.095		
			min	-0.273	-1.424		
			std	0.148177	0.596786		
			rmse	0.630476	0.616005		
			rmser	0.630475746			
		NSSDA95%	95%	1.091227422			1.7308

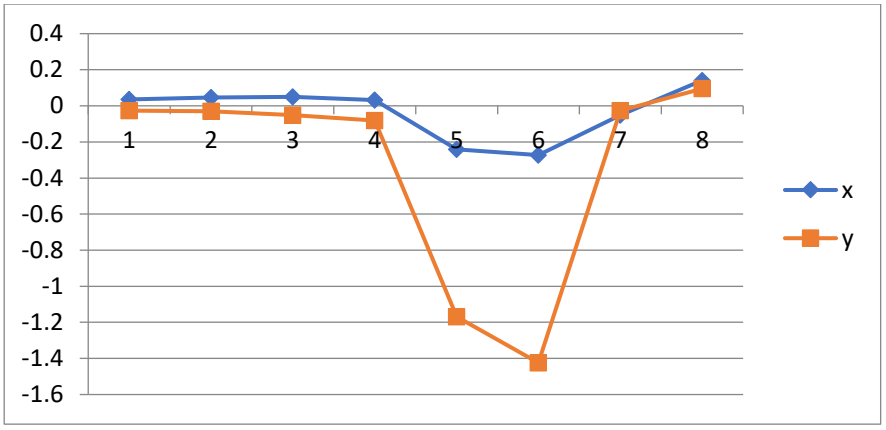

Figure 2 error distributions for corrected one.

Cadastral parcel accuracy result

Coordinate values obtained using RTK GPS were compared with the corresponding coordinates extracted from orthophoto that currently used for cadastral application. In this specific study, the accuracy of orthophoto is assessed with the reference to the data based on RTK GPS survey results. To achieve the aim, polygon features are selected for the study around the Yeka sub-city keble 09. In this study, 65 coordinate values were collected along the sharp corners of fences. The coordinates of the linear features were obtained in real-time kinematic global positioning system mode of techniques (RTK GPS). To statistically assess the accuracy of parcel corners total of fourteen checkpoints were used in this study. The coordinates and statistical analysis are done through the RTK survey were listed in Table (8).

Table 8 cadastral parcel accuracy assessment

	orthophoto coordinate		**Residual**		**GPS coordinate**		**Residual square**	
OBJECTID *	x	y			x	y		
1	481214.5	997851.5	0.264	0.1147	481214.2	997851.4	0.069696	0.013156
2	481193.4	997850.1	-0.498	0.2805	481193.9	997849.9	0.248004	0.07868
3	481169.5	997844.5	0.2138	-0.3865	481169.3	997844.8	0.04571	0.149382
4	481197.3	997907.3	-0.3624	0.2804	481197.6	997907	0.131334	0.078624
5	481195.8	997912.6	-0.0056	-0.3187	481195.8	997912.9	3.14E-05	0.10157
6	481179.7	997903.3	0.6132	-0.1544	481179.1	997903.4	0.376014	0.023839
7	481176.3	997911.2	-0.1032	0.5511	481176.4	997910.6	0.01065	0.303711
8	481170.1	997933.3	-0.2106	-0.2471	481170.3	997933.5	0.044352	0.061058
9	481189.1	997938.6	-0.2937	0.2115	481189.4	997938.4	0.08626	0.044732
10	481183.9	997951.8	-0.0254	-0.4633	481183.9	997952.2	0.000645	0.214647
11	481162.3	997959.2	0.7682	-0.26	481161.5	997959.4	0.590131	0.0676
12	481160.8	997964.5	0.2976	-0.4195	481160.5	997964.9	0.088566	0.17598
13	481182.1	997965.5	-0.3619	-0.4574	481182.4	997966	0.130972	0.209215
14	481180.1	997971	0.4277	-0.1468	481179.7	997971.2	0.182927	0.02155
		max	0.7682	0.5511			2.005293	1.543746
		min	-0.498	-0.4633			0.143235	0.110268
		stdv	0.159485	0.084235			0.378464	0.332066
		rmse	0.378464	0.332066				
		rmser	0.503491			1.7308		
		95%	0.871442					

Statistically, the agreement between the two datasets can be exemplified by analyzing the mean and standard deviation of the difference between the coordinates from parcel corner of orthophoto and RTK GPS surveying for only five parcel corners from both datasets. The mean of the difference is 37.84cm and 33.20cm in x- and y-components, respectively.

Comparative Analysis

Basically, there are three sets of transformation parameters that were defined for a region of Ethiopia: Parameters used by the National Mapping Agency/Geospatial Information Institute/, NGA for Ethiopia and NGA-Mean solution. Unfortunately, uncertainties of the transformation parameters and description of transformation models in use not well recognized and communicated to the end users. These parameters have been implementing extensively in the present urban cadaster project through incorporating it in their legal frameworks and standards as the mandatory procedure. Other local projects and individuals also use the same parameters in the geospatial data conversions. On the other hand, there is a growing grave concern from the user's side about the accuracy of the transformation parameters and the reliability of the models used. Also, many practitioners are reporting that the quality of their data is mostly affected by the uncertainty related to the transformation parameters. So, for this study the newly developed seven transformation model is comparatively analyzed with the existing three translation parameters. When the coordinate in WGS84 is compared with the Adindan in ARCGIS software (three translation parameter) the result shows in the table (9) below.

Table 9 difference value in ARCGIS

	Gcp In Wgs84				**Gcp In Aduindan**	
Fid	Easting	Northing			Easting	Northing
0	475336.4	1002439.92	95.174446	207.5044	475241.2	1002232
1	479740.1	1002426.47	95.176009	207.5041	479645	1002219
2	482673.3	998731.111	95.176867	207.5026	482578.1	998523.6
3	488498.1	998501.317	95.178993	207.5023	488402.9	998293.8
4	475370.3	1002453.04	95.174459	207.5044	475275.1	1002246
5	475360.1	1002447.62	95.174455	207.5044	475264.9	1002240
6	485542.6	999194.303	95.177938	207.5027	485447.4	998986.8
7	478159	997237.402	95.17512	207.5023	478063.8	997029.9
8	483761.6	997152.802	95.177192	207.502	483666.4	996945.3

When the coordinate in WGS84 is compared with the Adindan in Global mapper, the shift is 92.603 meter in X direction as well as 207.085 meter in Y direction. And all the conversion values for each point in (three translation parameter) the result shows in the table (10) below.

Table 10 difference value in global mapper

	GCP IN WGS84				GCP IN global mapper	
FID	EASTING	NORTHING			EASTING	NORTHING
0	475336.4	1002439.92	92.603	207.085	475243.797	1002232.835
1	479740.1	1002426.47	92.6	207.085	479647.5	1002219.385
2	482673.3	998731.111	92.598	207.087	482580.702	998524.024
3	488498.1	998501.317	92.595	207.087	488405.505	998294.23
4	475370.3	1002453.04	92.603	207.085	475277.697	1002245.955
5	475360.1	1002447.62	92.603	207.085	475267.497	1002240.535
6	485542.6	999194.303	92.596	207.087	485450.004	998987.216
7	478159	997237.402	92.601	207.088	478066.399	997030.314
8	483761.6	997152.802	92.598	207.088	483669.002	996945.714

When the coordinates are in Adindan (three translation parameter's) analyzed with Molodensky seven transformation parameter's there is no significant shift in between. The overall shift summarized as showed in table (11) below.

Table 11 over all shift analysis

GCP IN Adindan				GCP in Molodensky parameter's	
EASTING	NORTHING			EASTING	NORTHING
475241.2	1002232	-0.00012	-0.00015	475241.2	1002232
479645	1002219	-0.00012	-0.00015	479645	1002219
482578.1	998523.6	-0.00012	-0.00015	482578.1	998523.6
488402.9	998293.8	-0.00012	-0.00015	488402.9	998293.8
475275.1	1002246	-0.00012	-0.00015	475275.1	1002246
475264.9	1002240	-0.00012	-0.00015	475264.9	1002240
485447.4	998986.8	-0.00012	-0.00015	485447.4	998986.8
478063.8	997029.9	-0.00013	-0.00016	478063.8	997029.9
483666.4	996945.3	-0.00012	-0.00015	483666.4	996945.3

DISCUSSION

Datum transformation parameters are used for various geospatial data to transform from one known coordinate system into another. An in-depth analysis of the performance has done using seven co-located ground control points with three known coordinate transformation models are presented in this research. Over all findings shows that Molodensky transformation parameters with height iteration method shows that a good standard deviation result than the rest of the

others. The relative values of these models vary due to varied reasons such as number of collocated points, area, distortion, and accuracy of models.

Molodensky-Badekas Model with seven parameters has a good root mean square error between WGS84 to Adindan-Sudan Datum Transformation Manipulated by ITRF96, which have a common local datum (Mohammed & Mohammed, 2013). Similarly, a prior research in Ethiopia validated the greater accuracy of Molodensky-Badekas Model parameters with different height assumption methods (Hassen, n.d.). In addition, in the Ghana's local geodetic network when estimating local ellipsoidal height, the Abridged Molodensky model offered more satisfactory transformed coordinate values than the other models. It can therefore be proposed that, the Abridged Molodensky model should be used instead of the rest of the height assumption methods (Ziggah et al., 2016).

The finding of this study is consistent with earlier research of W. E. Featherstone to transform curvilinear co-ordinates from the Australian Geodetic Datum 1984 to the World Geodetic System 1984 are compared (D. W. E. Featherstone, n.d.).

In general, there are three sets of transformation parameters that were defined for a region of Ethiopia: Parameters used by the Geospatial Information Institute, NGA for Ethiopia and NGA-Mean solution (Ameti & Jager, 2016). The Federal Democratic Republic of Ethiopia Geospatial Information Institute uses the following $\Delta X = 162$ m, $\Delta Y = 12$ m and $\Delta Z = -206$ m as an official transformation parameter to transform GPS data to ADINDAN-Ethiopia system with the standard deviation and root mean square error of 0.7469 and 2.703, respectively. In addition, NGA (IHO, 2008) published two sets of transformation parameters for Ethiopia ($\Delta X = 166$ m, $\Delta Y = 11$ m and $\Delta Z = -206$ m) with the standard deviation and root mean square error of 0.409 and 0.915, and mean solution for Ethiopia and Sudan ($\Delta X = 166$ m, $\Delta Y = 15$ m and $\Delta Z = -204$ m) with the standard deviation and root mean square error of 0.668 and 2.995 respectively (Ameti & Jager, 2016). Again, due to the absence of meta-description about the parameters especially the overall quality, it is difficult to compare the official and NGA's parameters with the models tested and estimated parameters in this study.

In Ethiopia, all the above parameters are inconsistently integrated in different software packages and used as transformation parameters for any geospatial works. Therefore, the positional shift debates between orthophotos and ground control points from one software package to another software package to transform from global to local datum. The finding of the positional shift of orthophotos and ground control points shows that, the inconsistency of the transformation parameters and software packages used. Consistently there is different studies conducted in Ethiopia like, the positional accuracy in varied topography was studied for three cities, Bahir dar, Debre Markos, and Harer that was tested in 2019 with three different scenarios. The study was tested in varying control points with different scenarios, first scenarios 10 control point, second scenarios 15 control points, and third scenarios with 20 Ground control points within situ measurement's for each city with 12-hour duration of GPS logging time reading, and the data was least-square adjusted in Leica Geo Office(LGO) (Sisay et al., n.d.). And the results are as follows.

Table 12 RMS Error for 3 scenarios

Scenarios	RMSEr(cm)		
	Bahir Dar	Harer	Debre Markos
10 GCP	36	40.9	32
15 GCP	38	40.4	33
20 GCP	39	40.3	35

On the other hand, in 2018 the positional accuracy of Bahir Dar city was tested independently, the test was carried out in 5 checkpoints with 72-hour durations of GPS reading time. Also, the GPS derived coordinate process in different software packages like GAMIT (GLOBK), Leica Geo-Office, AUSPOS, and APPS with keeping international and national standards. And the result that was obtained in Ortho-photo with 15 cm ground sample distance with 1:2000 scale and GPS points' that are preceded on AUSPOS is ±0.3m. This means that the pointing accuracy read from the location and the Ortho-photos lied on this ranges (Vermeer et al., 2018)

Besides in 2017 G.C the Bahir Dar city positional accuracy of digital Ortho-photo and digital line map was tested, to assess the horizontal positional accuracy 5 checkpoints that are processed in two different processing software GAMIT/GLOBK and Leica Geo-Office (LGO) for 15 ground sample distance ortho-photo was used, and the result was with a root mean square error (RMSE) of 12.45 cm and 13.97 cm in x- and y-coordinates respectively, on the other hand, 6.06 cm with 95% confidence level – GPS coordinates from GAMIT/GLOBK as well as the accuracy of 16.71 cm and 18.98 cm in x and y-directions respectively and 11.07 cm with 95% confidence level – GPS data is processed by LGO. Similarly, the comparisons are taken between 32 coordinate values reading in RTK GPS measurement along road centerline and digitalizing of the road center line on a digital map, so the deviation of two technique's result with the mean value of 9.18cm in the x-direction and -14.96cm in the y-direction(Sisay et al., 2017).

It is also important to compare the country national standard's across with another countries, in Finland for non-urban areas where land is more valuable than agriculture and forest 0.3m for horizontal X- and Y- coordinates and 0.20m for urban areas where the land is not valuable, and outside urban areas the methods used to meet is 'fitness for purpose' requirement's (Enemark et al., n.d.). So, the current national standard of Ethiopia needs to revise the horizontal and vertical positional accuracy requirements.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Recent advance in geospatial technology have used both global and local reference data for several application of work. There are various kinds of geospatial data source like, open source, survey data, photogrammetric data, satellite image data, and etc. therefore, before using all these data for any application, they should be in the same datum and unique transformation parameters. The datum transformation parameters defined in this study based on two common models' height of abridge method and Molodensky-Badekas method with five different scenarios of height assumption methods like, height zero method, orthometric height method (OHM), abridged Molodensky, EGM08 and iteration. With the constraint of a minimum number of collocated datasets, the study tried to test two conformal transformation models,

statistically evaluated and then suggested the most suitable transformation model for Ethiopia. In addition to this the positional shift between orthophoto and ground control points are assessed on this study. The main findings of this study can be summarized as follows:

Abridged Molodensky transformation model has a standard deviation of above 2 for all height assumption scenarios. But the Molodensky-Badekas transformation model has below 2 of standard deviation for all height assumption methods. Based on this standard deviation values we can conclude that the Molodensky-Badekas transformation model has a good model to transform from global Ethiopia reference datum to local datum. The parameters estimated with Orthometric height method (OHM), and iteration solution have better accuracy than the other methods. The iteration is closer to the real values. However, it needs much time and high-performance computer when the number of collocated points increases.

The result proved that Molodensky-Badekas with height iteration method shows that the best seven parameter transformation model between wgs84 and Adindan across the region of Ethiopia. The result shows 168.617±0.1066 14.0389±0.1066 -205.374±0.1066 in translation parameters in X, Y, and, Z respectively, 0.879ppm±9.174e-012 of scale factor, and, 6.5083e, 07±2.193e-11, 4.0254e-07±3.98e-12, 1.9298e-07±1.62e-11 in rotation parameters. The standard deviation of this model is 1.06.

On the other hand, the positional the positional shift between the current orthophoto that used as a legal reference map for urban cadaster for Yeka-sub city and static survey ground control points root mean square error in 0.63 meter in X and 0.62 meter in Y, with resultant linear error of 0.63 meter. Based on the NSSDA horizontal accuracy standard of with 95% confidence interval level of 1.09meter shift exist between the orthophoto and static ground control points.

Another important conclusion this research is the software packages used to transform from global reference datum to local reference datum significantly alter the values of the specific points. For example, if we are transforming coordinate points from global to local using Global mapper the values of translation parameters are 162.12, and -206 in X, Y, and Z, respectively. while it is using ARC GIS software to transform from wgs84 to Adindan the values of translation parameters are 165 m, 11 m, -206 m and 166 m, 15 m, -204 m in X, Y, and Z, respectively.

RECOMMENDATIONS

The following recommendations have been supplied for practical and future work for future researchers based on the outcomes of this study:

- The geospatial scholars shall use customize transformation parameters rather than using the default one that customized on different software. While transforming raw data taken by GPS; one must search for the best fitting transformation parameter above with two step method, till the geoid model that represents the local ellipsoid is defined.
- The government also shall prepare a standards and guidelines to transform from global reference datum to local. And the researchers conduct detail empirical studies on this issue and provide the findings for the geospatial scholars, institutions, and software developers to avoid the inconsistency and confusion. As variations in transformation parameters significantly affects the quality and integration of spatial dataset; the concerned government body would better take due concern to precisely define the local ellipsoid. If this might not be possible; there should be evenly distributed GCPs for which their local elevations are precisely defined by level; that could enable to use 3D transformation parameter. To at least minimize this effect, the issue of active GPS should be though roughly assessed and need is to be established.

- Future works shall be focused more on increase the number and distribution of the collocated GCPs for the determination of transformation parameters, as well as the feature works shall be concentrated on densification of static ground control points that used for validating the accuracy of orthophoto.
- The shift between the newly transformed model and the existing one indicates that, there is no significant effect on the coordinates if we are using a common software transformation package to convert from global to local datum.

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4.3. Rate of Soil Erosion from Three Crops under Different Slope Gradients in Upper Blue Nile Basin, Ethiopia

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ABSTRACT

*Severe soil erosion can hinder sustainability of agricultural land and its productivity. Yet, the severity among cropland utilizations has been largely overlooked in contemporary soil erosion research. This study investigated the runoff (Ro), and soil loss (SL) responses of teff (*Eragrostis tef*), maize (*Zea mays*), and wheat (*Triticum aestivum*) crops under different slope conditions. Data was collected from 18 experimental erosion plots (30m^2) during 2020 and 2021. The highest runoff was recorded in teff crop (700 mm), which exceeds by 18.5 and 6.9% compared to its maize and wheat equivalent (P<0.05). Lower proportion of the rainfall was converted into runoff (RC=38%) in maize crop. Average rate of soil loss in teff, wheat, and maize crops was found to be 54.86, 45.61, and 38.27 t ha^{-1} year^{-1}, respectively. Steep slope cultivation of teff resulted in higher runoff (R=745 mm) and soil loss (SL=68 t ha^{-1} year^{-1}) than in the moderate and gentle slope. The rate of runoff and soil loss in all crops and slope conditions is high, but teff crop and steeper areas generate higher amount. Hence, sustainable land management and land use planning policy is recommended.*

Keywords: *Crops, Runoff, Runoff coefficient, Slope gradient, Soil loss*

INTRODUCTION

The land is a key means to achieving the sustainable development goals of the United Nations mainly linked to food, water, climate, and health (Keesstra et al., 2018). It is expected that the global food demand will strongly increase until 2050 (Valin et al., 2014). Increasing agricultural productivity and production is of most importance to secure the rising food demand. Thus, the land resource can be posed in a pressure, and it has been strongly affected. Keeping the neutrality of land degradation is indispensable to realizing sustainable development goals (Keesstra et al., 2018; Valin et al., 2014). Unless achieving food security and zero hunger at the world level can be challenging.

In the last few decades, since the 1970s and 1980s, Ethiopia has been making great efforts to feed its growing population and change its reputation from exemplary famine and drought (Hurni et al., 2015; Temesgen, 2015). The country has struggled to transform the farming community by introducing extensive investment, modern fertilizers, and the best seeds. However, it is being hampered by several pressing challenges such as land degradation, land scarcity and climate change (Stellmacher & Kelboro, 2019). Soil erosion is the leading challenge to the sustaining agricultural production and productivity in Ethiopia (Dzawanda & Ncube, 2022). Landscape modification by human alteration, particularly from forestland to other land uses, has had a significant impact on land degradation, fragmentation, and habitat losses, and strongly affects biodiversity. Agricultural practices are the major reasons exacerbating runoff and soil loss (Haregeweyn et al., 2016). Consequently, cropping lands are produce high erosion rate due to the cultivation of steep slopes and limited land management/conservation activities (Hurni et al., 2015; Zerssa et al., 2021). The agricultural land in Ethiopia is tilled by ox-plow; this makes the soil vulnerable to rainfall-runoff erosion, particularly in the beginning of the rainy time. Traditional ox-plow (traditional *Maresha*) tilled

soils have limited water conductivity and infiltration rate which resulted in a high runoff and soil erosion (Temesgen, 2015). The tillage directions within the topography leads to speedy flow of water and so causes severe level runoff loss and soil loss.

Because of these and related factors the agricultural land losses its significant amount of nutrients that can be available to plant growth. Adimassu et al. (2014) reported a soil nutrient loss of 0.99 g/kg N, 11.82 mg/kg, 7 mg/kg, and 1.9% of organic carbon from non-conserved cultivated plot. Consequently, agricultural productivity has been decreasing (International Monetary Fund [IMF, 2005]) even using a considerable amount of inorganic fertilizer and conversion of other land uses to cultivated land.

Cereal crops particularly wheat (*Triticum aestivum*), maize (*Zea mays*), and *teff* (*Eragrostis tef*) are three dominant crops in area coverage in the Ethiopian agricultural land (Zerssa et al., 2021). Teff (*Eragrostis tef*) is the leading and even increasing cereal crop for the last six decades (Zerssa et al., 2021). Particularly, section of the topography drained by Blue Nile River in Gojjam, Gonder, and Shewa, these crops are commonly cultivated. The land preparation, time of sowing, root systems, canopy cover of crops, etc. are different between cropland uses that can strongly influence the occurrence and severity of runoff and soil losses. Therefore, knowledge of the soil erosion impact of these crops can have paramount importance to take precautionary measures.

In the Abay basin, in which tillage of these crops has been practiced for millennia, the runoff and soil losses have not been sufficiently evaluated and comparisons in between are not documented. Thus, quantitatively analyzed data can help to implement evidence-based planning and implementation of sustainable land management and cultivation options under different topographic positions. The main purpose of this study was to evaluate the runoff coefficient, runoff, and soil loss responses of *teff*, maize, and wheat cropland use under different slope conditions in the Gumara sub-catchment, Abay basin.

The specific aims of the study were to:

(1) Evaluate the runoff, runoff coefficient and soil loss effect of different crop (Maize, Teff and Wheat),

(2) Quantify the effect of different slope conditions on runoff and soil loss responses of crops.

METHODOLOGY

Study Site

Gumara sub-catchment lies between 10^o 50' 15" - 11^o 0' 40" N and 37^o 30' 40" - 37^o 41' 22" E in the eastern escarpment of the Abay basin, Ethiopia (**Error! Reference source not found.**). The sub-catchment is about 20440 hectares with diverse topographic conditions from 1864 to 3235 meters. Very steep slopes are primarily covered by forest and shrub-woodlands, while cultivated lands are dominantly practiced in moderately steep (38.5%) and steep slope areas (19.1%). The sub-catchment is mainly characterized by Haplic Nitisols, Haplic Luvisols, and Haplic Alisoils, however, Haplic Luvisols representing 35.04% of the watershed and covers the current experiment site (MoWR, 1998). The sub-catchment is dominated by clay soils (Belayneh et al., 2019), which is mostly vulnerable to high runoff coefficient and soil loss.

Two decades rainfall data showed that the average amount of rainfall in the sub-catchment was approximately 2000 mm covering mainly from May to October. The temperature varies from 9 to 25.8 °C with an average value of 16.6 °C. Farmland, forest, grass, shrub, and barren lands

are the typical land use/covers in the sub-catchment, but agricultural land is the dominant type of land use. The major types of crops grown in the watershed include wheat, barley, *teff*, potato, bean, maize, and others. The sub-catchment is a high cereal crop production potential area but cultivated for millennia in ox-plow system (Zeleke & Hurni, 2001).

Experimental erosion plots design and preparation

Up on the reconnaissance survey the experiment was conducted in the upper part of the Gumara sub-catchment. This section of the sub-catchment has been vulnerable to soil erosion, supports crop growth selected for the study, and has easy access to different slope conditions nearby. It is relatively easy to access plot equipment, frequent supervision of the data collection, and transportation of the runoff to the laboratory center.

In the current research, 18 plots (3 cropland uses × 2 replicates × 3 slope conditions) have been installed using a randomized complete block design. Sloping (gentle slope; 8%), moderately steep slope (18%), and steep slope (32%) cultivated fields in a similar area (2 km buffer) were selected for the experiment to better be the sub-catchment topographically. Besides, this is important to study the effects of cropland use on erosion-prone cultivated fields and its relation to slope conditions. Plot slops were measured using Suunto PM-5 Clinometer.

Erosion plots were cultivated with maize (*Zea mays*), *teff* (*Eragrostis tef*), and wheat (*Triticum aestivum*). Plots were 3 m wide and 10 m long (30 m^2). A 50 cm long galvanized iron sheet was used to separate plots. Twenty five centimeter of the iron sheet was put in vertically into the soil to isolate the plot hydrology (Critchley et al., 1991; Morgan, 2005). A 720-liter plastic tanker was inserted into the ground at 1.2 meters below each erosion plot to trap the excess runoff (**Error! Reference source not found.**). As randemization and replication is vital the runoff plots were twice replicated and randomized (Morgan, 2005).

Data collection and analysis

Data collection period was from May to September of 2020, which this period shares greater than 70% of the annual rainfall. The rainfall data were collected using a plastic rain gauge installed at the plot site and recorded following every event rainfall. Total plot runoff was calculated by reading the water level of the plastic tanker following each rainfall event. The sediment concentration was decided from a one-liter runoff sampled by carefully steering tanker runoff. A Whatman™ filter paper with a pore size quality of 2.5 µm was used for sediment filtration and then kept at oven for 24 hours at 105 ^oC.

The runoff depth in mm was computed by using runoff volume and plot area (Eq. 1). The ratio of collected runoff and respective rainfall method was used to compute runoff coefficient (Eq. 2). Sediment concentration (in g L^{-1}) was computed as the variation of weight of the clean filter paper and the oven-dried one with sediments. Finally, soil loss in t ha^{-1} was calculated (Eq. 3.).

$$\text{Runoff density} = \frac{\text{total runoff (mm3)}}{\text{plot area (mm2)}} \quad \text{Eq.1}$$

$$\text{Runoff coefficient} = \frac{\text{total runoff (mm)}}{\text{rainfall (mm)}} \times 100 \quad \text{Eq.2}$$

$$\text{Total soil loss} = \frac{\text{SC (g L} - 1) \times \text{total runoff (L)}}{\text{plot area (m2)}} \times 10^6 \quad \text{Eq.3}$$

ANOVA was applied to test the significant variation of runoff and soil loss between cropland uses and slope conditions. SPSS® version 23 was used for statistical analysis.

RESULTS AND DISCUSSION

Variation of runoff loss among croplands uses.

Cropland uses significantly affected the runoff and soil loss amount in different topographic positions (**Error! Reference source not found.**; Table 13). The surface runoff depth from tested cropland uses ranged from 570 to 700 mm. The highest annual runoff was recorded from the *teff* land use and the lowest is from maize land use. Maize land use highly reduced surface runoff loss than that of *teff* and wheat land uses, which shows an annual runoff reduction of 18.5 and 6.97%, respectively. The statistics result shows that the difference of runoff loss between land uses are statistically significant ($P < 0.05$; Table 14). However, the multiple comparisons analysis revealed that there was a significant variation only between maize and *teff* land uses ($P < 0.05$).

Although the runoff for all cropland uses is highest in August, the variation was greater in June and July. This is seen in the recorded data that the variation between *teff* with maize, *teff* with wheat, and maize with wheat was 7.6, 18.28, and 10.77% in June and 19.89, 8.56, and 12.39% in August, respectively. These variations could probably be caused by the land preparation, time of sowing, crop canopy cover, and their relations with the prevailing rainfall in each agronomic activity. For instance, the canopy cover for maize crop is higher starting from the end of June but for others particularly the *teff* crop canopy cover becomes minimal until the end of July. Relatively, the number of times plowing is repeated for maize crop is smaller and its sowing time is approximately 1 to ½ months before *teff* and ½ to l month from wheat crop. Therefore, as maize once cultivated stabilizes the soil and its canopy cover can minimize overland runoff that the bare and disturbed *teff* and wheat cropland use.

Table 13. Summary of rainfall, runoff, and coefficient of runoff in teff, wheat, and maize crops.

			Cultivated land uses					
			Runoff (mm)			Variation (%)		
		Rf	Teff (t)	Wheat (w)	Maize (m)	t *vs* w	t *vs* m	w *vs* m
Main rainy season	May	119.6	36.83(30.8‡)	36.0(30.1‡)	34.8(29.1‡)	2.25	5.58	3.41
	Jun	196.1	71.52(36.5‡)	66.1(33.7‡)	60.2(30.1‡)	7.6	15.77	8.84
	July	512.1	279.4(54.5‡)	255.9(49.9‡)	228(44.6‡)	8.41	18.28	10.77
	Aug.	471.2	251.7(53.3‡)	230.1(48.7‡)	201(42.8‡)	8.56	19.89	12.39
	Sep.	202.1	70.1(35.7‡)	71.7(35.5‡)	54.3(26.9‡)	-2.31	22.5	24.25
Annual	Yearly	1501	700(46.6‡)	651.2(43.4‡)	570(38.0‡)	6.97	18.5	12

‡ Denotes the RC in percent

The minimal coefficient of runoff was seen at the maize land use (38%; Table 13). The runoff coefficient generated from *teff* was higher by 21.1% and 7.08% against the wheat and maize cropland use, respectively. Variations of runoff coefficient among *teff* (46.6%), maize (38%), and wheat (43.4%) land uses are significantly different (Table 14; $P < 0.05$).

Table 14. Means differences test of runoff loss, runoff coefficient, and soil loss among crops.

Variable	(I)	(J)	Mean variation (I-J)	Sig.
Ro	Teff (t)	Wheat (w)	.7431257 ns	.479
		Maize (m)	1.7445980*	.019
	Wheat (w)	Maize (m)	1.0014722 ns	.264
		Overall variation	F=3.718 *	.025
SL	Teff (t)	Wheat (w)	.1216593 ns	.632
		Maize (m)	.2181628 ns	.230
	Wheat (w)	Maize (m)	.0965036 ns	.749
		Overall variation	F=1.347 ns	.261

* Refers to the mean difference is significance at 0.05; ns-non-significance difference.

Soil loss variation among cropland use

Soil loss showed variations between *teff*, maize, and wheat cropland uses. However, the largest rate of soil loss was recorded at the *teff cropland use* (54.86 t ha^{-1}), followed by wheat (45.61 t ha^{-1}) and it was found lowest in the maize land use (38.27 t ha^{-1}. Maize cultivated plots reduced soil loss by 16.86 and 30.23% annually compared to *wheat and teff* land uses, respectively. The difference in soil loss between *teff* and wheat was relatively smaller showing only a 16.08% reduction in wheat. The statistical test shows that the mean variations of soil loss between cropland uses were not significantly different ($P > 0.05$). As the plot site characteristics are comparable except crop types and their characteristics from land preparation to harvesting, the identified difference in soil loss among erosion plots are credited to the land preparation, timing of sowing, crop cover, and root systems.

Besides, the interaction between land preparation, land cover, and root systems with the prevailing rainfall at a different time (onset to the ending) of the rainy time in the year leads to variations in sediment concentration and soil loss among cropland uses. For instance, the soil loss effect of *teff* compared to maize land uses in May, June, July, and August were -20.37, 23.34, 34.60, and 56.46%, respectively.

From May to mid-June the land prepared for wheat and *teff* are barren and the soil is dispersed via plowing at least two to three times land preparation. But, in maize land uses sowing starts around mid-May to June. This implies that the land prepared for maize is at least covered with some crop cover in June when other plots recorded the highest rate of soil loss from their bare and disturbing plots. Particularly in *teff* the land is almost without cover until the ending of July. However, because of an increase in crop canopy, the roots-soil attachment, and the tilled soil is stabilized making plots less vulnerable to soil erosion in August and September.

Table 15. Summary of soil loss (SL, t ha^{1}) in teff, wheat, and maize crop cultivated lands.

			Cultivated land uses					
		Rainfall	*SL* (t ha^{1})			Variation (%)		
		(Rf)	Teff (t)	Wheat (w)	Maize (m)	t *vs* w	t *vs* m	w *vs* m
Main	May	119.6	4.41	5.21	5.31	-18.14	-20.37	-1.89
rainy	Jun	196.1	13.61	12.12	10.44	11.00	23.34	13.87
season	July	512.1	29.65	24.02	19.39	18.99	34.60	19.27
	August	471.2	5.94	3.29	2.59	44.50	56.46	21.56
	Septem-	202.1	1.24	0.96	0.55	22.10	55.43	42.79
Annual	Yearly	1501	54.86	45.61	38.27	16.86	30.23	16.08

Effects of slope gradient on runoff and soil loss

Runoff loss was significantly affected by crop land-use types ($P < 0.05$). In fact, runoff loss is significantly varied with crop land-use types due to differences in land preparation, land management, land cover, and land use. The highest annual average runoff depth (745.68 mm) value was observed under the *teff* cropland use in the steep topography and the lowest average value (463.36 mm) was under the Maize at the gentle slope (Table **16**, **Error! Reference source not found.**). Indeed, the runoff depth is relatively higher in the *teff* followed by Wheat cropland use at all the slope gradients. However, the ANOVA Tuky HSD result shows that a significant difference has been seen only between gentle and steep slope conditions ($P < 0.05$).

Regardless of the slope gradient class, the total runoff loss was lower in the Maize cropland use compared to other crop land uses. However, the difference in runoff among cropland uses decreases with increasing slope gradient (**Error! Reference source not found.**). This is clear that the annual runoff from Maize cropland use strongly increases with slope than that of Teff and Wheat land uses. For instance, annual runoff from Maize land use increased from 463.36 mm at the gentle slope to 604.15 and 644.35 mm in moderate and steep slope conditions, respectively (Table **16**). Similarly, a research result in china reported an increasing amount of runoff with an increasing slope gradient (Gao et al., 2020). This implies that as the slope gradient increases the effect of land preparation, crop roots, and crop covers on runoff loss decreases.

Table 16. Summary of runoff and soil loss different crops under different slope conditions.

Slope gradient (%)	Cropland uses	Rainfall (mm)	Runoff depth (mm)	Average (mm)	Soil loss (t ha^{1})	Average (t ha^{1})
Gentle	Teff	1501	630.51		35.72	
	Wheat	1501	566.55	553.48	28.40	28.52
	Maize	1501	463.36		21.44	
Moderate	Teff	1501	724.00		60.63	
	Wheat	1501	676.90	668.35	51.00	52.03
	Maize	1501	604.15		45.09	
Steep	Teff	1501	745.68		68.21	
	Wheat	1501	710.30	700.11	57.42	57.98
	Maize	1501	644.35		48.29	

This is mainly associated with slope inclination on rainwater infiltration, evapotranspiration, and easy and rapid movement of runoff. As the slope steepness increases the high proportion of rainwater, becomes converted into overland runoff instantly instead of it being infiltrated and overland storage. As indicated in Wischmeier and Smith (1978), on steeper slopes, the runoff has higher speed and as a result rises its shear stress in the soil and carrying high quantity of sediments. However, on the other hand in gentle slope areas, the rainwater travels slower, which gives time to infiltration and evaporation.

Table 17. Significance means differences in runoff and soil loss between slope conditions.

Parameters	(I) Slope	(J) Slope	Mean Difference (I-J)	P-value	Slope*Crop land use (interaction effect)
Ro	Gentle	Moderate	-1.0990643	.201 ns	
		Steep	-1.7283041	.020*	
	Steep	Moderate	.6292398	.590 ns	
	Overall variation		F=3.712	.025*	F=0.081 ns
SL	Gentle	Moderate	-.3120878	.049 ns	
		Steep	-.3875470	.010*	
	Steep	Moderate	.0754592	.836 ns	
	Overall variation		F=4.806	.008**	F=0.016 ns

* Refers to the mean difference is significance at 0.05; ns-non-significance difference.

The soil loss from different cropland uses (*teff*, maize, and wheat) are shown in Table **16** and **Error! Reference source not found.**5. With increased slope gradient, the annual soil loss increased for all cropland uses. The amount of soil loss greatly increases from 6 to 12 % slope, but the increase was slight from 12 to 16% slope gradient (**Error! Reference source not found.**5). For instance, the average soil loss in a year from the three-cropland uses was 28.52 t ha^{-1} at the gentle slope plots but the value rose to 52.03 t ha^{-1} at the moderate slope. However, the differences between moderate and steep slope conditions have been relatively smaller (5.95 t ha ^{1}). Table 17 shows a significant mean difference in soil loss among slope conditions regardless of cropland uses ($P < 0.01$). However, the Tuky HSD analysis showed that the mean variance in soil loss is significant only between gentle and steep slope areas ($P < 0.05$). As with increasing slope the severity of soil erosion increases due to the high speed of runoff and less infiltration.

CONCLUSION

This research investigated the effect of different cropland uses its preparation, canopy, root systems, and related characteristics on runoff and soil loss. The results of the study have shown that varying cropland uses had significantly affected the vulnerability of the land to runoff and soil losses. The soil erosion rate in the Maize, Wheat, and *Teff* plots was 54.86, 45.61, and 38.27 t ha^{-1} yr^{-1}, respectively. Due to relatively higher (4-5 times) plowing preparation, sowing at the highest rainfall time, preparation of sowing (trampling of the plot by animals and humans during preparation), shallow root system, and low crop cover during the highest rainy months makes the *teff* land use highly vulnerable to soil erosion followed by wheat cropland use than maize land use. This rate of erosion particularly on the steeper slope is extremely high for *teff* cropland. The infiltration and water retention ability of the maize cropland use is higher than *teff* and wheat land uses. The runoff coefficient and runoff amount are extremely high in the *teff* land used mainly related to relatively lower water infiltration as a result of high compaction of the land use during land preparation for sowing. However, steeper slopes for all land uses have been highly vulnerable and resulted in extremely high runoff and soil loss.

Therefore, since the runoff coefficient and soil loss are extremely high in all croplands uses compared to the tolerable soil loss estimated for Ethiopian highlands, sustainable watershed management needs to be implemented and better attention should be given to areas dominantly growing *teff*. Besides, sustainable landscape management and land use planning are recommended.

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4.4. Modelling the Performance of Regional Climate Models in simulating *Precipitation over Guder sub-basin, Upper Blue Nile Basin, Ethiopia*

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ABSTRACT

The main aim of this study is to assess the model performance of five RCMs driven by a single GCM (ICHE-EC-EARTH) in capturing the mean annual and seasonal rainfall of Guder sub-basin in the Upper Blue Nile Bain for the period between 1986 and 2005. Model data were downloaded freely from Earth System Grid Federation (ESGF) website and observational data were also obtained from National Meteorological Agency of Ethiopian (NMA). Among the models, CCLM4-8-17, RACMO22T, and REMO2009 were relatively better in representing the average yearly observed precipitation over the Guder catchment. Additionally, in most station RCA4, HIRHAM5 and CCLM4-8-17 model overestimate the precipitation with a minimum bias of 0.01mm at Jeldu station and a maximum bias of 6.48 mm at Ambo station. The highest bias (6.48 mm) was noted by RCA4 around Ambo, while the lowest bias was resulted from CCLM4-8-17 model in Jeldu station. Among the five selected models CCLM4-8-17 model is the best in catching the pattern of long term monthly and year-round precipitation over the Guder sub-basin. Whereas HIRHAM5 and RCA4 poorly catching year-round and monthly distribution of the precipitation over the study catchment. The analysis of this results shows that, all models could not be able to perform equally at a specific site and it is essential to find the correct climate model for climate impact study at watershed level to aid the decision maker.

Keywords*: Climate change, Guder, GCMs, RCMs, Precipitation*

INTRODUCTION

For earth's climate studies Global Climate Models (GCMs) are a very essential tool. GCMs are developed to simulate the earth's climatic conditions (Dibaba et al., 2019) and used as an instrument to assess the changes of the earth's climate system because of various radiative forcings (IPCC, 2013). For this reason, one of the main applications of the GCMs is investigation with the aim of improving the understanding and knowledge of the climate system. As a result of this, starting from the 1950s several international climate institutes developed numerous GCMs (Edwards, 2010). For instance, for documentation, access, evaluations, and intercomparing of GCMs, the Coupled Model Intercomparing Project (CMIP)

organized by various modeler teams around the globe were used as a standard framework (Abbasia et al., 2019). The fifth phase of CMIP consists of two datasets which include, the near and the long-term climate simulation experiments that produced because of the Atmosphere-Ocean General Circulation Models (AOGCMs). From more than 20 modeler teams, CMIP5 can provide over 50 GCMs simulation other than the other uncertainty challenges (Abbasia et al., 2018).

For instance, the uncertainties related to GCMs simulation includes the spatial and temporal coarse resolutions nature of the model, the initial model assumption and the mathematical formulation considered in the model (Haile and Rientjes, 2015; Ahmadalipour et al., 2017). Regardless of its uncertainty, GCMs were considered as the most important tools for future climate projection study (Kharin et al., 2007; Loukas et al., 2008). However, it is known that GCMs based future climate variability and trend study will be done after the performance evaluation of GCMs in simulating climate variables (Dessai, 2005; Reifen and Toumi 2009; Belda et al., 2015; Nasrollahi et al., 2015).

GCMs outputs dynamically downscaled using Regional Climate Models (RCMs) can better suit for assessing hydrological impact as well as for climate adaptation study (Haile and Rientjes, 2015; Worku et al., 2018). In this aspect the World Climate Research Program (WCRP) that created and funded the Coordinated Regional Climate Downscaling Experiment (CORDEX) program played a great role in coordinating the worldwide climate research. WCRP was established to better understand the climate system and the possible reasons for climate change and variability under the sponsorship of World Meteorological Organization (WMO) and the International Council for Science (ICSU). Their primary objective of establishment is to determine the predictability of the climate and the effects of anthropogenic activities on the climate itself.

A climate change impact and adaptation study are also prominently supported by CORDEX which is a globally coordinated effort that works towards the climate research including the assessment of the uncertainty of climate model simulation as well as evaluation of GCMs and RCMs. It also downscaled the GCMs output relatively into a finer scale to assist the climate researcher in accessing the readily available data (Haile and Rientjes, 2015). By considering the initial and boundary conditions of the selected GCMs, downscaling is performed through RCM. The GCMs biases that arise due to the large-scale variables cannot be removed by RCM. But, when GCMs are dynamically downscaled by RCMs it may improve the simulation performance of the model due to the improvement of the resolution of the topography and land cover data. Simulation through RCMs is spatially more reasonable, and it also increases the reliability of the estimates because of the reduction of the biases. GCMs model errors and biases can possibly reduce through downscaling techniques (Laprise et al., 2013). So, relevant information designed for policy plan, adaptation practices and climate related hazard assessment details can be generated from the downscaled GCMs output by RCMs for decision makers.

Model performance study in simulating key climate variables especially temperature and precipitation can be possible through CORDEX and there is a study that evaluate the efficiency of the climate models at continental, regional and country level by applying various evaluation methods. For instance, at continental and regional level several evaluation studies were conducted (Segele et al., 2008; Herna´ndez-Dı´az et al., 2012; Endris et al., 2013; Kim et al., 2013; Landgren et al., 2014; Perez et al., 2014; Akinsanola et al., 2015; Akinsanola and Ogunjobi, 2017; Almazroul et al., 2020). Country as well as basin wide RCMs evaluation studies in Ethiopia were also reported by Diro et al. (2011); Bhattacharjee and Zaitchi (2015); Haile and Rientjes, (2015); Jury (2015); Reda et al. (2015); Van Vooren et al. (2019). Luhunga

et al. (2016) also evaluates the performance of RCMs in simulating precipitation and temperature at country and catchment level in Tanzania (Mutayoba and Kashaigili, 2017). In addition, a case study of RCMs performance evaluation was also conducted in USA at Florida State (Bayissa et al., 2021).

Generally, as described by Nikulin et al. (2012); Kim et al. (2014) and Dosio et al. (2015) in various regions of Africa, CORDEX have advantages than GCMs especially in representing extreme and yearly cycle of rainfall events. However, across different regions and seasons RCMs performance is inconsistent (Feser et al., 2013; Endris et al., 2013). Furthermore, RCMs model uncertainty also exist in simulating precipitation and temperature (Varis et al., 2004) and it is so challenging to distinguish the root cause of the existing uncertainty. But the assumption related to model uncertainty may be either from RCMs parameterization or initial boundary condition of the GCMs (Worku et al., 2018). In addition, consideration of multiple RCMs driven by various GCMs may also contribute for large model errors and uncertainty.
The previous research works at catchment level in Ethiopia also includes Worku et al. (2018) and Dibaba et al. (2019) in which mostly focused by considering more than one GCMs downscaled by numerous RCMs. However, RCMs evaluation studies at local or small watershed level are still limited and it require much more efforts to confirm simulation capability of the multiple RCMs driven by a single GCM in capturing the detail characteristics of the climate pattern at watershed scale. Therefore, the main aim of this study is to assess the model performance of five RCMs driven by a single GCM (ICHE-EC-EARTH) in capturing the mean annual and seasonal rainfall and temperature of Guder sub-basin in the Upper Blue Nile Bain for the period between 1986 and 2005.

METHODOLOGY

Description of the study area

Guder sub-basin is located within the Upper Abay/Blue Nile basin of Ethiopia, which is located between 8.70250 – 9.89560 N and 37.27530 – 38.15340 E (Figure 1). It covers a total drainage area of 7,011km^2 which is situated in the Northwest of Ethiopia and in the southeast of the Blue Nile. The river originates in Lake Tana and flows to the Sudanese border to eventually meet the White Nile River at Khartoum in Sudan. The characteristics of Guder sub-basin is mountainous with elevation ranging from 1500 to 3000 m.a.s.l. The topography of the study area makes large climate variations in the basin which vary from cool in the highlands to moderately hot relatively in the lowland areas within a limited range of elevation. But most of the Guder watershed is found in the Woina Dega Agro-climate Zone of Ethiopia and it has both dry and wet or rainy seasons on a yearly basis. As a result, the catchment receives most of its rain during the rainy (Kiremt) season in between June to September whereas the dry (Bega) season covers from December to February. The soil type of the catchment is highly variable due to the topography, landscape and other soil forming factors but the main soil type in the watershed includes Vertisols, Latosols, Cambisols, Alisols, Luvisols and Nitisols (Haileyesus, 2011). In the study area, due to heavy population, conventional agricultural practice is the main activity and cultivated land is expanding at an increasing rate at the expanse of natural vegetation, forest and shrublands. Consequently, the natural resources and the environment in the watershed are at a greater risk.

Data source and management

Observational data

According to Diro et al., (2011) for the advancement of climate model representation, unavailability of data may limit the process and reference data must have been there to evaluate the performance of RCMs simulation. Therefore, for the purpose of regional model evaluation,

daily observational climate data of precipitation, maximum and minimum temperature between 1986 and 2005 were used in the current study. In this evaluation study, the included daily observed climate data were obtained from National Meteorological Agency of Ethiopian (NMA) that was recorded from eight meteorological stations which were found in the vicinity and within the Guder watershed. The recording has so many missing values, which might be due to either the failure of an instrument or the data recorder. Therefore, the missing data was managed by applying advanced techniques rather than using the usual gap filling methods. As described by Turrado et al., (2014), multiple linear regression and inverse distance weighting are some of the usual methods used in filling the missing values. Instead of using the above conventional methods, this study used an algorithm called Multivariate Imputation by Chained Equations (MICE) as clarified by Buuren et al. (2015). This algorithm is found freely on R statistical software, which was provided by the R Development Core Team, (2015). The method calculates the missed represented values of a particular station by using the other full observed climate station data and the remaining complete station data will be used as a predictor. One of the qualities of this method is that, for each missed value, it creates various predictions and has a room to consider the uncertainty while calculating the missed data. As explained by Buuren et al. (2015), the method also provides a standard error while calculating the missing data. That is why MICE are much better than the other usual methods in completing missing data.

After completing the missing data calculation, data quality management was checked and accomplished using RClimDex 1.1 (Zhang and Yang, 2004). While doing the data quality management, errors like negative precipitation, an occasion of value of minimum temperature greater than maximum temperature might happen and these related errors were corrected by the nearby station. An observational data of this type might have an outlier and those data were changed to mean values according to WMO, (2009). After completing all the required quality checks, all the observational data was fully used for this study.

Model (RCMs) data

In this study a simulation of five historical RCMs model results driven by single GCMs (ICHE-EC- EARTH) was used in the period between 1986 and 2005 (Table 1). The name of the driving model or GCM used in this paper is EC-EARTH which is developed by an institute called ICHEC: Consortium of European research institutions and researchers in Europe. The GCM was driven by CMIP5 model data, and the institution is responsible for the scientific aspects of the CORDEX simulation including configurations of RCMs and model related experiments. This GCM was regionalized *by* five RCMs which include Climate Limited-Area Modelling Community (CCLM4-8-17), Regional Atmospheric Model of Royal Netherlands Meteorological Institute (RACMO22T), Rossby Centre Regional Climate Model (RCA4), Max Planck Institute Regional Model (REMO2009) and HIRHAM5 regional model. These RCMs models were chosen due to their performance in downscaling historical simulation of EC-EARTH GCM driven by CMIP5 over the CORDEX-Africa domain. According to Nikulin et al., (2012); Kim et al., (2014) and Dosio et al., (2015), most of the model evaluation results of these RCMs driven by various GCMs showed a reasonable performance in Africa and this is why this paper initiated to evaluate the performance of the selected RCMs driven by a single GCM over Guder catchment in the Upper Blue Nile Basin. For these reasons all the model data containing daily precipitation, maximum and minimum temperature were downloaded freely from Earth System Grid Federation (ESGF) website (https://esg-dn1.nsc.liu.se/search/cordex/).

The downloaded precipitation and temperature data were acquired from grids that fully cover the Guder watershed and a historical simulation was utilized for each individual models. With regards to the ensemble members, in this study CCLM4-8-17, RCA4 and REMO2009 models considered the 12^{th} ensemble member of the models whereas, in the RACMO22T and HIRHAM5 models, the first (r1) and the third (r3) ensemble member were used respectively. The RCMs model simulation results have the spatial resolution of approximately 50km by 50 km which was derived from CORDEX- Africa datasets.

To match the RCMs gridded data with the observed climate data, spatial data conversion was employed to convert the observational point data of precipitation, maximum and minimum temperature collected from the gauge station. For areal rainfall calculation, the concept of Thiessen Polygon method was used, and this method classifies the Guder catchment into polygons of a smaller size based on area of influence of each climate observation station. Depending on the area of the polygon in proportion to the sub-basin of the whole area, the methods compute sub-basin wide rainfall to each classified polygon. Likewise, based on RCMs grids areas that fully cover the Guder watershed, the Thiessen polygon methods was used to compute the precipitation of each RCMs in the whole watershed. In addition, sub-basin wide areal precipitation was also computed. Finally, estimation of areal rainfall as well as areal maximum and minimum temperature in each station was done and various statistical metrics were employed to evaluate the performance of the studied RCMs in simulating the climate condition over the Guder watershed.

For this model evaluation study, both observed, and RCMs model data were equally essential. The observational data was collected from the Ethiopian NMA as described in section 2.2.1 whereas, the RCM's gridded data were obtained from a freely available website of Earth System Grid Federation (ESGF) as mentioned in section 2.2.2. Before the actual analysis, the downloaded gridded RCMs climate model data were extracted using Climate Model data for hydrologic modelling (CMhyd) software and this tool is primarily used for extraction and bias correction purposes of climate data which were acquired from GCMs and RCMs. The necessary observational climate data cleaning and management task was also successfully implemented using R software as explained in the above section.

The performance of RCMS climate model can be assessed by comparing the observational climate data with that of the modelled data. This could help to evaluate the results of the quality of simulated RCMs over the observed data. For this reason, to compare the freely acquired RCM gridded climate data of a specific gauge station with the other equivalent data, various methodological approaches were utilized (Dibaba et al., 2019). For instance, among the methods spatial interpolation approaches of both Inverse Distance Weighting (IDW) and Kriging are commonly used in this kind of study (Ly et al., 2011). As described by Hartkamp et al., (1999) IDW interpolation methods showed a better result as compared with other interpolation approaches. Consequently, this method also currently utilized by Dibaba et al., (2019) and in this study the same methodological approach was used to interpolate the climate condition of the simulated values to the observed with IDW over Guder sub- basin.

In the first case, the spatial variation between the individual simulated RCMs average annual rainfall against the observed precipitation were evaluated over the Guder catchment. Similarly, difference of spatial average annual maximum and minimum temperature of RCMs with that of the observational data were also compared. For this approach, spatial maps were prepared for both RCMs output and observed climate variables. To support this analysis measure of performance including the Root Mean Squared Error (RMSE), Correlation Coefficient (Correl) and BIAS between the observed and modelled data were presented along with the developed spatial maps of rainfall and temperature. Moreover, the capability of the RCMs in reproducing the climatic conditions of the study area were also assessed by comparing the average values

of monthly climate pattern, seasonal and annual frequency distribution of precipitation and temperature. Return periods of RCMs results against the observational data were also considered. Furthermore, three statistical metrics were also used as a criterion for RCMs performance evaluation in simulating the climate conditions, particularly precipitation and temperature of the Guder watershed. These measures of performance include RMSE, Pearson Correlation.

Where, R_{RCM} is a precipitation and temperature of RCMs, R_{Observ} is a precipitation and temperature of a stations, the bar over the variables denotes the average over the period between 1986 and 2005, and N represents the analysis periods of 20 years.

For simulations of climate variables, RMSE represent an absolute model error and relatively the best model could be represented with the smaller BIAS and RMSE values. RMSE evaluates the variations between the observed and modeled climate variables and a value of 0 RMSE represents the best performance model. The correlation coefficient was used to describe the linear relationship between the observed and modeled results of the climate variables. Between the observed and the modeled climate variables data, a -1 and a +1-correlation coefficient means a perfect negative and positive correlation among the mean of RCM and observational precipitation, respectively. Since the correlation coefficient is found in the value between -1 and +1. BIAS also used to assess the volumetric variation between RCMs output and observed climate variables and a value of 0 BIAS means a very minor difference whereas, a value of BIAS away from 0 represent a deviation between RCMs output and observed values of climate variables.

Finally, Taylor diagrams were also used to graphically evaluate the models. This diagram was developed by Taylor, (2001) with the aim of helping the scholars while comparing the performance of various climate models. It is used to measure the degree of correspondence among observed and RCMs modeled climate data. For this purpose, three statistical metrics including RMSE, correlation coefficient (Correl) and Standard deviation (SD) were used to explain the diagrams. Taylor diagrams of precipitation, maximum and minimum temperature of the Guder watershed were developed by using the system of R software. Relatively, the best model could have a smaller value of RMSE of theRCMs model data, a closer value of SD of the modeled with that of the observed data and strong correlation among the observed and modeled data.

RESULTS AND DISCUSSIONS

Average climatology of the climate variables

An understanding of the climate conditions and its variability of an area could help to minimize the risks associated with extreme weather conditions. In this regard, rainfall and temperature are the two most useful climate variables in the climate system of Guder watershed. Impact on livelihoods and ecosystem changes through drought, reduction of agricultural production, water scarcity and changes of temperature may result due to the average annual variations of the climate variables in the catchment. Therefore, for proper planning, decision, climate adaptation and mitigation measures, evaluating the performances of climate models in capturing the climate variables (rainfall and temperature) are quite useful in the study catchment.

Precipitation

Rainfall is one of the essential climate variables that contribute to characterizing the climate conditions of Guder catchment where the livelihood activities of the people in the area are largely interconnected with seasonal rainfall dependent agriculture. It is also the most important climate parameter that spatially and temporally varies across different scale over the sub-basin.

However, the areal variability of the rainfall in the catchment might be due to the influence of the topography. Fig. 2 depicts the long-term distribution of the spatial annual mean rainfall climatology for each RCMs modeled and observed rainfall over the Guder watershed in the year between 1986 and 2005.

Among all considered RCMs models, CCLM4-8-17, RACMO22T, and REMO2009 were relatively better in representing the average yearly observed precipitation over the Guder catchment. On the other hand, in the remaining two RCMs models including HIRHAM5 and RCA4 demonstrate a weak performance result in capturing the mean yearly precipitation (Fig. 2).

Comparatively, RACMO22T and CCLM4-8-17 model is the best as compared with the other RCMs in representing the average annual observed rainfall, and in this model most of the areas have about similar precipitation over the studied year in the Guder catchment except in Kachise and Fincha station. Again, in comparison with the observed rainfall, CCLM4-8-17 model overestimate in the south and southwestern part of the catchment with the exception around the area of Kachise station. On the contrary, RACMO22T model underestimate in the northern and northeastern region of the watershed and in the other remaining area, the long-term average precipitation of the model is similar with that of the observed rainfall. Likewise, REMO2009 model underestimate in most areas of the watershed including in the south, southwestern and northwestern region of the sub-basin and similar with that of the observed rainfall in the north and northeastern part of the catchment.

HIRHAM5 and RCA4 models overestimate almost in all areas of the Guder sub-basin except in a few areas in the northern part. The maximum long term average precipitation of the two models was depicted in the southern region of the catchment and the highest rainfall was shown in the RCA4 model followed by HIRHAM5 model (Fig. 2).

The RMSE, BIAS and the Correlation of climate stations between the observed and modeled rainfall is shown in Table 2. Apart from the area around Fincha and Kachise gauge station, in all the other station RCA4, HIRHAM5 and CCLM4-8-17 model overestimate the precipitation with a minimum bias of 0.01mm at Jeldu station and a maximum bias of 6.48 mm at Ambo station.

Table 2 The simulated model performance evaluation results of the statistical metrics in being the long term (1986-2005) average precipitation at each climate stations in the Guder watershed**.**

	RCMs			**Correlation**		**RCMs**			**Correlation**
Stations	**model**	**RMSE**	**BIAS**	**(r)**	**Stations**	**model**	**RMSE**	**BIAS**	**(r)**
Ejaji	CCLM4	2.71	2.54	-0.14	Ambo	CCLM4	3.67	0.58	0.22
	HIRHAM5	1.73	1.61	0.13		HIRHAM5	4.69	4.63	0.16
	RACMO22T	0.62	0.44	0.34		RACMO22T	1.12	1.02	0.29
	RCA4	2.94	2.9	0.34		RCA4	6.54	6.48	0.31
	REMO2009	0.77	0.62	0.32		REMO2009	0.56	0.42	0.47
Gedo	CCLM4	2.56	2.39	0.04	Jeldu	CCLM4	0.15	0.01	0.3
	HIRHAM5	4.56	4.46	0.07		HIRHAM5	2.18	1.7	-0.12
	RACMO22T	6.66	0.33	-0.18		RACMO22T	1.56	-1.05	0.18
	RCA4	5.08	4.99	0.04		RCA4	3.94	3.82	0.54
	REMO2009	1.37	1.18	0.31		REMO2009	1.36	-0.52	-0.1
Tikur enchine	CCLM4	2.03	1.54	-0.41	Kachise	CCLM4	2.29	-2.20	0.33
	HIRHAM5	2.83	2.57	-0.18		HIRHAM5	10.7	-5.6	-0.08
	RACMO22T	1.35	-1.03	0.05		RACMO22T	2.17	-2.03	-0.13

	RCA4	4.63	4.43	-0.19		RCA4	4.1	-4.05	-0.04
	REMO2009	1.87	-1.63	-0.19		REMO2009	1.19	-0.94	0.16
Guder	CCLM4	2.59	2.31	0.38	Fincha	CCLM4	1.68	-1.30	-0.13
	HIRHAM5	3.59	3.34	1.34		HIRHAM5	2.7	-2.58	0.38
	RACMO22T	1.11	-0.26	0.43		RACMO22T	1.85	-1.61	0.01
	RCA4	5.36	5.2	0.28		RCA4	2.64	-2.45	-0.17
	REMO2009	1.43	-0.86	0.27		REMO2009	1.88	-1.62	0.05

The highest bias (6.48 mm) was noted by RCA4 around Ambo, whereas the lowest bias was resulted from CCLM4-8-17 model in Jeldu station. However, all the models around Kachise and Fincha stations underestimate the rainfall in the range of 0.94 mm – 5.6 mm. As compared with the other models, HIRHAM5 was highly underestimated the precipitation (5.6 mm) in these two stations with a high systematic error of 10.7. Furthermore, RACMO22T and REMO2009 models also underestimate the precipitation in most of the climate stations except in the area around Ejaji, Gedo and Ambo. RACMO22T underestimate the rainfall in the range between 0.26 mm to 2.03 mm at Guder and Kachise stations, respectively. Whereas REMO2009 underestimate in the range of 0.52 mm – 1.63 mm around Jeldu and Tikur enchine stations, respectively. In comparison with the other entire model in each station, the lowest bias and RMSE were produced by CCLM4-8-17 followed by REMO2009 and RACMO22T model. For instance, at Jeldu station, CCLM4-8-17 has the lowest bias value with the least systematic error. On the other hand, an RCA4 and HIRHAM5 model depicts the largest bias with the maximum RMSE in each climate station (Table 2).

In Ejaji, Tikur enchine and Fincha stations, the CCLM4-8-17 model was negatively correlated and in the other remaining stations the model has a positive correlation with the observed. As compared to the other models, CCLM4-8-17, REMO2009 and RACMO22T showed a better correlation with minimum bias and RMSE. However, RCA4 and HIRHAM5 model have a better correlation with the observed in a few stations but the bias and the systematic error of these two models are very high (Table 2). Overall, in most of the climate stations CCLM4-8-17, RACMO22T and REMO2009 model simulate the precipitation better than the other RCMs.

Monthly and year-round precipitation

The long term monthly and year-round precipitation in between 1986 and 2005 at various stations and RCMs were presented in Fig. 4. In this figure, the year-round precipitation clearly shows the main rainy and dry seasons over the Guder sub-basin. As shown in Fig.4, the rainy season starts in June and end up in September (JJAS) whereas, the dry season include the month of November up to February (NDJF).

The basin wide areal average and station level monthly and year-round precipitation are captured by most of the models (Fig. 4). For example, CCLM4-8-17, REMO2009 and RACMO22T are better in capturing the pattern of the long term annual and monthly rainfall than the other two models. Among them, relatively RACMO22T and CCLM4-8-17 model were the best in catching the pattern of long term monthly and year-round precipitation over the Guder sub-basin. Much more precipitation was also simulated in JJAS of the main rainy season, where each of the models shows a change in simulating amount of long term monthly and annual cycles of precipitation.

Consequently, RCA4 model overestimate the rainfall in most of the station while the long term observed rainfall underestimate in the other remaining stations. However, in Kachise station observed precipitation overestimate over most of the other models throughout the whole

months, while GCMs downscaled by HIRHAM5 and RCA4 in this station only showed underestimation of the seasonal rainfallover Guder sub-basin. HIRHAM5 and RCA4 model overestimate the long-term pattern of monthly and year-round rainfall in all climate stations except in Kachise and they are poorly catching year-round and monthly distribution of the precipitation over the study catchment. Analysing the overall distribution of extreme precipitation event at catchment level and the capacity of the model in capturing this extreme is so essential for designing natural hazard prevention and mitigation measures. The shape of the histogram of the daily incidence of the rainfall that obtained from the observational data and simulated modelled data shows a slight resemblance. As the number of days of occurrences decreases both the observed and modelled daily precipitation follows the same pattern. The analysis of the daily occurrence of the rainfall indicates that both in the observed and modelled precipitation, many drier.

However, the daily magnitude of precipitation in between 0 and 0.5 mm is underestimated by the observed and overestimated by the modelled rainfall. In addition, in this range the daily amounts of precipitation of the models largely dominated by light precipitation. In the range between 1 and 12 mm, the incidences of the frequency of the observational precipitation dataset are higher than the RCMs modelled precipitation. On the other hand, much rainiest days, the precipitation amount greater than or equal to 14 mm were frequently detected in the RCMs models than the observational precipitation data. Furthermore, Inter-model differences were also observed in reporting the incidence of daily precipitation of different amounts. In line with this study, Haile and Rientjes (2015) also described in the same manner that the frequency of the magnitudes of rainfall occurrence of the simulated is smaller than the observed in between 1 – 10 mm/day over the upper Blue Nile Basin.

RCMs model wise, a higher number of rainy days were observed in REMO2009, CCLM4-8-17 and RACMO22T as depicted in the range of 1 – 12 mm/day. Worku et al., (2018) evaluated 10 RCMs of which GCMs downscaled by CCLM4 and REMO2009 illustrated a reasonable performance in reproducing the distribution and extreme precipitation incidence over the Jemma Sub-basin. The research finding reported by Dosio et al. (2015) on the continental Africa also showed that the model output downscaled through CCLM4 produce better result in representing the extreme events and distribution of the rainfall. Likewise, among the RCMs models, RCA4 model had showed an intense form of rain of above or equal to 14 mm/day (Fig.5). Like this study, in the Upper Blue Nile basins of Ethiopia different scholars reported that a global model downscaled using RCA4 demonstrated a continuous incidence of intense heavy rainfall events (Worku et al., 2018; Haile and Rientjes, 2015). The cumulative distribution of the magnitudes of daily precipitation was also presented in Fig.6 to aid further interpretations.

A recurrence interval or return period is defined as an average estimated time between events to occur. It is also useful for the analysis of risk related to extreme incidences like floods and discharge flows of a river. Fig.7a and b both depicts the seasonal and annual recurrence interval of precipitation respectively over the Guder Sub-basin. The analysis of the recurrence interval of the RCMs models indicates an overestimation in some years and underestimation of the return period in the other years. The RCA4 and HIRHAM5 models showed an extreme overestimation of the seasonal (JJAS) return period (Fig.7a) whereas, in the annual return period, the high overestimation of the RCA4 model is confirmed (Fig.7b). Relatively, the CCML4-8-17 model showed a reasonable capacity in capturing the seasonal and annual recurrence interval of the precipitation over the study watershed. In line with this study, Worku et al., (2018) also confirmed an overestimation of the return period in the RCA4 model family in the Jemma watershed of the Upper Blue Nile basin.

Statistical metrics used to evaluate observational and RCMs precipitation **over the entire Guder**

sub-basin.

To summarize how closely the set of patterns of the different modelled RCMs matches with the observed precipitation was described by using the Taylor diagram (Taylor, 2001). The patterns of similarity or deviation between simulated and observed values were quantified in terms of centred root-mean-square difference, correlation and standard deviations or their extent of amplitude differences. Figure 8 illustrates the statistical metrics value of the long-term average annual and seasonal precipitation between the five RCMs models and observational values.

Relatively the best models are modelling whose simulated patterns agree with the observed one that lie close to the marked hollow point on the x-axis. Accordingly, the simulation of the annual average precipitation over RACMO22T and REMO2009 RCMs models demonstrates best matches with the observed values. The mean annual precipitation in both the overlapped models agree best with the ground truth observation, each one with about the smallest and equivalent values of RMSE, with about similar strong correlation and a closer value of the standard deviation.

Table 3 The long term (1986 – 2005) annual and seasonal statistical performance of RMSE, BIAS and Correlation between the RCMs and observational precipitation in the Guder sub-basin.

Avera Performance of statistical metric RMSE

	g		*BIAS*		*Correlation*			
	Annual	Seasonal	Annual	JJAS	Annual	JJAS	Annual	JJAS
Observed	4.07	8.36						
CCLM4	5.18	9.12	1.32	1.78	1.11	0.75	0.13	-0.36
HIRHAM5	5.58	12.62	1.66	4.51	1.52	4.25	0.05	-0.16
RACMO22T	3.73	8.00	0.59	0.94	-0.34	-0.37	0.31	0.6
RCA4	6.73	16.14	2.74	7.94	2.66	7.77	0.26	0.01
REMO2009	3.65	7.51	0.64	1.65	-0.42	-0.85	0.29	-0.16

The other remaining three models in simulating the average annual precipitation displayed either the lower correlation or high RMSE and a high amplitude variation represented by SD as shown in Fig.8. Similarly, simulation of the long term seasonal (JJAS) average precipitation simulated by RACMO22T model outperformed from the other RCMs model as denoted by a short distance from

the marked hollow point on the x-axis which represent the observed seasonal average precipitation. For instance, as depicted in Fig.8 the seasonal correlation pattern of the RACMO22T model is 0.6, which is a strong correlation as compared with the other RCMs models. The blue curves denote the centred RMSE and its value for RACMO22T model is about 0.94 mm/day. The SD of the pattern of the simulated is proportional to the distance of the radial from the origin. For RACMO22T RCM model the SD of the simulated or modelled field is about 0.65 mm/day which is obviously less than the observational SD that is denoted by black solid line arc at the hollow point on the x-axis with the observational value of about 1.1 mm/day. As it can be shown from Fig.8 the poorly performed RCM model is RCA4 which has the highest centred RMSE and high amplitude variation. The annual and seasonal statistical performance values between the modelled and observed precipitation was also displayed in Table 3 for evidence to further assist the interpretations of the results.

CONCLUSION AND RECOMMENDATION

Assessing the performance of climate models are becoming one of the essential prior tasks to assist the decision maker and for designing effective strategies for climate change adaptation and mitigation. The changing climate and other environmental challenge affect the precipitation around the Guder sub-basin, which in turn require an understanding of different RCMs models in simulating the rainfall over the Guder watershed. The current paper examines the performance of five RCMs models which downscaled from a single GCMs in simulating the long-term average climatology, mean monthly as well as annual variability of the precipitation and its characteristics. The performance assessment was done by comparing how the long-term average precipitation values simulated by individual RCMs models varied spatially with respect to the observational ground stations rainfall data over the Guder sub-basin. The result indicates that from single GCMs downscaled by RACMO22T RCMs models outperform from the other models. Following the RACMO22T models, REMO2009 and CCLM4-8- 17 also showed a good performance in representing and capturing the long term annual average distributions of precipitation events over the Guder sub-basin. On the contrary, RCA4 and HIRHAM5 RCMs models poorly capture the precipitation over the Guder watershed. In most of the studied criteria RCA4 was the poorest whereas RACMO22T was the best RCMs model in representing the long-term annual average as well as mean monthly distributions of rainfall events over the studied watershed.

Identifying the most useful output of climate model that can successfully represent the climate of the Guder sub-basin is essential to investigate the impact of future climate change as well as to assist decision related to climate adaptation and mitigation measure. As explained by Teutschbein and Seibert, (2012) a climate model that perform well for the existing climate condition of an area most likely assumed to perform well for future climate in those areas. As a result, in this paper the performance capacity of five different RCMs models driven by single GCMs were studied over the Guder sub-basin and the result showed RACMO22T and REMO2009 models' simulation were betterin terms of the magnitude of biases and distribution of precipitation events. This can also be improved by utilizing statistical bias correction methods and the findings of this study could reasonably use as an input for future climate adaptation and mitigation study as well as measure taken by decision maker.

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4.5. Local microalgae potential for coupling wastewater remediation with lipid and bioethanol production

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ABSTRACT

Microalgae are recently considered promising resources for coupling wastewater remediation and biofuel production. The aim of this study was to evaluate the potential of local microalgae for coupling wastewater remediation with lipid and bioethanol production. The local microalga, Scenedesmus sp. was grown in brewery wastewater for biomass production and remediation processes. Lipids were extracted from microalgal biomass using a microwave, autoclave, osmotic stress, oven heating, and acid digestion as pretreatments. Bioethanol was produced after reducing sugar extraction in a microwave using the hydrolytic agents (HCl, H_2SO_4, NaOH, and KOH) with response surface method (RSM) optimization for the effective hydrolytic agent. Scenedesmus sp. reached a maximum removal efficiency of 78%, 94.6%, 99.98%, and 69% for COD, TN, NH_4^+-N, and TP, respectively. The highest lipid content obtained was 24.27% using a microwave, followed by HCl digestion (19.43%), autoclaved (17.57%), osmotic shock (16.73%), and oven heating (15.53%). The highest reducing sugar yield obtained using HCl was 146.78 mg/g, which was increased by 19.6% after RSM optimization. The maximum bioethanol yield of 0.44 g/g reducing sugar was achieved after a 24 h fermentation. This study proved that the local microalgae have an enormous potential for integrating wastewater treatment with lipid and bioethanol production.

Key words: *Bioethanol, Nutrient removal, Lipid, Reducing sugar, Fermentation.*

INTRODUCTION

Alternative energy sources are currently being extensively explored around the world because the use of fossil fuels worsens climate change through greenhouse gas emissions. Biofuels are perceived as viable alternative energy sources due to their potential to be renewable, sustainable, and environment-friendly (Cheng & He, 2014). They are classified into various generations depend on the types of feedstocks used. First-generation biofuels are made from edible feedstocks like corn, soybeans, and sugarcane, while second-generation biofuels are obtained from non-edible feedstocks such as jatropha and waste. However, the first-generation biofuels have an issue like "food versus energy," and the second-generation biofuels face difficulties in overcoming technological barriers, showing that these two sources are unsustainable (Ashokkumar et al., 2017; Noraini et al., 2014). Third-generation biofuels obtained from microalgae and macroalgae have sparked intense interest due to their ability to overcome the shortcomings of the previous two generations of biofuels (Mubarak et al., 2015).

Moreover, microalgae can remediate wastewater by removing nutrients and other pollutants. Microalgae such as *Chlorella* and *Scenedesmus* species are admirably adapted to grow in various wastewaters. Moreover, they can accumulate a considerable amount of lipids and carbohydrates in their biomass (Sivaramakrishnan & Incharoensakdi, 2018). For example, Mercado et al. (2020)

cultivated *Scenedesmus* sp. in dairy wastewater and obtained a maximum content of 51% lipids and 27% carbohydrates while removing 88.4% total nitrogen (TN) and 97.1% total phosphorus (TP). Diniz et al. (2017) reported a maximum of 19.5% carbohydrates and 12.5% lipids in *Scenedesmus* sp. grown in municipal wastewater after removing 70% TN and 90% TP. Hence, microalgal biomass obtained after wastewater treatment has an enormous potential to produce lipids and carbohydrates and, after, biofuels.

Biofuel production from microalgal biomass needs pre-treatment for lipid and carbohydrate extraction because these biochemical products are typically encapsulated within the microalgal cellular structures. Several pre-treatment methods, such as autoclave, microwave, ultrasonic oven heating, homogenization, sonication, bead-beating, and osmotic stress, have been employed for lipid and carbohydrate extractions so far (Lee et al., 2010; Miranda et al., 2012; Halim et al., 2012). For example, Yu et al. (2020) and Chandra et al. (2020) employed microwave and autoclave pre-treatments for carbohydrate extraction and so, bioethanol production, respectively. Moreover, Lee et al., (2010) and Guldhe et al. (2014) used various pre-treatments, including microwaves for lipid extraction and both got the greatest lipid content employing microwave pre-treatment.

Several earlier studies have produced bioethanol and lipid from synthetically grown microalgae. (Chandra et al., 2020; Guldhe et al., 2014; Miranda et al., 2012; Lee et al., 2010), which adds an extra cost for biofuel production. However, a few studies have been conducted to combine wastewater remediation with lipid (Li et al., 2011) or bioethanol production (Onay, 2018). Furthermore, there is a scarcity of concrete and dependable data on microalgae use in Ethiopia. Therefore, the aim of this study was to assess the potential of local microalgae, *Scenedesmus* sp., for coupling wastewater remediation with lipid and bioethanol production,

METHODOLOGY

Microalgae and Wastewater

The microalga, *Scenedesmus* sp., was isolated and found from lake water (Ziway Lake) based on standard methods. The anaerobically digested (AD) agro-industrial effluent was collected from the St. George brewery industry, Addis Ababa. Thereafter, the Scenedesmus sp. was cultivated in AD brewery effluent using a 2 L conical flask that was used as a photobioreactor. The cultivation conditions, such as light intensity, temperature and photoperiod were held at 5000 lux, 21 ± 3.0 and 12:12 light-dark cycle, respectively. The growth characteristics and the change in nutrient concentrations were investigated over the cultivation period. After cultivation, the biomass was harvested, dried in a 60 ℃ oven, and thereafter ready for the extraction of lipids and reducing sugars, followed by the production of bioethanol.

Pretreatment Methods for Lipid Extraction

The microalgal biomass pretreatment for lipid extraction was carried out using an autoclave (Models: DIXONS and ST3028), a microwave (Models: Milestone SK-10 and SK-12, Italy), oven heating (Model: GX65B), osmotic shock, and acid digestion in a water bath (Model: DK-98-II). Dry microalgal biomass of 500 mg was blended with 30 mL of distilled water and pretreated using: (i) an autoclave at 121 ℃ for 15 min, (ii) a microwave at 1000 W and 100 ℃ for 10 min, and (iii) oven heating at 120 ℃ for 15 min (Yu et al., 2015). 500 mg of dry microalgal biomass was also

suspended in 30 mL of (i) 10% NaCl for osmotic stress pretreatment for 48 h, and (ii) 3 N HCl for acid digestion at 80 ℃ in a water bath.

Pretreatment and Optimization for Reducing sugar Extraction.

A 5% (w/v) dried microalgal biomass was mixed with 3 N HCl, H2SO4, NaOH, and KOH, as well as H2O in a Teflon cap, separately, and put in the microwave with conditions of 1000 W, 120 ℃, and 15 min. After pretreatment, the supernatant was separated using centrifugation and analyzed for reducing sugar content. The RSM technique was used to perfect the key parameters (concentration, microwave power, temperature, and extraction time) after the most efficient hydrolytic agent had been found.

After obtaining the most effective hydrolytic agent, optimization of the main parameters, such as concentration, microwave power, temperature, and extraction time, was employed using the RSM approach. MINITAB software (version 18) was used for experiment design and model development using CCD (central composite design) of RSM with three level (Table 1). A triplicate experiment was performed under best conditions to confirm the developed model's suitability for predicting the best reducing sugar yield.

Bioethanol Production

Microalgal hydrolysates obtained under best conditions were used to produce bioethanol. The fermentation was carried out using *Saccharomyces cerevisiae* (commercial baker's yeast) prepared according to Harun et al. (2010). Fermentation was carried out in 125 mL conical flasks with a 50 mL working volume, containing the microalgal hydrolysate and fermentation nutrients suggested by Yu et al. (2020). The hydrolysate solution was fixed to a pH of 5, sterilized in an autoclave at 121 °C for 20 minutes, and then inoculated with 10% of pre-cultured *Saccharomyces cerevisiae* yeast (Thu et al., 2009). The flasks were kept at 30 ℃ and 150 rpm on a shaker incubator (ZHWY-103B, China) for three days. Bioethanol was decided after distillation within an interval of 24 hours.

Analytical Methods and Calculations

The biomass yield was estimated according to APHA (1999). COD and TP were determined according the procedures found in Hach manual (Hach, 2002). TP and NH_4^+-N were analyzed the procedures found in APHA (1999). A chloroform and methanol mixture (1:2 v/v) was used to extract lipids according to the procedures of the Bligh and Dyer (1959) method after pretreatment. The lipid content (LC) in microalgal biomass was calculated using the formula: $LC = (\text{weight of extracted lipids} / \text{weight of microalgal biomass}) \times 100\%$.

Reducing sugar was determined according to the procedures of the DNS (Miller, 1959). The reducing sugar yield (mg/g) obtained after pretreatment was estimated using the formula: reducing sugar $= (\text{reducing sugar content (mg)} / \text{microalgal biomass (g)})$. The bioethanol yield was estimated in the basis of the procedures providing by Crowell & Ough (1979) by potassium dichromate method in distilled samples. The bioethanol yield was calculated using the formula: bioethanol yield = (bioethanol obtained in fermentation (g))/(microalgal biomass (g)) (Manmai et al., 2020).

Statistical Analysis

Except for the fermentation process (which was done in duplicate), all experiments in this study were done in triplicate, and results were presented as the mean ± standard deviation. A one-way ANOVA with the Tukey post-doc test was employed to compare lipid contents among pretreatment methods and reducing sugar yields among hydrolytic agents using R-software. $P < 0.05$ was used to decide whether the differences were significant. MINITAB software version 18 was used to analyze the experimental results in RSM. To set up the functional connection between independent factors and sugar yield, a mathematical model was developed. Analysis of variance (ANOVA) was used to assess the statistical significance of the constructed quadratic model and the model terms. To evaluate the relationship between the independent factors and the response (reducing sugar yield), contour plots were made.

RESULTS AND DISCUSSION

Nutrient removal and Biomass yield

The AD brewery effluent used in this study had a concentration of 399.58 ± 29.14 mg/L COD, 41.52 ± 4.73 mg/L NH_4^+-N, 53.42 ± 6.2 mg/L TN, and 50.00 ± 2.64 mg/L TP. The concentrations of these nutrients are above the permissible discharge limits of brewery effluent, which are 250, 40, 20, and 10 mg/L for COD, TN, NH_4^+-N, and TP, respectively. Therefore, the discharge of this effluent without the proper treatment method may cause the deterioration of the receiving water bodies. As a result, microalgae are proposed as an effective method for the treatment of this type of effluent. The potentials of local Scenedesmus sp. for biomass production and wastewater remediation were investigated by measuring dry weight and COD, TN, NH4+-N, and TP removals, respectively. Figure 1 (a and b) shows the biomass production with nitrogen and phosphorus nutrients or COD removal over the cultivation time. The biomass yield had increased throughout the cultivation period, peaking at 1.05 ± 0.11 g/L on the 18^{th} day. The biomass yield obtained in this study was comparable to those reported by Ferreira et al., (2017) using *Scenedesmus* sp., but lower than those reported by Darpito et al. (2014) using *Chlorella* sp. in AD brewery effluent.

The concentrations of TN, NH_4^+-N, and TP gradually declined until the end of the experiment and eventually achieved a maximum removal efficiency of 94.6%, 99.98%, and 69%, respectively. However, the concentration of COD was gradually decreasing until day 6 and after the sixth day, the COD concentration fluctuated, sometimes increasing and sometimes decreasing until the end of the cultivation. This is due to the use and release of COD during the cultivation time (Wang et al., 2012; Wang et al., 2010). However, the removal efficiency of COD reached 78% at the end of experiment. Darpito et al. (2014) reported a similar removal efficiency in TN and COD but a higher removal efficiency in TP. Furthermore, Ferreira et al. (2017) obtained a lower removal efficiency of NH4+-N, TN, and TP than in this study. The result obtained in this study shows that agro-industrial wastewater, like AD brewery effluent, is used for sustainable biomass production from microalgae with nutrient removal for biofuel production.

Lipid extraction

The microalgal biomass obtained after growing in AD brewery effluent was used to extract lipids with and without pretreatment methods. Figure 2 shows the contents of total lipids obtained after

different pretreatment methods (autoclave, microwave, osmotic stress, oven heating, and acid digestion in a water bath). All the pretreatments performed in this study were able to disrupt the cells of *Scenedesmus* sp., but their lipid yields differed. The maximum and minimum lipid contents were extracted from *Scenedesmus* sp. cells using microwave and osmotic stress, respectively. The statistical analysis revealed no significant differences ($P > 0.05$) between autoclave, osmotic, and HCl digestion methods. However, microwave pretreatment was significantly different ($P < 0.05$) from the other pretreatments. The highest lipid content obtained was 24.27% using microwave pretreatment, which was followed by HCl digestion (19.43%), autoclaved (17.57%), osmotic shock (16.73%), and oven heating (15.53 mg/g). The total lipids achieved without pretreatment ($14.79 \pm 1.02\%$) are significantly different ($P < 0.05$) from the other pretreatments (except oven heating) evaluated in this result, pretreatment is an option to maximize the lipid content of microalgal biomass obtained after wastewater treatment, and it should be performed before further processing.

Results from this study follow previous studies by Lee et al. (2010) and Guldhe et al. (2014), where microwave pretreatment has been shown to extract the highest content of lipids from *Scenedesmus* sp. as compared to autoclave, sonication, or osmotic shock. Moreover, Patrícya et al. (2014) reported a higher lipid content extraction from mixed cultures using microwave pretreatment as compared to autoclave pretreatment. However, Yu et al. (2015) investigated different pretreatments, including autoclave, microwave, acid digestion, and sonication, for lipid extraction from *Chlorella sorokiniana*, and reported acid digestion provided the highest lipid content of the other pretreatments.

Screening of Hydrolytic Agent for Reducing Sugar Extraction

Microalgal biomass pretreatment in the microwave with various hydrolytic agents (H_2O, HCl, H_2SO_4, NaOH, and KOH) was investigated to find the best hydrolytic agent for reducing sugar extraction. Figure 3 depicts the reducing sugar yield after microwave pretreatment with various hydrolytic agents. HCl produced the highest reducing sugar yield, while H_2O produced the lowest reducing sugar yield. As a result, an acid (HCl) was chosen for perfecting reducing sugar extraction from microalgal biomass.

This study found a higher reducing sugar content than Hernández et al. (2015) and Kassim & Bhattacharya (2016), who found a maximum of 88 mg/g from *Scenedesmus almeriensis* and Chlorella sp. using acid and alkaline pretreatments, respectively. The variation in reducing sugar yield among different studies is since the accumulation of carbohydrates in the cells of microalgae depends on the growth medium, microalgae species types, and growth conditions (such as temperature, pH, light intensity, and photoperiod) (Ho et al., 2013). Most earlier studies used synthetic medium as a growth medium, which increases the cost of bioethanol production; however, this study used wastewater. The yield of reducing sugar reported in this study is therefore encouraging to produce bioethanol employing cost-cutting techniques.

Moreover, the alkaline pretreatment method made a lower reducing sugar yield than the acid pretreatment method. Hernández et al. (2015) and Shokrkar et al. (2017) reported that alkaline pretreatment releases less reducing sugar than acid pretreatment from Scenedesmus and mixed microalgae in autoclave pretreatment. However, Kassim & Bhattacharya (2016) and Harun et al. (2011) found a higher reducing sugar yield using alkaline pretreatment from Chlorella sp. and

Chlorococcum infusionum using autoclave and oven heating pretreatments, respectively. The results found in this study showed that the extraction of microalgal reducing sugar using microwaves is dependent on the types of hydrolytic agents. Acid hydrolytic agents are more favorable than alkaline hydrolytic agents for reducing sugar extraction from microalgae in the microwave.

Optimization of Reducing Sugar Extraction

The main factors of microwave pretreatment were statistically perfected with RSM in present study. The optimization of reducing sugar extraction was employed after selecting HCl as an effective hydrolytic agent for microwave pretreatment. To predict the reducing sugar yield, a quadratic model (Eq. (1)) was generated using a multiple nonlinear regression analysis of the experimental data.

$$R = -264 + 41.82\,X + 0.026\,Y + 4.528\,Z + 0.09\,W - 2.258\,X^2 - 0.000006\,Y^2 - 0.02005\,Z^2 - 0.0357\,W^2 - 0.03033XY + 0.0184XZ - 0.0230XW + 0.000933YZ + 0.000295YW + 0.00664ZW \quad (1)$$

where R denotes the predicted reducing sugar and X, Y, Z, and W denote for HCl concentration, microwve power, temperature, and extraction time, respectively. XY, XZ, YZ, YW, and ZW are the interaction terms, and X^2, Y^2, Z^2, and W^2 are the quadratic terms.

Table 2 displays the ANOVA for the data generated by Eq. (1). The model's F-value (78.36) and p-value (0.000) showed the significance of the model. All linear terms except extraction time had significant effects on reducing sugar extraction. The model fit was satisfactory, as indicated by the p-value of 0.26 for lack of fit. The higher R^2 value (0.98) demonstrated the model's high reliability in predicting reduced sugar production. The high adjusted R2 value (0.97) indicated a reasonable agreement between the observed and predicted reducing sugar yield values. R^2 and adjusted R^2 values are close to one, implying a significant correlation between observed and predicted reducing sugar yield values. The low coefficient of variance (2.37%) indicated that the experimental data had a high degree of precision and reliability. As a result, the developed model was sufficient for predicting reducing sugar yield across a wide range of experimental variables.

The contour plot was generated to visually be the two - way interaction of independent variables and to find the best levels of each variable for reducing sugar yield. Figure 5 (a-f) depicts a contour plot as a function of two independent variables, with the other two independent variables held constant.

Figure. 5. Contour plot showing the combined effect of variables on reducing sugar (a) X versus Y, (b) X versus Z, (c) X versus w, (d) Y versus Z, (e) Y versus W, and (f) Z versus W

The highest reducing sugar yield obtained was 173.9 mg/g by the interactive effect of microwave power (1200 W) and temperature at the optimum values of 1200 W and 145 ℃, respectively (Fig. 5d), while the lowest reducing sugar yield of 156.2 mg/g was obtained by the interaction of HCl concentration (3.0) and temperature (140.6 ℃) (Fig. 5b). The other interactions, such as acid concentration and microwave power (Fig. 5a), acid concentration and extraction time (Fig. 5c), microwave power and extraction time (Fig. 5e), and temperature and extraction time (Fig. 5f),

released a maximum reducing sugar of 171.2, 157.7, 169.5, and 159.3 mg/g with optimum values of 1.64 N & 1200 W, 3.0 N & 16.4 min, 1200 W & 17.4 min, and 140.2 ℃ & 17.6 min, respectively.

At best conditions, the predicted reducing yield was 175.5 mg/g. The best acid concentration, microwave power, temperature, and extraction time are 1.68 N, 1200 W, 144.65 ℃, and 18.89 min. Experiments in triplicate at best conditions were used to confirm the predicted reducing sugar yield. Considering this, the actual result, which was 172.5 mg/g, was in excellent accord with the predicted value. As a result, the model proved proper and sufficient to explain the extraction of reducing sugar from microalgal biomass using a microwave.

Bioethanol Production

The best conditions obtained were used to extract reducing sugar from microalgal biomass for bioethanol production. The bioethanol was produced using a commercial baker's yeast, *Saccharomyces cerevisiae*. The microalgal hydrolysate used for the fermentation process had a concentration of 178.99 ± 0.92 mg/g reducing sugar. Fig. 6 shows the bioethanol production profiles from Scenedesmus sp. within 72 h of fermentation time in this study. As shown in Fig. 6, the concentration of reducing sugar drastically decreased from its first concentration to 74.43 ± 0.69 mg/g within 24 h, then it decreased slowly until the end of fermentation. Conversely, the concentration of bioethanol was increased from 0 to 24 h, after which there is no meaningful change in the concentration. The maximum bioethanol yield obtained was 0.44 g/g reducing sugar with a fermentation efficiency of 88.2%.

The bioethanol yield obtained in this study was similar to that obtained the study by Sivaramakrishnan & Incharoensakdi (2018), who produced bioethanol using autoclave pretreatment from *Scenedesmus* sp. grown on BG11. However, it was slightly lower than the results obtained by Guo et al. (2013) and Chandra et al. (2020), who produced bioethanol from *Scenedesmus abundans* and *Scenedesmus acuminatus* grown on BG 11 medium, respectively. The maximum bioethanol productivity obtained by Chandra et al. (2020) is comparable with this study. Unlike this study, most previous studies used a synthetic medium for microalgae growth. However, this study used brewery effluent as a growth medium; therefore, the result of this study is more attractive when compared to the bioethanol obtained in other studies.

CONCLUSION AND RECOMMENDATION

This study proved that the local microalga, *Scenedesmus* sp., has the potential to remediate wastewater and produce biomass that can be converted into biofuels like bioethanol. *Scenedesmus* sp. effectively removed nitrogen nutrients (> 90%) from AD brewery effluent when compared to the phosphorus nutrients. The highest lipid content was found to be 24.27% using microwave pretreatment. The hydrolytic agent, HCl, is more effective for reducing sugar extraction in a microwave. The reducing sugar yield increased by 19.57% after RSM optimization. The RSM optimization results showed that the developed mode was significant, and its predictions are in line with experimental results. The bioethanol yield obtained was 0.44 g/g reducing sugar at 24 h of fermentation time. Based on the findings of this study, it can be suggested that local microalgae supply a promising result for lipid and bioethanol production after growing on wastewater. Pilot-

scale microalgal cultivation should be carried out to evaluate large-scale biomass production for lipids, carbohydrates, and biofuel (bioethanol and biodiesel) production.

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5. LEADERSHIP & DEVELOPMENT

5.1. The Effect of Leadership Styles on Organizational Performance: A Survey of selected Federal Civil Service Institutions in Ethiopia

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ABSTRACT

This study aimed to examine the effect of leadership styles on organization performance of Civil Service Institutions at federal level. The study employed quantitative research with correlational design. The respondents of this study are middle and lower-level managers, experts and employees from six organizations. They were selected using simple random and proportional sampling. A total of 400 survey instruments were distributed to these respondents working in six identified organizations. Participants were informed of the aims of the study and assured of the confidentiality of the research both in formal letters and in person. The reliability test showed that all variables scored above 0.7 Cronbach alpha coefficients. Descriptive and inferential statistics methods were used to analyze the data. The findings revealed that leadership styles predict 49.1 percent of organizational performance. The study showed that both transformational and transactional leadership styles strongly positively correlated with organizational performance while laissez-faire leadership style is negatively correlated. The findings portrayed that leadership styles have both positive and negative effect on the organizational performance of the federal civil service organizations. It is concluded that leadership style has effect on organizational performance, and leaders who exercised both transformational and transactional leadership styles reached more organizational performance than leaders who practiced other leadership styles. It is recommended that leaders in civil service sector need training as well as education developing executive leadership package. Moreover, the research calls for leaders to use combined leadership styles to ensure high organizational performance. The findings of the study add to limited but growing body of research on public/civil service sector leadership and organizational performance.

Key words: Leadership styles, transformational leadership, transactional leadership. Laissez-faire leadership, organizational performance

INTRODUCTION

Since it is exceedingly difficult to give a precise definition of the term *leadership*, scholars define it in their own way (Russell, 2005, Bennis, 2007, Hackman & Wageman, 2007). While Asika (2004) suggests that leadership is the process of influencing people to direct their efforts towards achievement of some organizational goals, Chris and Ukaidi, (2016) posits that leadership has to do with the role someone plays in influencing followers to achieve organizational goals. Similarly, Rue and Byres (2009) define leadership as "the ability to influence people to willingly follow one's guidance or adhere to one's decisions." Furthermore, Northouse (2010:5) defines leadership as a

"process whereby an individual influence a group of individuals to achieve an organizational goal." Even though each definition uses varied factors, the general tenet of the leadership is that leadership is a process that influences the behavior of the followers to perform tasks efficiently and effectively which again calls for proper exercise of leadership style (Bass, 2000).

Studies show that organization performance and leadership effectiveness depend on the styles or methods that the leaders use (Harris et al., 2007). Scholars confirm that behind any organization's success or failure, there is leadership style that organizations adopt. According to Ebrahim (2018: 2), leadership style is "a combination of different characteristics, traits and behaviors that are used by leaders for interacting with their subordinates." According to Ojokuku et al. (2012: 202), leadership style is a key determinant of the success or failure of any organization and is the ways of supplying direction, implementing plans, and motivating people. Hence, the literature describes that leadership style influences the performance of an organization.

Research suggests that effective leadership styles can ease the improvement of performance of organizations. The attainment of organizational goals depends on the leadership styles (Chris & Ukaidi, 2016). The behavior that leaders adopt or the method they practice decides effectiveness of the organizational performance positively or negatively. Studies that were conducted on leadership and organization performance reveal that leadership style of top management directly affects the performance of public sector organizations (Fu-Jin et al., 2011; Ojokuku et al., 2012). Similarly, McGrath and MacMillan (2000) declare that there is significant relationship between leadership styles and organizational performance.

Leadership styles can be categorized as transformational, transactional, laissez-faire, culture-based style, charismatic and visionary leadership styles (Soughi et al., 2015; Harris et al., 2007; Yukl, 1994), autocratic, laissez faire and democratic or participatory (Chris & Ukaidi, 2016), Transformational and Transactional leadership styles (Wahab et al., 2015). This study uses the three major leadership styles (transformational, transactional, and laissez-faire) which form in one or other ways all the leadership styles.

The above discussions show that there is relationship between the organizational performance and leadership styles. The discussion also points out that civil service institutions and their leaders should be cautious and transforming the existing leadership styles of public sector organizations to implement the visualized changes is important. Lately the Federal Civil Service Commission (2019/20) evaluated the performance of several federal civil service institutions. The commission used BSC based indicators to measure the performance of these organizations then ranked them high, medium and low performers.

Even though there would be several factors such as work environment (Akintayo, 2012), employees attitude and employee commitment (Igbaekemen & Odivawri, 2015) that contribute to organizational performance, several studies (Fu-Jin Wang, et al., 2011; Ebrahim, 2018; Chris and Ukaidi, 2016; Ojokuku et al., 2012; Obiwuru et al., 2011) state that organizations' performance and their success are largely the consequence of leadership style. Thus, the purpose of this study is to investigate which leadership styles in selected institutions are practiced and to what extent such leadership styles affect the organizational performance of federal civil service institutions in Ethiopia.

Improving organizational performance is among the challenges that public sector leader's face. They must toil to satisfy the ever increasing and demanding needs of their customers. Recently Federal Civil Service Commission (FCSC, 2019/20) evaluated the overall change implementation performance of the federal civil service institutes and announced their ranks based on checklists that the commission developed. As per the evaluation checklist, organizations were ranked as High, Medium and Low performers (FCSC, 2019/20). It used *organizational change execution* (institutional change leadership, building strong change agents, result oriented system, customers' satisfaction) and *good governance* (tackling internal and external good governance problems, rent seeking attitude and practice, complaint management and citizens' charter) indicators as criteria to rank the performance of these institutions. Though the Commission ranked 27 federal organizations according to their performance, the study did not specifically indicate what factors explain the level of performance in the public sector. Moreover, except Simret (2020) no study is conducted on what were the elements connected with extremely high or low performance of these organizations.

Furthermore, while few leaders understand that the leadership styles strongly influence their organizations' performance and goal achievement; most leaders may not understand that leadership styles do make a difference in their organizational performance. Thus, the limited research in this area, unexplored issue about leadership styles at public service institutions' context triggered the researcher to investigate further the effects of leadership styles on organizational performance.

Basic Questions of the Study

The study looks to address the following research questions in the context of the federal public sector organizations in Ethiopia:

1. *What is the effect of transformational leadership style on organizational performance?*
2. *What is the effect of transactional leadership style on organizational performance?*
3. *What is the effect of laissez-faire leadership style on organizational performance?*
4. *Which leadership style has more effect on organization's performance?*

Related Literature

The Concept of Leadership

Leadership is a construct whose conceptualization is often shaped by the nature of theoretical traditions advocated by its researchers. Hence, depending on schools of thought, researchers offer different definitions of leadership. For instance, scholars like Yukl (2010), McManus (2006), Koestenbaum (2002) and Blanchard (2007) variously define the term leadership by their perspective. Yukl, after a comprehensive review of the literature, states that leadership is a way of influencing an individual to work toward the personal or organizational goals or aims willingly. It is also a process of bringing people together to strive to achieve shared goals (2010:20). While willingness to be influenced and shared aims are key issues to Yukl, McManus (2006:12) argues that leadership is a process of setting up a team and team spirit using empowerment as a tool to get positive outcomes.

Northouse (2001: 3) presented that a potential leader is such that he/she can influence others and ensure that they follow him/her. Leadership is a process in which we find the involvement of both

leaders and followers. Nevertheless, it is the leader who starts this process to be possible more than their followers. It is one of these characters that distinguishes a leader from his followers. According to Plunkett, Attner, and Allen (2008: 434-435), leadership forms three sets of variables, namely: the leader, followers, and the organization and situation in which both the leader and the follower are interacting and continuously altering. Both the leader and those being led are human beings with various skills, traits, understandings, and attitudes developed through experiences that shape their personalities, personal viewpoints, and ethical beliefs. These factors can contribute to or reduce from the leader's ability to influence others. They are the sources of the individual's strengths or weaknesses.

To the researcher, leadership makes people feel important and then inspire them to exert their maximum effort to achieve the goals. Koestenbaum (2002:19-21) states that leadership is greatness in all one does. Greatness is a style that leader's practice in their daily activities such as: innovativeness, foresight, effectiveness, and flexibility giving high value for people and their willingness to take risk. Blanchard (2007:3) notes that leadership is the process of touching the 'thoughts and actions of others. Likewise, Sashkin and Sashkin (2003:39) define leadership as the art of transforming people and organizations with the aim of improving the organization's performance.

Leadership and its potential outcome on organizational performance and enduring experience are at the front position of the agenda of organizations of the world. Hence, in this era of globalization, all organizations, be it profit making or not-for-profit, need high-quality leadership at all tiers. There is also growing evidence that senior leaders can play a crucial role in the design and success of service delivery and employment to meet the needs of an increasingly diverse population.

Thus, from the literature, leadership may be considered a process of influencing and leading followers and situations which improve organizational performance. Since the focus of this study is on leadership styles of civil service institutes at federal level, it is logical to review the most common leadership styles.

Leadership Styles

Leadership style plays a key role in today's organizations. According to Haque et al. (2015), leadership style is a method that a leader exercises to motivate employees towards the achievement of the organization goals. Leadership style is a behavior that a leader uses in dealing with employees and situation at a given time within an organization (Ukaidi, 2016). The leadership style of a leader has a key role in improving the performance that the organization is expecting (Wang et al., 2010).

Chris and Ukaidi (2016) argue that by implementing the suitable leadership style, a leader can positively affect the performance of his/her organization. Effective leadership style can increase organizational performance, bring employee satisfaction, and boost employee commitment. So, Harris et al. (2007) argue that the leadership style has immense contribution on organization performance, has impact on employee job satisfaction (Yahaya et al., 2012), and employees' commitment. The study of Bass and Riggio (2006) found that leadership style has 45-65% effect (positive or negative) on organization performance. Thus, the extent of success depends on the style of the leader and the systematic environment created for staff.

Ojokuku et al. (2012: 202) state that leadership style is a key determinant of the success or failure of any organization and is important in supplying direction, implementing plans, and motivating people. Similarly, Ebrahim (2018: 2) points out that leadership styles are "a combination of different characteristics, traits and behaviors that are used by leaders for interacting with their subordinates." The behavior that the leaders adopt or the method they practice decides effectiveness of the organizational performance positively or negatively. Since the attainment of organizational goals depends on the leadership styles (Chris and Ukaidi, 2016), the leadership style of top management directly affects the performance of public sector organizations (Fu-Jin et al., 2010; Ojokuku et al., 2012).

Though there are numerous styles of leadership, in this study the researcher considered the transformational, transactional, and laissez-faire leadership styles. The transformational leadership style is more innovative, productive, effective, and satisfying to followers as both parties work towards the good of the organization and they both come together by shared visions and values while they exercise mutual trust and respect (Bass & Riggio, 2006). A leader who employs transactional leadership style tends to motivate followers by appealing to his/her self-interest. This leader motivates followers to achieve expected levels of performance by helping them to recognize task division, find goals and strength the relation about meeting wanted performance level (Bass & Avolio, 2004), though laissez-faire style is passive leadership (Bass & Riggio, 2006). Leaders must understand that their leadership styles influence their subordinates' commitment and behavior to support their leaders, and above all their organizational performance (Saleem, 2015).

Organizational Performance

The ability to implement an institute's aims efficiently and effectively is called organizational performance (Sofi & Devanadhen, 2015; Longe, 2014). According to Ojokuku et al. (2012), organizational performance is the successful attainment of organizational aims. Until the introduction of BSC there were no well-established instruments that measured organization's performance. Though financial dimensions did not measure sufficiently, it was the common method in measuring institutes' performance. This gap called for the inclusion of non-financial perspectives in measuring OP. BSC which was introduced by Kaplan and Norton (1992) found a solution on how to understand and develop the system of non-financial measurements.

According to Kaplan and Norton (1992), the BSC method suggests four perspectives to be considered when measuring quality of performance. These perspectives are: Client perspective (How do the organizations' customers see it?); Internal process perspective (What are the business's processes that the organizations must excel at in order to satisfy the shareholders and customers?); Learning perspective (How should the organization strengthen its abilities and competences in order to meet the external environment requirements?) and Financial perspective (How does the organization satisfy shareholders?). Since the purpose of this research is to examine the effect of leadership style on civil service institutions' performance, it is logical to use BSC and its four perspectives to measure the performance of these institutions.

Leadership Styles and Organizational Performance

The common leadership styles are transformational, transactional, and Laissez-faire leadership styles. There is considerable impact from the leadership styles on organizational performance. The leadership style influences the culture of the organization which, in turn, influences the

organizational performance. It is important to understand the effects of leadership on performance given that researchers perceive it as key factor to improve organizations performance (Obiwuru et al., 2011). Moreover, Mehra et al. (2006) argues that if an organization wants to be best from other similar organizations for long, a lasting approach should be to focus on the effects of leadership. Bass and Avolio (2004) suggest that leaders and their leadership behavior/style have effect on both their followers and organizational outcome.

Transformational leadership style and organizational performance

Transformational leadership style focuses on developing the followers and considering their needs. The managers who appreciate transformational leadership style focus particularly on developing the overall value system of employees, development of moralities, skills, and their motivation level. Transformational leaders act as strong bridge between followers and leaders, to develop clear understanding associated with the motivational level, values, and interests. Bass and Avolio (1994) state that transformational leadership proves the superior leadership performance. The transformational leadership, according to Bass and Avolio (1994), occurs when the leaders broaden or elevate the interest of the employees. The transformational leaders are the ones who encourage the employees to look beyond their self-interest.

The transformational leaders are effective because of several reasons including that the leaders may be charismatic in terms of inspiring employees, the leaders may meet the emotional needs of employees, or they may stimulate employees intellectually (Bass & Avolio, 1994).

Wang et al. (2011) found that the transformational leadership and individual level performance is positively linked. Further, the study showed that transformational leadership and performance of teams at organizational level are associated positively. Xu and Wang (2008) state that performance is the function of skills, abilities, knowledge, and motivation which are directed towards a prescribed behavior. Hence, it can be said that transformational leadership and organizational performance are positively associated (Jyoti & Bhau, 2015). Sofi and Devanadhen (2015) said that transformational leadership has significant impact on the performance of the organization. They conducted research on banking organizations with the help of statistical tools such as SEM and SPSS and reached the same conclusion that transformational leadership has a direct positive relationship with organization's performance.

Transactional leadership style and organizational performance

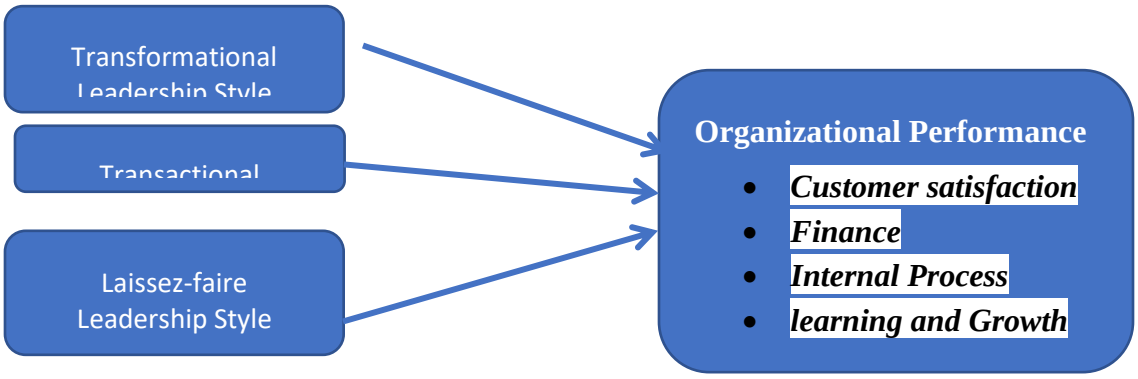
A leader is known as a transactional leader if he/she is always willing to give something in return for something they consider valuable (Uchenwamgbe, 2013). This can include a number of things like promotion, pay raise, performance reviews, new responsibilities, etc. The major problem with this type of leadership is the expectation. Hence, transactional leadership can be defined as the exchange of targets and rewards between the management and the employees (Ojokuku et al., 2012). The study by Longe (2014) revealed that transactional leadership style has a positive impact on the organizational performance. The transactional leadership style helps in creating as well as sustaining the context in which organizational and human capabilities are maximized as employees are always able to achieve the tangible and intangible rewards. This leadership style particularly helps in creating an environment that is best for performance and articulates the compelling vision that enhances the overall organizational performance (Longe, 2014).

According to research conducted by Sofi and Devanadhen (2015), transactional leadership was not found to have a direct impact on organization performance. This leadership style does not encourage creativity and innovation among employees and hence the employees do not perform as per the expectations of the organization.

Laissez-faire leadership and Organizational Performance

Laissez-faire leadership style has been defined by Northouse (2015) as the leadership style that sets the direction of what is to be carried out by the followers with very little supervision. This style allows complete freedom to group decision without leader's participation. Subordinates are free to do what they like. The key role the leader plays is just to supply materials. The leader does not interfere with or take part during events decided by the group.

Laissez-faire type of leadership is at the other end of the continuum from the transaction style. With this type, leaders try to pass the responsibility of decision-making process to the group. The group is loosely structured, as the leader has no confidence in his leadership ability. Decision making under this leadership is performed by whoever is willing to accept it. Decision-making is also terribly slow and there can be a great deal of low reliability (Ojokuku et al., 2012).



METHODOLOGY

Research Approach and Design

This study employed the quantitative research approach. A descriptive explanatory survey research based on the view of middle and lower-level managers, and employees in six (6) federal civil service institutions in Ethiopia was undertaken. The survey design is proper for this kind of study as it supplies a quantitative description of attitudes, experience and opinions of the sample population (Bryman, 2008). Its analysis is based on primary data collected through structured questionnaires administered on respondents.

Population and Sampling Strategies

The population of the study consists of employees of 27 Federal Civil Service Institutions that were supervised by Federal Civil Service Commission (FCSC, 2019) and leveled as 'High', 'Medium' and 'Low' performer in change and good governance implementation. Among these institutions, 15 were leveled Very High, 10 were Medium and 2 were Low. The target population

is categorized based on their level of performance. So, the level (high, medium and low) was used for stratification. So, among 15 institutions that scored 'High', three institutions; from 10 institutions that scored 'Medium', two; and from 2 institutions that scored 'Low', 1 institution is selected using proportional sampling. Then the six institutions were found through lottery method. From high performers Ministry of Innovation and Technology, Ministry of Trade and Ministry of Transport are drawn. From medium performers Ministry of Foreign Affairs and National Plan Commission, from low performers Ministry of Mining was drawn out of 27 institutions. The advantage of using a lottery method is to avoid the chance of systematic errors and sampling biases (Kotari, 2004).

The sample respondents for the study were drawn from a total of 5220 employees working in selected organizations. The number of sample respondents from each organization was decided proportionally and selected using a three-stage sampling. Each sample organization was first divided into directorates/departments at stage one and representative directorates were selected, while the selection of sample units/wings from each sample directorates was carried out at stage two. Finally, the selection of individual respondents from each sample units was carried out at stage three. In all cases simple random sampling procedure was used since it gives every individual the same probability of being selected and the choice of an individual in no way affects selection of another individual.

Sample Size of the Study

Data from Federal Civil Service Commission (2019/20) shows that 27 federal level civil service institutions were supervised as per indicators that the commission developed, and among these organization 15 (fifteen) were labeled high scorer, 10 (ten) were medium and 2 (two) were labeled low. From each level of performance, the researcher planned to take six institutions (three from high, two from medium and one from low) which selected using lottery system of sampling. These organizations are Ministry of Innovation and Technology, Ministry of Trade, Ministry of Transport, Ministry of Foreign Affairs, Federal Plan Commission, and Ministry of Mining. Thus, the sample size of the study determined based on target population of these organizations.

The sample size is selected depending on the type of the research design being considered, the desired level of confidence in the result, the amount of accuracy wanted, and the characteristics of the population. Thus, to estimate the sample size the researcher employed the formula introduced by Yamane (1967) by considering a 95% confidence level and estimated characteristics of the study population (P=0.5) and level of accuracy or sampling error (e2=0.5). The selected organizations have more than 5420 employees. Since the population of the selected organizations is known, the researcher used Yamane (1967) formula to calculate the sample size of the study. Thus, the sample size for this study is decided as follows:

The formula runs as: n=N/1+N (e2):

5220/5220+1 (0.05) 2

=399.909 which is nearly 400

Table 3.1: Proportional distribution of the sample size

No.	Name of the organization	Number of employees	Proportional calculation	Sample size
1	MInT	741	741* 400/5220	57
2	MoT	893	893*400/5220	68
3	MoTs	800	800*400/5220	61
4	MoFA	976	976*400/5220	75
5	Plan Comm.	722	722*400/5220	55
6	MoMi	1088	1088*400/5220	84
Total		**5220**		**400**

Source: field data, 2022

Data Collection Tools

In this study two data collection questionnaires, namely Multifactor Leadership Questionnaire (MLQ 5X) and self-developed questionnaire were employed. MLQ has two forms. The first is the Leader Form and the second one is Rater Form (MLQ 5X) which needs followers to rate their leader's leadership style. This study used only MLQ 5X, because research showed that self-rating questionnaires mostly tend to exaggeration and partiality. According to Bass and Riggio (2006:20), self-ratings of one's own leader behavior are prone and bias. Similarly, Bolton (2010:51) revealed that leaders look at their transformational leadership styles in an inflated way. Hence the more reliable and important version to study leadership style is the rater form.

Therefore, the MLQ version that used in this study was Multifactor Leadership Questionnaire (MLQ-5X). MLQ 5X served to collect data regarding leadership style, while self-developed questionnaire served to collect data about the organizational performance. Organizational performance questionnaire was constructed based on the BSC four dimensions which were developed by Norton and Kaplan (1992). The MLQ 5X short is a 45-item questionnaire that measures transformational, transactional, and laissez-faire leadership styles using a five-point Likert Scale (Bass & Avolio, 2000; Bass & Avolio, 2004). There are 45 items that measure the leadership styles and the leadership outcomes. Numerical values are given for each of the responses for the leadership factors. The values are as follows: 5 = to a very great extent, 4 = to a great extent, 3 = to a moderate extent, 2 = to a slight extent and 1 = not at all.

Data Analysis

The study used quantitative research methods of data analysis. The collected data was analyzed using descriptive and inferential statistical measures. Both descriptive and inferential statistics were employed. To run these statistics the Statistical Package for Social Science (SPSS version 25) was used. While percentages, frequencies and mean were computed using descriptive statistics, correlation and multiple regression were used to analyze and interpret the relationship between variables, significance difference, and statistically significant relationship saw between dependent and independent variables. The mean ratings were used, by employing MANOVA, to find the prime leadership styles that affect organizational performance. The effect of the leadership styles (transformational, transactional, and laissez-faire) on organizational performance was analyzed using multiple regressions.

Validity and Reliability of the Study

In this study, internal validity of the MLQ for the three styles of transformational, transactional, and laissez-faire and self-developed questionnaire (BSC) was measured using Cronbach Alpha. Hence, the reliability of Total Transformational Leadership (TTFL), Total Transactional Leadership (TTSL) and Total Laissez-faire (TSL) is .921, .775 and .754, respectively. Both data were translated from English to Amharic. Particularly the MLQ (5X) was translated to Amharic considering the Ethiopian context and retranslated to English getting a translator who is excellent in both languages. Moreover, the self-developed questionnaire was pilot tested with 50 (fifty) respondents in comparable institution which is not part of the study. Furthermore, the content validity for measures of organizational performance was assessed by professionals in the field.

Data Presentation, Analysis, and Interpretation.

Response Rate and Reliability Test of the Scale

As assessment of the survey showed that all (400) surveys were returned properly completed. The collected questionnaires that fulfilled the prerequisite were encoded into SPSS Version 25. The reliability test of the scale was computed before beginning the data analysis. One of the most used indictors of the scale's internal consistency is Cronbach's alpha coefficient (Pallant, 2010). According to Tabachnick and Fidell (2019), Cronbach's alpha coefficient of a scale should be at least 0.7. Hence, in this study while the Aggregate Leadership Style (ALS) is .907, the Aggregate Organizational Performance (AOP) is .944. Moreover, the reliability of Total Transformational Leadership (TTFL), Total Transactional Leadership (TTSL) and Total Laissez-faire (TSL) is .921, .775 and .754, respectively. Hence, as per the lists in Table 4.1, all variables have more than coefficient of 0 .7 which witness the internal consistency between items.

Table 4.1: Reliability Test

Reliability Statistics

Variables	Cronbach's Alpha	N of Items
ALS	.907	32
TTFL	.921	20
TTSL	.775	8
TLS	.754	4
AOP	.944	24

Source: Field survey, 2022

The research has three independent (TFL, TSL and LS) and one dependent (OP) variables. While running the test, the researcher spotted four items which could drop the reliability of the scale below the minimum level of the coefficient. Thus, to keep methodological acceptability, these four items were cut from leadership styles, and this made the analyzed number of items decreased from 36 to 32.

Demographic Data of Respondents

Table 4.2 shows that among 400 respondents 233 (58.3%) were male and 167 (41.8%) were female. Though the number of males exceeds that of females, the researcher believes that the obtained number is sufficient to get females' opinion about the subject. Table 4.2 displays that 68 (17%) of the respondents are aged 18-27 while 184 (46.0%) are aged 28-37. Moreover, when respondents that aged 38-57 are 145 (36.3%) respondents that aged above 57 are (8 %). The overall data on age tells us that most of the respondents are young and at their prime working age. If the leaders use proper leadership styles, they will be an asset to their organization.

The other demographic variable that analyzed was the respondents' educational level. More than 95.6 percent of the respondents held their first (241) and second degrees (141), while 18 (4.6%) respondents had diploma and other kinds of certifications. Therefore, it is possible to conclude that besides well understanding and critically examine the survey items, the sampled organizations have highly qualified human resource, if properly led they could be worthwhile asset. Table 4.2 shows that majority 206 (51.5%) of the respondents have served in current organization up to 5 years while 127 (31.8%) of respondents have served 6-10 years. While 51 (12.8%) of the respondents have served 11-20, 16 (4.0) of the respondents have served more than 21 years in their current organization. From the data, there is clear demonstration that the respondents are seasoned and able to evaluate their leaders from their rich experience. Organizations are considered strong if they have more long-serving employees.

Table 4.2 depicts that 92 (23.0%) of respondents are directors or process head and team leaders while 297 (74.3%) of the respondents are senior experts working with leaders in very near proximity. From this data it could be possible to infer that the mix of respondents give advantage to this study to find out diverse responses. Moreover, respondents are from two major organizational structure-core and support wings. While 232 (58.0%) of the respondents are from core positions, 168 (42.0%) of the respondents are from support staff. Since the leadership is revealed over the whole organization's performance, having respondents from both wings make the findings more balanced and dependable.

Data were collected from six federal public ministries namely Ministry of Transport and Logistics, Ministry of Plan and Development, Ministry of Labor and Women Affairs, Ministry of Foreign Affairs, Ministry of Mining and Ministry of Innovation and Technology. The sampled employees working in these organizations completed the survey personally. The sample size involved 400 directors, process heads, team leaders and experts.

The surveys consisted of three parts: the first part has demographic; the second part has leadership styles, and the third part forms items that requests about organization performance. The demographic characteristics have seven items, and these are: sex, age, and education level, work experience in current organization, and whether respondents were working under core or support process.

Table 4.2: Demographic Data of Respondents

		Frequency	Percent	Valid Percent
Valid	Male	233	58.3	58.3

	Female	167	41.8	41.8
	Total	400	100.0	100.0
Age	18-27	68	17.0	17.0
	28-37	184	46.0	46.0
	38-47	104	25.0	25.0
	48-57	41	10.3	10.3
	58 and above	3	.8	.8
	Total	400	100.0	100.0
Education Level	Diploma	13	3.3	3.3
	First degree	241	60.3	60.3
	Second degree	141	35.3	35.3
	Other	5	1.3	1.3
	Total	400	100.0	100.0
Service Year	6 Mon. up to 5 yrs	206	51.5	51.5
	6 up to 10 years	127	31.8	31.8
	11 up to 15 years	30	7.5	7.5
	16 up to 20 years	21	5.3	5.3
	21 and above	16	4.0	4.0
	Total	400	100.0	100.0
Position	Director or Process Head	35	8.8	8.8
	Team leader	57	14.2	14.2
	Expert	297	74.3	74.3
	Other	11	2.8	2.8
	Total	400	100.0	100.0
Structure	Core process	232	58.0	58.0
	Support process	168	42.0	41.8
	Total	400	100.0	100.0

Source: Field data, 2022

Checking Assumptions

Multiple regressions are used to explore the predictive ability of a set of IV on one continuous DV (Pallant, 2010). There are diverse types of multiple regression, and they allow researchers to compare the predictive ability of independent variables and to find the best set of variables to predict dependent variables (Tabachnick & Fidell, 2019). Before beginning the actual regression, it is mandatory to check the normality, linearity, absence of outliers and multicollinearity.

The purpose of normality test is to check whether the respondents' response distributed evenly or not. This was done looking at the Histograms and Normal Q-Q Plot. The Histogram (Figure 4.1) scores appear to be reasonably normally distributed. Moreover, Normal Q-Q Plot (Figure 4.2) also shows that the value for each score is plotted against the expected value from the normal distribution. Hence, the Normal Q-Q Plot looks reasonably straight line, and this suggests a normal distribution (Pallant, 2010).

Multicollinearity

Multicollinearity is a process to check that the independent variables have relationship with the dependent variable. To find the problem of multicollinearity, two variables are calculated

(**Tolerance** and **VIF**). According to Pallant (2010), Tolerance is an indicator of how much of the variability of the specified independent is not explained by other IV variables in the model and is calculated using formula 1-R squared for each variable while VIF is the inverse of Tolerance value. If the Tolerance value is less than .10, it shows that the multiple correlations with other variables are high or there is possibility of multicollinearity.

VIF (Variance inflation factor) value Pallant (2010) recommends tolerance value of less than .10, or a VIF value above 10 as the cut-off point for deciding the presence of multicollinearity. In this study (Table 4.3) the tolerance value for transformational leadership is .426 and VIF is 2.348; Transactional leadership is .449 and VIF 2.229; and the tolerance value for laissez-faire is .920 and VIF is 1.087. In this study the tolerance value for TTFL, TTSL, TLS are .426, .449, and .920, respectively. All are not less than .10, implying that the multicollinearity assumption is not violated. Similarly, the VIF value for TTFL, TTSL, TLS are 2.348, 2.229, and 1.087 showing that the values are below the cut-off point of .10 and the assumption is not violated.

Table 4.3: Multicollinearity test of leadership styles

	Collinearity statistics	
Independent Variables	**Tolerance**	**VIF**
TFL	.426	2.348
TSL	.449	2.229
TLS	.920	1.087

Source: Survey 2022

The data were scrutinized further to examine the assumptions using Normal Plot (P-P) and Scatterplot. The Normal Plot (P-P) shows that the points lie in a straight diagonal line from bottom left to top right which shows no major deviations from normality. The **Scatterplot** also shows that, according to Pallant (2010), if the residuals are distributed in a roughly rectangular way and most of the scores concentrated in the center there could be no major violation of normality. In the Figure 4.3, majority of the scores centralized along the 0 point. Thus, it is possible to conclude that the model is acceptable and to go ahead to conduct regression.

The Effect of Leadership Styles on Organizational Performance

The major aim of the study is to examine the effect of leadership styles on organizational performance. Thus, the first step of the data analysis was to investigate the leadership styles practiced in selected organizations and relationship between variables (IV and DV), next the effect of each leadership styles (TTFL, TTSL and TLS) on organizational performance then examining which leadership style has more effect on organizational performance.

The leadership styles practiced, relationship between leadership styles and organizational performance.

In this study Transformational, Transactional, and Laissez-faire leaderships were major dimensions of leadership styles (Bass and Avolio, 2004). It is logical to find which leadership style

is practiced in sampled civil service institutions. Table 4.4 presents the composite mean and standard deviation of transactional, transformational, and laissez-faire leadership styles that are practiced in sampled institutes.

Table 4. 4: Descriptive of the practiced leadership styles

	N	Minimum	Maximum	Mean	Std. Deviation
Total Transactional Leadership Style	400	1.00	5.00	3.0941	.70123
Total Transformational Leadership	400	1.00	4.60	3.0319	.70299
Total Lassie-faire Leadership	400	1.00	5.00	2.7950	.78311
Valid N (listwise)	400				

Table 4.4 shows that there is mean difference between transactional, transformational, and laissez-faire leadership styles that are practiced in sampled institutions. While the composite mean value of transactional (3.09) and transformational (3.03), the composite mean of laissez-faire leadership style is found (2.79). This implies that though there is mean difference between the practiced leadership styles, leaders in the sampled federal civil service institutions are practicing transactional, transformational and laissez-faire leadership styles.

To decide whether there is relationship between transformational, transactional, and lassie-faire leadership styles and to decide the strength of the relationship between these variables' correlation was computed. According to Field (2005) and Cohen (1988), correlations of 0.1-0.29 are considered small, 0.30-0.49 are moderate and 0.5 and above are considered large. Hence, this study found relationship between the three leadership styles and organizational performance. Table 5 portrays relationship between leadership styles and organizational performance of federal public sector organizations.

Table 5: Relationship between Leadership styles

and organizational performance

Correlations

		AOP	TTSL	TTFL	TLS
OP	Pearson Correlation	1	.606**	.682**	-.207**
	Sig. (2-tailed)		.000	.000	.000
	N	400	400	400	400

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

Source: Field survey, 2022

Table 5 depicts that transactional leadership (TTSL) is correlated with organizational performance (r=.606, p<0.01), transformational leadership (TTFL) is correlated with organizational performance (r=.682, p<0.01), and the correlation index for the relationship between lassie-faire leadership (TLS) style and organizational performance (AOP) is (r=.-207, p<0.01). The result of

the relationship between the leadership style (represented by three variables) and organization performance revealed that both transformational and transactional leaderships have positive and strong relationship while lassie-faire leadership has negative and weak or small relationship with organizational performance. However, all the three variables have meaningful relationship with the organizational performance (AOP).

Regression analysis could be performed to explain to what extent independent variables explain the dependent variables. In this study regression was made to analyze the effect of leadership style that is represented by Transformational, Transactional, and Lassie-faire leadership on organizational performance.

Table 6: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.704[a]	.495	.491	.50517

a. Predictors: (Constant), TLS, TFL, TLS

b**. Dependent Variable: Aggregate Organizational Performance**

The model summary reveals that the effect of leadership style on organizational performance is .491. Therefore, in this study the (R^2) is .491 which explains 49.1% variance in organizational performance. The model summary explains that 49.1 % change of organizational performance can be predicted by the combination of the three leadership styles (Transformational, transactional, and lassie-faire leadership).

Moreover, to assess the statistically significant of the result, ANOVA (Table: 4.7) was computed and its F-ratio is 129.350 thus it is significant at p<.005 which permits to conclude that the model discloses that leadership styles (TTFL, TTSL, TLS) significantly predict organizational performance (AOP).

Table 7: Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	99.031	3	33.010	129.350	.000[b]
	Residual	101.060	396	.255		
	Total	200.091	399			

a. Dependent Variable: Aggregate Organizational Performance

b. Predictors: (Constant), Total Transactional, Total Transformational and Total Laissefaire Leadership

The model of regression in the Table 4.8 also shows that the level of the contribution of leadership styles to organizational performance and their level of significance. The beta values and standard error of transformational and transactional leadership are (B=.487, SE=055) and (B=.248, SE=.054), respectively while the beta value of lassies-faire leadership is (B=. -070, SE=034).

Table 8: Coefficient of leadership styles on organizational performance

	B	Std. Error	Beta	t	Sig.
(Constant)	1.008	.166		6.085	.000
TFL	.487	.055	.484	8.840	.000
TLS	-.070	.034	-.078	-2.090	.037
TTSL	.248	.054	.246	4.608	.000

a. dependent variable: Aggregate Organizational Performance

Though laissez-faire leadership has shown negative relationship, the beta values of the three leadership styles are greater than their standard error and their *t* values are statistically significant. Therefore, a unit improvement of transformational, transaction, and lassie-faire would lead to about .487, .248, -070, respectively are contributing to the organizational performance in federal public sector organizations.

The effect of transformational leadership on organizational performance

One of the basic questions of this study was to examine what the effect of transformational leadership on the performance of organizations is. The correlation in Table 4.5 shows that transformational leadership has positive statistically significant relationship (r=.682, P<0.001) with organizational performance. This portrays that transformational leadership is independent predicator to organizational performance and it enables the organization and their employees to perform better. Moreover, to find the contribution of transformational leadership style the researcher looked at the output box labeled coefficient. Since the purpose of this research question is to compare which leadership style has more effect than the others, the researcher used standardized coefficients of beta value (Table 4.8).

At the Beta column among the leadership styles (independent variables) a variable that has the largest beta value is transformational leadership. Transformational leadership has the largest beta coefficients (.484). The result shows that transformational leadership makes the strongest unique contribution to explaining the dependent variable (organizational performance), when the variance explained by all other variables in the model is controlled for (Pallant, 2010). Moreover, the sig value confirms that transformational leadership style is making a statistically significant unique contribution to the prediction of the dependent variable. Furthermore, the Part correlation coefficient result shows that transformational leadership explains 10 percent of the variance in total organizational performance scores.

The effect of transactional leadership on organizational performance

The second basic question was explaining the effect of transactional leadership on the organizational performance of federal level public sector organizations. According to Table 4.5, transactional leadership has positive statistically significant relationship (r=.606, P<0.001) with organizational performance. This shows that transactional leadership is independent predicator to organizational performance, and it makes the organization and their employees to perform better.

Moreover, at the Beta column transactional leadership held the second largest beta value. The transactional leadership style's beta coefficient is (.248). This result shows that transactional leadership creates moderately strong unique contribution to explain the dependent variable, when

the variance explained by all other variables in the model is controlled for (Pallant, 2010). Since its sig value is less than .05, transactional leadership is making a statistically significant unique contribution to the equation, and the **Part** correlation coefficient result of it portrays that this leadership style explains 3 percent of the variance in total organizational performance scores.

The effect of laissez-faire leadership on organizational performance

Laissez-faire leadership style is among the leadership style that was examined whether it has effect on the organizational performance of federal level public sector organizations. The correlation at Table 4.4 describes that laissez-faire leadership has negative relationship ($r = -.207$, $P<0.001$) with organizational performance. Moreover, the correlation between laissez-faire leadership and organizational performance was negative as well as significant and this shows that the more the leaders exercise a laissez-faire leadership style, the less the organizational performance or the performance of the organizations could deteriorate.

In the Table (4.7) the Beta column of laissez-faire leadership is -.070. This result shows that laissez-faire leadership creates low unique contribution to explain the dependent variable, when the variance explained by all other variables in the model is controlled for (Pallant, 2010). Even though its sig value is less than .05, laissez-faire leadership made less of a unique contribution to the dependent variable.

The leadership style that has more effect on organization's performance

Federal organizations namely MoFA, MoLSA, MoMi, MoPD, MInT and MoT were sampled for this study. While MoLSA, MInT and MoT were selected among the organizations that were leveled *high*, MoFA and MoPD were from *medium* and MoMi was included from *low*. The leveling was done by their organizational performance (FCSC, 2019/20). Even though the correlation and regression results have shown us the perceived types of leadership styles that are practiced by the leaders of these organizations, the statistics did not reveal to what extent they differ in their leadership styles and organizational performance, or which leadership style has more effect on OP. To know the extent of difference between these organizations, multivariate analysis of variance (MANOVA) was conducted.

Table 9: Multivariate analysis of variance (MANOVA)

Descriptive Statistics

Variable	Organization	Mean	S. D	N
Total Transactional Leadership Style	MoFA	3.2433	.57682	75
	MoLSA	2.6820	.59477	68
	MoMi	3.1369	.80674	84
	MoPD	3.2318	.63438	55
	MoST	3.0044	.77415	57
	MoT	3.2705	.60259	61
	Total	3.0948	.66490	400
Total Transformational Leadership	MoFA	3.0867	.53659	75
	MoLSA	2.5647	.72940	68
	MoMi	3.0411	.80690	84
	MoPD	3.2964	.50624	55
	MoST	2.9456	.72088	57
	MoT	3.3148	.56313	61
	Total	3.0415	.64385	400
Total Lassie-faire Leadership	MoFA	2.9033	.80737	75
	MoLSA	2.8493	.77765	68
	MoMi	2.6637	.76883	84
	MoPD	2.7500	.75920	55
	MoST	3.0395	.74820	57
	MoT	2.5943	.77347	61
	Total	2.8000	.77245	400
Aggregate Organizational Performance	MoFA	3.0172	.58051	75
	MoLSA	2.4884	.56816	68
	MoMi	3.1850	.67674	84
	MoPD	3.0924	.55217	55
	MoST	3.0906	.80074	57
	MoT	3.4980	.67903	61
	Total	3.0619	.64289	400

Source: Field survey (2022).

Table 4.9 above shows that organizations and the leadership styles they exercised were different in their mean and standard deviation. Except MoLSA (M=2.68, SD .59477), the remaining five organizations MoFA (M= 3.2433, SD=.57682), MoMi (M=3.1369, SD=.80674), MoPD (M=3.2318, SD=.63438), MInT (M=3.0044, SD=.77415), and MoT (M=3.2705, SD=.60259) have comparable mean and standard deviations on Transactional leadership. Therefore, it could be possible to conclude that except for MoLSA, all organizations have nearly similar mean and standard deviation on transactional leadership style. Regarding the transformational leadership style, MoLSA (M=2.56, SD.72940), MInT (M=2.94, SD=.72088), MoMi (M=3.0411, SD=.80690), MoFA (M=3.0867, SD=.53659), MoPD (M=3.2964, SD=.50624), and MoT (M=3.3148, SD=.56313). While MoLSA and MInT scored below three in their mean, MoMi and MoFA (M=3.04-3.01) and MoPD and MoT (M=3.29-3.31) scored closely similar mean and standard deviation. This implies that there is difference between organization in mean and standard deviations on transformational leadership.

The third dimension of leadership style is laissez-faire leadership style. Concerning laissez-faire leadership (TLS), the organizations scored MoLSA (M=2.8493, SD.77765), MInT (M=3.0395, SD=.74820), MoMi (M=2.6637, SD=.76883), MoFA (M=2.9033, SD=.80737), MoPD (M=2.7500, SD=.75920), and MoT (M=2.5943, SD=.77347). In the case of laissez-faire, MInT scored slightly higher mean (M=3.04) than organizations that were considered in this study. Hence, it could be concluded that there is slight difference between organizations that are included in this study.

Table 4.9 shows the studied organizations and their performance mean and standard deviations. Accordingly, the scores of organizations on AOP were, MoFA (M=3.0172, SD=); MoLSA (M=2.4884, SD=.56816); MInT (M=3.0906, SD=.80074); MoMi (M=, SD=); MoPD (M=, SD=); and MoT (M=3.4980, SD=.67903). When MoT scored the highest mean (M=3.4980, SD=.67903), MoLSA scored the lowest mean (M=2.4884, SD=.56816). The other four organizations score almost similar mean and standard deviations on organizational performance (AOP) which tells us there is not much difference between organizations that are considered in this study.

RESULTS AND DISCUSSION

The aim of this study is to explain the effect of leadership styles on organizational performance of federal level public organizations. The finding of the study revealed that leadership styles have strong relationship with organizational performance. Among the leadership styles TFL and TSL have strong positive effect while the effect of TLS (lassie-faire) was small and negative. Moreover, the study found that 49.1 % change of organizational performance can be predicted by the combination of the three leadership styles.

The overall effect of leadership styles on organizational performance

There is wide agreement that organization performance depends on the leadership style that the incumbent implements. For example, the study of Wang et al. (2010) revealed that a style a leader adopted has effect on organizational performance.

This study examined which leadership style practiced and the effect of leadership styles (ALS) on organizational performance (OP) and the findings revealed that leaders are practicing all the three leadership styles and the considered leadership styles have effect on organizational performance. The aggregate leadership style has shown strong significant correlation ($r=675$, $p<0.001$) with organizational performance. In this case the (R2) value is .491 which explains 49.1% variance in organizational performance and showed that Aggregate leadership styles have large effect size. Moreover, the beta value in the regression analysis is .217 which reveals that the presence of one unit of ALS in the organization increases organizational performance by .217, $p<.05$. Generally, leadership styles (TFL, TSL and TLS) predicted the organizational performance in joint manner. The findings of the study in agreement with the proposition of (Bass & Avolio, 1978; Arif & Akram, 2018; Widodo et al., 2017) confirm that leadership style adopted influences organizational performance.

The effect of transformational leadership on organizational performance

Most research findings show that transformational leadership style has positive relationship with organizational performance (Howell & Avolio, 1993; Wang et al., 2010; Jyoti & Bhou, 2015).

Researchers also argue that transformational leadership style makes huge contributions on the improvement of organizational performance (Sofi & Devanadhen, 2015). In this study, the contribution of transformational leadership style was examined looking at its effect on organizational performance. Hence, the finding shows that there is strong correlation (r=.682, P<0.001) between transformational leadership style and organizational performance. This finding matches with (Ebrahim, 2018; Bass & Avolio, 1994 and Wang et al., 2008). These authors argue that by using inspirational and challenging skills transformational leader motivate employees to deliver best performance (Ebrahim, 2018), distinct attention these leaders wage to every individual follower's need has direct contribution to the organization performance (Bass & Avolio, 1994) and transformational leaders improve the organizational performance by being role models to their followers, by eliciting higher team commitment and operation (Wang et al., 2010).

Findings revealed that the beta coefficient of transformational leadership is (.484). The result shows that transformational leadership makes the strongest unique contribution to the organizational performance, and it also explains 10 percent of the variance in total organizational performance scores. This result aligns with research findings of Arif and Akram (2018) and Dijoko Steyo Widodo et al. (2017). The leadership inspires their followers alongside challenges and persuades, bestowing both understanding and meaning. This kind of leadership style is also intellectually motivating and increasing the followers' use of skills.

The effect of transactional leadership on organizational performance

The transactional leadership style and its effect on organizational performance were investigated. Most research findings (Ebrahim, 2011; Sofi & Devanadhen, 2015) show that transactional leadership has negative effect on organizational performance. They argue that since to this leadership style the "carrot or a stick" approach is instrumental in followers goal attainment; it negatively affects organizational performance. According to Bass and Riggio (2006), transactional leaders are negotiators and resource allocators in which the power and politics behind a request may be as important as its merit. This leadership style does not encourage creativity and innovation among the employees and hence, the employees do not perform as per the expectations of the organization.

However, the results of this study show that TSL have a strong positive correlation (r=.606, P<0.001) with organizational performance. The correlation table also showed that transactional leadership has positive statistically significant relationship with organizational performance. This finding matches with the research findings of Timothy, et al., 2011 and Longe, 2014. These authors argue that the transactional leadership style helps in creating as well as sustaining the context in which organizational and human capabilities are maximized as the employees are always able to achieve the tangible and intangible rewards. This leadership style particularly helps in creating an environment that is best for performance and articulates the compelling vision that enhances the overall organizational performance (Timothy et al., 2011; Longe, 2014).

The model of regression also shows that the beta values and standard error of transactional leadership is (B=.248, SE=.054) which shows that transactional leadership is independent predicator to organizational performance. In other word, transactional leadership creates

moderately strong unique contribution to explain the dependent variable. These findings are in line with (Timothy, et al., 2011 and Longe, 2014).

The effect of lassie-faire leadership on organizational performance

Laissez-faire leadership was among the leadership style that examined in this study. The findings revealed that TFL and TSL were positively correlated. However, in this study Laissez-faire leadership was negatively correlated ($r = -.207$, $P<0.001$) with organizational performance as well as with the other leadership styles. Moreover, the beta value result (-.70, $p<.037$) shows that laissez-faire leadership creates low unique contribution to explain the organizational performance. The results of the study align with the findings of Bass and Riggio, 2006; Bass, 1990 and Avolio and Bass, 2004. In these studies, laissez-faire leadership showed negative correlation with other active leadership styles and showed weak effect on organizational performance. Furthermore, these authors argued that the laissez-faire leadership style is associated with dissatisfaction, unproductiveness and ineffectiveness (Bass & Riggio, 2006), it avoids decision making and supervisory responsibility (Bass, 1990) and such leaders mostly delay responding to urgent questions (Avolio & Bass, 2004).

The leadership style that has more effect on organization's performance

The six organizations showed mean difference in their leadership styles. Almost all (6) organizations that included in this study showed that they were exercising transactional leadership. While leaders in MoT, MoFA, MoPD, and MoMi were practicing both transactional and transformational leadership styles, MInT and MoLSA were using transactional and laissez-faire leadership.

Regarding the mean score of organizational performance, except MoT (M=3.45) and MoLSA (M=2.45), the remaining four organizations scored almost similar mean. Even though leaders showed different leadership styles, concerning performance they proved the same result. Moreover, the current result showed that organizations that used both transactional and transformational leadership styles showed relatively higher mean (M=3.01-3.45) than organizations that employed transactional and laissez-faire leadership styles (M=2.48-3.09) in their organizational performance. Concerning the laissez-faire leadership style, though its mean rank was low, the descriptive statistics suggests that this style is prevalently practiced by leaders at the sampled organizations. Particularly, the finding showed that MInT leaders employed laissez-faire leadership styles slightly higher (M=3.03) than others.

Generally, the study showed two exceptional findings; first, in most of the organizations that exhibited above the average mean in OP, leaders were using both transactional and transactional leadership styles. This result portrays that both TFL and TSL have positive contribution to organization's performance. The second is organization that registered below average mean in OP was exercising above the average mean of laissez-faire leadership style, which revealed that laissez-faire leadership style negatively affect organizational performance. Thus, even though organizations were using the mixed leadership style (TFL+TSL, TSL+TLS or TFL+TLS), when we look at the average mean of the organizational performance relatively the dominant (M=3.09) leadership style was transactional leadership. The result of these findings aligned with the research findings of Bass and Avolio (1994) and Bass and Avolio (2004). These researchers state that

leaders are more successful when they practice both transformational and transactional leadership in amalgamated way rather than trying to use one excessively.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The purpose of this study was to examine the effect of leadership styles on organizational performance of some selected federal level public organizations. Regarding leadership styles, the focus was only on transformational, transactional, and laissez-faire leadership. There are two leadership styles, transformational and transactional leadership styles, which were found to have a positive and strong relationship with organizational performance. The third one, laissez-faire leadership was found to have negative relationship with the organizational performance (OP). Hence, the study showed that leadership style has positive as well as negative relationship with organizational performance. The results of multiple regression analysis showed that a linear relationship between the leadership style and organizational performance is from small to high degree of significance. Furthermore, regression analysis showed that transformational and transactional leadership styles significantly predicted organizational performance and it explained a considerable proportion of variance. The findings of the study also showed that leadership styles account for 49.1 percent of the performance of the organization.

The mean scores of leadership style at organization level show that respondents perceived that their leaders were using the three leadership styles but to varying degrees. Leaders at the studied organizations were practicing hybrid or mixed leadership styles, with more transactional and transformational, rather than one type. The findings of this study showed that transformational and transactional leadership practices correlated with organizational performance positively and significantly. Hence the scrutinized look at the results in the statistical analysis showed that the mix of transformational leadership and transactional leadership were strong predictor of organizational performance than the combination of other leadership styles.

Almost all leaders in selected organizations were exercising laissez-faire leadership style though it was in slightly different manner. Leaders that exercised less transactional and transformational leadership style but high in their laissez-faire leadership style showed less in their organizational performance (less than the average mean, M=2.48). On the other hand, leaders that exercised high transactional and transformational leadership style in their mean rank, but low laissez-faire showed extremely high organizational performance (higher than the average mean, M=3.45). Thus, in both cases laissez-faire leadership style negatively associated with other leadership styles and has negative effect on the organizational performance.

RECOMMENDATIONS

The present study used correlation and multiple regression analyses to prove a significant relationship between leadership styles and organizational performance at six federal organizations. Based on the findings and conclusions, the following recommendations are sent.

- The study found that perceived transformational leadership style has effect on the organizational performance, thus leaders stimulate employees to question their assumption, invite innovative and creative solutions to problems, and encourage followers to achieve

both extraordinary outcomes and develop their own leadership capacity. Moreover, leaders should communicate lofty expectations to their followers, moving them through motivation to become committed and a part of the organization's shared vision.

- Transactional leadership also strongly correlated with organizational performance; thus, leaders must balance between concern for people and concern for task because if it is used as the only leadership style besides shrinking the performance of the organization it will proliferate employee dissatisfaction, absenteeism, and high turnover.
- Since sampled respondents expect their leaders to be transformational, concerned bodies must facilitate continuous education and training on contemporary leadership theories and practices before or immediately after assignment on senior leadership position.
- This study revealed that laissez-faire style is a weak negative predictor of OP, thus leaders must get timely and intensive training on leadership including performance management is most urgent.
- The study identified that leaders will be effective in their organizational performance if they use transformational and transactional in combined way rather than depending only on one as sole leadership style. Hence, it is recommended that to continue exhibiting the best organizational performance, leaders at federal level must be ready to be open, supportive, challenging, inspiring and use unilateral power when the situations demand it.
- This study has used only quantitative data. Using both types of data is more advantageous than one. Therefore, to get more and deep understanding on the effect of leadership style on organizational performance, future researchers should focus on using both quantitative and qualitative (mixed methods) data which allow the researcher to fill the gap that comes from using one type of data and to exploit the advantages that both methods have. Moreover, this study focused on performance at organization level.
- Future researchers could consider performance at individual and team levels. The respondents of this research were middle and lower-level leaders, experts, and employees of federal level public organizations. Though they are the best and reliable sources, to compare results and to get broad picture of leadership styles in public sector, future research might use data from higher level leaders.

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5.2. The Effect of Servant Leadership on Organizational Citizenship Behavior of Instructors in the Public Universities of Amhara region

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ABSTRACT

The purpose of this study was to examine the effect of servant leadership on the organizational citizenship behavior (OCB) of instructors in public universities in Amhara region. Explanatory sequential mixed design was employed. The size of the population was 2170. Of these, 338 instructors were taken into the sample using Yamane's (1973) formula. Questionnaires and interviews were used to collect the data. Both quantitative and qualitative analysis techniques were used to analyze the data. The results obtained through the questionnaire and interview revealed that servant leadership and OCB were practiced moderately in the universities. There was a positive and statistically significant relationship between servant leadership and OCB with a standardized correlation coefficient (r=.578) by the critical ratio test greater than ±1.96 at p<.05. Thus, 33.4 % of the variance in OCB was predicted by servant leadership with a standardized regression coefficient (β =.578) at p<.05. The result of one-way ANOVA showed that significant differences were seen among instructors in their feeling of servant leadership and OCB. Based on the finding of this study, it is concluded that servant leadership had a significant effect on the OCB of instructors. Therefore, it is suggested to improve the implementation of servant leadership and OCB.

Key words*: Organizational Citizenship Behavior; Public Universities; Servant Leadership*

INTRODUCTION

In this competitive environment, organizationshighly depend on the quality of leadership to ease the changes needed to keep fair advantage through optimizing human capital. Though some scholars criticize servant leadership as idealized which cannot be implemented in the workplace (Lloyd, 1996; Northouse, 2013), it has become a popular issue in the literature when organizations increasingly demand ethical and genuine leaders (Blanchard, 2002; Boyum, 2006; Covey, 2006). That is, organizations with servant leadership cultures tend to be healthy, efficient, and leader-employee relationships are smooth and synchronized (Doraiswamy, 2012; Korkmaz, 2007). Servant leadership has the potential to offer organizations with leadership approach grounded in values, ethics, morals, and empowerment of others. Strong ethics, and values are seen as the core of servant leadership which bring long-term success.

Organizational citizenship behavior (OCB) is another organizational variable that is described as a discretionary behavior that is neither in the job description nor recognized in the formal reward system, but it contributes to the success of the organizations (Hoffman, Blair, Meriac, & Woehr, 2007). Itis conceptualized in terms of altruism, conscientiousness, sportsmanship, courtesy, and civic virtue (Organ, 1988). Employees who engage in positive work behaviors can enhance

organizational effectiveness, improve work performance, and positively contributes towards organizational function and survival (Mahembe & Engelbrecht, 2014; Ozturk, 2010). OCB can also ease the success of organizational goals by improving the commitment of employees and the effectiveness of the organization (Ozturk, 2010; Podsakoff & MacKenzie, 1997).

Serving leadership is a leadership that begins with a sincere feeling arising from a heart that desires to serve, that is to be the first serving party (Haider, Amir, & Waqar, 2015). They considered servant leadership as a crucial factor that influences OCB. Numerous studies show that there is a significant relationship between servant leadership and OCB in the workplace (Dirks & Ferrin, 2002; Ehrhart, 2004; Hu & Liden, 2011). Smith, Organ, and Near (1983) also found apositive relationship between servant-leadership and OCB.

Based on the discussions made on servant leadership and OCB as well as their relationships, the researcher has synthesized a new conceptual framework for this study as showed in Figure 1.

Employees who are supported by their leaders and coworkers are willing to exert extra effort for the accomplishment of organizational goals beyond their formal duty.A range of research findings indicated that servant leadership has a significant effect on OCB (Haider et al., 2015; Zhao, Peng, & Chen, 2014). Employees with superior performance can produce the strongest link between performance and functional participation (Turnipseed & Rassuli, 2005). Indeed, as citizenship appears to consist of discretionary behaviors, how the employee perceives the organization would likely influence the employee either perform or withhold such performance (Grojean, Resick, Dickson, & Smith, 2004).Even if maximum performance within the limits of contract obligations is shown, no one can be successful unless they engage in citizenship activities that contribute more to the interest of the organization than their own need. Moreover, helping behaviors enhance the social environment in the organization, reduce the rate of absenteeism and turnover intentions, and increases employee well-being and productivity (Podsakoff, MacKenzie, Paine & Bachrach, 2000).

Currently, there appears to be widespread evidence that senior faculty members hold leadership positions in higher education institutions without adequate preparation. As a result, staffin higher education are subjected to the feeling of unfair treatment and become less committed. Some authors tried to examine the specific challenges met by academic leaders, such as the complex and dynamic social, economic, and political contexts in most universities that handle ineffective leadership in higher education (Smith & Hughey, 2006). Poor leadership is also responsible for the subordination of an organization's interest for self-interest, violation of the professional code of ethics, undermining organizational missions and goals, and declining attentions to organizational growth and development (Hellsten, 2006). Although some studies have been done on servant leadership and OCB, research has not been conducted on the causal relationship between these variables in the context of Ethiopian public universities in general and in the public universities of Amhara region in particular.Therefore, this study aimed to examine the effect of servant leadership on the OCB of instructors in public universities in Amhara region.

Research Questions

1. *What is the perception of instructors towards servant leadership and OCB in the public universities in Amhara region?*

2. *Is there a significant relationship between servant leadership and OCBin the public universities in Amhara region?*
3. *What is the effect of servant leadership on OCB in the public universities in Amhara region?*
4. *Are there differences among instructors in their perception of servant leadership and OCB in the four generations of public universities in Amhara region?*

METHODOLOGY

Research Design

Research design is the plan and structure of the investigation used to obtain evidence to answer research questions. Based on the nature of the study, researchers may follow different research designs to obtain answers to the research questions. To this study, explanatory sequential mixed design (QUAN qual) was employed to understand the quantitative results in depth using the qualitative data. Explanatory sequential mixed design has a strong quantitative orientation in which the researcher first gathers the quantitative data and analyzes the results, and then plans the qualitative phase of the study using the quantitative results (Creswell, 2014). This design will capitalize on the strengths and minimize the limitations of quantitative and qualitative research approaches (Creswell & Clark, 2007; Johnson & Onwuegbuzie, 2004). A simplified illustration of explanatory sequential mixed design is shown in Figure 2.

Research Settings

This study was conducted in the public universities of Amhara region that were categorized intofour generations based on the year of establishment.That is, two universities in the 1st generation, three universities in the 2nd generation, two universities in the 3rd generation, and three universities in the 4th generation were found. These generations were considered as which strata had universities with nearly similar characteristics such as infrastructures, staff profiles, academic programs, and so on.

Population, sample, and sampling techniques

Initially, six universities were selected out of ten universitiesfrom the specified strata for manageability reasons. That is, the University of Gondar from the 1st generation, Wollo and Debre Markos Universities from the 2nd generation, Debre Tabor University from the 3rd generation, and Injibara and Debarq universities from the 4th generation wereselected using a stratified random sampling technique. These stratifications allowed us to ensure the representation of universities from each generation and make comparisons among respondents in their feeling of servant leadership and OCB.

Then, 21 colleges wereselected from the six universities to determine the size of the population and subpopulations of the study. Specifically, five colleges from the University of Gondar, four colleges from Wollo University, four colleges from Debre Markos University, four colleges from Debre Tabor University, two colleges from Injibara University, and two colleges from Debark University were selected using a simple random sampling technique mainly lottery method. In this regard, a total of 2170 instructors that were found in the selected universities were taken as the population of the study. Of the total academic staff, 731 from the 1st generation, 710 from the 2nd

generation, 427 from the 3rd generation, and 302 from the 4th generation were considered as the subpopulations of the study.

Thus, the sample size of this study was decided using Yamane's (1973) formula given:

$$n = \frac{N}{1 + N(e)^2} = \frac{2170}{1 + 2170(.05)^2} = \mathbf{338}$$

Were.

N = total population

n= needed sample size

e = level of precision= 0.05(5%), and assuming 95% confidence level at 0.5 variability

After deciding the total sample size of the study, the sample size of each stratum was calculated based on the respective size of their population using the proportional sample allocation method developed by Pandey and Verma (2008). Hence, the researcher determined the sample size of each stratum using the Pandey and Verma (2008) formula as given below. i.e.

$$n_k = \left(\frac{Nk}{N} \right) * n$$

Were.

n_k = Sample size of k^{th} strata

N_k = Population size of the k^{th} strata

N = Total population size

n = Total sample size

Of the total sample of 338instructors, 114 from the 1st generation, 111 from the 2nd generation, 67 from the 3rd generation, and 66 from the 4th generation were taken into the sample using proportional stratified random sampling techniqueas shown in Table 1 below.

Table 1: Summary of population and sample of the study

Strata	Name of universities	Population size of each university (N_k)	Sample size of each university (n_k)
1st generation	University of Gondar	731	114
	Wollo University	280	44
2nd generation	Debre Markos University	430	67
3rd generation	Debre Tabor University	427	67
	Injibara University	145	22
4th generation	Debark University	157	24
	Total	N= 2170	n= 338

About the qualitative phase of the study, five respondents were purposively selected to collect the qualitative data through interviews to further explain the quantitative results.

Data Collection Tools

Both questionnaires and interviews were used to collect the data. The questionnaire has three parts having close-ended items. The first part of the questionnaire dealt with respondents' characteristics related to sex, work experience, educational qualification, and generations of universities. The second part of the questionnaire assessed respondents' feeling of servant leadership in the workplace using the latest version of Liden and his colleagues (2008). It was measured using 28 items organized in seven dimensions – emotional healing, conceptual skill, creating value for the community, empowering, helping subordinates grow and succeed, putting the interest of subordinates first, and behaving ethically. The third part of the questionnaire consisted of 25 items developed by Lee and Allen (2002) to measure respondents' perception of OCB in terms of altruism, conscientiousness, sportsmanship, courtesy, and civic virtue.

Finally, respondents were asked to rate items using five points Likert items ranging from 1 (*not at all*) to 5 (a *very great extent*) to measure servant leadership and OCB in the workplace.

About qualitative data, a semi-structured interview was conducted on the status of servant leadership and OCB in the study area.

Validity and Reliability of the Questionnaire and Interview

The face and content validity of the questionnaire were checked through technical evaluation by research experts. The face validity of the questionnaire related to the feasibility, readability, clarity of language, consistency of style, and formatting was improved based on the comments of my colleagues. About content validity, the organization of the questionnaire related to relevance, simplicity, and wording of items was adjusted based on the feedback obtained from the research advisors. After items were found to be included in the final questionnaire, the content validity index was calculated for the mean of the content validity ratio values of the retained items. Thus, the content validity indices of items are (.87 and .82) for servant leadership and OCB respectively showing that items were valid to measure their respective dimensions.

The pilot test was also conducted on 90 selected respondents out of the main sample of the study to assess the reliability of the questionnaire. The distribution of the sample for the pilot test followed the same procedures as in the main sample of the study. Cronbach Alpha was used to test the internal consistency of items. The reliability coefficients of the instrument with Cronbach Alpha (α) = (.84, .86, .81, .83, .89, .85 &.82) and (.84, .83, 90, 86 & .88) for items concerning the dimensions of servant leadership and OCB, respectively. This shows that items in the respective dimensions with reliability coefficients ≥.80 are considered internally consistent to measure servant leadership and OCB constructs (George & Mallery, 2010).

Data Collection Procedures

Initially, a permission letter was looked for from Bahir Dar University to collect the data from the research sites. Based on the given permission, the list of target respondents was accessed, and found the required samples. Participants were informed about the absence of potential risks and benefits due to participation in the study. Moreover, respondents were informed that their involvement in the study was voluntary, so they would withdraw from the research at any time. Then, the researcher distributed the questionnaire to the sample respondents. After the questionnaire was returned to the researcher and analyzed the data, the interview wasdeveloped and conducted with each interviewee to further explain the quantitative results.

Data Analysis Techniques

Both descriptive and inferential statistical analysis techniques were used to analyze the data using SPSS and AMOS software. Specifically, one sample t-test was used to measure the status of servant leadership and OCB in the workplace (Research question #1). Structural equation modelling was used to assessthe relationship between servant leadership and OCB (Research question #2). Structural equation modelling was also used to analyze the effect of servant leadership dimensions on OCB (Research question #3). In addition, ANOVA was employed to decide whether there are significant differences among instructors in their perceptionof servant leadership and OCBin the four generations of public universities in Amhara region (Research question #4).

Finally, the data collected through a semi-structured interview on the status of servant leadership OCB were analyzed qualitatively.

RESULTS

This section presents the results and discussion of the study according to the themes of the research questions. It began with testing the construct validity of the respective dimensions of the latent variables and measurement model fit through conducting exploratory and confirmatory factor analyses.

Testing the construct validity and Measurement model fit

Even though there is no clear criterion to decide what is large or small, items with factor loadings ±.33 and above are considered to satisfy the minimum level of threshold based on the suggestion of Ho (2006). The result of exploratory factor analysis showed that 49items in the respective dimensions of servant leadership and OCB had high factor loadings above the smallest threshold of ±.33. Specifically, the factor loading values of these items range from .601 to .914 which

predicted more than 50 % of the variance in the constructs were kept. On the contrary, four items with low factor loadings were excluded from the analysis for they suppressed the accuracy of the results. The result of the principal part analysis also showed that the factor loadings of servant leadership and organizational justice dimensions with eigenvalues range from 1.592 to 3.173 greater than the cutoff point 1.

Based on the results of the construct validity, the researcher identified the seven dimensions of servant leadership (emotional healing, creating value for the community, conceptual skill, empowering, helping subordinates grow and succeed, putting subordinates first, and behaving ethically) and five dimensions of OCB (altruism, conscientiousness, sportsmanship, courtesy, and civic virtue), as indicators. Taking the identified dimensions of the two latent variables, the researcher constructed the measurement model using AMOS version 23 as shown in Figure 2.

Although there is little agreement among scholars on the type of fit indices and their cutoff points as to what constitutes good fit, the researcher used relative chi-square (CMIN/DF), goodness fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), incremental fit index (IFI),Tucker-Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA)to assess the degree to which the measurement model fits the observed covariance matrix as indicated in Table 2.

Table 2: AMOS outputs on the fitness indices against the criteria of the measurement model

Criteria	Obtained values	Threshold
Relative chi-square (CMIN/DF)	4.828	<5
Goodness of fit index (GFI)	.947	>.90
Adjusted goodness of fit index (AGFI)	.917	>.90
Normed fit index (NFI)	.929	>.90
Incremental fit index (IFI)	.942	>.90
Tucker-Lewis's index (TLI)	.925	>.90
Comparative fit index (CFI)	.942	>.90
Root means square error of approximation (RMSEA)	.045	<.05

As shown in Table 2, the measurement model satisfied the fit indices. That is, the results showed that the measurement model fits the data by the chi-square test, $\chi 2$ (N = 338, df = 53) = 225.884, p <.05. In addition, the fit indices of GFI (.947), AGFI (.917), NFI (.929), IFI (.942), TLI (.925) and CFI (.942) were higher than the threshold of .90 and a RMSEA (.045) was lower than the cutoff of point .05 with p= .000. This shows that the possible improvement of the measurement model ranging from .053 to .083. The maximum likelihood estimates of the unstandardized and standardized regression weights also confirmed that all the path coefficients in the model are significant at p < .05 as shown in Table 3.

Table 3: Unstandardized and standardized regression weights of the measurement model

			Unstandardized				Standardized
Parameters/dimensions			Estimate	S.E.	C.R.	P	Estimate
Emotional healing	<---	SL	1.000				.752
Creating value	<---	SL	1.117	.052	21.468	***	.815
Conceptual skill	<---	SL	1.077	.056	19.364	***	.727
Empowering	<---	SL	.959	.051	18.900	***	.710
Helping subordinates	<---	SL	.737	.055	13.466	***	.510
Putting subordinates first	<---	SL	.642	.055	11.657	***	.442
Behaving ethically	<---	SL	-.429	.053	-8.118	***	-.310
Altruism	<---	OCB	1.000				.738
Conscientiousness	<---	OCB	1.109	.053	21.084	***	.784
Sportsmanship	<---	OCB	1.076	.051	21.205	***	.789
Courtesy	<---	OCB	1.024	.048	21.117	***	.786
Civic virtue	<---	OCB	1.048	.052	20.284	***	.754

As indicated inTable 3, the unstandardized regression weights of all the dimensions of servant leadership and OCB are significant with the critical ratio test greater than ±1.96 at $p < .05$. This shows that the critical ratio tests of all dimensions are extremely far from the threshold of ±1.96 which shows a significant path at $p < .05$. The standard regression estimates of 12 dimensions in the measurement model were significantly represented by their respective latent variables. Specifically, the standardized regression weights of the observed variables in the measurement model range from -.310 (behaving ethically) to .815 (creating value for the community). This implies that the observed variables explained the respective latent constructs ranging from 9.6 to 66.42 %. These values show that servant leadership and OCB were significantly measured by their respective dimensions.

Thus, it is concluded that all dimensions in the measurement model were internally consistent and structurally valid to measure their respective constructs.

Status of Servant leadership and Organizational citizenship behaviour

Table 4: A one sample t-test for the dimensions of servant leadershipand OCB

Dimensions	Mean	Std.	Test value	Mean difference	t-value	Sig.(2-tailed)
Servant leadership						
Emotional healing	11.09	2.149	9	2.095	27.435	.000
Creating value for the community	14.21	3.433	12	2.211	18.126	.000
Conceptual skills	13.89	3.893	12	1.885	13.626	.000
Empowering	11.39	3.144	12	-.615	-5.505	.000
Helping subordinates grow and succeed	10.65	2.146	9	1.648	21.608	.000
Putting subordinates first	10.97	3.673	12	-1.034	-7.923	.000
Behaving ethically	10.57	2.083	12	-1.434	-19.383	.000
Total	87.970	13.356	78	9.970	13.724	.000
Organizational citizenship behavior						
Altruism	13.89	2.670	12	1.889	19.907	.000
Conscientiousness	13.66	4.565	15	-1.342	-8.274	.000
Sportsmanship	14.63	4.483	15	-.367	-2.307	.000
Courtesy	14.05	4.607	15	-.951	-5.807	.000
Civic virtue	14.07	2.834	12	2.066	20.513	.000
Total	72.875	12.644	69	3.678	5.635	.000

N=338, df = 337, *Sig. <.05

The results of one sample t-test indicated that the mean scores of emotional healing (11.09), creating value for the community (14.21), conceptual skill (13.89), and helping subordinates grow and succeed (10.65) were higher than the respective test values at (t = 27.435), (t = 18.126), (t = 13.626) and (t = 21.608) respectively at p<.05, df =337. The respective positive mean differences and t-values of these dimensions also ensured that emotional healing, creating value for the community, conceptual skill, and helping subordinates grow and succeed was implemented by the department heads to some extent as perceived by instructors.On the contrary, the mean scores of empowering (11.39), putting subordinates first (10.97), and behaving ethically (10.57) were less than the respective test values at (t = -5.505), (t = -7.923) and (t= -19.383) respectively at p<.05, df =337. The negative mean differences and t-values of these dimensions proved that empowering, putting subordinates first, and behaving ethically were exercised to a little extent. In sum, the total mean score of servant leadership (87.970) was higher than the test value (78) with (t = 13.724, df = 337) at p<.05.

Similar result is also obtained through the interview on the status of servant leadership. Almost all interviewees reported that department heads showed servant leadership behavior in relation to emotional healing, creating value for the community, conceptual skills, and helping subordinates grow and succeed. Specifically, Participant 1 reported that department heads showed servant leadership behavior in terms of emotional healing, creating value for the community, and helping

subordinates in achieving their goals. Similarly, Participants 2 and 4 said that their department heads were interested in helping people who faced different problems in the community. In the same way, Participant 3 and 5 reported that their department heads were competent enough to solve work-related problems effectively.

On the contrary, most respondents said that department heads were less likely to show servant leadership behavior in empowering, putting subordinates first, and ethically serving employees. For example, Participant 1, 2, 3 and 5 reported that their department heads made decisions about their job without collecting correct information. They also reported that explained that their department heads gave high emphasis to satisfy their own needs over the needs of instructors and did not empower them to make important decisions related to their job.

About OCB, the results of one sample t-test showed that the mean scores of altruisms (13.89) and civic virtue (14.07) were higher than the respective test values at ($t = 19.907$) and ($t = 20.513$) respectively at $p<.05$, $df = 337$. This implies that academic staff was to some extent volunteerto support their coworkers and universities by offering important suggestions. On the contrary, the mean scores of conscientiousness (13.66), sportsmanship (14.63), and courtesy (14.05) were less than the respective test values at ($t = -8.274$), ($t = -2.307$), and ($t = -5.807$) respectively at $p<.05$, $df =337$. This means that instructors were a little extent willing to perform the function of their universities voluntarily. Thus, the total mean score of OCB (72.875) was higher than the test value (69) with ($t = 5.635$, $df = 337$) at $p<.05$.

The responses obtained through the interview also showed that instructors were engaged in OCB, yet it was not sufficient to support the function of the universities as well as instructors. Participant 1 reported that he provided professional support for fellow workers who faced difficulty related to their tasks under unusual circumstances. He also gave professional support to the newly employed instructors and reoriented them to adapt to the work environment and feel good about their job. In the same way, Participants 3 and 4 said that they actively took part to improve the effectiveness of the universities by attending important meetings to provide constructive comments and suggestions with the intent to improve the performance of the universities. They also voluntarily took part in the affairs of the universities by offering constructive comments to solve work-related problems. However, other participants reported that they showed a low level of engagement in OCB related to conscientiousness, sportsmanship, and courtesy (Participant 2 & 5). They also reported that they did not exert extra effort beyond the formal duties to achieve the goals of the universities. This means that they were not much interested to support the universities willingly.

The relationship between Servant Leadership and Organizational citizenship behavior

Table 5: Correlation coefficient of servant leadership and OCB

Latent variables in the structural model			Unstandardized				Standardized
			Estimate	S.E.	C.R.	P	Estimate
Servant leadership	<-->	OCB	.808	.057	14.068	***	.578

As can be seen from Table 5, a positive and statistically significant relationship was seen between servant leadership and perceived OCB with a standardized correlation coefficient (r=.578) by the critical ratio test greater than ±1.96 at p<.05. This implies that respondents' scores of servant leadership and perceived OCB were increased concurrently.

The effect of Servant leadership on Organizational citizenship behavior

Table 6: Regression of OCBon servant leadership

Latent variables in the structural model			Unstandardized				Standardized
			Estimate	S.E.	C.R.	P	Estimate
OCB	<---	Servant leadership	.555	.028	19.904	***	.578
R-squared			.334				

As shown in Figure 3 and Table 6, the path that links servant leadership and OCB with a standardized regression coefficient (β =.578, p<.05) shows that servant leadership is significantly predicted instructors' OCB. This means that instructors are more likely to engage in OCB when leaders manifest servant leadership behavior in the workplace. Thus, the value of R^2 indicated that 33.4 % of the variance in OCB was predicted by servant leadership.

One way ANOVA on the perception of instructors in servant leadership and OCB

Table 7: One way ANOVA on differences in feeling of servant leadership and OCB among instructors in the four generations of universities.

Variables	Generations of university	Sum of Squares	df	Mean Square	F	Sig.
Servant leadership	Between Groups	3.875	3	1.292	4.204	.006
	Within Groups	102.622	334	.307		
	Total	106.497	337			
OCB	Between Groups	.978	3	.326	.506	.678
	Within Groups	215.023	334	.644		
	Total	216.001	337			

As revealed in Table 7, the result of one-way ANOVA showed that a significant difference was found among instructors in their feeling of servant leadership at F (3, 736) = 4.204, p = .006.

However, there was no significant difference among instructors in their feeling of OCB at F (3,334) = .506, p = .678in the four generations of universities.

DISCUSSION

Status Servant leadership and Organizational citizenship behavior

The finding of this study is like the work of Fentahun and Matebe (2020) in that they found servant leadership moderately implemented by the leaders of public universities. Fikre (2017) also proved the successful implementation of servant leadership in the Compassion International organization worked in Ethiopia, which is consistent with the finding of this study. Similarly, Boume (2016) found that servant leadership is an important approach to easing the performance of higher education institutions. The result of this study is also like the works of Alamri (2011), Kassahun (2015), and Lerra (2015) in that that higher education institutions were led by unethical, authoritative, bureaucratic leaders who want to meet their own needs over the needs of others. In the same way, other studies confirmed that leaders in higher education institution is ineffective and holds individual needs over those of the institutional goal (Frew, Mitiku & Mebratu, 2016).

The finding of this study also showed that OCB was found to a little or some extent in the workplace. This result is quite similar with the findings of (Akyuz, 2012; Buluç, 2008; Oguz, 2011; Polat & Celep, 2008) on the presence of moderate levels of OCB in workplaces. The finding of this study also supported by Turnipseed and Murkison (2000) that OCB contributes to the organization by creating positive workplace environments. Extra-role behaviors are also essential for an organization, as they are likely to promote more effective communication, which allows best practices to be shared amongst employees or fosters increased coordination among employees (Ren-Tao & Heung-Gil, 2009).Employees who engage in OCB can enhance organizational effectiveness and efficiency by exerting extra effort beyond one's duties.

The relationship between Servant leadership and Organizational citizenship behavior

The result of this study is similar with the findings of Abdu (2014) and Mostafa (2014) that servant leadership is positively related to OCB. Other studies further proved the presence of a positive relationship between servant leadership and OCB (Ehrhart, 2004; Taylor, Martin, Hutchinson, & Jinks, 2007). Research conducted by Setyaningrum (2017) found that servant leadership was positively related to citizenship behavior. In addition, several studies show that there is a significant relationship between servant leadership and OCB in the workplace (Dirks & Ferrin, 2002; Hu & Liden, 2011). Servant leadership can create a servant mindset in employees so that they are encouraged to help colleagues find creative solutions for a given problem.

The Effect of Servant leadership on Organizational citizenship behavior

The result of this study is supported by the findings of other researchers concerning the effect of servant leadership on the OCB of employees (Ehrhart & Naumann, 2004; Schlecter & Engelbrecht, 2006). Consistent with this result, Van Direndonck and Nuijten (2011) and Abid, Gulzar, and Hussain (2015) also found that servant leadership had a significant effect on the OCB of employees. Consistent with this result, Mirshekar and Haddadi (2017) found that the servant leadership approach of leaders significantly predicted employees' OCB. Moreover, Reed (2016) and Prabowo and Setiawan (2013) reported that servant leadership significantly predicted employees' OCB. Employees tend to show citizenship behavior when they are cared for and fairly

treated by their leaders. The findings of this study were like Mira and Margaretha (2012) that hold servant leadership has a positive influence on OCB.

CONCLUSION AND IMPLICATIONS

CONCLUSION

The purpose of this study was to investigate the effect of servant leadership on the OCB of instructors in public universities in Amhara region. Based on the finding of the study, the researcher concluded that the OCB of instructors was influenced by servant leadership practices. Specifically, servant leadership and OCB were practiced moderately in the public universities in Amhara region. This shows that a positive and significant relationship was found between servant leadership and OCB with a standardized correlation coefficient.

Implications of the study

This research can supply valuable information for higher education officials in encouraging employees to engage in OCB. Specifically, it tries to generate empirical data that show the importance of servant leadership in supporting the functions of the universities. This implies that human resource management practices can be instituted to affect efficient and fair improvement in the behavior of employees. The results of this study generally emphasize the central role played by team commitment in the quest to understand factors that help employees to perform their roles. Servant leadership is also recommended as one of the people-oriented leadership approaches that foster employee development and has a significant effect on team effectiveness when employees feel committed to their work.

As far as my reading, servant leadership and OCB have received little attention in the context of Ethiopia, this research may start other researchers to conduct further studies by considering all public and private universities found in various parts of Ethiopia.

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6. CROSS-CUTTING ISSUES

6.1. An Assessment of Critical Success Factors in Thesis writing: The Case of ECSU and AAU

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ABSTRACT

The quality of education continues to challenge Ethiopian higher education. This study has explored and account thesis writing, its governance, factors, and critical challenges in Ethiopian public universities, taking Addis Ababa University and Ethiopian Civil Service University as case. The study employed a concurrent triangulation mixed research design. Both quantitative and qualitative data were collected from sample public universities. Thus, in the case of Ethiopian Civil Service University, from the total graduate degree students of 2014, 334 students were sampled; and in the case of Addis Ababa University, 388 sample students were sampled—in total 722 survey questionnaires were collected. Qualitative data using a semi-structured interview were generated from 40 participants drawn from students and teachers in these two sample universities. The quantitative data from sample survey were analysed using descriptive statistical analysis — while the qualitative data from both survey and interview were analysed using thematic analysis supported by analytical techniques such as coding, categorizing, and theming. The descriptive analysis of this study supplied the status of critical success factors of thesis writing. It revealed that advisor's capacity (measured by knowledge on subject matter, on research, and on the use of research tools) was found slightly higher than average in both sample universities (ECSU, 3.32; AAU, 3.68; Total, 3.51). However, the mean value of students' prior capacity both as measured by knowledge on subject matter (ECSU, 2.55; AAU, 2.69; Total, 2.630) and knowledge on research (ECSU, 2.28; AAU, 2.52; Total, 2.41)— were found significantly lower than average. The level of knowledge gained (both in terms of gain in knowledge in subject matter and research) in thesis writing in ECSU (Mean value, 3.19) and AAU (Mean value, 3.16) were found to be significant. The effectiveness of management practices (in terms of topic allocation, monitoring advisors, complaint handling, use of schedule) were found below average (Mean value, 2.78). Written feedback is found to be the dominant mode of communicating comment by advisors in thesis writing— while provision of feedback through face-to-face communication is found to be very minimal in both institutions. The overall thesis writing and management in public higher education institutions suffer significant limitations, including the absence of guiding documents in research and thesis writing as well as the existence of loose monitoring and evaluation system on the key actors— advisors and students. The management of thesis feedback in general, the guidance, documentation, use, and monitoring were found to be ineffective. Advisors' commitment is also inhibited by poor incentive mechanism in place. Students lack key set of critical skills, including English language and writing. Finally, the lack of vibrant research culture and practice in both institutions were found to play an inhibiting role for effective thesis writing in higher education

institutions. In order to ensure the quality of thesis writing, leaders and academicians is better to consider the following measures— to prepare and execute high quality guiding documents and protocols for research; to launch an effective feedback management system; to provide performance based incentive; to strengthen effective monitoring and follow up on students and advisors; to enhance students awareness through training; to avail digital and analytical resources; and, last but not least, to conduct permanent seminars on research, writing, and methods.

Key words: *Thesis writing, quality, management, factors, challenges*

INTRODUCTION

Ethiopia has enjoyed a significant growth in terms of both number and size of universities, the majority of which run graduate degree programs—as a result, several thousands of students have an opportunity to attend graduate programs in a number of fields of study. For graduate degree programs, the writing and successful defence of a research thesis is a partial requirement to earn a higher degree. This important instrument is introduced, on the one hand, to supply an opportunity for graduate students to exercise and in the process to nurture their research and critical thinking skills. On the other hand, thesis writing also serves as an evaluation tool to measure students' scholarly ability and therefore based on grading of thesis paper, universities award higher degree. Developing research and academic skills among graduate students, through thesis program, a global academic tool, is probably the most essential component in graduate programs of any field of study— its successful application and management significantly determines the quality and effectiveness of graduate programs. But the implementation of a thesis program requires significant resource.

Ethiopian higher education institutions direct tremendous number of resources annually for implementation of thesis program. Millions of public monies are spent to finance the thesis program in the form of payment to advisors and examiners as well covering costs incurred by graduate students. Thousands of graduate students commit one full academic year to develop and complete their thesis paper—but even more several thousands of survey respondents and interviewee also spend their crucial time in giving responses and spending time with students and researcher. However, all these costs seemed to yield small return.

Numerous graduate students have shown deficient performance in the writing of thesis paper. One of the yardsticks used to measure the quality of research paper is its appearance on journals, including international journals. Research and studies by graduate students at Ethiopian universities occupy very insignificant position in international journals. Also, the publication of research article on local journals is at its infant stage. One possible interpretation of this fact is that the majority of the thesis papers are below par to the standards and quality set by journal articles.

Many students plagiarize and copy-paste the works of others. "We are not getting adequate guidance and feedback from advisors", students complain, on the one hand; "students lack the basic essential skill before they sign into thesis writing"— is the common cry of thesis advisers, on the other side of the coin. Studies have also shown that there exist capacity gaps among graduate students, including the writing skill deficit, which probably led students to copy-paste and plagiarize (Hagos, 2020).

Lack of quality in thesis and research by graduate students has also brought an important opportunity cost. If the thesis writing program had been a success, several areas would have been professionally researched and as a result numerous empirical fact[1] would have been set up in many areas.

The lack of quality in thesis paper can only be addressed if significant intervention, driven by a comprehensive study in the area, is introduced. And therefore, this study undertakes an in-depth investigation into the process of thesis writing in Ethiopian higher education institutions. This study is believed to supply a comprehensive account of the practice as well as the challenges of students and advisers in thesis writing. It will find the critical gaps that require reforms to enhance the quality of thesis papers, and the experience of graduate students.

Specific Objective of the Study

- To measure and examine factors affecting thesis writing effectiveness in public universities.
- To identify and investigate critical challenges (along with their underlying root causes) impeding thesis writing process and its effectiveness in public universities.

REVIEW OF LITERATURE

The Purpose of Thesis Writing in Graduate Degree Programs

The present college and university degree, according to Mauch and Park (2003), along with its thesis and dissertation writing dated back 700 years ago. Currently according to these scholars, thesis and dissertation in higher learning institutions underlies two major fundamental reasons. The first is that thesis and dissertation are seen as a requirement in the attainment of advanced degrees to evaluate and show the capacity of students in making a rational and scientific argument. The second is that thesis and dissertation is introduced to stimulate candidates to achieve higher learning, including critical thinking and problem-solving capacity, in a particular field with a significant help from faculty. The second view gives emphases to the learning process while the first to evaluation. However, much focus seems to be allotted to the first cause.

Currently, in college and university learning, the writing of thesis is a requirement to earn a degree—though it is doing a thesis that a significant amount of learning is carried out. The essence of writing thesis and dissertation is therefore to provide students an opportunity to practice and test their capacity as to whether they can independently (with substantial independence) advance a scientific and rational argument by undertaking research as well as reveal the knowledge and skill appropriated in the process.

Thesis writing with its several forms target to build the ability and skill of students to advance scientific argument. In general, academic writing, including thesis writing, has the following four purposes: to report the process and outcome of a research project, to answer a question forwarded to the writer, to discuss a subject, to review and synthesize previous research on a particular subject (Bailey, 2011, p. 3).

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[1] Facts on a specific issue or topic developed, based on extensive and frequent evidence resulted from quality research.

Factors Affecting Thesis Writing Effectiveness

There exist several factors and issues relevant for thesis writing effectiveness. The examination and analysis of empirical studies on thesis have shown the presence of several factors that can potentially affect thesis writing effectiveness. In this brief review of relevant literature, six areas (factors), which have a potential impact on student's thesis writing performance, have been discussed.

Support and Guidance from Advisors. Support and guidance, according to several studies (including Tauber, 2016; Sugimoto, 2012), is one of the key factors that decide the student's performance in thesis. Advisor's comments and suggestion not only affects student's thesis area and quality but also students' knowledge and understanding in research (Tauber, 2016; Dodson, Fernyhough, Holman, 2006). And therefore, the nature and quality of advisors' guidance of student on thesis is worth the effort to further explore and analyse.

Advisor's Research Capacity. The knowledge and research skill of an advisor as well as its exposure to research and research practice can have direct positive effect on the quality and effectiveness of advice, he/she provides to students (Ondrusek, 2012; Mauch and Park, 2003). An advisor with rich understanding and practice of research is expected to supply effective guidance to advisees and vice versa.

Department/Faculty Role. The role of faculty /department in supplying guidance to students about resources and material can also play a positive role in students' effectiveness in thesis performance. According studies (such as: Clark, 2005; Chapman, 1989), apart from area specific guidance given by advisors, faculty and department can provide other key supports to student, including provision of training and seminar on research and thesis writing, effective writing manuals and also research resources (such as data analytical software).

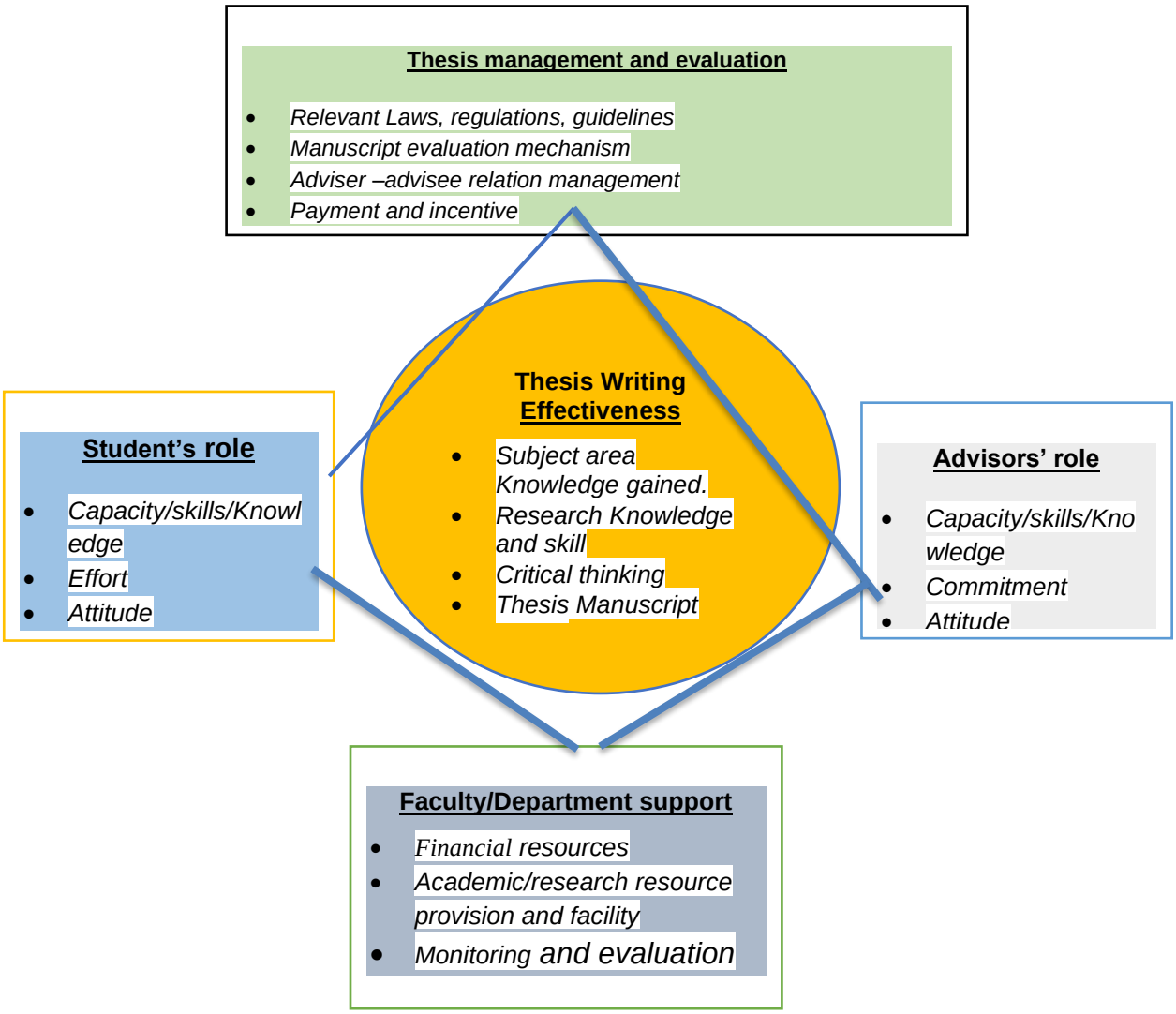
Student's Role. Despite advisor's critical support, the role of students in thesis performance is unique. First of student's earlier academic capacity and skill in general and their writing, language and research skills in particular play an important role in their master thesis effectiveness (Channon, Savva and Nygaard, 2021). In addition, student's practical effort and their enthusiasm, which can be decided by other several factors and issues, can also affect the quality of their thesis (Loss, and Ryan, 2016). The more time and effort students put into their thesis —the more the quality of their thesis. **Student's view of their thesis research programs** is also another crucial factor. A student who mainly sees thesis writing as a mere criterion to award a degree may give a significant attention to final product of the thesis rather than the process, which is believed to build student's critical and research skill (Tauber,2016).

Graduate Research Course. Most students who joined graduate-degree programs have come to take graduate and advanced research courses for the first time. According to Feldon et al. (2016), graduate research courses are the main mechanism to build the knowledge and skill of students who sign into thesis writing. And therefore, the quality and effectiveness of graduate research courses can have its own significant impact on students' performance in thesis writing (Channon et al. 2021; Feldon et al., 2016).

Thesis Management and Evaluation. The overall thesis and student research management can also play a critical role in the success of the thesis program. An effective system, including relevant

regulatory and implementation framework, practice and management, effective thesis evaluation mechanisms, and efficient assignment of advisors over advisees— can bring significant result in the success of student's research performance (Bailey, 2011). A thesis management system with strong research ethics and implementation has a positive contribution to the overall thesis program effectiveness. Payment and incentive to advisors and examiners can also play a key role in thesis effectiveness—attractive payment package is expected to play a positive role in motivating advisors and examiners (Ondrusek, 2012).

Conceptual Framework



Source: Own computation from review of literature

METHODOLOGY

Research Design

This study pursued a concurrent triangulation mixed research design in which both quantitative and qualitative research methods will be applied. The quantitative research method was used to measure the key characteristics and potential factors relevant for thesis writing effectiveness. The qualitative research method was used to explore challenges inhibiting the overall quality of thesis in higher education. The quantitative research was carried out in parallel with qualitative research phase —and finally a thorough triangulation of data and analysis will be conducted.

Data Source and Data Collection Instruments

In this study both primary and secondary data were collected. The source of primary data was graduate students and teachers in sample public universities: Ethiopian Civil Service University and Addis Ababa University. Secondary data were also collected from these sample public universities and their colleges and faculties as well as from the Ministry of Education.

This study has employed two major primary data collection instruments: survey questionnaire and semi-structured interview. A survey questionnaire was designed to measure key practices, characteristics, and critical success factors affecting student's thesis performance. The semi-structured interview was used to explore and account the critical challenges hindering the quality of thesis research in public universities.

Sample Size Determination and Sampling Techniques

The sampling unit of this study is a graduate degree student. This study, using survey and semi-structure interview, collected data from two public universities. For the sample survey, proportional random sampling technique was employed to select sample graduate degree students in social science field from Ethiopian Civil Service University and Addis Ababa University. One of the chief aim of this study is not only to provide a statistically viable account of issues and findings on thesis writing at higher education level in Ethiopia, but also aim to produce statistically significant variables and factors for each sample case: Ethiopian Civil Service University and Addis Ababa University— so that comparison can be made between these two sample universities across variables and themes. As a result, to accommodate these analytical aims (to produce statistically significant findings in each sample case and to make comparisons), the total sample needed for the survey was decided after the sample size of each sample university is calculated.

Therefore, in these two public universities, sample students were selected for each university using a sampling formula of Yemane (1967). Thus, in the case of Ethiopian Civil Service University, from the total graduate degree students of 2014, 334 students were sampled; and in the case of Addis Ababa University, 388 sample students were selected—in total 722 students were selected and survey data through questionnaire were collected from these students. (See Annex 1 in the Appendix for detail sample size determination). The total sample of each public university therefore was proportionally distributed across their respective graduate degree programs, to fully consider differences of program specializations in each university.

For the semi-structured interview, participants were drawn from sample public universities using purposive sampling. Participants for interview were composed of graduate degree students,

teachers, thesis advisors, college and department heads. Studies on interview data collection show that saturation happens in the range of 15 to 20 participants (Guest, Bunce, & Johnson, 2006). This study, based on the recommendation of Crouch & McKenzie (2006) on saturation of information for interview, interviewed 20 sample participants from each sample public universities. And in total, 40 participants (i.e.2*20) were selected and interviewed using purposive sampling technique.
Data Processing and Analysis

The quantitative data from survey questionnaire was processed and analysed using SPSS. A reliability test using Cronbach's alpha was undertaken for each group of items in the survey. In addition, factor analysis as well as descriptive statistical tests (such as mean, standard deviation, weighted mean) was conducted. The qualitative data from semi-structured interview were meticulously transcribed. And then the qualitative data were thoroughly coded using open coding. Using coding and qualitative data analysis, an effort was made to produce significant themes that reveal and describe critical challenges hindering thesis writing program.

Validity and Reliability

Several measures were taken to keep the validity and reliability of instruments and findings of this study. To ensure the validity and reliability of survey questionnaire, proper operational definition based on relevant literature and sources were set up for each variable and theme to be explored in this study. Based on these operational definitions, a number of relevant items were constructed for each variable in the survey questionnaire.

Cronbach's alpha test, as showed the following Table, for each major variables and constructs were conducted. Besides, operational definition of each variable was consistently applied across all stages of this study starting from data collection up to analysis and interpretation.

To ensure statistical and external validity of the data processing and analysis made on survey questionnaire, statistical tests and procedures were strictly applied. And to ensure the reliability of qualitative data analysis, several measures were also undertaken: the application of thorough coding, peer debriefing, thick and rich description, and effective data triangulation.

Table 18: Result of Cronbach's alpha reliability test

S. N	Variable/Related Items	Total Number of Items employed	Valid No of Items	Cronbatch's Alpha Test	Remark
1	Students' perception on advisors' capacity	4	4	0.81	All items were qualified for Analysis
2	Student's capacity and attitude	3	3	0.78	All items were qualified for Analysis
3	Knowledge gained.	6	6	0.88	All items were qualified for Analysis
4	Thesis management	4	4	0.80	All items were qualified for Analysis
5	Feedback	7	7	0.90	All items were qualified for Analysis
6	Ethics and plagiarism	3	3	0.77	All items were qualified for Analysis
7	Resource for research	4	4	0.86	All items were qualified for Analysis

As seen in Table 1, Cronbach's alpha test was conducted for seven group of items and the alpha test revealed that these groups of items employed in survey questionnaire were reliable.

Ethical Considerations

The study has pursued relevant ethical practices. The respondents' participation in this study was voluntary and based on their free will. In addition, all respondents and interview participants were oriented as to the purpose of this study before they supplied their responses. The researcher of this study as well as the data collectors has refrained from doing harm unto participants in time of interview. Interviewers neither have manipulated nor abuse the views and responses of participants. The confidentiality and anonymity of all participants will continue be protected and kept. In addition, the citation of interviewee was anonymous. All sources of information and data for this study including earlier studies and literature are duly acknowledged.

RESULT AND DISCUSSION

Descriptive Analysis

A sample survey was conducted on second degree graduate students' in ECSU and AAU to measure relevant variables and items affecting thesis writing quality. A total of 722 respondents have taken part in the survey. However, due to inferior quality of returned survey questionnaire, 64 questionnaires were excluded from the sample. And therefore, a total of 658 (309 from ECSU and 349 from AAU) survey questionnaires were entered into SPSS. Presentation and descriptive analysis of survey result has been presented below.

Demographic Characteristics of Respondents

Sex and Age

As showed in the following Table 2, most respondents were male (70.79 per cent) while the remaining (39.03 per cent) were female.

Table 19: Sex of respondents

Sex	Freq.	Percent	Cum.
Male	467	70.97	70.97
Female	191	39.03	100.00
Total	658	100.00	

Regarding age of respondents, the following Table 3 depicts the age composition of respondents.

Table 20: Age of respondents

Age Category	Freq.	Percent	Cumulative
<25	28	4.26	4.26
25-30	124	18.84	23.10
31-40	385	58.51	81.61
41-54	121	18.39	100.00
Total	658	100	

As showed in the above Table 3, young respondents (with the age of less or equal to 30 years) constituted 23.1 per cent of the total respondents. Most respondents (58.21 per cent) were between the ages of 31 up to 40 years. Senior student respondents (with the age of 41- 54 years) are 18.39 per cent of the total share of the respondent).

The Role of Advisor

Student's assessment of advisor's capacity

The intellectual ability of advisors in general and their knowledge and skill in the specific field of study they are assigned to advise students in particular—plays an overly critical role for the success of thesis writing in higher education in Ethiopia. The following table depict graduate students' feeling of the ability of their advisor in ECSU and AAU.

Table 21: Student's assessment of advisor's ability in percentage

Degree	ECSU and AAU				
	Subject mater	Research	use of Research tools	Total	Cum. average
Very low (1)	2.4	9.7	9.4	7.1	7.1
Low (2)	6.8	14.7	14.2	11.8	18.9
Medium (3)	16.4	23.8	28.2	22.7	41.6
High (4)	49.8	34.3	33.9	39.5	81.1
Very high (5)	24.5	17.5	14.4	18.9	100.0
Total	100.0	100.0	100.0	100.0	
Mean	**3.87**	**3.35**	**3.30**	**3.51**	

As showed in the above table, three broader items, such as subject matter knowledge of advisor, research knowledge of advisors, and the ability to apply research tools and software, were introduced. Regarding subject matter knowledge, most students (74.5 per cent) have rated their advisor's capacity as high and extremely high; it is only 9.2 percent rated this attribute as low and very low. However, about knowledge on research, a simple majority of students, 51.8 per cent, rated their advisor's capacity in this area as high and extremely high. The same is true for use of research tools. However, the positive reaction of students on ability of their advisors declines on research and the use of research tools when compared to subject matter knowledge. As revealed in the above table, the relatively highest mean value (3.87) was recorded by subject matter knowledge, followed by research knowledge (3.35) and use of research tools and software (3.30). These findings imply that though there are limitations in subject matter knowledge of advisors and teachers in both higher institutions, there exist a significant gap in the research ability of advisors and teachers.

Degree of commitment

One of the common key ingredients for work performance, in which recommending thesis papers is one, is the commitment of key actors engaging in the field. This study has tried to measure student's assessment of their advisors about the degree of commitment in advising.

Table 22: Student's assessment on advisor's commitment in ECSU and AAU

Degree	ECSU		AAU		Total	
	percentage	Cum. percentage	percentage	Cum. percentage	percentage	Cum. percentage
very low (1)	15.91	15.91	16.92	16.92	16.43	16.43
Low (2)	12.66	28.57	21.15	38.07	17.06	33.49
Medium (3)	39.29	67.86	28.70	66.77	33.80	67.29
High (4)	21.10	88.96	19.64	86.40	20.34	87.64
Very high (5)	11.04	100.00	13.60	100.00	12.36	100.00
Total	100.00		100.00		100.00	
Mean	**2.99**		**2.92**		**2.95**	

As showed in the above table, a considerable number of student respondents in ECSU (28.57 per cent) and in AAU (38.07 per cent) have rated the degree of commitment of their respective advisors as low and exceptionally low. The mean value of the commitment was found to be slightly below than medium level both in ECSU (2.99) and AAU (2.92). These results revealed that though there exist minor difference about commitment where ECSU performs slightly better than AAU—both higher institutions came out to be inadequate in this regard.

The Role of Student

Student's assessment on self-academic capacity

The role of student in the successful completion of thesis is irreplaceable. This study has investigated variables aim to measure student's role in their thesis writing. The following table presents students prior knowledge on a range of issues (that can decide their successful completion of thesis writing).

Table 23: Student's prior knowledge on subject matter and on research

Degree	ECSU and AAU					
	Subject mater	Cum. average	Research method	Cum. average	total	Cum. average
Very low (1)	22.12	22.12	25.39	25.39	23.74	23.74
Low (2)	22.89	45.01	26.48	51.87	24.67	48.41
Medium (3)	31.64	76.65	32.55	84.42	32.10	80.51
High (4)	16.74	93.39	13.08	97.51	14.93	95.44
Very high (5)	6.61	100.00	2.49	100.00	4.56	100.00
Total	100.00		100.00		100.00	
Mean	**2.63**		**2.41**		**2.52**	

The significant percentage of students (45 percent) in both sample higher institutions regarded their prior knowledge on subject matter of their thesis topic as low and exceptionally low. Likewise, most students (51 per cent) have rated their prior knowledge on research as low and exceptionally low. On average, the mean value of prior knowledge on subject matter and on research were found to be 2.63 and 2.41, respectively, which are far below medium level. These data reveals that a significant majority of graduate students in both sample higher education institutions lack key sets of knowledge and skills (relevant for thesis writing effectiveness) before they engage in thesis writing.

Student's attitude towards thesis writing

Another key factor affecting thesis writing effectiveness is students' levels of constructive attitude towards the issue in general— the level of knowledge and skill they believe they get in thesis writing.

Table 24: Student's belief on knowledge and skill gained in the process of thesis writing in ECSU and AAU

	ECSU		AAU		Total	
Degree	percentage	Cum. percentage	percentage	Cum. percentage	percentage	Cum. percentage
Very low (1)	27.1	27.1	24.1	24.1	25.5	25.5
Low (2)	29.1	56.2	24.9	49.0	26.9	52.3
Medium (3)	33.8	90.0	28.4	77.4	30.9	83.2
High (4)	5.4	95.3	16.6	94.0	11.4	94.6
Very high (5)	4.7	100.0	6.0	100.0	5.4	100.0
Total	100		100.0			
Mean	**2.31**		**2.56**		**2.44**	

As showed in the above table, most student respondents in ECSU, 56.2 per cent, and in AAU, 49 percent, on average, 52.3 percent— have had low and exceptionally low level of belief that they can gain new knowledge and skill in writing process. It is only a relatively small percentage of the student respondents in both universities (16.8 per cent) that believe they will enhance their knowledge and skill in the process of thesis writing. The level of belief of students in AAU (when compared to ERCSU) about the benefit of thesis writing was found to be slightly more constructive as the mean value of ECSU is 2.31 while AAU is 2.56. However, the attitude of students in both universities (total mean value= 2.44) towards thesis as a source of opportunity to enhance and gain new knowledge can be said very minimal, far below medium level.

Knowledge and skills gained in the process of thesis writing.

One of the key purposes for the introduction of thesis research in graduate degree programs is to create a practical opportunity to deepen students' understanding on their field of study as well as on scientific research. The following table depicts the responses of students on the degree of knowledge gained in thesis writing.

Table 25: Average degree of knowledge gain in the process of thesis writing in ECSU and AAU

Items	ECSU	AAU	Total
	Mean	Mean	Mean
Knowledge gain (Subject matter)	3.17	3.21	3.19
Knowledge gain (Research method)	3.16	3.18	3.17
Knowledge gain (Research writing)	2.78	2.78	2.78
Knowledge gain (Research in general)	3.21	3.12	3.16
Knowledge gain (facts, data)	2.74	2.81	2.78
Knowledge gain (Stat. tools)	3.21	3.17	3.19
Total	**3.04**	**3.05**	**3.04**

As indicated in the above table, the mean values of knowledge gain on subject matter, on research method, on research in general, and the use of statistical tools were found to be 3.19, 3.17, 3.16, and 3.19, respectively, all of which are slightly higher than the average value. This data therefore shows that there is convincing evidence that graduate student gain knowledge and skill in thesis writing. It also reveals that the level of learning in terms of skills gained in academic writing (mean value=2.78) as well as learning on data and facts (Mean value=2.78) is found to be very modest. Therefore, it is fair to say that the knowledge and skill gain in thesis writing lacks comprehensiveness.

In addition, as shown in above table, the degree of knowledge and skill gain attributed to the thesis writing, measured across a range of parameters, has shown no significant difference between the two sample higher institutions, ECSU and AAU. The relatively lower rates were registered in regard to knowledge gain in research writing and sensitivity to data and facts—both in the case of ECSU and AAU.

Thesis management

Effective management of thesis in schools and universities is also one of the critical factors for effective thesis writing. There are several mechanisms useful to undertake effective management of thesis writing, including effective topic allocation mechanism, checking of advisors, implementation of complaint handling, and the discipline to lead by fixed schedules, which is necessary to manage educational programs. The following table shows the degree of responses of graduate degree students on these issues.

Table 26: Level of effectiveness of management practices in thesis writing in ECSU and AAU (in percentage)

Degree	ECSU and AAU					
	Topic allocation	Monitoring advisors	Complaint handling	Led by schedule	Total	Cum. percentage
Very low (1)	17.5	24.5	24.1	5.03	17.7	17.7
Low (2)	19.9	30.9	30.9	15.5	24.2	41.94
Medium (3)	41	29.3	30.3	25.5	31.5	73.43
High (4)	13.9	10.2	9.94	28.4	15.7	89.12
Very high (5)	7.73	5.12	4.73	25.6	10.9	100
Total	100	100	100	100	100	
Mean	**2.74**	**2.41**	**2.4**	**3.54**	**2.78**	

On the range of management practices, the mean value of schedule (i.e. the degree to which departments and colleges manage thesis writing based on fixed schedule), which is 3.54, was found to be the highest when compared to other items; and followed by mean value of topic allocation (i.e. to what extent departments and colleges allocate thesis topic among advisors based on specialization), which was found to be 2.74. The relatively lower rates (as shown in the mean value) were registered in the case of monitoring and follow up on advisors as well as in handling complaint of, which was found to be 2.41 and 2.4, respectively. These data revealed that, except on the use of fixed schedule to manage. e progress and completion of thesis (which is found relatively moderate. the overall management of thesis writing in sample higher education had. ffered from significant limitation and can be said highly ineffective. *able 27: Students' assessment of adviser load in ECSU and AAU*

Degree	ECSU		AAU		Total	
	Number (share)	Cum. percentage	Number (share)	Cum. percentage	Number (share)	Cum. percentage
Yes (1)	221 (71.8%)	71.8 %	87 (25.7%)	25.7%	308 (47.7%)	47.7%
No (0)	87 (28.2%)	100%	251 (74.3%)	100%	338 (52.3%)	100%
Total	308		338		646	
Mean	**0.72**		**0.26**		**0.48**	

As seen in the above table, most student respondents in ECSU, 71.8 per cent, believe that their advisor load is extremely high—while only 25.7 percent of respondents in AAU has the same reaction. On the contrary, most respondents in AAU, 74.3 percent identified with the fact that advisor load is manageable. This data revealed that advisors in ECSU (when compared to AAU) have shouldered a significant amount of load of advisee.

Feedback

Feedback is the major means to guide and enhance thesis of students and so occupies a central position in the advisor and advisee relationship. The following table depicts the mode of communication used to supply feedback for student's thesis.

Table 28: Mode of feedback for thesis in ECSU and AAU

Mode of Feedback communication	ECSU		AAU		Total	
	Number (share)	Cum. percentage	Number (share)	Cum. percentage	Number (share)	Cum. percentage
Verbal (1)	74 (24.42%)	24.42 %	88 (26.59%)	26.59%	162 (25.55%)	25.55%
Written (2)	191 (63.04%)	87.46%	219 (66.16%)	92.75%	410 (64.67%)	90.22%
Face-to-face (3)	38 (12.54 %)	100.00	24 (7.25%)	100.00%	62 (9.78%)	100.00%
Total	303		331		634	
Mean	**1.9**		**1.81**		**1.84**	

As indicated in the above table, written feedback is the dominant mode of communication between advisor and advisee in the process of thesis writing in both higher institutions (63.04 per cent in ECSU and 66.16 per cent in AAU); followed by verbal communication (24.42 per cent in ECSU and 25.55 per cent in AAU) and face-to-face communication (12.5 per cent in ECSU and 7.25 per cent in AAU). From these figures, it can be learned that communicating feedback through face-to-face, which is essential to clearly communicate feedback, clarify ambiguities and discuss expected changes, is very minimal in both institutions.

Table 29: Degree of feedback received from advisors in ECSU and AAU

Degree	ECSU and AAU				
	Face-to-face	Verbal	Written	Total	Cum. Percentage
Very low (1)	29.3 %	25.6%	24.8%	26.6%	26.6%
Low (2)	32.2 %	24.7%	24.8%	27.3%	53.9%
Medium (3)	27.6%	27.9%	29.6%	28.4%	82.3%
High (4)	7.2%	13.2%	12.3%	10.9%	93.1%
Very high (5)	3.7%	8.5%	8.6%	6.9%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	
Mean	**2.24**	**2.54**	**2.55**	**2.44**	

The degree of feedback communicated in these three modes of communication, as showed in the above table, is largely minimal. The level of face-to-face feedback is rated as low and exceptionally low by 61.5 per cent, as medium by 27.6 per cent, and high and extremely high by 10.9 per cent. Similarly, the level of verbal feedback is rated as low and exceptionally low by 50.3 per cent, as medium by 27.9 per cent and high and extremely high as 21.7 per cent. Regarding written feedback, student respondents provide similar rate with earlier mode of communication.

Table 30: Average frequency of received feedback by each mode of communication in ECSU and AAU

Mode of feedback	ECSU Mean	AAU Mean	Total Mean
Verbal	2.78	2.33	2.54
Written	2.64	2.47	2.55
Face-to-face	2.35	2.13	2.24
Total	**2.59**	**2.31**	**2.44**

As showed in the above table, the degree of feedback given to students in ECSU when compared to AAU is relatively higher in all three modes of communications. However, in both institutions the degree of feedback given to students is below average. In total as indicated by the mean value of each type of mode of communication, which is below average (2.24 in the case of face-to-face feedback, 2.54 in the case of verbal feedback, and 2.55 in the case of written feedback)—the level of feedback given to graduate students is far from being adequate.

Table 31: Degree of feedback quality in ECSU and AAU

Degree	ECSU and AAU					
	Timeliness	Detail	Comprehensiveness	constructiveness	total	Cum. average
Very low (1)	26.1	24.3	23.9	25.2	25.5	25.5
Low (2)	30.8	30.0	31.5	30.7	30.0	55.5
Medium (3)	30.3	32.4	30.4	29.4	30.2	85.7
High (4)	8.8	8.4	8.8	9.4	9.2	94.9
Very high (5)	4.1	4.9	5.4	5.3	5.1	100.0
Total	100	100	100	100	100	
Mean	**2.34**	**2.40**	**2.40**	**2.39**	**2.38**	

When it comes to enhancing students' thesis quality, it is not only the amount and frequency of feedback that matters but also its quality. As showed by the above table, most students have given

lower rates for feedback across a series of quality criterions. The timeliness of feedback is rated as low and exceptionally low by 56.9 per cent; the level of detail of feedback received was rated as low and exceptionally low by 56.9 per cent; in terms of comprehensiveness, 55.4 per cent; and on constructiveness by 55.9 per cent. The mean value of all quality criterions, employed in this study, came out to be far below average (timelines, 2.34; detail, 2.40; comprehensiveness, 2.40; constructiveness, 2.39; total, 2.38). These figures imply that advisors feedback for student's thesis have suffered a lot in terms of quality —and therefore significant improvements are imperative in this area to enhance the timeliness, degree of detail, comprehensiveness, and constructiveness of feedback.

Research ethics and plagiarism

Research ethics is one of the most missing ingredients in Ethiopian higher education. In this study, students' feeling on plagiarism and unethical research conduct is assessed. The following table depicts the student's rate on departments' effort to address the issue of plagiarism and unethical research practice.

Table 32: Mean value of efforts to forestall plagiarism in ECSU and AAU

	ECSU	AAU	Total
Mode of feedback	Mean	Mean	Mean
Awareness creation	2.86	2.91	2.89
Corrective measures taken	3.02	3.21	3.12
Overall effort of Dept. to address Plagiarism	2.77	3.11	2.95
Total	**2.88**	**3.08**	**2.99**

The mean value awareness creation is found to be 2.89. Regarding mean values of corrective measures are found to be 3.12, which is average. The overall effort of departments in both universities in addressing plagiarism is also found to be average (mean value=2.95). When these figures assessed all together; we can learn that the overall performance rated in addressing unethical research conduct and plagiarism is average—and therefore attention should be given to the issue.

As seen in the above table, there exists a minor difference between ECSU and AAU in all items employed to measure efforts addressing plagiarism. ECSU and AAU has performed a mean value of 2.86 and 2.91 in awareness creation respectively, 3.02 and 3.21 in corrective measures taken, and 2.77 and 3.11 in overall effort. In all these three items of plagiarism and unethical research conduct, ECSU has performed slightly lower than AAU—though both achieved average performance in all these items.

Access to key resources for thesis research

The provision of key facilities and resources is believed to be essential for effective thesis writing process. In this regard, the availability and access to resources for thesis writing in both ECSU and AAU, according to student respondents, have been good in general.

The following table shows that considerable number of high rates (high and extremely high) were given to access to reference books (52.1 %), published research papers (45%), digital access to journal articles (44.1), and research analytical software (23.9%). On the other hand, lower rates (low and exceptionally low) were seen in the case of research analytical software (38.9%), published research papers (26.9%), reference books (22.4%), and digital access to journal articles (22%). These ratings revealed that though the overall provision of resources relevant to research and thesis writing is good— the availability and access of some key resources such as research analytical software are in significant deficit. It is also imperative that access to reference books, digital access to journal articles and published research works also have a significant room for further improvement.

Table 33: Students' access to key resources for thesis writing in ECSU and AAU

Degree	ECSU and AAU					
	Access to Reference book	Published research papers	Digital access	Research analytical software	Total	Cum. Percentage
Very low (1)	6.1	8.4	9.6	12.5	9.2	9.2
Low (2)	16.3	18.5	12.4	26.4	18.4	27.5
Medium (3)	25.5	28.0	34.0	37.3	31.3	58.8
High (4)	31.4	26.7	28.1	13.9	25.0	83.8
Very high (5)	20.7	18.3	16.0	10.0	16.2	100.0
Total	100.0	100.0	100.0	100.0	100.0	
Mean	**3.44**	**3.28**	**3.29**	**2.82**	**3.21**	

There exist significant differences in this regard when comparisons are made between sample institutions: ECSU and AAU. The mean value of access to reference books in AAU is 3.72, slightly closer to 4 (high rate) while in ECSU is it is recorded as 3.15 close to medium value. Regarding availability and access to published research papers, the mean value of ECSU came 2.96 while AAU was found to be 3.59.

Table 34: Mean value of access of students to key resources for thesis writing in ECSU and AAU

Mode of feedback	ECSU	AAU	Total
	Mean	Mean	Mean
Access to reference book	3.15	3.72	3.44
Published research papers	2.96	3.59	3.28
Digital access	3.15	3.40	3.29
Research analytical software	2.76	2.89	2.82
Total	**3.00**	**3.39**	**3.21**

There is also greater difference in terms of digital access to journal articles and research analytical software. There exist minor differences in these categories in ECSU and AAU. Regarding research analytical software, student respondents both in ECSU and AAU have rated this facility as below average (2.76 in ECSU the lowest and 2.89 in AAU the second lowest). This figure implies that though all types of resources should be enhanced in higher education, though focus should be given to the availability, access and training of digital resources and research software.

External support for thesis writing

Graduate students in thesis writing not only rely on internal support from their advisors and departments, but also seek support from external sources, family members, friends, colleagues... etc., due to several factors (including inadequate consultancy support from their advisors). As showed in the following table, most students, 79.6 percent in the ECSU, 76.11 Per cent in AAU), and on average 77.7 percent receives thesis consulting support from external body. This result tells that it is imperative to encourage students not to be limited by consulting service from advisors but also look for other external sources.

Table 35: Presence of external support (thesis consulting service) for students in ECSU and AAU

	ECSU		AAU		Total	
Degree	Number (share)	Cum. percentage	Number (share)	Cum. percentage	Number (share)	Cum. percentage
Yes (1)	238 (79.60%)	79.60 %	258 (76.11%)	76.11%	496 (77.7%)	77.7%
No (0)	61 (20.40%)	100.00 %	81 (23.89%)	100.00 %	142 (22.3 %)	100.00%
Total	299		339		638	
Mean	**0.80**		**0.76**		**0.78**	

As showed in the following table, efforts were made to find the type of kinship students have with individuals who supply technical support in thesis writing. It was found that in the case of ECSU—family, friend, colleagues, and classmates are 11.68 percent, 14.09 percent, 23.37 percent, and 50.86 percent, respectively. The composition of kinship type in ECSU is remarkably similar with that of saw in AAU, 50.63 percent of students receiving thesis consulting support are from classmates. Therefore, it is imperative to devise tools that can enhance collaboration and support among classmates in master's graduate programs.

Table 36: Student's types of kinship with individuals (providing thesis consulting support) in ECSU and AAU

Degree	ECSU		AAU		Total	
	Number (share)	Cum. percentage	Number (share)	Cum. percentage	Number (share)	Cum. percentage
Family	34 (11.68%)	11.68%	47 (13.70%)	13.70 %	81 (12.78%)	12.78 %
Friend	41 (14.09 %)	25.77%	55 (16.03%)	29.74 %	96 (15.14%)	27.92 %
Colleague	68 (23.37 %)	49.14 %	76 (22.16%)	51.90%	144 (22.71%)	50.63 %
Classmate	148 (50.86%)	100.00%	165 (48.10 %)	100.00 %	313 (49.37%)	100.00 %
Total	291 (100.00%)		343 (100.00%)		634 (100.00%)	
Mean	**3.13**		**3.05**		**3.09**	

Regarding the degree of consulting support, most respondents in both universities have rated the level of external support as high and above (61.8 per cent in ECSU and 61.5 per cent in AAU). This implies that the degree of importance of external support from classmates, friends and families is substantive. This finding also complements the fact that higher institutions should devise a mechanism to nurture collaborations among classmates.

*Table **20**: Degree of external support in thesis consulting support in ECSU and AAU*

Degree	ECSU		AAU		Total	
	Percentage	Cum. percentage	Percentage	Cum. percentage	percentage	Cum. percentage
Very low (1)	7.89	7.89	5.59	5.59	6.68	6.68
Low (2)	10.20	18.09	9.71	15.29	9.94	16.61
Medium (3)	20.07	38.16	23.24	38.53	21.74	38.35
High (4)	40.79	78.95	39.71	78.24	40.22	78.57
Very high (5)	21.05	100.00	21.76	100.00	21.43	100.00
Total	100.00		100.00		100.00	
Mean	**3.57**		**3.62**		**3.60**	

Qualitative Analysis

The purpose of using qualitative method in this study was to explore and find significant challenges inhibiting thesis writing quality in ECSU and AAU. Qualitative data from semi-structured interview were collected. The qualitative responses from interview were organized in word file. From frequent readings of this transcript generally dealing with problems and challenges facing students and advisors in the process of writing and supervising thesis in ECSU and AAU—16 open codes, some of them are in-vivo codes using direct language of respondents.

And using these 16 codes, the entire transcript was open-coded. Based on grouping of similar open-coded chunk of data and applying critical thinking and intuition of the researcher, 6 categories were developed. Therefore, the findings on problems and challenges inhibiting thesis writing effectiveness were organized in 6 qualitative categories.

Lack of critical inputs for research

One of the key challenges often discussed by student participants of interview from ECSU was — the lack of high-quality thesis/dissertation guideline. The researcher has also learned from the review of relevant documents that there is no single and university-wide guideline that serves as to guide the contents and standards of thesis across all colleges—though there exist mini guidelines at department and college level. In addition, several participants have also argued, the research and technical competency of a considerable number of advisors have limitations—and as a result, the quality of feedback communicated to graduate students is equally limited. According to participants, schools and department doesn't avail essential digital resources as well as analytical software. Teacher participants from ECSU, on the other hand, have also complained the lack of plagiarism checking software at the university level. This account revealed that departments and colleges in ECSU don't have at their disposal one of the important tools to enforce integrity and ethics in the process thesis writing.

Loose monitoring on key actors of thesis writing, advisors, and advisee

Department and colleges check the progress of thesis research using a number of tools. Interview participants in general have complained that the degree of department checking on students and advisors is generally low, especially monitoring on advisors is minimal. Several interviewees have seen the fact that there is no mechanism in place to ensure advisors supply the necessary feedback and support to their students. In addition, according to respondents, penalties and administrative measures are not introduced to enforce advisor's role when the latter do not meet smallest requirements. These accounts show that department and colleges in both sample universities come short in one of the key practices in managing a task, control and monitoring.

Ineffective feedback management system

The provision of feedback and comments occupies a central position in relation between students and advisors. The researcher has learned from the review of documents as well as from the views of participants, departments and colleges doesn't have standards and protocols on feedback, detailing its content, frequency and time of communication, and other important features. In addition, there exist no tools and mechanism in place to document, communicate and use feedback and comments of advisors.

Most of the feedback, as showed in the descriptive analysis of this study as well as on accounts of participants, is communicated using written communications, which, according to several participants, are sometimes not effective to clearly communicate messages and ideas of advisors unto advisees. Participants have found that the lack of face-to-face feedback sessions limits their opportunity to perfect the comments and feedback of their advisors. According to several participants, the quality of feedback received from the advisors lacks comprehensiveness as well as came short to become constructive. Many advisors, as per the views of participants, focus on the finding the problems and pitfalls in their work rather than sending tangible solutions for limitations. As per the view of participants, many advisors, due to several reasons, do not supply adequate and prompt feedback to their advisees.

Students have also showed several limitations about addressing and incorporating feedback in their thesis work. Many teachers have complained that students have not acted upon on most comments and feedback sent by their advisors—and this at times discourages teachers from supplying significant amount of feedback to their students.

'Research conferences, workshops, and seminars are too little.'

Higher education institutions in Ethiopia are highly dominated by the teaching practice— research and its practice are not highly visible. Research activities such as conferences, validation workshops, seminars, and research trainings are essential to serve as a source of transfer of knowledge and skill for university communities, including graduate students; however, these practices are not often conducted in sample universities, especially in ECSU. According to many teacher participants, the absence of research conferences, workshops, and seminars, because of the infancy of research practice and culture in higher education, limits the opportunity and exposure of graduates' degree students. Therefore, strengthening research seminars, conferences, workshops, colloquium…etc could play an indirect positive role to build the research ability of students —and by implication the quality of their thesis.

Lack of commitment due to lack of Incentive

Lack of adequate incentive is the cry of several advisors. They underlined that the amount of income and incentive they receive in the form of salary as well as advisor fee is significantly small when compared to the intensity of the teaching/advising work they undertake. Therefore, this lack of adequate pay and incentive attached to their work, according to participants of interview, discourages them to effort and invest more time on their job.

Students lack set of critical skills.

One of the most visible limitations of graduate students in higher education, including ECSU — is on the English language. Student interviewees' knowledge and skill in English is highly limited. Most respondents have also revealed their limitation in academic writing, another critical skill for successful thesis writing. The researcher has also seen that graduates' students in both sample institutions have lacked English language as well as academic writing skills which have limited the quality of their thesis paper. These skill deficits have also pushed many students to plagiarise, and copy paste the works of others.

CONCLUSION

This study has examined the practices as well as critical success factors of thesis writing in Ethiopian higher education, taking ECSU and AAU as a case. Regarding students' assessment on the capacity of teachers and advisors, a significant number to teachers and advisors have limitation in mastering research methodology skills as well as the use of data analytical software—though most advisors are equipped with adequate level of subject-matter knowledge. The finding of this study concludes that there exists a significant difference between feeling of students on their respective advisor's ability in ECSU and AAU, especially in the area of research knowledge and the application of research software and tools.

In regard to the capacity of students, this study revealed that a significant majority of graduate students in both sample higher education institutions lack key sets of knowledge and skills (relevant for thesis writing effectiveness) before they engage in thesis writing, including knowledge on subject matter in general as well as selected research topic in particular, and basic knowledge on research method—the mean value of all these attributes were found to be far below medium level.

The finding of this study also revealed that most student respondents in ECSU and AAU have had low and exceptionally low level of belief that they can gain new knowledge and skill in thesis writing—this shows that the existence of limitation in attitude towards thesis writing. The degree of commitment of students, measured by the amount of time allotted, on the writing and completion of thesis, is also found very minimal.

The finding of this study also revealed that students have gained a significant degree of knowledge) in the process and completion of thesis writing in terms of subject matter, research method and research in general. However, the level of learning in terms of skills gained in academic writing was found to be very modest. Therefore, it is fair to say that the knowledge and skill gained in thesis writing lacks comprehensiveness.

The effectiveness of thesis management, measured across several indicators, was also found below average in both sample institutions. Effective topic allocation as per competence, monitoring on advisors, and compliant handling— all came out to be below average. The relatively good thing regarding thesis management in both sample institutions is found to be the implementation of schedule in managing the progress and completion of thesis project. The overall management of thesis writing in sample higher education had suffered from significant limitation, including the fact that advisors handle too much advisee, beyond their capacity to manage, and therefore can be said highly ineffective.

Regarding feedback, written feedback is the dominant mode of communicating ideas and comments from advisors to advisees in thesis writing in both higher institutions— communicating feedback through face-to-face, which is essential to clearly communicate comments and intents, is very minimal in both institutions. The mean values of the degree of feedback given to advisees is found to be far from being adequate, far below average (2.24 in the case of face-to-face feedback, 2.54 in the case of verbal feedback, and 2.55 in the case of written feedback). In addition, the

quality of feedback, measured in terms of timeliness, degree of detail, comprehensiveness, constructiveness—were found to be below average. Students do not only complain about the degree of feedback but also about its quality.

Practices on combating plagiarism and integrity in thesis writing were also found to have significant limitations, including in awareness creation and taking corrective measures.

Regarding performances of both sample universities in availing relevant resources and facilities in thesis writing, measured in terms of access to reference books, published research papers, access to digital resources, access to research analytical software (including plagiarism)—both registered average performances. And in both institutions, students' access to analytical software was found to be below average.

This study also came up with evidence that external support of students in the process of thesis writing were found to be significant. Families and classmates' matter in success of their peers in completion of thesis project.

The overall thesis writing and management in public higher education institutions suffer significant limitations, including the absence of guiding documents in research and thesis writing as well as the existence of loose monitoring and evaluation system on the key actors— advisors and students. The management of thesis feedback in general, the guidance, documentation, use, and monitoring were found to be ineffective. Advisors' commitment is also inhibited by poor incentive mechanism in place. Students lack key set of critical skills, including English language and writing. Finally, the lack of vibrant research culture and practice in both institutions were found to play an inhibiting role for effective thesis writing in higher education institutions.

RECOMMENDATIONS

Based on the analysis and findings made in this study, the researcher recommends the following measures to enhance the practice and management of thesis writing and by implication the quality and effectiveness of thesis as well as to address the existing challenges in this area.

- ***To prepare and execute guiding documents and protocols*.** One of the deficits observed in thesis management in sample universities, especially in ECSU, is the lack of university-wide guiding documents, which not only provides critical guidance on standards and quality but also serve as a vehicle for research knowledge and practices. Therefore, to ensure basic standards and practices on thesis writing across school, departments, and colleges in a university—universities are advised to produce high–quality guidelines. Another important issue related to thesis guidance is the establishment of body that foresees and approves ethical requirements of studies conducted in the university.
- ***To launch an effective feedback management system*.** Another important deficit in thesis management is the absence of effective feedback management system; as a result, feedback of advisors and examiners are not optimally utilized. ECSU and other universities is therefore should craft feedback management system that enables effective electronic documentation of feedback, enhance utilization (including for administrative purpose), and can easily be accessible for relevant bodies. The feedback management system determines and details the quality of feedback in terms of their content, frequency, timeliness, degree

of comprehensiveness, level of detail and other important features—so that advisors can receive and produce thesis feedback that can enhance thesis effectiveness.

- ***To provide incentive based on performance*.** Inadequate incentive for thesis advice is identified as recurrent challenge inhibiting one of the key ingredients in thesis writing, the motivation of teachers in providing effective feedback and support to students. Another issue related to incentive is the existence of non-discriminatory incentive package that provides equal payment for both best and average performers. Therefore, universities are advised not only provide adequate payment for thesis advisors —but also launch a discriminatory incentive system based on performance, which pays better for advisors who helps the completion of best thesis papers and do vice versa.
- ***To strengthen effective monitoring and follow up on advisors and students.*** Monitoring and follow up on students and advisors in the process of thesis writing seemed very inadequate. And the monitoring of advisors in providing feedback and guidance to students as they are required seemed—nonexistent. As monitoring and follow up enhances job performance and quality including in thesis writing, universities should pay more attention to the monitoring of student's thesis progress as well as the support and guidance provided by advisors.
- ***To enhance students' awareness through training.*** The degree of awareness of students on thesis writing, its requirements, its bits, and pieces seemed very inadequate. Therefore, departments and schools should engage this awareness gap by providing training.
- ***To avail digital and analytical resources.*** The resources and support available for research and thesis writing has limitations, especially the availability of digital and analytical resources and software. Universities should pay attention to the development of research resources, including the provision of standard analytical software and versions.
- ***To conduct recurrent seminars on research, writing, and methods.*** One of the limitations observed in higher education institutions is the lack of adequate research seminars in general and seminars on research, methods, and writing. These academic practices serve as a vehicle for transfer of knowledge and lessons among university communities, including students; and thus, can play a positive role in enhancing research practice and quality, including thesis. Therefore, to enhance thesis writing quality, universities should also strive to conduct lots of seminars on research and methods on usual basis.

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6.2. Causes of Informal Sectors: Case of Women street vendors in Dire Dawa City, Ethiopia

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ABSTRACT

Women participation on street-vending activities takes the larger segments of urban informal employment in Dire Dawa city, Eastern Ethiopia. So, this study aimed at finding factors affecting the causes of informal sectors in Dire Dawa City. In doing so, primary data from a sample of 384 women street vendors were collected through structured questionnaire. The study result from Multivariate probit regression modeling concluded that while the early stages of age growth has a positive effect on women's street-vending activities as a response to the absence of jobs and tight bureaucratic conditions in the formal sector; the later stages of age growth has negative but significant effect on the two respective causal approaches of informal sector. Here also, while an increase in the household size has a positive and significant effect on the women's voluntary engagement on street-vending activities; it has a negative but significant outcome on their participation of similar activities due to lack of jobs and bad bureaucratic conditions in the formal business. On top of that, compared to Christians, while Muslim women's voluntary engagement on street-vending activities is lower; it happens to be higher as retaliation to bureaucratic legal condition in the formal sector. Hence, before taking any strategic measures, policy makers in the city should understand the distinct causal approaches of informal economy in general, and the heterogeneous effects of different explanatory variables on the causes of the women's street vending activities.

Keywords: *Informal Economy. Woman street vendors. Causes of Informal sector. Multivariate probit regression. Dire Dawa city*

INTRODUCTION

Our planet earth has gone through a high rate of urbanization in the last six decades but the year 2007 remarked as well because for the first time in history the global urban population exceeded the global rural population (Ritchie and Roser, 2018). The Sub-Saharan Africa (SSA) is one of the regions with the fastest urbanization rates in the World. In 2010, 294 million people were living in urban areas of SSA, and it is projected to loom to 621 million by 2030 (Satterthwaite, 2017). Similarly, the World Bank report (2022) said that 40% and 22% of the total population in SSA and Ethiopia lives in the urban areas, respectively.

With all its challenges and opportunities to the cities, the migrants and the urban-governments; rural-urban migration has always been one of the driving forces for such high urbanization rate in SSA and Ethiopia (Awumbila, 2017; Kebede, 2021). The Original Lewis 'two sector Model' (1954) said that so long as the migrant is unlimited from the rural area, there will be cheap labor that could be hired at subsistence wage in the modern capitalist sector. And if any part of the

surplus from the urban capitalist sector is reinvested; profit and capital formation will grow continuously. Consequently, there will be a transition from subsistence agriculture to modern formal industrial sector, and this situation in the context of economic transition is known as '*The Lewis Turing point*' (Zhang *et.al*, 2011).This perspective was reinforced by the successful rebuilding of Europe and Japan after World War II and the expansion of mass production in Europe and North America during the 1950s and 1960s.

By the mid-1960s, the optimism about the prospects for economic growth in developing countries began to give way to concerns about persistent widespread unemployment. This led development economist Singer (1970) to argue that he saw no sign of '*The Lewis Turning Point*' in developing countries. As Amin (1976) concluded "*in most developing nations with ever increasing population and urban Dwellers, industry employs workers in fewer numbers than those of the craftsmen it ruins and the peasants who are 'released' from agriculture*." Thus, if the formal industrial sector is not supplying jobs, people will be forced to look and engage in the informal sector to sustain their urban livelihood. This concept of informality was coined by international labor organization (ILO), and the proponents of this informal economy debate were known as the dualist school (Hart, 1973).

In the dualist approach, informality arises due to the failure of modernization strategies (Lewis Two sector model) to absorb increased migrant population and forcing the new entrants to create their own employment elsewhere. Accordingly, the informal sector is a byproduct of poverty/involuntary choices, and the sector serves as a '*safety valve*' or '*employer of the last resort*' for the mass of jobless migrants (Rosenstein-Rodan, 1943; Lewis (1954,1956); Ornate, 1955; Higgins, 1956, Hirshman (1957, 1958); Jorgenson, 1961; Ranis and Fei, 1961; Geertz, 1963;Nurkse, 1966; Dixit, 1970; Harris and Todaro, 1970; Singer, 1970; and Hart, 1973).

On the contrary, for the voluntarist school, the informal sector may also reflect '*a greater measure of choice than it is generally attributed by the Dualist School*'. Workers, firms, and families may choose their best levels of engagement in the informal sector based on their valuation of the net benefits associated with informality. In other words, workers may make implicit cost–benefit analyses about whether to cross the relevant margin into formality, and often decide against it. Here, it does not necessarily mean that workers who are voluntarily informal are not living in poverty. Rather, it means they knew that it would not obviously be better off in the formal jobs for which they are qualified (Balan *et.al*, 1973; Evans and Jovanovic, 1989; Murphy*et.al*, 1990; Fields, 1990; De la Rocha, 1994; and Maloney, 2004)

In *the 'Other Path'*, **Soto** (1989) still stated that informality is the result of a hostile/ rigid legal system existing in Peru and other Latin American countries. So, unlike the dualist approach, in the legalist school; informal enterprise is the eruption of real market forces/firms to stay off from the state's radar or regulations (Portes and Schauffler, 1993). These regulations can be many kinds like very high registration costs, large paper work and bureaucracy, regulatory burden to becoming formal, and high ongoing costs of fully integrating with the state (Friedman *et al*, 2000; Djankov *et al*,2002; Loayza *et.al*, 2005; Schneider, 2005; Acemoglu*et al*2001; and North *et.al*, 2005).

There is also another approach in the informal sector debate which known as '*the structuralist school*'. Instead of adopting a dichotomous economy (formal and informal) view of dualist school,

the structuralist approach suggests that the labor market should be viewed as many fragmented and interconnected sectors. Thus, while the informal sector is characterized as being dependent and subordinate to the formal sector; the formal sector exploits the informal sector by obtaining cheap labor and wage goods. In general, for the *'structuralist school*', informality arises due to the nature of capitalism growth. In other words, informality is the derivative of formal firms aiming at increasing managerial flexibility and decreasing labor costs through off-the-books hiring and subcontracting of informal entrepreneurs (Breman, 1976; Moser, 1978; Bromely, 1979; Davis, 1979; Painter, 1989; and Portes and Haller, 2005).

In general, the multiplicity of causes for informal sector brought the classic '*blind men and the elephant problem*' where everybody touches part of the sector but understands only the part that they have touched (Saxe, 2016). Nevertheless, studies on the causes of informality are limited. Using descriptive method of data analysis; a study by Unni and Rani (2000) in Asia, Kapunda and Mmolawa (2007) in Bostwana, Timalsina (2011) in Kathmandu (Nepal), Afework(2011) in Dejen town (Ethiopia),Tshuma and Jari (2013) in South Africa, and Telila (2017)in Dire Dawa City (Ethiopia) have addressed the contribution and the gender-employment differentiality of the sector towards women street vending.

On the other hand, Woldie (2015) by applying descriptive method of data analysis on a sample of 206 respondents in Dessie Town (Northern Ethiopia), the study concluded that 67% of the women were engaged in parallel trading just because they were divorced or widowed, and the rest were to get a better income and for self-subsistence. More recently, the descriptive study result from a sample of 198 streets vending in Dire Dawa city (Eastern Ethiopia) by Dube (2021)showed that majority of women engaged on the street vending to help themselves and their family (62%), being unable to find formal job (53%), and due to lack of other options (45%).

Based on the four causal approaches, Sibhat (2014) also addressed factors affecting the causes of informal street vending in Addis Ababa, Ethiopia. The study result from the multinomial logit regression analysis confirmed that inability to fulfill formal sector criteria (legalists) and lack of job opportunity in the formal sector (dualists) where the main reason why street vendors were employed in the informal sector. The study also confirmed that age and migration had a positive and significant effect on the choice of informal street vending due to absence of formal jobs (dualists).

So, unlike the earlier literatures that focused on livelihood dynamics of informal sectors and gender specific employability of street vending, Chen (2012) asserted that the current thinking in the informal economy requires the need for an integrated approach of the four causal theories (dualist, structuralist, legalist, and Voluntarist). In this direction, this study tried to make a modest contribution to the current body of knowledge by examining factors that contribute to street vending relating to the four causal theories of informal sectors in Dire Dawa city.

In doing so, contrary to the earlier studies by Woldie (2015), Sibhat (2014) and Dube (2021) that used descriptive and multinomial logit regression, respectively; this study used the multivariate probit model as method of data analysis. The choice of this model has two advantages over the earlier two. First, in this model, it is possible to show factors affecting the four causal theories of

informal sectors. Second and foremost, unlike the multinomial logit regression, this model enables to capture the possibility interdependence among the four causal theories of informal sectors (the dependent variables) (Kropko, 2007).

Moreover, now-a-days poverty alleviation occupies an innermost position in the development agenda of many developing countries. It seems that developing country like Ethiopia with a population of more than 115 million, with increasing urban population (WB, 2022) and with an informal economy taking more than 50% of women urban employment share (CSA, 2015);it seems a must to give more emphasis on the causes of informal economy. Hence, for the purpose of proper policy prescription, this study would supply reliable and up-to-date information about the causes of informal sector in general and women street-vendor of Dire Dawa city in particular.

METHODOLOGY

Description of the study area

Dire Dawa is the second largest city in Ethiopia which composed of 38 rural and 9 urban Kebele[2]s. The city is found about 515 kilometers east of Addis Ababa, and geographically lying at 9° 38 N latitude and 45° 50´ E longitude. In the West, North and East it ties bounded by the Somali national regional state and in the South by the Oromia rational regional state. Ecologically, the city Administration situated in an arid (below 1500m) and semi-arid (above 1500m) (DDAEDPB,

Data source, method of data collection and Sampling design

Informal employment includes both self-employment in informal enterprises and wage employment. Self-employment is characterized by one's ownership of the means of production and they run their own businesses, alone, or in association with other owners, and do not regularly employ paid workers. The self-employed are engaged in a remarkable array of activities, ranging from hawking, street vending, letter writing, and junk collecting, prostitution, drug peddling, and snake charming. Others found jobs as mechanics, carpenters, small artisans, barbers, and personal servants (ILO, 2002; Kebede, 2015).

Among the self-employed in the informal sector, street vendors are the most visible and largest groups (ILO, 2013; Bezu and Holden, 2014). Vendor's employment is higher in an economy where trade is a more important branch of economic activity. In Sub-Saharan Africa (SSA), while women took more than 90% of informal sector employment; trade accounts for 43% of all informal non-agricultural employment. Consequently, vendors choose place where they will be easily visible to pedestrians and motorists. In other words, women street vendors usually prefer to work in strategic areas of heavy human traffic than anywhere else (Mitullah 2003; Roever, 2016; and Malta *et.al*, 2019).

So, this study used a quantitative primary data collected from women street vendors in Dire Dawa city working regularly around markets, bus and taxi terminals. When properly constructed and responsibly administered; questionnaires are vital instrument to draw statements about specific

[2]*A kebele is the smallest administrative unit of Ethiopia with a delimited group of people.*

groups or people (Trueman, 2018). Hence, the primary data were collected through a series of questions asked in structured questionnaire from the sample of 384[3] women street vendors.

Method of data analysis

Based on the theoretical, earlier empirical literatures and observable knowledge; the causes of women street vending in Dire Dawa city can be classified in to four groups.

a. The first group accounted to informal sector as a safety value—the dualist school.
b. The second group accounted to informal sector as personal choice—the voluntarist.
c. The third group accounted to informal sector as a subordinate to formal sector—the structuralist.
d. The third group accounted to informal sector because of bad laws—the legalist school.

These reasons to run in informal sector can be modeled following random utility formulation (Tarekegn*et.al*, 2017). Consider the i^{th} woman (i=1, 2….. N) is facing a decision problem to involve into street vending based the four informal sector causal theories. Let U_o represent informal sector as a **safety value** (Y_1). Let also U_k represent the K^{th} reason to operate to in the informal sector like one own 'personal choice' (Y_2), due to bad laws (Y_3) and to subordinate formal work(Y_4).Accordingly, a woman decides to choose the K^{th} reason to operate informal sector if $Y_{ik}^{*} = U_k^{*} - U_0 > 0$. The net benefit$Y_{ik}^{*}$ that a woman derives from involving in informal sector option is a latent variable decided by saw explanatory variable (X_i) and the error term (ε_i):

$$Y_{IK}^{*} = Y_I\beta_K + \varepsilon_i(K = Y_1, Y_2, Y_3, Y4) \qquad (1)$$

Using the indicator function, the unobserved preferences in equation (1) translates into the observed binary outcome equation for each choice as follows:

$$\begin{cases} 1 \text{ if } Y_{ik}^{*} > 0 \\ 0 \text{ otherwise} \end{cases} \left(K = (Y_1, Y_2, Y_3 \text{ and } Y_4\right) \qquad (2)$$

Therefore, the reasons to run informal sector are discrete choice dependent variables. For multiple discrete choice dependent variables, qualitative choice models are the proper method of data analysis. Among qualitative choices models, this study employed the multivariate probit model as method of data analysis. Multivariate probit model (MVP) was selected because a woman may have more than one reason to run in the informal sector. To rephrase it, the choices among the causes of informal employment might not be mutually exclusive. So, the error terms in MVP jointly follow a multivariate normal distribution with zero conditional mean and

[3] Cochran's (1977) formula $n = [\frac{\frac{Z_\alpha}{2}}{e}]^2 P(1-p)$ was used to calculate the sample size by considering the total target population. Where "e" is the level of precision (= 5%); with 95% confidence interval and 5% level of significance (α), $\frac{Z_\alpha}{2}$ =1.96); "p" is estimated proportion of street vendors in the informal sector. According to Esayas and Mulugeta (2020) street vending, on the average, accounts for 33 percent of total informal employment in Dire Dawa city (CSA, 2018). Hence, p=0.33 was used to calculate the sample size. By substituting the values in the above formula and adding 13 percent contingency, sample of size (n=384) street vendors were selected.

variance normalized to unity ($MVN \sim (0, \Omega)$)(Dorfman, 1996; Wooldridge, 2002; Tarekegn*et.al,* 2017; and Ermias, 2021).

Here, in the symmetric covariance matrix (Ω) given in equation (3), the off-diagonal elements are the unobserved correlation between the stochastic components of the different reason to involve in informal sector. Moreover, a non-zero off-diagonal element in equation (3) is the presence of unobserved characteristics that affect the choice of alternative informal sector causal options (Tarekegn*et.al*, 2017; Ermias, 2021).

$$\Omega = \begin{bmatrix} 1 & \rho_{y12} & \rho_{y13} & \rho_{y14}\rho_{y15} \\ \rho_{y21} & 1 & \rho_{y23} & \rho_{y24} \ \rho_{y25} \\ \rho_{y31} & \rho_{y32} & 1 & \rho_{y34} \ \rho_{y35} \\ \rho_{y41} & \rho_{y42} & \rho_{y43} & 1 \ \rho_{y45} \end{bmatrix} \quad (3)$$

Following the form used by Cappellarri and Jenkins (2003), the log-likelihood function associated with a sample outcome is then given by.

$$lnL = \sum_{i=1}^{N} \omega_i ln\Phi(\mu_i, \Omega) \quad (4)$$

Where ω is an optional weight for observation i, and $\Phi$is the multivariate standard normal distribution with arguments μ_i , Ω where μ_i can be denoted as; -

$$\mu_i = \left(k_{i1}\beta_1 x_{i1,} k_{i2}\beta_{2,}\ k_{i3}\beta_3 x_{i3}\right), while \Omega_{ik} = 1 \ for \ j = k \ and \quad (5)$$

$$\Omega_{jk} = \Omega_{kj} = k_{ij}k_{ik}\rho_{jk} \ for \ j \neq k, k = 1,2,3 \ldots with \ k_{ik} = 2y_{ik} - 1 \quad (6)$$

Description of variables and expected signs.

Dependent variable: The dependent variable of the study was the causes of women informal sector employment to street vending. With a multivariate response, the causes were classified in to four groups; street vending as a byproduct of poverty—**dualist**; street vending as by product of voluntary choices—**voluntarist;** street vending to support formal business—**Structuralist**, and street vending as a byproduct of bureaucratic condition or bad laws in forming formal business—**Legalist**.

Explanatory variables: Based on earlier empirical studies and observable knowledge, the study included the following as explanatory variables.

Age/Age^2: It is a continuous variable measured in years of living. According to Nuri (1992) and Selamawit (2008) the young female household heads in Ethiopia are mostly engaged in domestic service, daily labor and prostitution. Maglad (1998) in Sudan, Angel-Urdinola and Tanabe (2012) in Middle East and North Africa region, and Hugues and Lewis (2020) in Côte d'Ivoire also concluded that young women were highly to involve in the informal employment compared to the older once. So, as a woman getting older, the study expected that they are not likely to involve in the informal activity.

Education/Education²: It is a continuous variable measured in years of schooling. To Sen (1999) *"[Education] can add to the value of production in the economy and to the income of the person who has been educated. But even with the same level of income, a person may receive help from education – in reading, communicating, arguing, in being able to choose in a more informed way, in being taken more seriously by others and so on*". So, education can enhance the self-steam and motivation of women to have equalized social and economic status in the formal sector. Leach (1996) and Parajuli (2014) also showed how less educated individuals prefer to join the informal sector. In this study, therefore, women with less years of schooling were expected to end up in the informal employment in general and street vending in particular.

Household size: It is a continuous variable measured in total number of family members living or dwelling in each house. In most developing nation taking care of the family falls on the women hand. Where the number of dependents inside a given household is high, it is reasonable to expect that it will have a positive effect on the household head to look for jobs outside of formal employment (Banerjee *et.al,* 2011). So, a study by Yah *et.al,* 2018 in Cameroon concluded that as the size of a household increases the likelihood of working in the informal sector increases. In this study, therefore, household size and women's tendency to engage on street-vending expected to have a positive relationship.

Marital status*:* As a general category, the marital status of sample respondents can be divided in two de-jure and de-facto discrete choices. Women in the de-jure category are those who never married and those that are legally or permanently separated from their partners or husbands (including single, Widowed and Divorced). On the other hand, women in de-facto category are those whose partners or spouses are temporarily absent, or the wife plays a dominant economic role in each household. The de-facto type's problems are usually temporary. But the de-jures' are not equally lucky. Women under the de-facto are relieved of their duties and responsibilities once their partner returns home. Women who receive support from their spouses are better off than those who are widowed or those who do not receive support from some other sources. Therefore, the labor supply of wives to street-vending had a negative response to their marital status of being married (Hill, 1983; Maloney, 1987; Wabwire, 1997; Mayee 2003; and Mulugeta, 2009)

Migration status*:* It is a dichotomous discrete variable incorporating migrants and non-migrants. In SSA the rate of rural-urban migration is greater than that of the number of jobs generated in the formal sector. This internal migration is also gender specific in which women taking greater share than that of men (Amin, 1976; Masanja, 2014). Hence, with limited urban formal job, migrant women are not able to fulfill formal jobs requirements in the urban areas. Consequently, the urban informal sector has been the last resort of residence for the migrant women's (Todaro, 1986). In this study, therefore, a positive relationship between migrant women's and informal sector employment was expected.

Initial capital*:* It is a continuous variable measured in terms of birr[4] a woman invested to start-up her informal business. The main characteristic of informal sectors in general and street-vending particular is small scale first capital requirement (ILO, 1972). A study by Aikaeli and

[4] *The basic monetary unit of Ethiopia*

Mkenda (2014) also confirmed how lack of capital deters micro and small entrepreneurs from starting large formal firms. So, in this study women with low first capital was expected to fall under in the informal employment.

***Religion**:* It is a dichotomous discrete variable forming two of the most dominant religious institutions (Christianity and Islam) in Ethiopia in terms of their followers (Marsden, 2020). According to Xaba *et al* (2002) the number of women working in the informal sector dropped significantly for predominantly Islamic places such as Tunisia, Kaduna and Nigeria due to the practice of purdah[5]. In this study, therefore, Muslims women were expected not to work on street vending activities.

RESULTS AND DISCUSSION

Cause to engage in informal sectors.

The reasons to engage in the informal sectors are multivariate in their nature, and a woman can choose a combination of motives towards street-vending. In other words, a woman may choose more than one possible cause to be on the street-vending activities. Thus, Table 1 shows that the voluntarist school was the main cause to engage in the informal sector (55.73%) followed by the dualist (42.19), legalist (14.13%), and structuralist (10.41%).

Table 1 Causes of informal sector engagement. Source: Own survey, 2022

Decision	Dualist		Structuralist		Voluntarist		Legalist	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Yes	162	42.19	40	10.41	214	55.73	54	14.13
No	222	57.81	344	89.58	170	44.26	330	85.86
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	0.4202	0.4942	0.1063	0.3087	0.4414	0.4972	0.1413	0.3488

Econometric Result

Overall fitness, Correlation matrix and Joint probability

Table 2 displays the MVP model overall goodness of fit, correlation matrix and the joint probability of success/ failure among the four causal theories of informal sectors. So, at 1% level of significance level, both the Wald test ($\chi2$ (28) = 69.42, p = 0.000)) and the likelihood ratio test model (LR $\chi2$ (6) = 227.91, $\chi2$ > p = 0.0000) are significant. The Wald test has two implications. First, it shows that the coefficients in the model are jointly significant. Second, it implies that the independent variables included in the model can explain the dependent variables well enough. On the other hand, the likelihood ratio test checks the independence among the four causes of informal sector ($\rho21 = \rho31 = \rho41 = \rho32 = \rho42 = \rho43 = 0$). As shown on Table 2, therefore, the likelihood ratio test rejects the null hypothesis of no- interdependence. The estimated joint correlation matrix also confirms that there is a significant interdependence among the four motives of informal sector

[5] *the practice in certain Muslim and Hindu societies of screening women from men or strangers, especially by means of a curtain to restrict their public appearance.*

employment. Consequently, the '*independence of irrelevant alternatives*' assumption from multinomial model was rejected, and the choice of MVP model was right.

The separate correlations between the four causes (ρ_{ij}) of women street vendors in Dire Dawa city are also presented on Table 2. At 1% level of significance, the correlation between the legalist and the voluntarist (ρ_{43}) is positive. This implies that women's who are on street-vending activities due bureaucratic laws in the formal sectors are more likely to be in the informal sector due to their own personal choices. The table also displays a negative correlations between the structuralist and the dualist (ρ_{21}), the voluntarist and the dualist (ρ_{31}), the legalist and the dualist (ρ_{41}), and the voluntarist and structuralist (ρ_{32}). This finding leads to the conclusion that woman's who choose structuralist, voluntarist and legalist as cause to engage to informal sector are less likely to choose dualist school (ρ_{21}, ρ_{31},ρ_{31}). The also hold true for women's who choose voluntarist over structuralist (ρ_{32}).

Finally, Table 2 shows the predicted probability or the likelihood of choosing the four causal theories of informal sector in general and street-vending in particular. So, the likelihood of choosing voluntarist (46.54%) is high followed the dualist (44.34%), the legalists (13.63%), the structuralists (10.47%). Moreover, while the likelihood of simultaneous choosing the four causal theories (success)is 52.34%; that of failure is nearly null.

Table 2 Overall fitness and correlation matrix. Source: Own survey, 2022

Variables	Dualist	Structuralist	Voluntarist	Legalist
Predict probability	0.4434	0.1047	0.4654	0.1363
Join probability (success)	0.5234			
Join probability (failure)	.0082			
Estimated correlated matrix				
	ρ1	ρ2	ρ3	ρ4
ρ1	1			
ρ2	-.8058*** (.0412)	1		
ρ3	-.1925*** (.0675)	-.2698*** (.0694)	1	
ρ4	-0.3119*** (.0817)	-0.0090(.0831)	0.2868*** (.0860)	1
Likelihood ratio test of: ρ21 = ρ31 = ρ41 = ρ32 = ρ42 = ρ43 = 0:				
χ 2 (6) = 227.918 Prob> χ 2 = 0.0000***				
Number of draws (#) 5				
Number of observations 384				
Log likelihood − 632.09				
Wald (χ 2 (28)) 69.42				
Prob> χ 2 0.0000***				

Note: *** significant at 1% level of significance

Factor affecting the causes of informal sector engagement.

The normal MVP result shows only the direction of association between the explanatory and dependent variable. Hence, to measure a unit change in the choice of a particular categorical

dependent variable due to a unit change in the independent variable, it is necessary to calculate the marginal effects. Accordingly, as shown on Table 3, while some of the independent variables were significant in more than one causal factor; still others were significant only in one of the informal sectors causal theories.

Age/Age^2

At 5% and 10% significance levels, the effect of age/age^2 was confirmed in both the dualist and legalist causal theories of informal sector, respectively. In the early stage sas the age increases by one year, women's street-vending activities as a response to the absence of jobs and bureaucratic laws in the formal sector increases by 3.8% and 2.83%, respectively. On the contrary, in the later stages as age increases by one year, for the two respective causal factors, women's engagement in informal business declines by 0.04% and 0.02%. This might be because informal employment requires young and healthy people to cope-up with the adverse effects of working on streets like running with their carts when a government official come to arrest them. Hence, allowing access to resources like capital, removal of unnecessary state restrictions and the legalization of informal property rights might be a proper key to promote the livelihood of women street-vendors in the city. This result also goes in line with the findings ofHart (1973), Soto (1989)**,** Nuri (1992), Selamawit (1994), Maglad (1998), Angel-Urdinola and Tanabe (2012), and Hugues and Lewis (2020). Still in the early stage, unlike the proposed expectation, age growth has a significant negative effect on women's engagement on street-vending activities following their own personal choices. This might be since as age rises like a wallflower; the women may prefer to perform short-term formal work like being a security guard in educational institutes, hospitals, and hotels than those of informal employments with higher profit.

Education/Education^2

Unlike the proposed expectation, in the later stages of higher educational status; women's participation on street-vending activities to support formal business and their year of schooling goes in the same positive direction. Particularly, at 10% level of significance, women's yearly schooling increases engagement in the informal sector to aid formal jobs by 0.09%. In other words, as the women's educational status looms, they may tend to understand benefit of informality in terms of supporting their formal work through increasing managerial flexibility and lowering labor costs (Breman, 1976 and Moser, 1978). Therefore, regulations of commercial and employment relationships between the informal and formal economies might be a proper policy procedure to address unequal relationships between 'formal businesses and subordinate employees (Moser, 1978; and Castells and Portes, 1989)

Households Size

While an increase in the household size has a positive and significant effect on the women's voluntary engagement on street-vending activities; it has a negative and significant outcome on the two causal theories of informal sector—the dualist and the legalists. Specifically, as the family size expands by one, women's informal employment as a response to the absence of jobs and bureaucratic laws in the formal sector decrease by 2.54% and 2.3%, respectively. This might be due to the presence of other causal factor that led women of Dire Dawa city to engage in the informal economy. At 1% level of significance, as the household size increases by one, women's

voluntary participation on street-vending activities rises by 5.4%. Accordingly, bringing of informal employees into the formal regulatory system; first, it may reduce the adverse effects of working on street. Second, it may enhance the government tax revenue collection. This result is also consistence with the finding of Maloney (1987), Banerjee*et.al*, (2011) and Yah *et.al*, (2018).

Marital Status

Only the structuralist causal theory of informal sector is significantly and positively affected by the marital status of women's street vendors at 5% significance level. Particularly, the study reveals that women's involvement on street-vending activities to subordinate formal business higher for the de-jure relative to de-facto marital status category by 6.56%.To put in other words, since the women's under the de-jure category are legally or permanently separated from their partners or husbands, they are not in a position to get help from their spouses. Hence, their participation on street-vending activities is quite straightforward. Accordingly, giving access to capital, provision of extension program, and ensuring the prevalence of equal distribution of income between formal and informal sector might help to reduce the adverse effect of a single-handed involvement of women on street-vending activities. The study result also goes in line with the findings of Wabwire (1997), Mayee (2003) and Mulugeta (2009).

Migration status

The structuralist and legalist causal approach for informal employment are positively and significantly affected by the migration status of the women at 5% and 10% level of significance, respectively. Compared to non-migrants, migrant women's who engage on street-vending activities to support their formal sector is higher by 5.89%. This might be due to the cheap labor wages migrant women require to be employed in the formal sectors. Similarly, as a response to bureaucratic laws in the formal economy; migrant women's participation on identical activities is higher by 7.02%. This result is consistence with the finding of Todaro (1981), Soto (1989) and Masanja (2014) saying that women migrate to urban areas with the expectation of formal jobs, but the bureaucratic legal condition will force them to look for jobs in the informal economy. Accordingly, allowing fair distribution income in both sectors of the economy, liberalization of state regulations, legalization of informal property rights, and promoting labor-augmenting formal jobs might enhance the welfare of women street-vendors in Dire Dawa city.

Religion

Here, at 5% level of significance, the voluntarist and legalist causal theories of informal sectors are significantly affected by the kinds of religion women's street-vendor follow. In one hand, involvement in the informal sector due to personal choices is lower for the Muslim women compared to Christians by 9.24%. This result supports the findings of Xaba *et al* (2002) saying that women street-vendors working in Islamic areas showed a decreasing trend. Accordingly, lowering the stereotype towards women's who wear veils publicly through awareness creation, media discourse and public dialogues might be a proper key amplify the women's welfare (Faeiz, 2019). Still, unlike prior expectation, Muslim women's engagement on street-vending activities as retaliation to bureaucratic legal condition in the formal sector is higher compared to Christians by 8.75%. Thus, revision and liberalization of laws in the formal sectors might play a significant role to enhance the livelihood of Muslim women street-vendors in the city.

Table 3 Multivariate probit estimations for factor effect cause of informal sector choice. Source: Own survey, 2022

Variables	Causes of informal							
	Dualist Coeff(se)	Mgf	Structuralist Coeff(se)	Mgf	Voluntarist Coeff(se)	Mgf	Legalist Coeff(se)	Mgf
Age	0.0816* (.0485)	0.0380* (0.02)	-0.0851 (0.0612)	-0.0159 (0.0105)	-0.0899* (.0517)	-.0395* (0.0197)	0.1503** (.0735)	.0283** (0.0142)
Age2	-0.0011* (0.0006)	-0.0004* (0.0002)	0.0012 (0.0008)	0.0002 (0.0001)	0.001 (0.0006)	0.0004 (0.0002)	-0.0015* (0.0009)	-0.0002* (0.0001)
Edu	-0.0436 (.0517)	-0.0202 (0.0206)	-0.0928 (.0633)	-0.0135 (0.011)	0.0435 (.0503)	0.0117 (0.0204)	0.0954 (0.005)	0.0166 (0.0135)
Edu2	0.0012 (0.0037)	0.0007 (0.0014)	0.0069* (0.0041)	0.0009* (0.0007)	0.0005 (0.0037)	3.96 (0.0014)	-0.0058 (0.005)	-0.0001 (0.0009)
Household size	-0.0788* (.0409)	-.0254* (0.0165)	0.0118 (.0494)	-0.0008 (0.0085)	0.1334*** (.042)	0.0540*** (0.0164)	-0.1158** (.0573)	-0.023** (0.0104)
Marital statues (De-jure)	-0.1141 (.0965)	-0.0611 (0.046)	0.3644** (.1417)	0.0656** (0.0258)	-0.0856 (.1001)	-0.0377 (0.0472)	0.0777 (.1199)	0.0132 (0.0257)
Migration statues (Migrant)	-0.1967 (.1342)	-.0837 (0.0531)	0.4030** (.1961)	0.0589** (0.0248)	-0.1271 (.1352)	-0.0548 (0.0539)	0.3094* (.1772)	0.0702* (0.0326)
Initial capital	-4.50e (7.27e)	-.2.91e (3.46)	4.47e (6.68e)	9.29e (1.23)	-2.88e (8.50e)	1.51e (2.98)	0.00001 (7.37e)	2.40e (1.56)
Religion (Muslims)	0.1076 (.1335)	0.0456 (0.055)	-0.0121 (.1809)	-.0138 (0.031)	-.2584** (.1398)	-0.0924** (0.0549)	0.3888** (.1756)	0.0875** (0.035)

Note: *, **, and *** = significance level at 10, 5, and 1%, respectively

Standard errors in parentheses

Coefficient and Marginal effects above Standard errors

CONCLUDING REMARKS

Despite the key role of informal sectors in creating job opportunities for women of Dire Dawa city, their no consensus among scholars on its causal factors. Current re-thinking said that there are four causal theories of informal sector employment: the dualist, structuralists, legalist, and voluntarist schools. This study, therefore, aimed at finding factors affecting the causes of informal sectors in Dire Dawa city. In doing so, primary data from a sample of 384 woman's street vendors were collected through structured questionnaire. The study result from Multivariate probit regression model concluded that except for first capital; age, educational status, household size, marital status, religion, and migration status have inconclusive effects on the four causal theories of informal sector.

So: First, implementation of the traditional policies like access to capital and market, promoting labor-augmenting formal jobs and extensions services may enhance the welfare of those women's who are involuntarily thrown into street-vending activities. Second, for those women's who are in the informal sector voluntarily, acknowledging and bringing them into the formal regulatory system may reduce the adverse effects of working on street. Such policy may also increase the tax revenue of the city government and bring fair distribution of income between the formal and informal economy. Third, for those women's who are on street vending activities due to tight laws to open-up a new formal business, the introduction of simplified bureaucratic procedures to register informal enterprises and properties might be a proper policy prescription. At last, for those women's who are in the informal sector to support their formal business, governments should address the unequal relationship between 'big businesses and subordinated producers through regulating the relationship between formal and informal employment.

Generally, in Soto's (1989) words "*people who have adapted every other western invention, from the paper clip to the nuclear reactor, have not been able to produce sufficient capital to make their domestic capitalism work*". Hence, before taking any strategic measures, policy makers in the city should understand the distinct causal approaches of informal economy in general, and the heterogeneous effects of different explanatory variables on the causes of the women's street-vending activities.

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6.3. The political and Institutional Implications of Amhara Nationalism in Ethiopia

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ABSTRACT

The article examines the political and institutional determinants of Amhara identity formation and mobilisation in post-1991 Ethiopia. The article engages with the discursive narratives, ideological othering, and institutional flaws that reinforce the development of Amhara nationalism. The findings show how Ethiopia's ethnolinguistic-based federal arrangement, founded on a political discourse about "Amhara domination", leads to Amhara nationalism. Using a qualitative research methodology, it gathers data from sources such as documents, broadcast and social media, and key informant interviews to argue that the origins of the Amharas' sense of victimization lie in good part in the replacement of centralised one-nation nationalism with a non-representative devolved system; having been left out during the institutionalisation of the current political system, the Amhara now demand to be integrated into that system. This could be an entry-point to the development of legitimate constitutional and institutional system that addresses the limitations of the existing federal design and its propensity for conflict. Hence, launching an inclusive constitution-amendment process accompanied by the introduction of consociationalism democracy is a necessary condition to mitigate the current political discontent.

Keywords: *Amhara nationalism, Amhara domination discourse, institutional designs, implications, Ethiopia*

INTRODUCTION

In Ethiopia's contemporary political and scholarly discourse ethnicity and nationalism are largely framed in two competing models that could be described as pan-Ethiopian nationalism, on the one hand, and ethnonationalism, on the other. These models became polarised after the Ethiopian People's Revolutionary Democratic Front (EPRDF) institutionalised the latter as an organising principle of the polity. Pan-Ethiopian nationalism envisages an idealised national identity or supra-ethnic identity into which ethnic groups subsume themselves; ethnonationalism, in contrast, sees "Ethiopianness" as the aggregate output, or sum, of a range of ethnic groups that otherwise remain distinct. The ethnicity of other ethnic groups has centered on the discourse of "Amhara domination", with roots going back to the student movement of the 1960s and 1970s and ultimately to the territorial expansions of Menelik and the birth of modern Ethiopia at the end of the 19th century. The Ethiopian Student Movement (ESM) of the 1960s and 70s articulated ethnonational claims in Marxist terms; at the same time, state aggrandisement presented Ethiopia as a unified nation under the imperial crown of Haile Selassie I – a vision that was not uncontested. The ESM rejected the idea of Ethiopia as a nation, seeing it instead as made up of diverse cultures and semi-autonomous elements. Ethiopia, it was held, was as a multinational state restrictively defined

through the prism of Amhara cultural hegemony. This line of thinking came to shape Ethiopia's political discourse and the way the state is viewed, and over the past four decades it has led to the rise of increasingly vociferous ethnoregional movements (Semahagn, 2014).

After the overthrow of the imperial system of government by the Ethiopian revolution of 1974 and the subsequent ousting of the military Marxist regime that displaced it in 1991, the new regime attempted to redress the national question by introducing a federal system in which the federal units were defined (modeled on the USSR) by ethno-linguistic criteria. Each of the major language groups thus bought its own autonomous state within the federation. The area within which Amharic was widely spoken as a native language thus became the Amhara state. The ethnonationalists' conception that the presence of a unified Amharic-speaking people associated with the Ethiopian state constituted "national oppression" became the foundation for the new political system since 1991 and the main cause for the rise of Amhara nationalism.

As this article will be arguing, the constitutional and federalisation project was designed by ethnonationalist movements that raised arms for self-determination – and since that historical moment, the Amhara people, who otherwise subscribe peaceably to the notion of an Ethiopian national identity, have become the objects of ongoing ethnic target practice.

In this regard, "Amhara identity" has been a centre of political and academic debate, especially among the "Amhara elites" and Ethiopianists abroad – a political debate initiated following the non-representation of the Amhara in the 1991 transitional process. Studies on Amhara identity, such as those by Tegegne (1998), Pausewang (2005), Michael (2008), Admasu (2010), and Birhanu (2015), describe "Amhara" both as an ethnic identity and a supra-ethnic category. Some scholars, such as Tegegne and Admasu, have considered the circumstances and political developments that could galvanise an Amhara ethnic consciousness in the future. However, these studies assumed a situation in which most Amhara people subscribe to pan-Ethiopian nationalism. Circumstances have changed, however, and heated political mobilisation along the Amhara ethnic line has prevailed.

This in turn raises the need for a systematic understanding of the formation of Amhara ethnicity and what it means for the current political system. While studies and commentaries have been written on the protests and instability Ethiopia has witnessed in recent years, little has been said about the rising potency of Amhara nationalism and its implications for the country's political system. This article seeks to contribute to bridge the gap and provide an outline of the role that the post-1991 political system has played in the rise of Amhara nationalism and how this nationalism could indeed impact productively on the working of the federal system.

The argument is that, since 1991, ethnicity has been the predominant vehicle for articulating political conflict in Ethiopia. In the process, Amharas have come increasingly to feel that they can better protect their interests by identifying themselves as a single ethnicity rather than by subscribing to a pan-Ethiopian national identity – all of which has important implications for the current discontent and the future of Ethiopia. The discourse of Amhara nationalism appears to differ from that of the two competing nationalisms, pan-Ethiopianism and ethnonationalism. While the latter is the antithesis of the former, Amhara nationalism is a reaction to ethnonationalism; however, except for its opposition to the thesis of national oppression, Amhara nationalism accepts

the existing political organisation and federal order, albeit on the basis that significant revision is needed.

As such, the underlying questions this article seeks to answer are these:

- In what ways do the post-1991 political discourse and its institutions contribute to the development of Amhara ethnicity?
- What are the political and institutional implications of Amhara ethnicity under the existing political system?

Theoretical and Methodological Approaches

This study is informed by a constructivist approach to ethnicity, especially that formulated by Fredrick Barth. According to Barth (1998), ethnicity is fluid, and ethnic boundaries are not stable but change in response to political and historical contexts. In Ethiopian political discourse, the fluidity and variability of Amhara ethnic identity is indeed coming to the fore.

Barth's other constructivist proposition is that the characteristics of ethnicity are both ascribed by others as well as self-ascribed – in the latter case, this is determined by members of the group. The varying nature of the arguments and opinions regarding the Amhara identity relate to the in-group conception of Amhara identity, which appears to vary greatly. This is partly the result of the fact that the Amharas are not politically mobilised along ethnic lines, barring the exception of the short-lived All Amhara People's Organisation (AAPO). Conversely, the out-group conception of Amhara identity presumes the presence of a cohesive Amharic-speaking group. In this regard, movements among other ethnic groups have centred on a discourse, rooted in the student movement of the 1960s and 70s, about "Amhara domination". Barth's conception of ethnic identity as fluid and relational is central to understanding Amhara nationalism[6] because Amhara ethnic sentiment becomes more and more visible as other ethnic groups set about mobilising themselves.

Qualitative research for this study is based on the paradigm of interpretivism, which considers the way people interpret and make sense of their experiences and the world in which they live. Apparently, the origin of ethnic mobilization is centered on the identification process made by a given elite group. The study extensively consulted potential respondents among the actors. Data were gathered from a variety of sources, among them documents such as magazines and party programmes; broadcast and social media, including audio recordings of speeches by and debates among, inter alia, political officials and Amhara activists; and key informant interviews. Thirteen interviews were conducted (of which four were group interviews) with key informants such as officials of the National Movement of Amhara (NaMA) and Amhara Prosperity Party (APP); Amhara activists; academics; and displaced individuals from Oromia who are defined as Amhara.

Political and Institutional Determinants of Amhara Nationalism

A Sense of Exclusion and Marginalization from the Political System

The Constitution itself is a source of resentment for many Amhara elites. One of the major issues that arose during, and in the aftermath of, the Amhara protests that broke out in 2016 is a sense of

[6] *In this article, the phrases "Amhara ethnicity" and "Amhara nationalism" are used interchangeably.*

victimisation due to exclusion from the making and implementation of the federal political order. The AAPO's nascent Amhara nationalism and pan-Ethiopian nationalism were side-lined in the constitution-making process because the EPRDF portrayed these as reactionary nationalisms aimed at restoring the old regime. The Ethiopian People's Democratic Movement (EPDM) became a *de facto* Amhara organisation sharing power in the transitional government as well as participating in constitution-making.

This does not mean to say that people from the newly established Amhara region were not represented in the constitutional assembly. The fact, however, is that these representatives were hand-picked by the regional party, the EPDM. Information from senior members of the EPDM confirms this. A senior official the party summarised how individuals were selected to represent the Amhara in the constitutional assembly: "[T]here was a top-down assignment of individuals [whereby] a short-list was prepared by the party and the people were asked to [endorse] the names in the list" (KIIP04, Bahir Dar, 5 December 2019). Hence, the people did not have the opportunity to propose persons to represent them. The members of the constitutional assembly selected by the party "elected" by the people to represent the Amhara supported the right of ethnic groups to secession. In contrast, in popular discussion of the draft constitution, there was strong opposition to that constitutional clause (among others) (KIIP06, 20 November 2020, Addis Ababa).

The same data also shows that the Amhara ethnic consciousness was not developed at the time. The discussants on the draft constitution accept the right to self-determination of nations, nationalities, and peoples, it was not considering they are part of those ethnic groups rather it was from the impression that the right deserves for other nationalities. This was the case perhaps because they did not consider themselves a distinct ethnic group claiming collective political rights. The lack of ethnic consciousness among the people was the result of the "Amhara people" rallying in support of pan-Ethiopian sentiment. Generally, the spirit of the Bolsheviks' assertion that "progressives [who] came out from the oppressive nation must support the right to the secession of oppressed nationalities" was the driving force that shaped the mind-set of participants in the constitution-making process.

The Amhara's sense of exclusion from the political life of the current system has in effect delegitimised the constitutional and federal order. An inclusive constitution-making process is a necessary condition for holding together divided societies. Consent is a crucial element for meaningful and legitimate constitutions and is secured by providing the polity with a sense of authorship and ownership of the constitution and inclusion within it (Lerner, 2010). In this regard, the South African Constitution represents a rare achievement in overcoming the difficulties of creating a legitimate constitution in deeply divided societies. The Ethiopian Constitution, however, does not enjoy such legitimacy.

There are accusations from Amhara nationalists that Amhara did not accurately stand for during the making of regional demarcations. Nor does the government undertake consultations with both the local elites and the population. Delineating boundaries during the transitional period and in the aftermath was largely done politically (Young, 2021). The boundary was delimited based on language, an observable marker than disputable history (Vaughan, 2003). Indeed, delineating boundaries in the transitional period and its aftermath was politicised (Young, 2021). Teshome (2018) describes events as follows: "To be blunt, the harsh reality is, the ethnic 'Scramble for

Ethiopia' was supervised by TPLF, OLF, and other like-minded organisations in the early 1990s to determine who gets which pieces of the pie." Boundaries were typically delimited based on language, a more observable marker than disputable history. To complete its tasks as quickly as possible, the boundary commission relied extensively on the work of the Derg's Institute for the Study of Ethiopian Nationalities as well as on Bender's 1976 language map (Vaughan, 2003).

The legacy of regional state demarcation in areas formerly part of the principal Amhara domains – Shewa, Gojjam, Wollo, and Gondar (Begemidir) – extended to other regions, notably Tigray, Benishangul-Gumuz, and Oromia, leading to the Amhara's sense of dispossession. Areas taken from Gondar and Wollo and incorporated into the Tigray region, such as Wolkayit and Raya, remain bones of contention and sites of identity mobilisation that attract international attention. Such claims are not unique to the Amhara: although they do not admit it officially, Tigray and Oromia lost large chunks of land to the Afar and Assosa Zone of the Benishangul-Gumuz region, respectively.

Nonetheless, it is understandable if the Amhara now retrospectively reinterpret the politics of allocation in this fashion, given the country's power imbalance and their sense of exclusion from the political process. New, heightened territorial claims and disputes between the Amhara state and its neighbouring states, notably Tigray, are among the main fault lines giving rise to Amhara nationalism. There is a basic alignment between the National Movement of Amhara (NaMA) and Amhara Prosperity Party (APP) in framing the Amhara peoples' questions: Countering the national oppression thesis and its side slipped "Amhara domination" discourse that master the federal edifice is built up on; issues related to constitutional amendment; heightened territorial claim more particularly the Wolkayit and Raya; the violations of rights against Amhara living in other regions. Both parties raise the criticism that the Constitution is not authentic enough to protect Amhara interests – a theme reiterated in Amhara activism and mobilisation, especially post-2018.

The Limits of Ethnic-territoriality Approach and Amhara Sense of Victimization

The institutional legacy of the FDRE Constitution and federal arrangement partly established the causes for the rise of Amhara ethnicity. The Constitution emphasised empowering the titular ethnic groups by providing for their territorial self-government and for them to turn themselves into the majority within these territories, thereby enabling them to gain territorial autonomy. Article 39(5) of the Constitution – in particular the phrase "an identifiable, predominantly contiguous territory" – may be seen as reflecting as an "ethnic territorial approach" (Van der Beken, 2014). Such an approach creates a new kind of minority vulnerable to discrimination and attacks by the titular groups. Regional constitutions have conferred special status to regionally empowered "indigenous" groups to develop a sense of "the son of the soil", while other groups are considered newcomers and treated as "second-class citizens" (Van der Beken, 2007).

The paradox of multinational federalism is thus that while it explicitly recognises diversity and guarantees territorial autonomy at the national level, it fails to do so at the subnational level (Kössler, 2018). The tendency to build replica nation-states has been seen clearly in relatively

homogenous regional states such as Oromia, Tigray, and Somali.[7] Their constitutions give sovereign power only to dominant ethnic groups named by the regional state. By contrast, the Amhara state constitution has provisions that recognise territorially concentrated intra-state minorities. For such minority groups, it has created "nationality administrations" under articles 45(2) and 74, the Awi, Himra and Oromo ethnic groups; similarly, a "nationality *woreda*" was established under ordinary law (Proc. No. 130/2006) for the Argoba ethnic group.

The Canadian federation offers good examples of creative mechanisms for accommodating differences. The differentiated rights of groups include self-government rights for what Kymlicka (1996) terms "national minorities" (Quebecois and Aboriginals) and polyethnic rights for "ethnic minorities" (immigrants). According to Kymlicka (1996), national groups in Canada are historic communities with homeland rights, whereas ethnic minorities are not "nations" and do not occupy homelands – they are, however, are free to maintain aspects of their ethnic heritages and practise old customs and traditions. There appears to be a similarity between the Ethiopian and Canadian mechanism since "indigenous" groups with territorial concentration are guaranteed self-government. The case in point in the Amhara region is like the "self-government rights" in Canada. However, there are indigenous minorities who relegated their self-government rights in regional states, as noted above. Moreover, unlike the case with Canadian group-differentiated and special-preservation rights, virtually no regional states in Ethiopia provide proportionate, guaranteed representation for dispersed and marginalised groups.

Given the absence of federal institutions in such contentious areas, intra-unit minorities are left at the mercy of local autocrats, because of which they continue to face various kinds of discrimination and marginalisation (Assefa, 2017). This also encourages subnational elites to form homogeneous units of their own. Paradoxically, the ethnonationalists, who fought against one-nation nationalism ("Ethiopianness"), have now been building a replica of that nation-state model in their "home regions". This has violated the rights of minorities located within homogenising subnational units like these, ultimately forcing them into either assimilation or displacement. This has forced minorities into assimilation or displacement. In recent years Ethiopia has come to have one of the world's largest populations of internally displaced people. Given a large number of Amhara living in various parts of the country, they have been victims of attacks such as ethnically motivated killing and displacement, which have endured for nearly three decades. This deep-seated insecurity is one of the triggering factors for the emergence of Amhara nationalism.

"Amhara Domination Discourse" and Deep-Seated Insecurity on Amhara Living in Other Regional States

The cause of Amhara nationalism goes beyond institutional design. This displacement and killings have been eased by the enduring "Amhara domination" discourse. Accusations have been made

[7] The Oromia region fails to recognise not only dispersed minorities, but so too the Argoba (resident in the western and eastern Hararghe zones), the Zay (resident within and around Lake Ziway), the Gedeo, and the Yem. Tigray does not guarantee self-government rights for the Kunama, Erob, and Amhara minorities. The Somali Regional State refuses to recognise the Bantus and Shiekash despite the Somali people's cultural similarities with them.

that, for decades, the EPRDF and its core TPLF regime used revolutionary democracy as an ideological weapon to target Amharas. Since the 1980s, "revolutionary democracy", known in Amharic as "*abiyotawi* democracy", has been the central ideology of the TPLF. Bach (2011) describes revolutionary democracy as a doctrine which is neither revolutionary nor democratic but that "remains powerful as a fighting tool to exclude internal and external 'enemies'". Exclusion is inherent to this ideology, which the TPLF-led EPRDF used as a discursive weapon to weaken its opponents.

Notoriously, since 1991 the term *Neftegna* ("Amhara") has been used interchangeably with *timkihtegna* ("chauvinist") to demonise political rivals. The spectre of an ethnonationalism that criminalises the Amhara as an oppressor is haunting Ethiopia. In the early years of the 1990s, when ethnic tension was its highest, the Amhara became the fitting choice for ethnic target practice. The people of "Amhara" were subjected to "a clearly orchestrated ethnic cleansing from the civil service, the military, key economic activities, and longstanding settlements outside of [their] ancestral lands" (Birhanu, 2015). People designated as Amhara were massacred in or evicted from the newly established ethnic-territorial regions; they were executed or displaced in areas of the Oromia region such as Bedeno, Arba Gugu, Garra Muleta, and Eastern Wollega; and large numbers were evicted from the south-west to the Amhara region (Tronvoll, 2002; Tafesse, 2002). Such ethnically motivated tension and atrocities visited on "the Amhara" since 1991 and into the present have given momentum to the rise to reactive Amhara nationalism. As Teshome (2018) puts it, "the rise of Amhara nationalism was … a reaction to EPRDF-propagated discourse against the '*Neftegna'* – often meaning Amhara".

Many ethnonationalists act as if the "*Neftegna* system" (the old imperial regime) were never removed and the 1974 revolution never happened. The EPRDF, for its part, believed that, although this system collapsed, it survived vestigially and that elite groups, bereft of power but loyal to its ideology, would aspire to regain long-standing interests (Alemnew, 2017). As this notion spread to the territorial units, people defined as "Amhara" by titular groups were targeted and displaced, a situation that continues to this day. People's religious or ideological beliefs do not matter once designated as ethnic Amhara, ordinary Christian and Muslim people are regarded as "*Neftegna*", as recent atrocities in Oromia and Benishangul-Gumuz confirm.

Information from survivors of violence that claimed hundreds of lives among the Amhara community in the Oromia region on 1 November 2020 (Addis Standard, 2020) indicates that attackers and local administrators repeatedly said, "'*Neftegna* Amhara' do not deserve to be buried, let alone to live in this Oromo land." Most of the survivors to whom the author spoke were vulnerable Muslim women and children. One such woman said, "All the Muslims and Christians were targeted in the region, and they call us '*Neftegna* Amhara'; they told us as we have no place in that region." An elderly Muslim, also one of the survivors, said:

> *We made the mistake of not paying attention to them. Before four years, the local governors instructed us to vacate the area because it is not our property. They will compel us to leave and confiscate our property for the Oromo unless they forewarn us. They have completed the task now (interview, November 2020).*

This testimony is but a sample of the suffering of Amhara residents "outside their home state". Amhara nationalists style their movement largely in response to the victimisation engendered by "anti-Amhara" narratives. Discursive attacks against the Amhara that equate "*Neftegna*" and *timkihtegna* have forced individuals to decide on their identity (re)configuration – and, most probably, to embrace the Amhara identity and join the mobilisation.

Amhara nationalists also make the wider criticism that the Constitution itself is based on the narrative of Amhara domination, arguing that it implicitly endorses the idea of "Amhara oppression and oppressed nationalities". Notably, the preamble recognises unjust historical relationships between people, especially in the phraseology, "[f]ully cognisant that our common destiny can best be served *by rectifying historically unjust relationships* and by further promoting our shared interests".[8] This, they argue, reiterates the "national oppression thesis" which blames the Amhara for the country's ills – and is something that needs to be revised.

Towards Constitutional Amendment and Institutional Design?

A closer look at Amhara activism seems to suggest that it would be a dilemma for it to support a multinational federalism strengthened with remedies or to pursue a pan-Ethiopian agenda. However, for leading Amhara activists, Amhara nationalism is an antidote to deficits in the federal design rather than an instrument for restructuring the state to suit the actors' interests or exploiting the situation through identity-specific elements such as language, culture and ethnicity; it (Amhara nationalism) is an approach in which ethnic Amharas redefine their interests collectively around a sense of victimisation and the need to secure their survival (Mesganaw, 2018). Based on issues raised during the Amhara protests, political parties, notably the NaMA and APP, have adopted similar goals – the former put them in its programme, and the latter endorsed them at the 12th ANDM congress.

These major actors in Amhara political mobilisations do not reject the existing constitution in its entirety, nor do they reject the ethnic-based federal system. Rather, both the APP and NaMA demand constitutional amendments and action to remedy the current federal arrangement. The APP has advocated a multinational-brotherhood approach in which all regional states ensure both the group and individual rights of all citizens that were endorsed by the PP in the 2021 election campaign. The former president of NaMA summerizes:

> *We need a democratic country in which [the] Amhara as an ethnic group is respected equally vis-à-vis other ethnic groups of the country, and an Ethiopian state that represents all ethnic groups, including [the] Amhara, which … [necessitates] inclusive dialogue and negotiation followed by constitutional amendment and some concessions on the federal design (interview, October 2020).*

Nonetheless, the solutions are easier said than done, as they depend on a political reality in which almost all titular ethnic groups seek to maintain the status quo and fear that changes to it would harm their interests. Moreover, most of the claims of Amhara nationalism call for a "thinking-out-

[8] *Emphasis added.*

of-the-box" approach that utilises extra-constitutional amendment mechanisms. This is so because the issues, or aspects of the constitutional text, requiring amendment relate, inter alia, to the spirit of the Constitution as premised on the national oppression thesis the preamble, as well as to the definition of "nations, nationalities and peoples" and the secession clause – none of which are easily amendable under the current amendment procedures.

Furthermore, the issue of territorial claims is highly sensitive, particularly when it comes to Wolkayit. Claims concerning the latter were raised by Amharas in the area in the hopes that they could be resolved within the regional state, Tigray. However, when the Tigray region and federal government tried to suppress the matter by detaining leaders of the Wolkayit Amhara Identity Question Committee, the Amhara region reacted, and the issue took on strongly irredentist overtones. The "son of the soil" feelings that titular ethnic groups have for the territorial units that were established to enable them to exercise autonomy – along with the rigid positions taken regarding this status quo – are very likely to create resistance to reform.

CONCLUSION

Through "expansion" from northern central Ethiopia and the amalgamation of local elites, the Amhara identity has become strongly associated with Ethiopian statehood since imperial times. Coming under pressure and even suffering oppression and expulsion from parts of the country, there is the emergence of a reactive and defensive Amhara ethnic nationalism following the model of those who claim to have been oppressed by Amhara at earlier stages of Ethiopian history, with important implications for the current political discontent and future of Ethiopia. Amhara nationalism is the result of a political reality that one nation nationalism (Pan-Ethiopianism) political system and its centralized structures are replaced by a non-representative devolved system. The Amhara, who were left out during the institutionalization of the current political system, now demand integration into it. This would be an entry point to the evolution of constitutional and institutional designs that redress the limits of existing multi-national federalism or further replicate the strain on the management of conflicts caused by the existing system.

RECOMMENDATIONS

The incumbent party or the established commission need to create a sense of authorship and ownership among the Amhara people—a sense that they are included in the constitution. This could be done through launching an inclusive dialogue on the constitution, which is also called an extra-constitutional amendment. Albert's (2009) political model of constitutional amendment entails when a constitutional amendment become difficult based on the amending procedures, or political deadlock an initiation of amendment might come from the elites as they appeal to the people for its necessity. This led to a mutual understanding of the benefits of keeping the spirit of the Constitution or amending it. The inclusive dialogue can redress the contention emanated from the violation of the existing rigid amending procedures.

The federal government should work to get consensus with the regional states on the protection of internal minorities and thwart their pursuit of creating homogenous states. EPRDF's failure to consider the recommendations by scholars of Ethiopian federalism partly contributed to the current political crisis. Consociational democracy must be introduced and constitutionally recognized,

which obliges all ethnic based self-governing units to implement it in their region to ensure the protection of minorities.

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