ISSN 2519-9781

Mogadishu University Journal

Scientific Refereed Journal
Issued by Research Unit of Mogadishu University

Issue 6, 2020

Editor -in- Chief

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Advisory Board

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Editorial

Praise be to God and blessings and peace be upon His Prophet.

Either after:

The Research Unit at the Mogadishu University has the honor to publish the sixth issue of its annual scientific journal, which is issued in both Arabic and English. With God Almighty's grace, the magazine has overcome during its six years of life the difficulties and obstacles that hinder the path of education and scientific research in Somalia, which is still suffering from the effects of the civil war and the consequences of the collapse of the state. The university has succeeded in making its way towards achieving its goals during the past three decades amidst this tremendous number of obstacles. The university's research unit has also succeeded in laying the foundations of scientific research and creating a view for Somali researchers to spread their research and contribute to knowledge production.

This issue contains eleven papers; six in the Arabic version and five in the English version. The papers encompass various fields that Mogadishu university faculties represent. Some of these papers deal with the effect of the COVID-19 Pandemic on education and society, in response to the community's need to solve emerging problems through scientific research.

Based on that, the editorial and research unit team calls upon researchers inside and outside the university to publish their papers in Arabic and English in the Mogadishu university journal; and enrich the

academic field by solving the thorny issues of Somalia through scientific research.

On behalf of the editorial team, I extend my sincere gratitude and appreciation to all those who participated in accomplishing this great work, and in particular, the President of the University, Dr. Ibrahim Muhammad Mursal, and the Head of the University's Research Unit, Dr. Said Abu-Bakr Sheikh Ahmed.

Editor-in-Chief

ISSN 2519-9781

Evaluating Students' Perceptions of Virtual Classroom Instruction during COVID-19 Pandemic

"A Case Study: Mogadishu University Students"

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Abstract

Teaching and learning process through Virtual learning was widely used in tertiary education in Somalia as an alternative of the physical classroom during the COVID-19 pandemic when has spread around the world and all educational institutions including universities were closed. Mogadishu University has decided to restart the teaching and learning service over the virtual classroom via the ZOOM application. Based on that, this study aims to investigate how the extent of students' perception at Mogadishu University towards the virtual classroom instruction during CVID-19. The researcher adopted a descriptive method in this study over a survey on all faculties of the university with a sample size of 1087 students. For the data analysis, the researcher used SPSS in the data

analysis. The result of the study showed the positive perception and satisfaction of Mogadishu University students with virtual classroom instruction during COVID-19 as a vital alternative of physical classroom. The study recommended enhancing online courses via virtual classroom and devote maximum efforts on the provision of the required types of equipment and facilities.

Key Words: Evaluating, Students' Perception, Virtual Classroom, COVID-19, Mogadishu University.

1. INTRODUCTION

When the Pandemic COVID-19 spread around the world, human activities have been lockdown and the educational system was one of the most sector heavily affected by COVID-19 pandemic. Somalia as many Governments around the world has temporarily locked educational institutions to control the spread of the Covid-19. UNESCO revealed that more than 72% of the world's student's population are not attending schools/colleges (Jena, 2020). During this time, teachers and education professionals have been asked to supply students with teaching material and instruct students directly via remote digital tools. The expectation is that most students learn from home under the supervision of their parents. This is referred to as "home-schooling" in the media. (TUAC, 2020).

Among the educational institutions disrupted by COVID-19 tertiary education, World Bank Group Education(World Bank, 2020) illustrated total affected tertiary education students, by regions as the table (1)and

figure (1) demonstrate disaggregated by region and as a proportion of total disrupted tertiary education students:

Table 1. Disaggregated by Region and as Proportion of Total Disrupted Tertiary Education Students.

Region	Out-of-school tertiary edStudents	Total tertiary ed students	%
East Asia and Pacific	72,391,442	73,538,139	98%
Europe and Central Asia	36,948,926	38,030,033	97%
Latin America and Caribbean	27,007,997	27,111,868	100%
Middle East and North Africa	14,282,666	14,282,666	100%
North America	20,640,820	20,640,820	100%
South Asia	40,468,782	40,468,782	100%
Sub-Saharan Africa	8,399,127	8,533,188	98%
Grand Total	220,139,760	222,605,496	99%

Source World Bank, 2020

The table above and figure below show how COCID-19 disrupted tertiary education students whereas East Asia and Pacific, South Asia, Europe and the Central Asia and Latin America and Caribbean have out-schooled students spans 97-100% from total the students while the region of Sub-Saharan Africa where Somalia geographically located has out-schooled students 98% from the total of the students. The grand mean of the out-schooled students of all the regions from the total students during COVID-`9 99%.

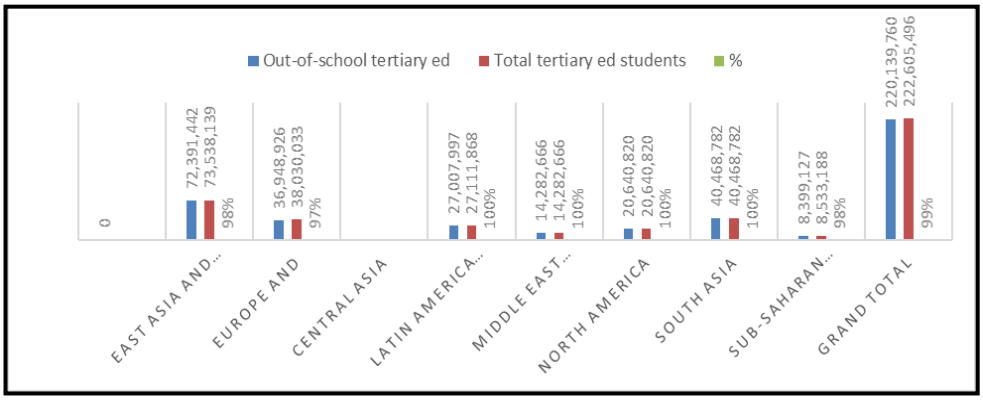

Figure1. Disaggregated by Region and as Proportion of Total Disrupted Tertiary Education Students

Role of Technology in Education during COVID-19 Pandemic

Generally, it is obvious the importance of technology in education due to its role in the field of education in terms of the curriculum, as an instructional delivery system, as a means of aiding instructions and also as a tool to improve the entire learning process. It was discovered that the use of modern technology, the learning, and interactivity of students increase. (Maslin, Consultant, & Ltd, 2010). The importance of technology in education we observed and witnessed, during COVID-19 pandemic its vital role in continuing education throughout the world; schools, institutes, and universities. The public and private universities in Somalia widely used ICT in the educational process under COVID-19 from March to July 2020. This period was the first experience encountered by the administration of the universities, the teaching staffs as well as the students and the parents as cooperative learning services in "homeschooling. Due to using ICT in delivering lectures, providing

materials, sharing information, and interaction among lecturers and students successfully, the administration of the universities realized the importance of ICT in education and the possibility of launching online courses. This perception coincides with the World Bank's key principles for educational technology in tertiary education listed as follows(World Bank, 2020):

- ✓ **Ask Why?** for today's crisis response, the use of educational technology is to support remote learning at home for students during the closure of school due to COVID 19.
- ✓ **Design for Scale**: educational technology interventions must be designed for scale for all students. For most low- and middle-income countries, adopting a mobile-first approach is critical.
- ✓ **Empower Teachers**: technology should enhance teachers' capacity and capabilities for teaching and learning. In remote learning, the parent is now also a "teacher" but less so for higher education.
- ✓ **Engage The Ecosystem**: universities should consider a multi-stakeholder approach- engaging actors both inside and outside the university e.g. government, NREN (National research and education network), telecom companies, local/global IT companies, publishers, local educational technology startups.
- ✓ **Be Data-Driven**: set up feedback mechanisms to be able to collect, analyze and respond to feedback, provide appropriate Quality Assurance .(World Bank, 2020).

Virtual classroom

The virtual classroom is very effective in the dispensation of the Distance Education Program in many countries of the world. VC is a tool in enhancing teaching and learning in a diversified form of education. (Akpan, Etim, & Ogechi, 2016).

Virtual classrooms is quite different from physical or face to face classrooms. First, they are a shift away from the "norm" of having one teacher and a group of students all in one place at one time. In a virtual classroom, students may be in a different location from their teacher or other students in their class. Second, teachers and students in virtual classrooms may be using a range of ICTs to facilitate learning, communication, and collaboration (Bolstad & Lin, 2009).

There are several definitions of the virtual classroom, (techopedia.com) defines as" a teaching and learning environment where participants can interact, communicate, view and discuss presentations, and engage with learning resources while working in groups, all in an online setting." *(techopedia.com/, 2020)*

"A virtual classroom is an online learning environment that allows for live interaction between the tutor and the learners as they are participating in learning activities" (vedamo.com, 2020).

Whatls.com, defines virtual classroom as" an online learning environment. The environment can be web-based and accessed through a portal or software-based and require a downloadable executable file". (techtarget.com/, https://whatis.techtarget.com/, 2020).

Virtual classroom is a learning environment where instructors and students are separated by time and space or a web-based environment that simulates a live class room experience where instruction involves the synchronous or asynchronous use of electronic learning tools such as video-conferencing, online **classrooms,** whiteboards, chat rooms, document cameras, and so forth. It is a mode of computer-based education whereby the teacher interacts with students either via video-conferencing, Internet broadcast. (igi-global.com/, 2020).

The author tries to summarize the above definitions as" virtual classroom as an electronic learning environment for a live interaction that connects between instructor and students on one hand and among students themselves on the other hand during teaching and learning activities to achieve pre-stated educational objectives.

Learning Theories that Support Virtual Classroom

There is three classifications of educational technology namely; Teaching Technology, Instructional Technology and Behavioral Technology they are quite different in terms of the objectives, the content and the role of the teacher as a manager for the teaching technology, as a helper for the instructional technology and as secondary for the behavioral technology. For the Somali education context, Mogadishu University preferred teaching technology as an appropriate method to be followed in virtual classroom instruction under the COVID-19 pandemic. Based on the justification above, Mathew and Mysore (2016) described the fundamental principles and characteristics of Teaching Technology as teaching is a scientific process and its major components are content,

communication and feedback it is based on, as cited to Davies (1971); planning of teaching, organization of teaching, leading of teaching and controlling of teaching. There is a close relationship between teaching and learning. (Mathew & Mysore, 2016) it is vivid that the teacher and learner are active and vibrant but the teacher is as a manager of the teaching and learning process. This is what adopted in virtual classroom sessions at Mogadishu University during COVID-19.

The main learning theories backing teaching in the virtual classroom are stated below:

- ✓ **Social learning theorists** view learning as a process of adopting ways of thinking from the culture and community. Therefore, social interaction is an essential part of the learning process. Two pioneer thinkers in the social learning tradition were Albert Bandura and Lev Vygotsky.
- ✓ **Observational learning (Albert Bandura**) is based on behaviorist principles but is focused on modeling-learning by observing the behavior of others.
- ✓ **Vygotsky's Social Learning Theory** emphasized learning through social interaction. Vygotsky believed that our culture provides us with "cognitive tools" that affect the way we think. (Spector, 2015).

Mogadishu University Implementation of VC Instruction

Virtual classroom as an alternative of physical or face to face classroom was what the Somali private universities vividly used in the teaching and learning process during COVID-19. Mogadishu University as a stone cone of the private tertiary education in Somalia, from March to July has put on all its efforts to continue the education process. According to the ICT office report at Mogadishu University (Herery, 2020) MU administration has taken procedural stages below to implement the virtual classroom instruction throughout faculties:

The First Stage: Situation Analysis: to search for the appropriate means and tools to the lecturers, students, learning material, and faculty management as well as a learning environment.

The Second Stage: Planning: to take a common understanding of how to implement the virtual classroom and choose the best method to have experimented on students and mock classes to verify the pros and cons of each tool separately. In this stage, the ZOOM was designated to be the only application to be used in the virtual classroom instruction.

The third Stage: Mobilization and Induction: this stage all students, teaching staff, and personal management of the faculties are trained on the virtual classroom instruction via ZOOM.

The Fourth Stage: Implementation: it is continued the training for students and the formation of classes on the application to ensure the readiness of the faculties and the students to use the tool without obstacles.

The Fifth Stage: the follow-up phase and solving some technical problems faced by students and professors.

The Last Stage: Evaluation and Conducting Study on the process and procedures of the virtual classroom instruction, Based on that, this article is part of this evaluation.

Aim and Objectives of the Study

The core aim of this study is to evaluate the degree of students' perception of the virtual classroom at Mogadishu University during the COVOD-19 pandemic.

The specific objectives of the study are to:

1. Determine the level of students' skills to access virtual classroom sessions at Mogadishu University during the COVID-19 pandemic.
2. Verify the level of students' perception of the content shared and the delivered methods applied in the virtual classroom sessions at Mogadishu University during the COVID-19 pandemic.
3. Explore the level of students' perception of the communication and the interaction that practiced in the virtual classroom sessions at Mogadishu University during COVID-19 pandemic.
4. Identify the level of students' perception of the assessment conducted in the virtual classroom sessions at Mogadishu University during the COVID-19 pandemic.

5. Analyze the variances of students' perception according to the gender, faculties and academic years towards the virtual classroom during COVID -19pandemic

Hypotheses

The researcher tests in this study the following hypotheses

Ha_1: There is a significant difference in perceptions at level (a=0.05) between male and female students at Mogadishu University towards the virtual classroom instruction during the COVID-19 pandemic.

Ha_2: There is a significant difference in perceptions at level (a=0.05) among the students as faculties at Mogadishu University towards the virtual classroom instruction during the COVID-19 pandemic.

Ha_3: There is a significant difference in perceptions at level (a=0.05) among the students based on level of years at Mogadishu University towards the virtual classroom during the COVID-19 pandemic.

Methodology

The study adopted a descriptive research design to discover the student's perception of the virtual classroom instruction at Mogadishu University. The study was carried out in 9 faculties of the university.. The random sampling technique was applied to draw the sample size of 1087 students. The data in this study are obtained by administering a questionnaire that included 23 items established by the researcher. The instrument comprised of five sections. Section one intended to seek the personal information from the respondents. Section two was aimed to find information on the students level of use of ICT; section three was

designed to seek information on the Content shared and the delivery methods of the Virtual classroom instruction while section four was on the Communication and the interaction during the Virtual classroom instruction and section five was established to determine the Assessment during the Virtual classroom instruction. The respondents were asked to show their degree of agreement or disagreement on each item statement of the questionnaire. Likert' scale was used in the instrument where Strongly Agree (SA) stands for 5 points; Agree (A) for 4points while Neutral 3 ; Disagree (DA) equals 2 points and Strongly Disagree (SDA) matches 1 point. For the reliability of the instrument that the researcher established by using SPSS, the result showed a high level of acceptance with (a=82). For the data analysis, a descriptive analysis was carried out built on mean and standard deviations of the items as well as ANOVA in SPSS to determine the variance among respondents by testing hypotheses pre-stated by the researcher. The weightings of the responses from research questions will be computed using means values intervals as options of; Very Good (VG) = 4.20-5.00 points; Good (G) = 3.40-4.19 points; Average (AV) = 2.60-3.39 points ; Faire (F) = 1.80-2.59 points and Poor (P)=1.00-1.79. For the weighting of faculties ranking towards their perception of virtual classroom instruction during COVID- 19 pandemic, questions will be figured by using total percentages values intervals as options of; Excellent Level(EL) =90-100; Very Good Level (VGL) =80-89; Good Level (GL)= 70-79; Poor Level(PL) =60-69 and Very Poor Level(VPL) = 50-59.

Results and Analysis

This section is to illustrate the data that emerged from respondents of the study. The researcher used SPSS in data analysis in the light of objectives and hypotheses of the study.

Table (2) Gender

	Frequency	**Percent %**
Male	637	58.6
Female	450	41.4
Total	**1087**	**100.0**

Table (2) shows that the male students in the study represent 58.6% while the female stands for 41.4%, this means the number of female students in Somalia in general, and Mogadishu University in particular increases positively in comparing with the past two decades.

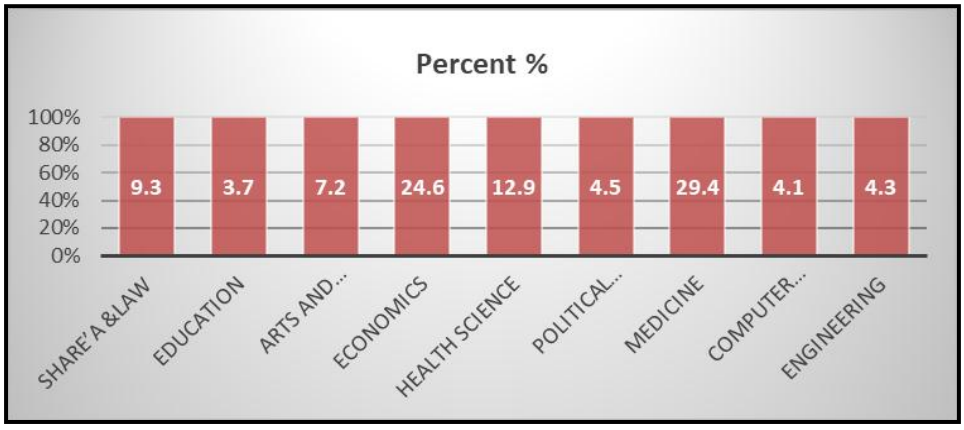

Figure 2. Faculties Representative of the Study

The figure above indicates the percentage of faculties in the study. The total number of faculties at Mogadishu University is 9 faculties. The faculty of Medicine, Economics, and health science scored up the high percentages of participants of the study.

Table 3. Level of Accessing the Virtual Classroom Sessions

Items	Statement	Mean	Std. Deviation	Decision
Q1	I am able to access virtual classroom.	3.78	.980	G
Q2	I face internet problem during virtual classroom sessions.	3.75	.974	G
Q3	My faculty offers us orientation on the use of virtual classroom instruction	3.29	1.183	AV
Grand Mean		**3.60**	**1.045**	**G**

Very Good (VG) = 4.20-5.00; Good (G) = 3.40-4.19; Average (AV) = 2.60-3.39; Faire (F) = 1.80-2.59 and Poor (P)=1.00-1.79.

The analysis on the table (3) and figure (3) illustrate that the students in faculties at Mogadishu University got a mean of 3.78 with SD .980 for item 1, 3.75 with SD .974 for item 2 as a Good level while item 3 obtained 3.29 with SD 1.183 as an Average level, however, the grand mean of the three items revealed 3.60. Thus, these results indicate that Mogadishu university students have a positive perception of a Good level of using ICT during virtual classroom instruction.

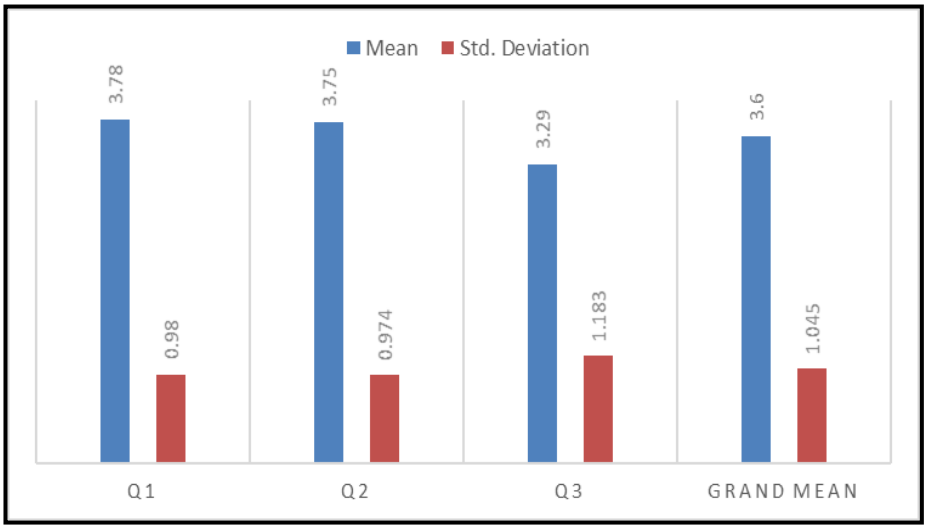

Figure 3. Level of Accessing the Virtual Classroom

Table 4. Content Shared and Delivery Methods

Items	Statement	Mean	Std. Deviation	Decision
Q1	I am able to understand the content on virtual classroom.	4.14	.988	G
Q2	I am able to hear the lecture very well.	3.98	.977	G
Q3	The quality of shared screen materials appropriate.	3.97	.958	G
Q4	The time allocated to the lectures on virtual classroom enough.	3.93	1.031	G
Q5	The lecturers provide us the required learning resources.	3.75	1.086	G
Q6	I can study through virtual classroom effectively from the house.	3.74	.918	G

Items	Statement	Mean	Std. Deviation	Decision
Q7	I am able to do class activities during virtual classroom effectively	3.74	1.119	G
Q8	The lecturers mostly use lecturing method in the presentation.	3.71	1.049	G
Q9	The lecturers use variety methods during presentations.	3.65	1.201	G
Q10	The lecturers provide us equal learning opportunities during virtual classroom sessions.	3.63	1.032	G
Grand Mean		**3.82**	**1.035**	**G**

Very Good (VG) = 4.20-5.00; Good (G) = 3.40-4.19; Average (AV) = 2.60-3.39; Faire (F) = 1.80-2.59 and Poor (P)=1.00-1.79.

Results on the table (4) and figure (4) ascertain that students in faculties at Mogadishu university attained a mean of 4.14 with SD .988 for item 1, the other items from 2 – 10, the mean values found were 3.98, 3.97, 3.93, 3.75, 3.74, 3.74, 3.71, 3.65 and 3.63 with their matching standard deviations as (.977, .958, 1.031, 1.086, .918, 1.119, 1.049, 1.201 and 1.032). The grand mean of all the ten items showed 3.82. Thus, these results highpoint that Mogadishu university students have a positive perception and satisfaction with content shared and delivered methods used in virtual classroom instruction with a Good level.

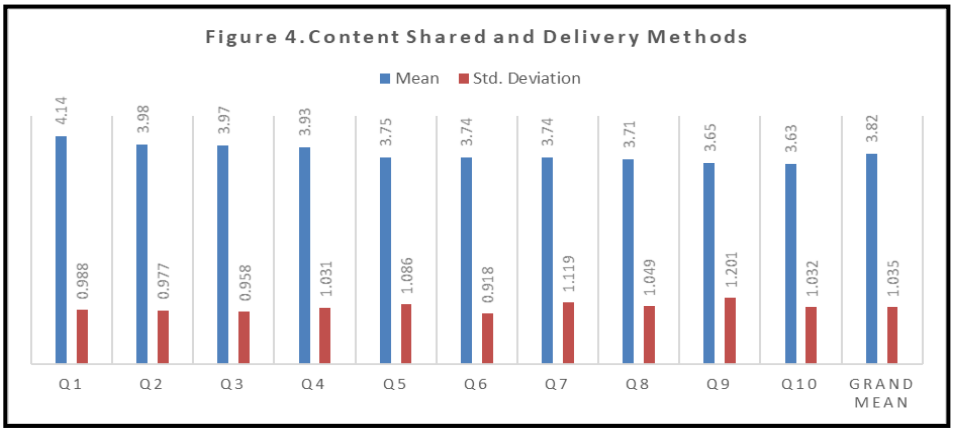

Figure 4. Content Shared and Delivery Methods

Table 5. Communication and Interaction

Items	Statement	Mean	Std. Deviation	Decision
Q1	The lecturers encourage us to learn effectively under covid-19 actively.	3.88	1.088	G
Q2	I consider the virtual classroom as the real /physical classroom for our learning courses.	3.85	1.018	G
Q3	I could reach the lecturers easily and ask them questions.	3.78	1.050	G
Q4	I can share information with my classmate smoothly when doing activities	2.76	1.420	AV
Grand Mean		**3.57**	**1.144**	**G**

Very Good (VG) = 4.20-5.00 ; Good (G) = 3.40-4.19; Average (AV) = 2.60-3.39; Faire (F) = 1.80-2.59 and Poor (P)=1.00-1.79.

The result of data presented as shown in table (5) and figure (5) prove that students in faculties at Mogadishu university shared a mean of 3.88, with SD 1.088 for item 1, 3.85, with SD 1.018 for item 2, the item 3 obtained 3.78 with SD 1.050 while item 4 has 2.76 with SD 1.420 thus this item obtained average level(AV) for sharing information among the students when doing activities smoothly. The grand mean of the four items indicated 3.57. Thus, these results show that Mogadishu university students confirmed a positive attitude towards communication and interaction adopted during virtual classroom instruction with a Good level.

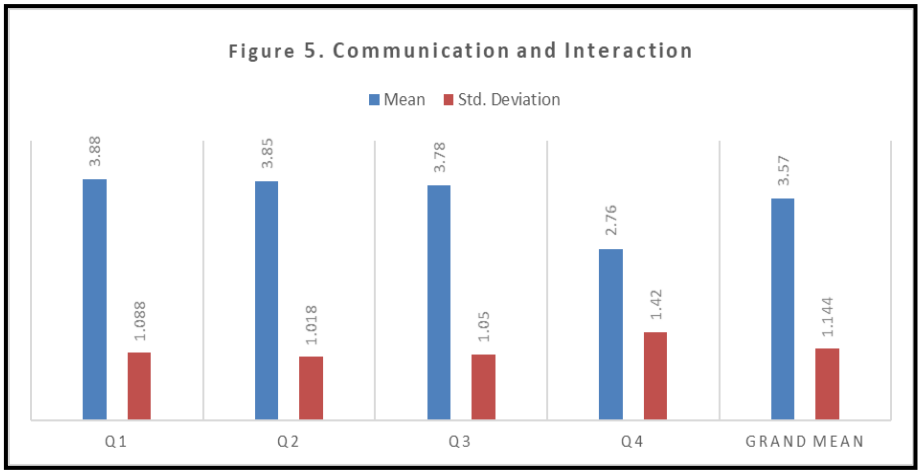

Figure 5. Communication and interaction

Table 6.Assessment

Items	Statement	Mean	Std. Deviation	Decision
Q1	The lecturers follow up our progress during virtual classroom sessions.	3.66	1.147	G
Q2	The lecturers give us tips on how to perform assignments.	3.64	1.043	G
Q3	The lecturers use oral questions during the lecture.	3.63	.980	G
Q4	The lecturers use quizzes during virtual classroom sessions.	3.57	1.101	G
Q5	The lecturers give us assignments.	3.23	1.385	AV
Q6	I am able to do online exam	3.13	1.214	AV
Grand Mean		**3.47**	**1.145**	**G**

Very Good (VG) = 4.20-5.00; Good (G) = 3.40-4.19; Average (AV) = 2.60-3.39; Faire (F) = 1.80-2.59 and Poor (P)=1.00-1.79.

Results on the table (6) and figure (6) demonstrate that students in faculties at Mogadishu university had a mean of 3.66 with SD 1.147 for item 1, 3.64, with SD 1.043 for item 2, item 3 obtained 3.63 with SD .980, item 4 has 3.57 with SD 1.101 all of these four items obtained the Good level. Item 5 gained 3.23 with SD 1.385 and 3.13 with SD 1.385 for item 6, hence both of the two items got level on Average. However, the grand mean of the six items indicated 3.47. Thus, these results reveal that Mogadishu university students gave a positive impression of

satisfaction with the assessment conducted during virtual classroom instruction with a Good level.

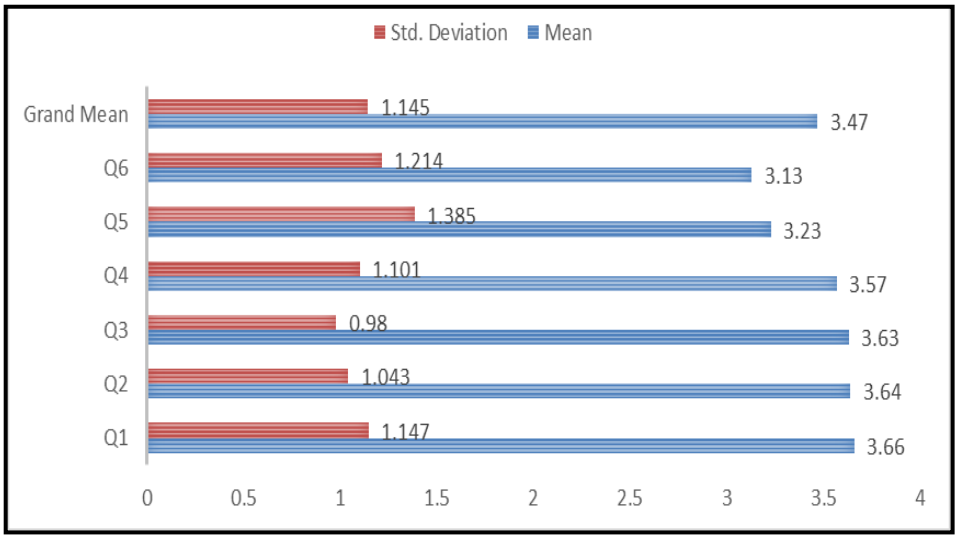

Figure 6. Assessment

Testing Hypotheses

The researcher demonstrates below testing the hypotheses pre-stated to determine whether they supported/ accepted or rejected:

***Ha$_1$**: There is a significant difference in perceptions at level (a=0.05) between male and female students at Mogadishu University towards the virtual classroom instruction during the COVID-19 pandemic.*

Table 7. Results of Hypothesis 1 Related to the Gender

ANOVA							Decision
		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**	
Level of using ICT	Between Groups	62.699	1	62.699	27.464	.000	Ha Accepted
	Within Groups	20605.914	9026	2.283			
	Total	**20668.612**	**9027**				
Content shared and Delivery Methods	Between Groups	1208.908	1	1208.908	33.082	.000	Ha Accepted
	Within Groups	329833.223	9026	36.543			
	Total	**331042.131**	**9027**				
Communication and Interaction	Between Groups	24.680	1	24.680	3.658	.056	Ha Rejected
	Within Groups	60891.290	9026	6.746			
	Total	**60915.970**	**9027**				
Assessment	Between Groups	27.359	1	27.359	1.771	.183	Ha Rejected
	Within Groups	139429.483	9026	15.448			
	Total	**139456.842**	**9027**				

The summary of the result presented in Table (7) indicates P-values of items; the level of accessing to VC, and content shared with delivery methods are less than (a= 0.05). The implication of this result is that there is a significant difference of perception between male and female students at Mogadishu University for the two items, while the P-values for the communication with interaction and assessment are greater than (a=0.05) that means there is no significant difference in perception

between male and female students towards the communication with interaction and assessment conducted in the VC instruction.

Ha_2: *There is a significant difference in perceptions at level (a=0.05) among the students as faculties at Mogadishu University towards the virtual classroom instruction during the COVID-19 pandemic.*

Table 8. Results of Hypothesis 2 Related to the Students as Faculties

ANOVA							Decision
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	
Level of using ICT	Between Groups	1099.389	8	137.424	63.335	.000	Ha Accepted
	Within Groups	19569.224	9019	2.170			
	Total	**20668.612**	**9027**				
Content shared and Delivery Methods	Between Groups	13127.850	8	1640.981	46.553	.000	Ha Accepted
	Within Groups	317914.281	9019	35.249			
	Total	**331042.131**	**9027**				
Communication and Interaction	Between Groups	2413.267	8	301.658	46.505	.000	Ha Accepted
	Within Groups	58502.704	9019	6.487			
	Total	**60915.970**	**9027**				
Assessment	Between Groups	6409.029	8	801.129	54.307	.000	Ha Accepted
	Within Groups	133047.813	9019	14.752			
	Total	**139456.842**	**9027**				

Table (8) shows the *p-v*alues of 4 sections of the study instrument are less than (a= 0.05) therefore the hypotheses 2 "*There is a significant*

difference in perceptions at level (a=0.05) among the students as faculties at Mogadishu University towards the virtual classroom instruction during the COVID-19 pandemic." was supported.

Ha_3: There is a significant difference in perceptions at level (a=0.05) among the students based on level of years *at Mogadishu University* towards *the virtual classroom during the COVID-19 pandemic.*

Table 9. Results of Hypothesis Related to the Level of Years

ANOVA							Decision
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	
Level of using ICT	Between Groups	38.612	4	9.653	4.222	.002	Ha Accepted
	Within Groups	20630.000	9023	2.286			
	Total	**20668.612**	**9027**				
Content shared and Delivery Methods	Between Groups	1529.257	4	382.314	10.469	.000	Ha Accepted
	Within Groups	329512.874	9023	36.519			
	Total	331042.131	9027				
Communication and Interaction	Between Groups	534.807	4	133.702	19.980	.000	Ha Accepted
	Within Groups	60381.164	9023	6.692			
	Total	**60915.970**	**9027**				
Assessment	Between Groups	4436.576	4	1109.144	74.121	.000	Ha Accepted
	Within Groups	135020.266	9023	14.964			
	Total	**139456.842**	**9027**				

The summary of the results presented in table (9) indicate that P-values for items; the level of accessing to VC, and content shared with delivery methods communication interaction as well as the assessment are less than at (a= 0.05). The implication of this result is that there is a significant difference of perception among the students at Mogadishu University according to their levels of years. Thus hypothesis three was accepted and supported.

Ranks of the Students' Perception of VC during COVID-19 According to Faculties and Levels of Years.

The following tables and figures reveal the ranking level among Faculties and Academic Years at Mogadishu University on their perceptions of the virtual classroom instruction during COVID-19 Pandemic. The author compares the means of a section of instrument/questionnaire have been adopted in the study and determines the total percentage that each section of the questionnaire gained to reach the decision of the ranks of the faculties and the Academic Years.

Table 10. Ranks of the Students' Perception of VC during COVID-19 According to the Faculties

Faculties	Level of Using ICT	Content Shared & Delivery Methods	Communication & Interaction	Assessment	Total Percentages	Decision
Share'a & Law	9.38	37.67	12.69	20.07	79.81	Good
Education	8.87	33.1	10.59	17.85	70.41	Good
Arts & humanities	8.81	36.44	11.77	17.63	74.65	Good
Economics	8.26	33.83	11.13	17.44	70.66	Good
Health Science	8.4	35.31	11.75	18.59	74.05	Good
Political Science	8.84	35.05	12.02	18.04	73.95	Good
Medicine	8.46	35.09	11.27	18.57	73.39	Good
Computer Science	9.09	35.7	12.02	19.34	76.15	Good
Engineering	8.81	33.56	11.11	16.87	70.35	Good
Grand Mean	8.7	35	11.5	18	73	Good

Table (10) and figure (7) below prove the ranking levels among faculties towards perception and satisfaction with virtual classroom instruction at Mogadishu University during COVID -19 pandemic, each faculty gained a positive level (Good level) as well as the total grand of the faculties (73) which reveals a Good level. The faculty of Share'a and Low obtained the top rank with (79.81), the second rank reached by faculty of Computer Science and Technology with (76.15) and the

faculty of Arts and Humanities attained the third position with (74.66) and the faculty of Health Science the fourth rank (74.05).

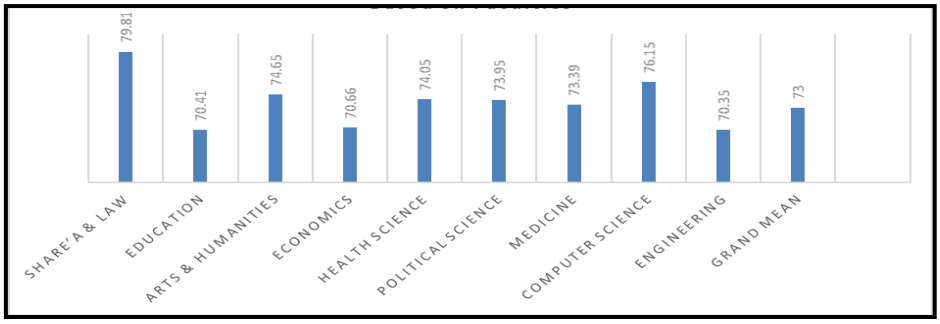

Figure 7. Total Percentages of the Student's Preceptions of VC Based on Faculties

Table 11. Ranks of the Students' Perception of VC during COVID-19 According to the Levels of Years

Academic years	Level of Using ICT	Content Shared & Delivery Methods	Communication & Interaction	Assessment	Grand mean	Decision
First year	8.65	35.57	11.85	19.27	75.34	Good
Second year	8.49	34.56	11.31	17.73	72.09	Good
Third year	8.62	34.94	11.46	18	73.02	Good
Fourth d year	8.63	35.22	11.4	18.14	73.39	Good
Fifth year	8.6	34.54	11.15	17.24	71.53	Good
Grand mean	8.6	35	11.43	18.1	73	Good

Table (11) and Figure (8) below highpoint the ranks of the students according to the academic years on their perceptions of virtual classroom instruction. The results showed a positive perception with the grand mean (73), thus it is a good level. For the ranks of each academic year in terms of their total percentages, the students of the first year have a higher perception of VC with (74.35), the fourth year gained the second level (73.39), and the third level for the third year with (73.02).

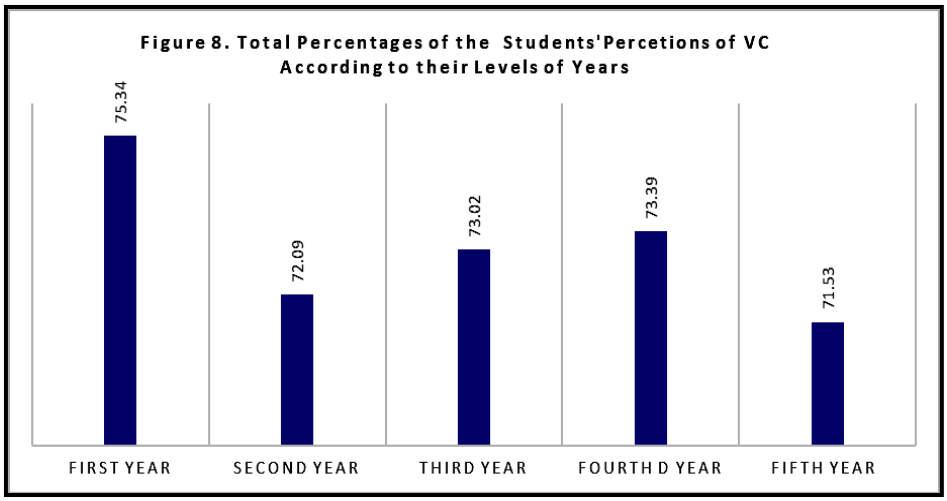

Figure 8. Total Percentages of the Student's Preceptions of VC According to their Levels of Years

Discussion of the Findings

Based on the objectives of this study and the hypotheses established by the researcher, the main findings are presented as follows:

Mogadishu University students have a positive perception of virtual classroom instructions during COVID-19 Pandemic at level Good (73%)

according to the study weighing scale. This result is a line with (Amritesh & Jeayaram, 2019) who underlined that virtual learning environments easy to understand for the students as well as the results found by (State, 2017)who expressed a view that virtual classrooms have positive impacts on the students and (Gedera, 2014) reached a similar result that virtual classroom affected student effectively.

All hypotheses at level a=0.05 for the four sections of the questionnaire of the study namely; the level of accessing virtual classroom instruction, content sharing, and delivery methods, communication with interaction and assessment, if there are any differences of perceptions among the students according to the gender, the faculties and the level of years, all these hypotheses were accepted except the sections "communication with interaction and assessment" for the gender were rejected and not supported therefore there is no significant difference perceptions between male and female students for the communication, interaction, and assessment during the virtual classroom.

Findings of the items for the section one of the questionnaire "Level of accessing VC" explored that the students have smooth access to the VC instruction sessions via internet effectively, this result is along with the result of (Guy Posey, Thomas Brugess, Marcus Eason, & Yawna Jones, 2010) they opined that the Internet is a very powerful tool that strongly affects teaching and learning activities.

For the items of section two, the results showed a positive perception of the students and their satisfaction with the content shared in terms of

teaching and learning materials provided and how the lecturers delivered the courses during virtual classroom instruction sessions this result, is an agreement with Sathya and Thangadurai (2017) found that the virtual classroom provides co-ordination, management and supervision of long term and day to day curriculum arranging, distribution and operations. These results stress that the virtual classroom is appropriate to the teaching and learning process (Sathya & Thangadurai, 2017).

The findings of questions of the section three "Communication and Interaction" a total mean proved that a potential of communication and interaction between teachers and the students on one hand and among students during sessions of the virtual classroom on the other hand, this is along with the results of Chadha(2018) who opined that e-learning enhances collaboration, discussions, and growth of educational experience of learners (Chadha, 2018) as well as the findings of Cakyrodlu(2014) who expressed a view of the virtual classroom improves teaching, learning, and learner interaction. (Çakýrodlu, 2014)

Finally, the items of the section four of the research instrument " Assessment" adopted via the virtual classroom was adaptable for the student and their perception was confident level, this result indicates how the virtual classroom instruction enhanced students' performance of the assessment this result in line with the result of Aniefiok, Ekpo-eloma, & Inebehe(2016) they discoursed that the use of the virtual classroom influences student academic performance(Akpan et al., 2016) as well as the findings of (Aniefiok, Ekpo-eloma, & Inebehe, 2016).

Recommendations

Built on the findings of this study, the researcher recommends as follows

1. Mogadishu University should accelerate online courses via virtual classrooms and devote maximum efforts on the provision of the required equipment and facilities. This will be helpful to keep abreast of modern education developments that arose in Somalia during COVID -19. It is expected in the near future, online courses will be launched at many Universities in Somalia.
2. Mogadishu University should improve the necessary skills to the students and the lecturers such areas more needed to engage the virtual classroom instruction.
3. Mogadishu University as a member of Somali REN (Research and Education Network), uses currently the internet service provided this network, should empower the internet to be benefited by both the students and the lecturers. This will contribute the active accesses of both the students and the lecturers to the virtual classroom instruction.

Further Studies

The researcher suggests further studies on areas of the online courses include:

1. The study on blended learning in higher education, Somalia.
2. The study related to the flipped learning at the tertiary education in Somalia.

3. A comparative study on the physical classroom and the virtual classroom in higher education, Somalia.

Contribution Knowledge of the Study

This study has explored one of the vital topics for the new education system in Somalia during the COVID-19 pandemic when all educational institutions locked down and the virtual classroom instruction became the only solution to continue teaching and learning processes at the universities not only in Somalia but the most universities around the world. Since, the virtual classroom instruction, via ZOOM was the new method of delivering lectures and learning materials at Mogadishu University, this study aimed to ascertain how the extent of the student's perception of virtual classroom instruction during COVID-19. The findings showed a positive perception of VC as a successful process. Thus, this result encouraged Mogadishu University leadership to plan in the near future to launch the online courses as a part of the education system of the university.

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ISSN 2519-9781

A Study Analysis on Challenges and Opportunities for Somali education system (2016-2021)

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Abstract

The Somali education system came through a difficult transition from total destruction into recovery scheme. While progress was achieved over the last years in the provision of the development of public education, the frequency ensuing period of insecurity led to a disruption of normal socio-economic life in many areas of the country. Consequently, the country has incorporated matters of education quality reform and policy-making processes. It is therefore clear that education sector in the country is facing different challenges, opportunities and trends requiring reforms in the management and governance styles. The rise of partners, internal factors, together with the rapid pace is created and utilized. There is an urgent need for institutions of quality performs to adjust rapidly the needs of the education system, and to deal with some of these trends, challenges and developments.

The study objectives are outlining the lines of change affecting education systems in the last four years (2016-2020) to review the challenges and opportunity in the performance and its progress including the capacity and gaps. Actual fieldwork was carried out in federal and federal state institution capacity in general with the understanding that there are significant differences across the different regions of Somalia.

The findings are challenges of high rates of school abrasion and poor learning outcomes, as well as weak capacities, limited available resource, which effective services deliver, there is a growing need for regulation in all education sectors and coordination challenges in decentralized education sector provision. The needs come into key factors across the subsectors that could affect learning and enrolment in the schools.

Keywords: Quality Assurance, Challenges, Opportunities, Policy and MECHE

1. Introduction

As the foundation and essential driving force of economic, social, and human development, education is at the heart of the change that is dramatically affecting our world in the areas of science, technology, economics, and culture. It is the reason behind social change and scientific progress, and in its turn, it is subjected to the results of progress that it itself has engendered, both with regard to content as well as methods and established aims. (Sadegh Bakhtiari, 2011).

The right to education for every Somali citizen is enshrined in the constitution under Article 30, which also underscores the right to free

education for every child up to secondary level (Draft constitution 2012). Somalia education having suffered major and prolonged disruption continues to require special attention in the process of national reconstruction and development.

Global obligations assure vital exchange experience enhancing many areas of the human development especially education; it's a major concern for all societies. Millennium Development Goals (MDGs) obliged all governments to have in place strategies that ensure achievement to advance sustainable socio-economic development; those goals' timeframe was in 2000-2015. The international civil society network (Social Watch) pointed out in 2013, that Somalia is unlikely to meet most, if any, of the (MDGs). (Social Watch 2013) Eventually, the country failed to improve one indicator of the (MDGs) including education sector development. In September 2015 United Nations member countries committed global Sustainable Development Goals (SDGs) for target deadline is 2030. Goal 4 ensures inclusive and equitable quality education and promotes lifelong learning opportunities for all. (UN, 2015) The main barriers to education in Somalia include, limited oversight and outreach by Ministry of education, insufficient resource, it has limited control over education services this means that there are a wide variety of actors offering education which is outside of the control of the government. The policy gap limits ministry's ability to monitor and enforce quality education as stipulated in the constitution and the National Development Plan. To address the education sector challenges, the ministry requires to reform and set clear policies, standards and guidelines. However, the study provides the findings based

on the situational analysis, strategic plans of the ministry and needs established to align the education sector with the National development agenda of the Federal Government of Somalia.

2. Statement of the problem

How the system can overcome the challenges and maintain opportunities? While there are prospects for the Somali education system moving forward, it is yet to be achieved the desired outcome. The system delivery and its capacities in federal and state level have remained weak with very limited resources to support service delivery. The real challenge is inadequate finance, low capacity of the human resource, in addition to inconsistent ministerial policy, lack of minimal standards, poor coordination and poor decision-making infrastructure.

3. Objectives of the study

The study seeks to achieve the following objectives:

1. To review the challenges and opportunity in the Somali education system performance and it's progress including the capacity and gaps.
2. To provides the findings of the capacity analysis and makes recommendation based on the situational analysis especially the internal and external capacity of the system.
3. To review the education system structures, management and responsibilities, focusing on the analyzing systems, processes and mechanisms for performing the functions to determine the efficiency.

4. Determine the managerial and governing skills gaps as well as suitability for tasks undertaken to determine quality needs.

4. Research questions

1. Is the education system in Somalia having enough capacity to deliver a relevant quality education for Somali people?
2. What is the current challenge and opportunity requiring to harmonizing policies, maintain resources, capacity building, curriculum development, teacher training and sustain quality education?

5. Significance of the study

The study contributes to understanding in depth how the functional role of the education system in Somalia is suitable in the last four years; this will help to safeguard institutional mission and identity.

Methodology

Methodology consists mainly of literature and documentary study reviews method used to collect, analyze and interpret available data and publications to find patterns and generalized results to research questions. The assessment and data analysis is carried out through contents and discourse analysis included:

1. Reviewing on the existing documents in the Ministry of Education Culture and Higher Education for the last four years to assess real performance of education systems, processes and

mechanisms through determining the challenges and opportunities of education subsectors developments.

2. The review focused on the annual joint reviews documents. Education Sector Strategic Plan (ESSP) related documents. The school mapping and needs assessment documents, national curriculum framework and teacher training documents.
3. The study also used analyzing interviews with a sample of some ministry members and education experts, interviewed to determine challenges and opportunities.

Education System Situation Analysis:

Under the capacity development, the ministry of education is working towards reversing factors that undermine delivery of quality education in the Federal Government of Somalia including limited education sector capacities, infrastructure and basic facilities. The Ministry works with other key stakeholders in the sector including the government, private sector, civil society organizations and development partners. The private education remains the major players in the education sector to date, governing 60% of schools. There is wide variation in levels of development between urban, rural and nomadic areas, between males and females, and between different regions of Somalia. (MECHE, JRES, 2019).

The education sector in Somalia comprises of six sub sectors: (The National Development Plan 2017-2019)

1- Pre-Primary education

2- Primary Education

3- Secondary Education

4- Technical vocational Education and Training (TVET)

5- Higher education

6- Non-Formal Education

There is no uniform education system as the education sector is largely managed and supported by partners, including regional administrations, international NGOs, Community Education Committees (CECs), community-based organizations (CBOs), education umbrella groups and networks, NGOs, private sector, and religious groups. There is wide variation about the levels of education services delivered by the government between the different regions. Various state authorities have developed their own policies and strategies to fit into their unique contexts and leverage their diverse potentials. (MECHE, JRES, 2019)

The government is responsible for providing quality public education in the country. Ministry of Education in federal and state level mandate is to deliver a relevant and quality education and training for all Somalia. They have limited control over education services in many areas, and have no harmonized curriculum, teacher training and limited supported teaching force. This means that there are a wide variety of factors such as civil society and private institutions offering education, which is sometimes outside of the jurisdiction and control of the government. (MECHE, JRES, 2019).

The major barriers to education in Somalia include lack of security, insufficient teachers, limited oversight and outreach. (National Development Plan 2017-2019). Somalia has one of the world's lowest gross enrolment rates for primary school-aged children in sub-Saharan Africa at 30 percent children at primary education level and 26 percent for secondary education. (The Somalia education cluster report, 2017). Over-age enrollment is very common all throughout the Somali formal school system due to delayed entry at the primary level which affects the entry at secondary and tertiary levels of education. (National Development Plan 2017-2019).

The National Development Plan acknowledges "the high number of over aged children enrolled in school (35% are aged 14-17 years, and 15% are 18 years or older) with the country's enrollment to secondary being the lowest in the region". The policy gap in the education sector has continued to deny the children of Somalia equitable access to quality education as stipulated in the constitution and the National Development Plan as it limits ministry of education ability to monitor and enforce quality education best practices in the country. Otherwise, the education system has been hampered by lack of credible data, which had an effect on planning. Data is primarily collected via partner NGOs and INGOs although all partners were not willing to share data with the government with limited oversight on their provenance and limited capacity to deliver interventions due to security, logistics, and financial challenges. (The National Development Plan 2017-2019) According to the finance directorate of federal ministry of education that 'total 5.01% of the national budget (2%), has been allocated to education. (1.5%)

contributing to budget allocation for Somali National University. (0.5%) Somali Academy of Science & Arts. The clear increase in domestic financing demonstrates the government's commitment to the education sector. Further increases to 12% are required to achieve the 2020 target. (MECHE, JRES, 2019). The lack of funds in the sector has affected the operational and maintenance costs for schools and the recruitment of qualified and provision of adequate and appropriate teaching and learning materials including textbooks. (National Development Plan 2017-2019)

There are no systematic teacher training and continuous professional development programmes, many teachers in schools are without professional pedagogical and teaching skills. The existing in-service training requires a standardized term and frequency to ensure teachers acquire necessary skills. Some of education workers such as umbrella groups are currently filling the gap vacated by the government in training teachers. (MECHE, 2019)

Some other challenge embedded in teaching language. The adoption of a language as a medium of teaching is a policy decision that should be based on research evidence and with an eye to the future, including the implication of language on identity and local culture. There is multiple medium of instruction. Arabic, Somali and English are now used in the schools. Public schools use Somali language, as an instruction language while privately owned schools use English and Arabic. The draft education policy favors use of English as a language of instruction in schools. (MECHE, 2019).

The federal ministry of education faced several challenges, including: Insufficient of standardized Curriculum. The education system in the country is not coordinated posing curriculum management challenges. There are parallel systems based on the curriculum. Most schools used 4-4-4 systems in which students spend four years each at primary, intermediate and secondary schools while other schools used the 6-3-3 systems where students spend six years in primary, three in intermediate and three in secondary. (MECHE, 2019)

Educational policies reform is an important issue in any post conflict nation. Somali education systems policies require an intensive effort from all the nationwide to establish a suitable policy emphasis on quality education and promote international education standards to enhance competitiveness of Somali citizens to compete for opportunities globally. The federal government of Somalia has made some strides in the development of the education systems and structure but still lacks key policies. Political and social risks affecting communities in Somalia have led to displacement, delays and upset. There are some education policies and strategies in draft form and awaiting approval including;

Education Sector Strategic Plan (ESSP) 2018-2020. The plan aimed to overcome the challenges contributing to limited access to quality education, inequity, weak governance, poor service delivery and limited sector capacity. The strategy is based on international goals and conventions such as Sustainable Development Goals (SDG) and Education for All (EFA), the Convention of the Rights of the Child (CRC), the International Safe Schools Declaration, and national

development agenda spelt out in the Constitution, the Education Act and the National Development Plan 2017-2019. The strategy is the sector-guiding document for planning, partnerships and implementation of programs. (MECHE, 2019)

Draft Education Policy 2017. Ministry of Education drafted the education policy create an enabling environment for quality education and sector development. (MECHE, 2019)

National Curriculum Framework 2017. Ministry of Education developed a curriculum framework with the support of UNICEF. (MECHE, 2017)

Challenges and Opportunities for education Access and quality

The quality of education is ultimately judged by learning outcomes of children in school and literacy rates. The overall adult literacy rate, which according to the 1975 population census was 54 percent, dropped to 40 percent. According to Population Estimate Survey for Somalia (PESS ,2014), main reasons for this decline were civil war and conflict. However, now literacy rates are higher for younger Somalis, which demonstrate that there have been improvements in educational quality generally. Since 2011, roughly are 2.6 million children and adolescents have enrolled in primary education across Somalia. While this is impressive progress in enrolment, the national Gross Enrolment Ratio (GER) for primary education has remained low at 30 per cent for primary level and 26.5 per cent at secondary level. The Net Enrolment Ratio (NER) for both primary and secondary levels is considerably lower than

the comparable Gross Enrolment Ratio (GER) at both levels. (UNICEF 2017)

In 2019, a total of 1,159 schools were mapped in Benadir and some federal member states (FMS) except Puntland and Somaliland. There are 339 schools in Benadir region, which are 30% of all schools assessed, 312 in Hirshabelle (27 %), 178 in South West (15%), 176 in Jubaland (15%) and 154 schools for Galmudug (13%). (MECHE, 2019)

Table 1: Enrolment summary from 2013-2019

School Type	Gender	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Primary	**Male**	44998	42887	N/A	119536	128937	135944	142950
	Female	36328	36020	N/A	94562	104520	110920	117319
	Total	l 81.326	78,907	N/A	214,098	233,457	246,863	260,269
Secondary	**Male**	11725	14362	N/A	37309	48740	49937	51133
	Female	7323	9688	N/A	25487	36842	36041	35240
	Total	l 19,048	24,050	N/A	62,796	85,582	85978	86373
Total		**100374**	**102957**	**N/ A**	**276,894**	**319039**	**332841**	**346642**

Source: Ministry of Education Culture and Higher Education, Annual Education Statistics Yearbook: 2018/2019

Despite the progress made in education sector, several challenges still face the education sector generally, such as inadequate finance, low capacity of staff at the MoECHE, low and inconsistent salary payments, lack of minimal standards of service and extremely low educational budgets. These challenges continue to impede the effective delivery of

education services in all regions. Communities offer a large part of schooling, which puts an extra burden on parents especially in the rural areas. (MECHE, 2019). The education authorities face substantial resource and capacity restrictions, and have struggled to coordinate inputs at decentralized levels, in particular, stakeholders appear to have limited inputs, in spite of recent progress and achievements in this regard. As such, when considering strategies and approaches to implement the recommendations in this section, partners may wish to consider how to ensure the appropriate consultation and inclusion of stakeholders outside of Mogadishu on decisions, which may affect them. (MECHE, JRES, 2019). Some member states have developed their own policies and strategies to fit into their unique contexts and leverage their diverse potentials. For instance, Somaliland, Puntland and Jubaland state has enacted a local policy. (MECHE, 2019)

Challenges and Opportunities for Curriculum Reforms

Curriculum reform has a dubious reputation, with more sobering than real and lasting success stories. ‘Change in education is easy to propose, hard to implement, and extraordinarily difficult to sustain’. (Cuban, 1992; Fullan, 2007; Leyendecker, 2008). (Hargreaves and Fink (2006).

The Ministry of Education developed a National Curriculum Framework in 2017, the document guides how the curriculum vision is translated into practice at the school level developed (MECHE, JRES, 2019). The lower primary education curriculum has revised, particularly in the early grades; the (grade 1-grade2) textbooks have been distributed to some regions in 2018. The upper primary textbooks were also

developed later, published and planned to distribute in 2019. All curriculum textbooks in low primary, upper primary and secondary are completed in 2020. (MECHE, 2020) Though, schools are implementing the syllabus based on the new curriculum, still the precise number of schools using the textbooks is unknown. However, ensuring sufficient proliferation and training on the new country-wide curriculum and materials could therefore not only help set clear expectations but also allow for effective comparison of schools. A positive aspect of the new curriculum, which was noted by interviewees, was the fact that the new curriculum is written and delivered in Somali language, rather than English language and/or Arabic, which aids understanding on the part of students. (MECHE, JRES, 2019) Importantly, not all learning materials currently used in schools are aligned to the curriculum framework. The challenges are aggravated by the absence of a revised teacher code of conduct. At the same time, divisions of authority between federal and regional governments are remains contested with a lack of clarity over accountabilities for service provision across federal and regional government structures and ongoing debates over decentralized state building, which in turn risk inflaming clan-based conflicts and aggravating inequities in the country. (MECHE, JRES, 2016). There are many visible gaps in the current curriculum such as:

1) Although the curriculum reformed, there is a lack of internal consistency within the curriculum design.
2) Insufficient cooperation between various actors in educational development.

3) Poor capacity of curriculum development department to develop and implement a curriculum capable of delivering quality education in the country.
4) The organization of the textbooks and printing is very poor.
5) Many teachers are not train on the curriculum.

Teacher's development; Challenges and Opportunities

Before 2012, there has been no data or any real statistics on the teachers sector, which runs the schooling system in the country. The gap vacated by the government since its collapse in 1991 filled by private institutions. However, the ministry recently undertaken some assessment mechanisms to train small number of teachers in Somali National University (SNU) and Mogadishu University and (FPENS). Although ministry of education undertaking some efforts to accelerate arranging school system data management in the country, however there is a big challenge including teacher training infrastructure, policy, teacher code of conduct and lack of a tough teacher management system and a strong accountable supervisory mechanism is the key detriments to the strengthening of the education process.

The Education Sector Strategic Plan (ESSP) indicated that 'The MECHE has tried to improve the teacher training infrastructure situation through auctioning the building of new teacher training facilities. There are two teacher-training institutes that are already operational (one in Hargeisa and another in Garowe).

Table 2: Teachers Summary for the year 2018/19

School Type	Gender	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Primary	Male	2126	2219	N/A	5639	5790	6033	6275
	Female	273	399	N/A	505	681	890	1098
Secondary	Male	1171	1205	N/A	2788	3245	3178	3110
	Female	33	57	N/A	57	115	127	139
Total		**3603**	**3880**		**8989**	**9831**	**10227**	**10622**

Source: MECHE, Annual Education Statistics Yearbook: 2018/2019.

The above table shows the number of teachers in the school years of 2012-2013 and 2013-2014, estimation covers Banadir region because the ministry's overall capacity is limited, there is no functioning public schools except few low capacity schools in Banadir region. The initiative of the ministry and UNICEF in Go2School program in 2013 was unsuccessful and totally collapsed. So no qualified teachers were inherited. In 2015-2019 Teachers Summaries covered only ten regions from four federal member states and Benadir apart from Puntland and Somaliland. There was no data assessed by the government in 2014-2015, school year. This is indicated by the vulnerability of the teacher development sector.

The Somali education system dominated by private sector and community education institutions from Quranic schools to higher education levels managed by umbrella organizations. In Banadir region alone has 24 public and 324 private schools according to the MoECHE,

Education Management Information System (EMIS) data for the year 2017.

With so many diverse data about the quality of teachers in the country, it has become necessary to evaluate the status of basic skill and capacity of the teachers. Teacher Proficiency Testing programme (TPT) conducted by the federal ministry of education and its partners in the first time in 2019, determining the teacher competencies in teaching methodology (pedagogy) and subject content skills in the subjects of Mathematics, Somali Language, Islamic Studies as well as English Language. The program implemented in Banadir region teachers only as a pilot. (TPT, Assessment Report, MECHE, 2019).

The (TPT) program provides findings that despite the good teaching and learning environment both primary and secondary school teachers have very little knowledge of how to deliver the subject content. In comparison between the public and private primary schools, the scenario of performance in pedagogy isn't very different. The variation between the trained and untrained teachers' performance in Pedagogy isn't also very significant level. However, there is an indication show that teachers with higher qualifications have relatively better performed in all subjects including pedagogy. In the term of the primary school teachers in both public and private teacher performs is poor in all subjects except Somali Language. The English Language and pedagogy has dismissal performance across all categories of teachers. (TPT, Pilot Assessment Report, MECHE 2019) The ministry of education conducted to recruit the qualified teachers, manage them professionally, remunerate, while

executing a robust code of conduct with consequences for indiscipline not in place (MECHE, 2019).

Examination and Certification; Challenges and Opportunities

Progression in education should be defined in the education policy and curriculum frameworks or qualifications policy to enable education institutions give students' quality testing mechanisms to allow them to compete in the job market. The MoECHE started to organize centralized secondary leaving certificate examination in 2014. Prior of that date this examination was administered by umbrellas of the schools. (MECHE, Examination & Certification Department, 2019) The ministry examination management imparked many challenges including poor ability to plan exams, invigilate and marks. In 2018, the centralized secondary school exam started on Saturday, May 19, 2018. The Ministry announced the test result on July 25, 2018 by a letter from the minister's office. (MECHE, Examination & Certification Department, 2019)

Table 3: Number of the students and their locations (2018)

Location	Number of students	%
Benadir	23161	80%
Galmudug	1306	4.6%
Hirshabelle	1821	7%
Southwest	2340	6%
Jubbland	806	2.4%
Total	25,628	100%

(MECHE, Examination & Certification Department, 2019)

The total number of the boys was 16,520, equivalent to 64%. And the girls total was (9,108), equivalent to 36%. - The number of students who passed in this exam equivalent to 19,537 (78%), while 5,641 (22%) failed. The number of students in this year was higher 32% than the previous 2017; their total reached 18,600 students. (MECHE, Examination & Certification Department, 2019).

In 2019, the secondary school exam took place on May 17, 2019; the total number of the students was 29,434. The ministry announced the result on July 23, 2019, through it's new website: www.soneb.gov.so

Table 4: Number of the students and their locations (2019)

Location	Number of students	%
Benadir	23161	79%
Galmudug	1306	4%
Hirshabelle	1821	6%
Southwest	2340	8%
Jubbland	806	3%
Total	29,434	100%

(MECHE, Examination & Certification Department, 2019)

The number of the boys was (18,584), equivalent to 63%, while the number of girls estimated (10,850) (37%). The number of students passed the exam was equivalent to 76%, while it is 24% fells. - The total number of students in 2019 was more than 15% in 2018. (MECHE, Examination & Certification Department, 2019)

Challenges and Opportunities for Higher Education

Along with the government university, private institutions and businesses are taking keen interest to create many higher education universities. The department of culture & higher education has the responsibility to develop quality assurance mechanism to standardize higher education in the country, but inconsistent ministerial policy at federal and member states level, the department has only embarked on to assess and register the exits universities without accreditation to ensure set up a platform for quality higher education regulation arrangement in the near future.

In the Education Sector Strategic Plan (ESSP) 2018-2020 prepared by the MOECHE, the following challenges have been highlighted in the higher education subsector:

- There are no comprehensive national higher education laws and no national commission for higher education; despite nominated five people as commission without clear policy and strategy.
- The sector is run with no curricula guidance or quality benchmarks or other key forms of support.
- Weaknesses and deficiencies in university management system, including the absence of clear regulations governing such processes, while challenges persist in the governance structure such as poorly defined lines of authority and delegation.

- Fees charged by private universities may be prohibitive and could exclude many eligible Somali students from entering into higher education.

The higher education sector in Somalia requires the legal and policy backing external quality assurance agency. The Education Sector Strategic Plan (ESSP) 2018-2020 stated that "The Ministry of Education, Culture & Higher Education will establish a higher education commission comprised of representative from federal and federal member state levels. The commission will be established with its functions and duties to be agreed upon and officially mandated once the Higher Education Act is officially ratified by parliament". Unfortunately, the commission established by the minister without specific law provides operational autonomy and separate financing under a ministry, and without proper mandate and consultation with the various education stakeholders. Generally, the main categories of external quality assurance agency are: (Tempus tne-qa, module 4, EN CIS Europe).

1) **Governmental**, whereby the agency operates directly under a ministry; for example, (Supreme Council of Universities, Egypt)
2) **Quasi-governmental**, the agency is established by a specific law that provides operational autonomy and separate financing under a ministry like (Commission for Higher Education - Kenya; Commission for Higher Education - South Africa).
3) **Private independent**, the agency is independent in operation and financing, not under the control of any other stakeholders; (Council for Higher Education Accreditation, United States of America (CHEA-USA); Quality Assurance Agency (QAA-United Kingdom)

4) **Professional association**, where member institutions agree on sets of rules, standards and guidelines that would govern them and the processes and procedures to be followed in determining compliance.

The findings of the Education Sector Analysis (2016) indicate, "The current state of university and higher education in Somalia requires firm intervention in order to align practices in the subsector with national policy and improve quality and relevance. The Higher Education Commission has been appointed in July 2019 to put in place the Quality Assurance mechanisms and guidelines for universities and improve the quality standards for universities in Federal Government of Somalia. (MECHE, JRES, 2019). Although, two higher education commissions in Somaliland and Puntland set up in three years ago. The proposed Commission for Higher Education in federal ministry of education now is look like a semi-autonomous/quasi-government agency that would receive some level of funding through government budget provision. It however carries out its functions based on policies and work plans that are approved and regulated by its own governing body (Commissioners). It may also levy fees for services rendered to higher education institutions, individuals and organizations and otherwise raise additional funds to facilitate financing of its entire operation.

The commission needs long time to develop a robust performance framework to review the quality of teaching, scholarships and external engagement of academic staff and engage with institutions to enable them collectively meet the national priorities, without wasteful duplication.

The commission has many challenges to overcome including lack of specific law that provides the commission's mandate to be operationally autonomy and separate financing under the ministry or could be independent in operation and financing, not under the control of any other stakeholders. Higher Education Act still isn't officially ratified by parliament. (MECHE, Education Sector Strategic Plan (ESSP) 2018-2020.

Discussion of Findings

Due to high rates of school abrasion and poor learning outcomes, as well as weak capacities, which effective services deliver, there is a growing need for regulation in all education sectors. The needs come into key factors across the subsectors that could affect learning and enrolment in the schools. In the recently established federal government structures, laws and policies on decentralization of administrative functions for social services have not yet been completed. At the same time accountability and transparency mechanism remains weak in terms of reporting on results and utilization of resources. The proportion of the national budget allocated to the education still is inadequate as the federal and state levels make little budgetary allocation.

Although there was some progress in the education process, still some challenges exist. The federal ministry of education formulated national education policies and guidelines, strategies and standards, curricula and teacher administration system, but that entire document not ratified by the parliament.

There is a strong correlation between lacks a coherent education policy reforms and a system performance to monitor the occurrence and impact of different types of learning. The education system also lacks an agreed upon legal framework to guide decentralizing education services. The challenges affected by poor regulatory environment and coordination between the federal and state level including clear accountabilities between different levels of administration.

The Internal and external capacity has had crucial influences on the ability in the system delivery to provide quality education services to the public.

The study used a documentary study included analyzing existing documents in the ministry and related agencies in the last four years to shed light on the performance and development of the education service delivery, determining the challenges and opportunities in the subsectors developments. The analysis included;

1. Internal and external capacity of the system,
2. Reviewing and determining adequacy of the education system structures, management and responsibilities.
3. Analyzing systems, processes and mechanisms for performing the functions to determine the efficiency.
4. Assessing the human capacity and skill gaps as well as suitability for tasks undertaken.
5. Assessing automation gaps to determine modernization needs.

The external and internal finding is undertaken in line with the PESTEL and SWOT Analysis.

1. A PESTEL analysis is a framework or tool used to analyze and monitor the macro-environmental factors that may have a profound impact on an organization's performance. The letters stand for Political, Economic, Social, Technological, Environmental and Legal.

Table 5: Summary of PESTEL Analysis

Political Factors	Economic Factors	Socio-Culture Factors
• Legal and policy framework still not officially ratified by parliament. • Strong correlation between lacks a coherent education policy reforms and system performances. • Security problems in various parts of the country • Poor data management in the education sectors • Limited control over education services • Weak systems and structures to support federal states coordination. • Lack of clear operational policy framework between staff at federal, state and region levels.	• Inadequate financial resources • Limited financial capacity to maintain education service in general. • Frequency delays for the school- teachers and administration salaries. • High poverty level in the communities. • Natural crisis such as floods, droughts and diseases.	• Inequality salary between the civil servant in the government and teachers across the country. • Low payment for teachers and education staff • Weakness of social awareness in their education system partnership.

Technological Factors	Environmental Factors	Legal Factors
• Lack of strategy to develop social ability of technology • Poor technology equipment for education development and management. • Limit of necessary technology skills and systems for education staff. • Lack of technical training to develop relevant education materials.	• Limit of clean environment • Poor of transport facilities • Fear of violence due to insecurity. • Problem of street blockage and checkpoints. • Pandemic of COVID-19 • Poor infrastructure and equipment in the schools • Transportation challenges for students and teachers.	• Legal framework weakness totally in • various education sectors, including staff management, service delivery, coordination and supervision.

2. SWOT Analysis

SWOT analysis is a planning technique used to identify strengths, weaknesses, opportunities, and threats related to education deliver services in Somalia. The strengths and weaknesses determine the positive and negative internal environment while the opportunities and threats assist in assessing the external environment.

Table 6: Summary of SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
1. Establishment of the Education Sector Strategic plan 2018-2020 **2.** Reestablished secondary leaving certificate examination from 2014 - 2020 **3.** Establishment of interim Higher Education Commission, July 2019 **4.** Improved education information management technologies.	1. Regulatory environment for the education sector have not been addressed. 2. Weakness of education administration system 3. Weakness of training facilities among federal and states levels. 4. Weakness of staff capacity and lack of expertise at critical levels. 5. Inadequate infrastructure and equipment. 6. Limit financial resources. 7. Uncoordinated with education partners. 8. Poor education infrastructure in the state level.	1. Increased community participation in the education services delivery. 2. Increased private contributions to support education sector envelopment perfectly. 3. Increase role of diaspora, and their contributions in the private education sector. 4. Increase global partnership and relationship in the education sector. 5. Improved school data collection mechanisms.	1. Increased insecurity in some parts of the country. 2. Limit of partnerships mechanism between ministry of education in federal and state levels to expand access. 3. Unclear data disaggregation between federal and federal member states.

The challenge is more related about the education policies reforms, weakness of the systems and structures to support federal states coordination and staff capacity and inadequate financial resources. However, the insecurity in various parts of the country is major constrain delays establishment and monitoring of sustainable education systems. But to set up reformed draft education policy, education sector strategy plan and coordinate curriculum framework was an opportunity in

education sector policies and strategies in 2016-2020 to promote quality education. Discussion of risks cut across education service delivery and sector related to governance, learning and inequity are addressed by combining into the national development priorities for building a peaceful and prosperous. The government capacities to plan for and mitigate impacts remain weak to non-existent. The main findings of the study including:

1. Poor alignment of strategies and targets across different administrative levels (Region, State and Federal) the key policy documents related to decentralization of social services.
2. Capacity building programs and training for ministry of education personnel, in federal and state level has been entirely dependent upon donors. This has damaged an intelligible government led system strengthening approach, with most beneficiaries of training being drawn from federal level.
3. There are sets of risks facing Somali education system such as conflict related risks and governance risks through different forms of corruption and the perpetuation of social and political inequities.
4. Evidence shows that; management systems related to human resources, recruitment, procurement, as well as weak financial and accountability expose the education system to inefficiencies, political manipulation and corruption.
5. Completion of the national curriculum frameworks has been an important development to ensure greater relevance of education for

learning. However, insufficient resource has meant that the curriculum has yet incompetently and poor purpose.

6. The objective of majority private universities in Somalia is for business regardless of quality education, the sector needs quality regulation, which is use a combination of capacity building, inspections and external evaluations to achieve the desired outcomes of quality and reliable education.
7. No clear line of management coordination between the federal government and members of federal states.
8. The higher education sector data is currently not collected and arranged, this attitude an additional challenge for the ministry of education in evaluating the long-run effects of its policies, transition rates to higher education, and delays in collecting and analyzing data.

Recommendations

With some opportunities on the education system in the last four years, the sector needs to concentrate the challenges and create an environment for quality education in particular:

1. Financial constraints such as expenditure on national education budget and related infrastructure are the key parameter for the government to judge the quality of education.
2. Transparent planning processes for the distribution of available resources in regions and federal states based on education needs based criteria to be developed in partnership with the Ministry of Finance and Ministry of Planning.

3. Strengthen partnerships between Federal and State levels; maintain the decentralized mandate and policy towards provision education in the local communities.
4. Develop a standardized teacher training system covering pre- and in-service training and mentoring linked to quality assurance systems through school supervision based on government quality standards for teaching and learning.
5. Greater research is required on the role of decentralization with improving efficiency of services and access to education.
6. Quality Assurance systems need to be developed and implemented.
7. A substantial effort and investment is required to implement the recently completed national curriculum framework across all schools with corresponding learning materials and textbooks available together with training and resource materials made available for teachers.
8. Capacity development strategies for strengthening government systems should be developed to increase the skills of education personnel to manage education services perfectly.

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ISSN 2519-9781

Factors Influencing ICT Applications Usage among Undergraduate Students in Somalia and Their Level of Skills.

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Abstract

ICT applications have become more popular in the field of education with a large broad range of users, including students from all levels of education. The study investigates the interrelationship among perceived usefulness, ease of use, cost-effectiveness, pressure, student's perception, and ICT applications use. The Technology Acceptance Model, Transaction Cost Economics and Theory of Reasoned Action were used to develop a research model. This study used a cross-sectional and cluster sampling technique, withsample size 382 undergraduate students from three universities in Mogadishu – Somalia using electronic data collection such as Kobo collect. Data analyzed using structural equation

modeling [SEM]. The results could help students to take benefit from different ICT applications and suggests the Minister of Education ,Cualture and Higher Education should include ICT subject in the curriculum at the levels of the secondary and the primary education.

Keywords: Usefulness, Ease Of Use, Cost-Effectiveness, Pressure, Students' Perception, TAM, TRA, TCE

Introduction

Students use different programs or apps on their computers and mobile devices (Domingo & Garganté, 2016). Students use the computer and mobile devices to complete homework, assignments, and pay bills to edit digital photos, post social media updates, and play games. They also use an antivirus program. Using ICT application, you can accomplish a variety of tasks on computers and mobile devices. An operating system is another kind of software that enables users to use applications such as a browser or word processing on a desktop or laptop(Shelly & Vermaat, 2011).

The use of technology has been changed society today as much as the industrial revolution changed society in the eighteenth and nineteenth centuries. People interact directly with computers in fields such as education, finance, government, health care, science, publishing, travel, and manufacturing. More than 70 percent of colleges offer distance learning classes(Shelly & Vermaat, 2011).

There are various types of ICT applications used by students such as:

- Productivity business and personal: these applications help the user in becoming more effective and efficient while performing daily activities at work school and home such software are (Word processing, Presentation, Spreadsheet, database, note-taking, calendar, project management and so on.
- Graphics and Media are software that is designed for the specific field of work such as power users such as engineers, architects, desktop publishers and graphic designers (Computer-aided design (CAD), desktop publishing, video, and audio editing, multimedia and website authoring and so on).
- Personal interest (lifestyle, medical, education, entertainment, and convenience).
- Communication apps (Blog, browser, chat room, email, file transfer, internet phone, mobile messaging, videoconference, and web feeds).
- Security: To protect your computers and mobile devices you can use one or more security tools such as (Personal firewall, antivirus, malware removers, and internet filters).
- File, disk, and system management (File manager, search, Image viewer, disk defragmenter, file compression disk cleanup, Uninstaller, screen saver, backup and restore, and PC maintenance).

ICT applications are available in a variety of forms such as retail, custom, web app, mobile app, mobile web app, shareware, freeware, open-source and public domain.

Retail software is copyrighted software and available for a single user or a company such as an operating system.

Custom software: is software that performs function specific to a business or industry.

Web app: is an application stored on a web server that you access through a browser.

Mobile app: are applications that you can download from app stores, sometimes called a marketplace.

Shareware is copyrighted software that is distributed at no cost for a trial period.

Freeware as the name suggests these are software at no cost by individuals or companies but it's copyrighted.

Open-source software: is software that allows users for alteration and redistribution.

Public – domain software has been donated for public use and has no copyright restrictions. Anyone can copy or distribute public-domain software to others at no cost.

Thousands of shareware, freeware, and public – domain programs are available on the internet for users to download. Examples include communications, graphics, and game programs.

Faculty of economics are incrementally becoming technology more dependent the major of students are expected to increase their skills information and communication technology (ICT). The term ICT

applications are referred to as a program created to make individuals more productive and help them with personal tasks(Shelly & Vermaat, 2011). The use of ICT means using personal computers which involves the ownership, type of computers, ICT skills, type ICT application uses and internet uses. Watson examined the role of ICT on students' learning and found that the youth committed to their job was developed by the use of IT. According to (Tcheeko & Ntah, 2005)there are four reasons for ICT application use and adaption which are cost-effectiveness, human resource capability, social acceptance, and service delivery.

Besides, there are empirical researches that have investigated Types of ICT applications used and the skills' level of nursing students in higher education(Harerimana & Mtshali, 2019).

Lack of empirical study in the factors affecting ICT usage among faculty of economic students. This study exam the interrelationships between usefulness, ease of use, cost of effectiveness, pressure from university, privacy, student's attitude towards ICT, and continuance usage of ICT applications. In this study, the researcher used two theories Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) both theories play an important role in making conceptual model and hypotheses. The main objective of this study is to explore the parameters which have influence the ICT applications to students of the economic department finally generalize the output for all students. In this study, the researcher needs to answer two research questions which are ***(1) to what extent the level skills of ICT applications (2) What are the***

factors affecting the use of ICT applications by the faculty of economics students.

Theoretical framework, hypotheses, and conceptual model

In this section, the researcher proposes the theoretical framework and hypotheses related to the subject of a student's perception of ICT application use. The main reason for the people accepted the technology or ICT applications are perceived ease of use, benefits, cost-effectiveness, pressure from the institute and perception towards ICT use(Agichtein, Castillo, Donato, Gionis, & Mishne, 2008; Zhang, Wang, de Pablos, Tang, & Yan, 2015).

The researcher used theories such as the technology acceptance model, transaction cost economics, and the theory of planned behavior to explain the factors affecting ICT application usage.

Technology Acceptance Model

In 1989, Davis explored TAM theory to determine the technology use behavior, the main objective of Davis is to indicate that TAM is the general acceptance of technology use. The basic TAM theory included two basic beliefs such as perceived usefulness(PU) and Perceived Ease of Use(PEU)(Lai, 2017). Technology acceptance theory encourages that individuals use actual systems from emerging (1) perceived usefulness and (2) perceived ease of use (3) intention to use (4) actual system(Venkatesh, Morris, Davis, & Davis, 2003). TAM model investigated the relation among socio-demographic (such as education, age, and previous experience with technology), financial (such as

perceived benefit), and competitive factors (such as trialability or technical support) (Pierpaoli et al., 2013).

Perceived of benefit

Perceived usefulness is to what extent that the person trusts that using a special technology will improve his/her performance(Davis, 1989). Perceived usefulness is directly impacted by perceived ease of use. A study conducted by Huang & Chen, (2010) that perceived ease of use of application software can positively predict perceived usefulness by students and perceived benefits is the key factor for students' willingness to be directed through a system 's learning process.

Perceived ease of use

Several studies indicated that the main reason people adopted technology is perceived ease of use free more effort to understand. According to (Davis, 1989) defined perceived ease of use is to what extent that a person believes that using new technology will be free from effort. The number of ICT applications is increasing among the students due to ease of use (Li, Zhao, Xu, & Pu, 2020).

Transaction cost economics

Transaction cost economics proposes that the cost acquired in making an economic exchange. Several of coordination costs exist such as; (1) search and information costs. (2) Bargaining costs. (3) Policy and enforcement costs. Search and information costs are the costs in determining that the required good is available on the market who has the lowest price. Bargaining costs are the costs needed to come to an

acceptable agreement with other parties to the transaction. Policy and enforcement costs are the costs of making sure the other party sticks to the terms of the contract. Transaction cost theory explains that the total cost incurred by a firm can group two large components such as transaction cost and production.

The theory appears primarily in the field of economics(McIvor, 2009; Tadelis & Williamson, 2012; Williamson, 2019), but later was applied in the field of technology(Aubert, Rivard, & Patry, 2004; Singh & Teng, 2016; Susarla, Barua, & Whinston, 2009).

The perceived cost of effectiveness

The majority of application software companies such as Microsoft, Mendeley, Autodesk and so one offers the students and scholars with no cost application software. For example, Microsoft Office in Education offers free student access to their incredibly powerful office 365 services. The Mendeley Desktop is a reference manager which provides web, desktop, and mobile version to the students and academic researchers with no cost (Patak, Naim, & Hidayat, 2016). Application software needs to complete functionality, availability within the right timeframe, and reasonable price (Steven & Peterson, n.d.).

Pressure from university

Application software is the software that enables or tells users to accomplish a specific task, so most of the universities in Somalia include each faculty with the subject of application software which means that students should understand basic skills related to the computer. Faculty

economics and management science is the one the faculties that are compulsory to their students to study the course of computer application.

Information privacy

Personal information means any information such as ID, name, phone number, home address, email address, license number, physical characteristics (facial dimensions, fingerprints or handwriting), credit card number, and family relationship.

Privacy is the right to the personal information to be protected rather than personal information itself(Mai, 2016). There are five methods to explore the right to privacy such as the right to get the reward for the value of one's information, the right to be free from unwanted access (e.g. Physical access, access via short messaging service), the right to have personal information expressed accurately and correctly (integrity), the right not to allow personal information to be used in an unwanted way (e.g. sale of information, exposure of information matching) and the right not to allow personal information to be collected by others without one's knowledge and consent (e.g. through the use of CCTV and cookies)(Chen, 2016). Information privacy is the ability of a user to personally control information about one's self (Sarikakis & Winter, 2017).

The majority of application software such as word processing, PowerPoint, and Excel allows users to set a password to protect their documents, but the problem is most of the students are lack of awareness how simply hackers can steal their data or documents.

Theory of Reasonable Action

The theory of reasoned action is one of the famous theories used about one factor that determines the behavioral intention of the person's perception towards that behavior. Attitude toward the behavior is defined as the individual's positive or negative feelings about performing a behavior. It's determined through an assessment of none's beliefs(Hill, Fishbein, & Ajzen, 1977).

Students' perception of ICT use

According to (Attard & Holmes, 2020) the students identified that application software comes with five different impacts such as providing new methods to learn, increasing engagement to learning, fostering autonomous learning. Facilitating access to information and promoting collaborative learning. Increase communication between pupils and teachers in the classroom(Boticki, Baksa, Seow, & Looi, 2015). Several studies have shown the majority of students believe that application software plays an important role in their academic performance(Boticki et al., 2015; Mallernee, 2018)

ICT application usage

The majority of the students use many ICT applications such as MS Word for writing documents, creating and sending email applications, social media applications (Facebook, WhatsApp, Imo, and so on) (Harerimana & Mtshali, 2019). ICT application has changed the academic performance for the students with an increase in their performance of learning(Oye, Iahad, Madar, & Rahim, 2012).

In this study the researcher will investigate the six hypotheses below:

Hypothesis 1. There is a relationship between usefulness and the student's perception of ICT use.

Hypothesis 2. Ease of use has an impact on the student's perception of ICT use.

The first two hypotheses have been derived from TAM (Venkatesh et al., 2003)

Hypothesis 3. There is a relationship between perceived cost-effectiveness and student's perception towards ICT use

Hypothesis 4. There is a relationship between information privacy and the student's perception of ICT use.

Hypothesis 5. There is a relationship between pressure and the student's perception of ICT use.

Hypothesis 6. There is a relationship between student' attitude an ICT application usage

Hypothesis six is related to the Theory of Reasoned Action (Ajzen, 1988). The use of ICT applications will be effect by the student's attitude and belief about the value of ICT and the perception of him or her to enhance their knowledge.

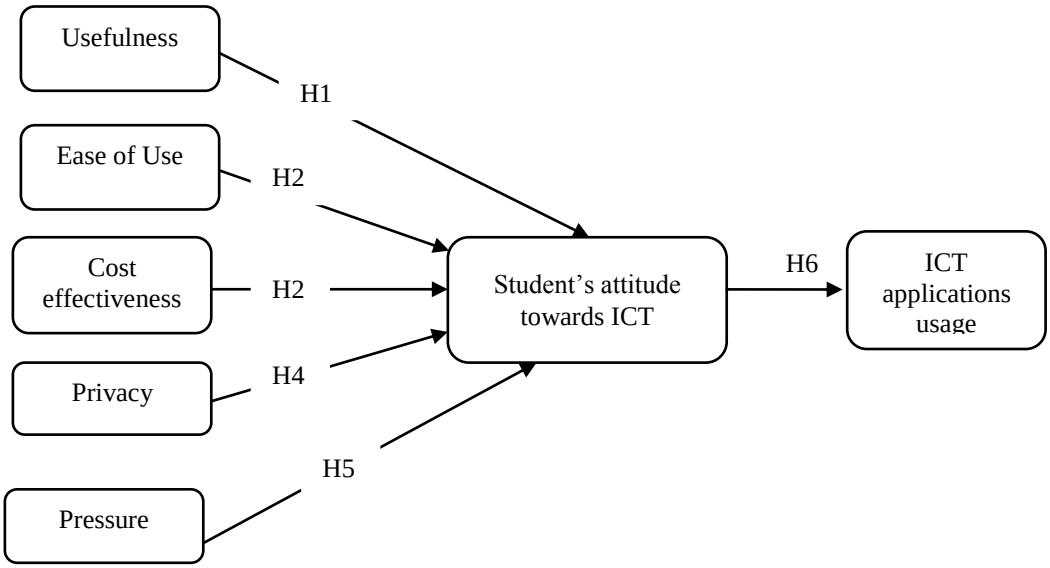

Fig1. Proposed model

Method

The researcher proposed six hypotheses in Fig 1 and tested the hypotheses, the study was mainly concerned with the factors to influence the use of ICT applications.

Sample and procedure

The population of this study was a public and private university in Somalia special Mogadishu city, because of Mogadishu is one of the densely populated cities in Somalia with 2.45 million people residing within 35 squares miles ($91km^2$). According to the Heritage Studies(2013), over 50,000 students are enrolled at higher education institutes 49% of these students are enrolled at universities in South-central, 35% in Somaliland, and 16% in Puntland. The majority of these students are

enrolled in the faculties of information technology and business administration, approximately 44% of students are registered in different information technology (IT), business administration, and social science. In this study, the population is undergraduate students of four faculties: Information technology, business, social science, and health science. The procedure of this study is a cluster sampling technique, cluster sampling which means that the researcher divides the population into separated groups, called clusters then the sample random is selected from the population(Taherdoost & Group, 2016).

Research instrument and response rate

A questionnaire survey was developed as an instrument for data collection. The variables used for perceived usefulness (PU), perceived ease of use (PEU), cost-effectiveness, information privacy, and pressure from the university, student's attitude, and ICT application usage. Five-points of Likert scale were used for those variables where 5 represented strongly agree and 1 represented strongly disagree. Data collected through an online survey was developed and administered using Kobo Collect, the student is requested to fill the questionnaire using their Smartphones and laptops it took more than 5 mints to complete the survey. The study used SEM (Structure Equation Modeling) for confirmatory factor analysis. The reliability and validity of the study were adapted and above 0.8 and 0.7 respectively. Several studies show the construct reliability and validity should greater 0.6 *and* 0.7 (Hafiz & Shaari, 2013; Joe F. Hair, Sarstedt, Ringle, & Mena, 2012; Mercer & Murphy, 2008).

After the data has been collected from the respondents, editing of the data was undertaken to confirm the completeness and consistency of the data(Sekaran, 2003; Zikmund, 2006). According to this study over 450 students requested to fill the questionnaire but 382 students were suitable for this study. The researcher requested the student complete the questionnaire for home or before the class began.

Data analysis

The data were analyzed using IBM SPSS- Amos [International Business Machine, Statistics Package for Social Science – Analysis of Moment Structure] and Excel spreadsheet, three steps followed to analysis the data collected: The first step for data analysis entitled the characteristics of respondents where descriptive analysis applied special using frequency and percentage. The second step means and standard deviation used to explain the level of ICT application skills by the students. In the third step, factor analysis was employed and structural equation modeling was worked to confirm the model fit. The last step regression used to test the six hypotheses in the study.

Properties of measure

To check the normal distribution of the data, this study used the absolute values of skewness and kurtosis. The skewness ranged from $-.059\ to\ 0.392$ and kurtosis$-.016\ \ to\ 2.532$. Regarding kline's (2011) should be (skewness<3; kurtosis<8).

Results

The study conducted by four faculties, the population of the study was 450. The sample size of the study was calculated by the level of confidence 95% and 5% of margin error.

Characteristics of participants

Table 1 indicates the characteristics of the respondents. Several males participate in this study made up of 75.9% of the sample while the number of females made up 24.1%. The majority of the respondents were the age group between 20 – 29 years (82.7%) this indicates that most of the students are undergraduate, less than 20 years (11.5%), and final between the ages 30 – 39 years (5.8%). The major of the students their mode of attendance was fulltime 81.4% and the lower percentage was part-time 18.6%. The majority of participants have experience in using computers between 2 – 4 years (88.5%) indicates the majority of the students start using computers at the level of the university, between 5 – 6 years (5.2%) and less than 1 year (4.7%). The majority of students receive their course materials by soft and hard copies (71.5%), hard copy (18.3%), and soft copy (10.2%). The majority of the students identified that their university doesn't offer lab with computers (61.8%), sometimes (31.4%) and 6.8% their university offer a Lab. 69.1% of the students indicated their university does not offer a lab with computers and internet, where few students identified their university offer computer lab and internet. The majority of the students indicated their university does not offer e-library resources were few students identified that they offer. The majority of the students have no desktop computers were 88.5% answered no and 11.5% answered yes. 89.3% have a laptop and 10.7

have no. 81.7 have a tablet and 18.4% have a tablet. 94.2% have a smartphone and 5.8% few students. 53.9 of the students identified that their teacher allows using a personal device such as a tablet, smartphone, and laptop, 41.9 sometimes were few identified does not allow.

Table 1: profile data

Characteristics	Items	Frequency(n)	Percentage (%)
Gender	Male	290	75.9
	Female	92	24.1
Age group	Less than 20	44	11.5
	20 – 29	316	82.7
	30 – 39	22	5.8
Mode of attendance	Fulltime	311	81.4
	Part time	71	18.6
Experience in using computers	Less than 1 year	18	4.7
	2 – 4 years	338	88.5
	5 – 6 years	20	5.2
	Above 6 years	6	1.6
Method for receiving course materials	Soft copy	39	10.2
	Hard copy	70	18.3
	Both soft and hard copies	273	71.5
Has the university provided you a lab with computers?	No	236	61.8
	Sometimes	120	31.4
	Yes	26	6.8
Has the university provided you a lab	No	264	69.1
	Sometimes	111	29.1

Characteristics	Items	Frequency(n)	Percentage (%)
with computers and the internet to practice the lessons?	Yes	7	1.8
Does your university have an e-library resource?	No	241	63.1
	Yes	141	36.9
Do you have a desktop computer?	No	338	88.5
	Yes	44	11.5
Do you have a laptop?	No	41	10.7
	Yes	341	89.3
Do you have a tablet?	No	312	81.7
	Yes	70	18.4
Do you have a smartphone	No	22	5.8
	Yes	360	94.2
Does your teacher allow you to use personal devices?	No	16	4.2
	Sometimes	160	41.9
	Yes	206	53.9

The table1 used descriptive analysis with frequency and percentage

Level of ICT applications skills by the students

This study indicates the majority of the student has various levels and competence in using ICT applications. To measure the level of competence of the student, the researcher scaled the questions as (1= none, 2= A little, 3= somewhat, 4= A lot). Participating in social networks such as Facebook, WhatsApp, Imo, etc. (3.42 ± 1.03).

Participate in social networks (Facebook, WhatsApp, Imo, etc) (73.8%, $n = 282$). Capture and edit digital photos, movies or other graphics(72.5%, $n = 277$). Using a browser for web surfing(72.0%, $n = 275$). Installing the software on the computer(69.1%, $n = 264$). Edit text online containing internet links and images(68.3%, n=261). Create a presentation with video or audio clips(64.4%, n = 246). Use emails to communicate with others 67.1%, n = 256). Edit text online containing internet links and images (68.3%, n = 261). Download and install software on a computer (61.5%, n= 235). Create a presentation with simple animation functions(64.4%, n = 246). Use a spreadsheet (40.3%, n = 154). Produce text using Ms word program (26.2%, n = 100) 52.6%, n= 201 have a little knowledge of producing text and using Ms- word program. Participating in a discussion forum on the Internet (25.7%, n= 96). Edit a questionnaire online has a little (86.4%, $n = 330$). Using Photoshop, Flash for creating graphics (22.3%, $n = 85$). Create and maintain blogs or websites (22.3%, n=85). Create a database (21.5%, $n = 82$). Video/audio software for creating and editing movies and audio (15.4%, n=59). Registering and participating in online training programs have no knowledge (59.2%, $n = 226$). Using SPSS for data analysis does not know (59.7%, $n = 228$). Using e-library resources of the university to complete a class assignment (12.6%, n = 48). Using Turnitin for plagiarisms checker (5.5%, n=21). Using Mendeley as a reference manager software (4.2%, n=16).

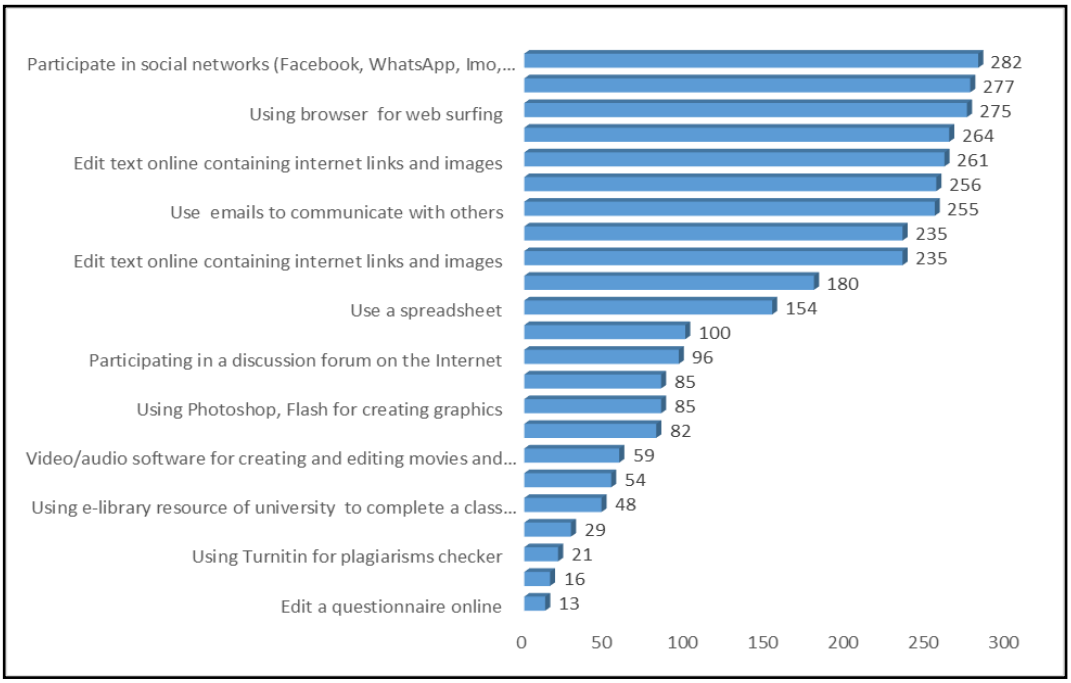

Fig. 2 Level of ICT applications

Reliability and validity

Structural equation modeling was employed to assess the relationship between theories. Structural equation modeling is a multivariate statistical analysis method that is used to analyze the structural relationship. Structural equation modeling [SEM] is also called casual modeling because it examines the suggested casual relationships(Byrne, 2013). Most of the researchers prefer between 200 to 400 sample sizes with 10 to 15 indicators, in this study the sample size was 382 with the 37 items to confirm the hypotheses. There are two types of models: measurement model and structural model in the structural model represents the theory that shows how a hypothesis is related to another

hypothesis in the measurement model represents the theory that specifies how measured variables come together to represent the theory(Johnston, 2014).

In this study, confirmatory factor analysis [CFA] was applied to detect the interrelationship between observed variables and latent variables. The researcher must address two important aspects of a measure: validity and reliability (Byrne, 2001) and (Sparkman, Hair, Anderson, Tatham, & Grablowsky, 1979). The validity of data is referred as the degree to which the findings truly represent the phenomenon you are claiming to measure in other words the validity is a solid claim according to Joseph F; Hair, Black, Babin, & Anderson (2010) describe the validity as the extent to which a measure or set of measures correctly represents the concept of the study. There are three major types of validity such as construct validity, external validity, and criterion validity, in this study the construct validity was examined both convergent and discriminant validity. Table2. Shows the range of standardized loadings between 0.64 and0.90. Regarding (Sparkman et al., 1979) with a factor of loading should be 0.50 or greater thus establishing convergent validity, further average variance extracted (AVE) in this study are between 0.527 *and* 0.74. According to (Fornell & Larcker, 1981a) the AVE should be 0.5 or greater than. The AVE was used to supporting convergent validity. Besides structural equation modeling, the reliability of the data is defined as the degree of measurement error present in any measure or the degree to which the research method produces stable and consistent results(Hafiz & Shaari, 2013). The construct reliability (CR) and Cronbach alpha are comparable to all

variables that were above0.850. The construct reliability should greater to 0.7 (J. Hair, Black, Babin, & Anderson, 2010). All square mean correlation (SMC) are greater or equal0.522. According to (Bollen, 1989) square mean correlation or (R^2) must be at least 0.4. the discriminant validity the maximum shared square variance(MSV) should be less than to average variance extracted (AVE) (Fornell & Larcker, 1981b). The study all MSV is less AVE.

Table2. Confirmatory factor analysis results

Construct	Items	Loadings	SMC	CR	AVE	MSV	Alpha
Perceived Usefulness	PU1	0.64	0.74				
	PU2	0.86	0.61				
	PU3	0.78	0.59	0.910	0.592	0.298	0.911
	PU4	0.77	0.64				
	PU5	0.80	0.69				
	PU6	0.83	0.48				
	PU7	0.69	0.58				
Perceived Ease of Use	PE1	0.73	0.57				
	PE2	0.75	0.49				
	PE3	0.70	0.51	0.817	0.527	0.181	0.816
	PE4	0.72	0.65				
Cost-effectiveness	CE1	0.81	0.72				
	CE2	0.85	0.82				
	CE3	0.90	0.76	0.934	0.741	0.181	0.932

Construct	Items	Loadings	SMC	CR	AVE	MSV	Alpha
	CE4	0.87	0.75				
	CE5	0.86	0.68				
Pressure	P1	0.82	0.81				
	P2	0.90	0.77				
	P3	0.88	0.79				
	P4	0.89	0.62	0.942	0.701	0.354	0.943
	P5	0.85	0.52				
	P6	0.78	0.52				
	P7	0.72	0.58				
Privacy purpose	PP1	0.76	0.77				
	PP2	0.88	0.72				
	PP3	0.86	0.77	0.926	0.678	0.298	0.927
	PP4	0.88	0.61				
	PP5	0.78	0.59				
	PP6	0.76	0.61				
Student's perception	SP1	0.78	0.60				
	SP2	0.75	0.56				
	SP3	0.77	0.60	0.850	0.586	0.515	0.847
	SP4	0.76	0.57				
Continuance usage	CU1	0.81	0.65				
	CU2	0.82	0.67				
	CU3	0.80	0.64	0.899	0.691	0.515	0.845
	CU4	0.87	0.76				

All factor loadings are significance at $p < 0.001$ SMC; Square Mean Correlation; CR = Construct reliability; AVE = Average Variance Extracted

The discriminant validity investigates the pattern structure coefficient to determine whether factors in measurement models are empirically unique(Sinn, 1997). Table 3. Indicates that discriminant validity is determined the square – root of average variance extracted [AVE]. The correlation among the study variables is presented in the lower off-diagonal (Fornell & Larcker, 1981a).

Table3. Descriptive statistics and discriminant validity test result.

	Mean	**SD**	**PU**	**PE**	**CE**	**P**	**PP**	**SP**	**CU**
Perceived Usefulness(PU)	2.902	0.731	**0.769**						
Perceived Ease of Use (PE)	2.772	0.794	0.404	**0.726**					
Cost effectiveness (CE**)**	2.291	0.801	0.409	0.426	**0.861**				
Pressure from university (P)	4.025	0.604	0.370	0.315	0.240	**0.838**			
Privacy purpose (PP)	3.537	0.771	0.546	0.3150	0.238	0.512	**0.823**		
Student's perception (SP)	3.967	0.546	0.422	0.293	0.233	0.595	0.529	**0.765**	
Continuance usage (CU)	3.815	0.644	0.279	0.181	0.233	0.557	0.402	0.717	**0.831**

Hypothesis testing result

Hypothesis 1. Proposes that there is a positive relationship between perceived usefulness and student's attitude toward ICT usage. ($\beta = 0.275, p < 0.001, t = 7.715$). Hypothesis 1. Accepted and suggests that the students have more benefits using ICT applications in the classroom or outside of the classroom and simple they can work their assignments in quickly with help application software such as word processing. This supports previous studies (FoAleksander Aristovnik Damijana Keržič Nina Tomaževič Lan Umek & Article, 2016; Harerimana & Mtshali, 2019; Yang, Li, & Lu, 2015). The study found that the students have more useful using ICT applications and they need to enhance their knowledge for application software.

Hypothesis 2. Identifies that there is a relationship between perceived ease of use and student's attitude toward ICT usage ($\beta = 0.169, p < 0.001, t = 4.396$). The hypothesis 2 indicates that the majority of the students suggested using ICT applications are more ease and friendly use no complexity, with the simplicity of these applications the students are likely to learn more about of this software, this supports with the prior studies (Attard & Holmes, 2020; Teo & Noyes, 2011; Terzis & Economides, 2011). The study found that using and learning ICT applications is ease according to the student's perception.

Hypothesis 3. It indicates that there is a relationship between perceived cost-effectiveness and the student's attitude toward ICT usage($\beta = 0.145, p < 0.001, t = 4.255$). Thus supporting hypothesis 3. The majority of the students identified that they receive application

software with no cost means free, this emphasis some of the application software companies offer the student free application such Microsoft, Autodesk, Mendeley and so on, with support of previous studies(Chang et al., 2012; Danner & Pessu, 2013; Perbawaningsih, 2013; Umar & Jalil, 2012). The study found that the application software is available to the students with no cost or less cost.

Hypothesis 4. Shows that there is pressure is positively related to student's attitude toward ICT usage($\beta = 0.528, p < 0.001, t = 12.104$). supporting hypothesis 4. The course of computer application & IT are required to the students of the faculties IT, business administration, social science, and nursing, this supports the previous studies(Clark, Austin, & Craike, 2015; Moghaddam & Khatoon-abadi, 2013; Sampath Kumar & Biradar, 2010; Sarkar, 2012; Yunus, 2007). The study found the majority of the universities include the course of ICT application.

Hypothesis 5. Privacy is positively related to student's attitudes toward ICT usage($\beta = 0.474, p < 0.001\ t = 10.500$). Thus supporting the hypothesis 5. This proposes that the students who have left their application software without a password are more likely to have fallen victim to information stolen information. This supports previous studies(Hoffmann, 2012; Jeilani, 2018; Mohamed & Ahmad, 2012).

Hypothesis 6. Student's perception is positively related to ICT application usage($\beta = 0.640, p < 0.001, t = 16.237$) supporting the hypothesis6. Suggests the majority of the students have a positive attitude towards the use of ICT applications, this support with the previous studies (Ashaari, Judi, Mohamed, & Tengku Wook, 2011; Oye et al.,

2012; Whiting & Williams, 2013). The study found that the majority of student's beliefs using ICT applications enhance their academic performance.

Table4. Summary of research hypotheses

Hypothesis	Results
H1: There is a relationship between usefulness and the student's perception of ICT use.	Accepted
H2: Ease of use has an impact on the student's perception of ICT use.	Accepted
H3: There is a relationship between perceived cost-effectiveness and the student's perception of ICT use.	Accepted
H4: There is a relationship between information privacy and the student's perception of ICT use.	Accepted
H5: There is a relationship between pressure and student's perception of ICT use.	Accepted
H6: There is a relationship between student' attitude an ICT application usage	Accepted

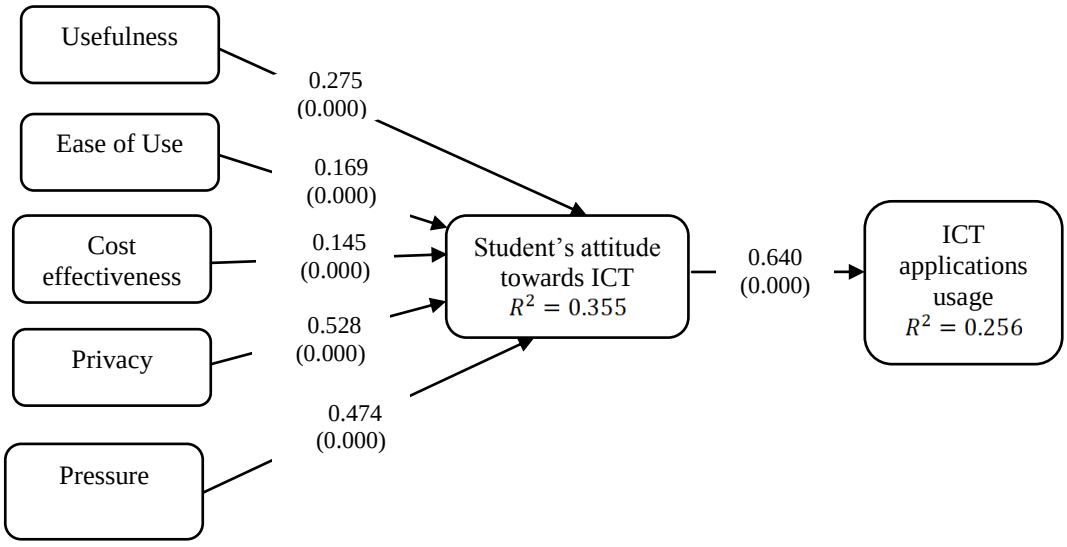

Fig 3. Result of the model test

Model fit

The modal fit in covariance structure models and it evaluates the value of inconsistency between the sample and fixed covariance, the good model fit should show that the level of significance p-values > 0.05. The chi-square statistics are often referred to as either goodness or badness of bit measurement (Hafiz & Shaari, 2013). Other model fits were employed such as GFI, AGFI, CMIN/df, CFI, NFI, TLI, and RMSEA. The table4. Shows the result of structural equation modeling that explores the model is fit were $x^2 = 810.974$, DF= 596, Q =1.361, GFI = 0.901, AGFI =0.881, CFI= 0.977, NFI = 0.927, TLI = 0.977 and RMSEA = 0.031.

Table4. Model fit indexes

Characteristics	Required	Achieved
Chi – Square Degree of freedom(df)		810.974 596
P- value	>.05	0.000
Relative – Chi – Sq	< 5	1.36
Goodness Fit Index(GFI)	>= 0.9	0.90
Adjusted Goodness Fit Index(AGFI)	>= 0.9	0.88
Comparative Fit Index (CFI)	>= 0.9	0.98
Normed Fit Index (NFI)	>= 0.9	0.93
Tucker Lewis Index(TLI)	>= 0.9	0.98
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.03

Conclusion and suggestion

In this study, the researcher identified the variables such as perceived usefulness, perceived ease of use, perceived cost-effectiveness, perceived pressure from the university, student's perception, and ICT application usage.

Perceived usefulness

The perceived usefulness is one of the main factors that encourage the students to use application software when responding to their assignment, the majority of the students identified that the course material available as soft copy. The result implies that students have more advantages in using ICT applications this brings the dependability of using this application.

Perceived ease of use

Perceived ease of use, the evidence proposes that sustainable use of ICT applications overall is perceived ease of use and friendly. This emphasizes with the past researches on perceived ease of use and usefulness of sustainable labels on apparel products(Ma, Gam, & Banning, 2017). The effects of perceived usefulness and perceived ease of use on continuance intention to use E-Government(Hamid, Razak, Bakar, & Abdullah, 2016).

Perceived cost-effectiveness

Perceived cost-effectiveness, the result proposes that the price of ICT application is free means no cost, the majority of the respondents identified that some companies offer the students ICT applications at no

cost. This is the emphasis with prior studies such as: comparing the effectiveness and cost-effectiveness of ICT interventions(Piper, Zuilkowski, Kwayumba, & Strigel, 2016), understanding the ICT investment effectiveness (Mathswenyego, Klopper, & Lubbe, 2013).

Perceived pressure from the university

Perceived pressure from the university, the result suggests the majority of the student identified that the universities include requirement courses of ICT applications because the national curriculum of Somalia was included technology studies before 2018.

Student's perception

Student's perception, the majority of the student's belief that ICT applications play an important role in academic performance such as downloading learning materials, completing assignments, giving a presentation of the classwork processing and analyzing data, and browsing relevant websites. This support with the study student's perception of implementing ICT in learning(Charles & Issifu, 2015), the impact of ICT on schools (Naji, 2017)

ICT applications use

Most of the students use various types of ICT applications such learning skills tool [MS – word for writing documents, MS - PowerPoint for presentation, MS – Excel for calculation and graphics]. Informational management tool [Google search, social media networking research websites, and so on]. Reference management tools [Mendeley, EndNote, Zotero and so] and Turnitin as a plagiarism checker. This supports with

the prior studies such as types of ICT applications used and skill's level of nursing students (Harerimana & Mtshali, 2019), an exploration of technology use mediate students engagement with mathematics (Attard & Holmes, 2020)

In the study the majority of the students start using computers at the level of university this needs to improve and the ministry of higher education should include the curriculum at the level of secondary and primary education.

Research implications

The study started with the following research questions (1) to what extent the level skills of ICT applications (2) What are the factors affecting the use of ICT applications by the faculty of economics students.

ICT application has forced the students to use it. Most of the students use ICT applications to download materials related to their subjects, simply complete their assignments, assist to do their research projects, and stay connected and maintain the relationship. However, the use of ICT applications is not without obstacles most of the students started with the interaction of this application software at the level of higher education.

Based on the Technology Acceptance Model, Transaction Cost Economics and Theory Reasoned Action, the research encompasses and confirms a research model in gaining insights into factors influencing ICT applications to use and their level of skills by the undergraduate students in Somalia. The finding suggests that the students have a

positive attitude in using ICT applications through variables such as perceived usefulness, perceived ease of use, cost-effectiveness, and pressure from the university. The study also shows that the majority of the student's interests using ICT applications through mobile technology instead of a computer. Since there has been a significant body of work related to the students' perception towards ICT application, there is a need to emphasize and advance the technology adaption in the context of developing countries such as Somalia.

The findings make clear that the students use a huge number of ICT applications, some of them used frequently while in the classroom or outside of the classroom.

Limitation of the research

Several limitations cause to directions for future research. First, the research sample size was 382, only undergraduate students for the faculties, IT, business administration, social science, and nursing were included. The population and sample were drawn only three universities located in the Mogadishu – Somalia, The capital city of Somalia, so the finding would not be generalized to the entire country. Future research may consider teachers' perception of ICT use when in the classroom or outside using different samples. Second, the data collected only using questionnaire method observations and interviewing may offer insights on the level of students of ICT applications use and their skills.

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ISSN 2519-9781

Integrated Water Resources Management in Light of Principles of International Water Law: Sustainable Perspectives for Solution "A case Study of Juba and Shabbelle Basins"

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Abstract

This article is a study analysis on the Juba and Shabbelle Basins, in light of the principles of international water law related to transboundary water resources management that has been developed at international conferences over the last three decades. The study reveals the principle of equitable and reasonable utilization, obligation not to cause significant harm, principles of cooperation, information exchange, notification, consultation, and peaceful settlement of disputes. The study also stresses that the integrated water resources management approach through effective transboundary cooperation involving the riparian countries of the Juba, the Shabbelle basins is the vital mechanism for overcoming the current water crises of Somalia as well as the whole region. Thus mitigating floods and ensuring enough water to address drought are the two major water resources management challenges for Somalia. These

principles could facilitate effective transboundary water resources management involving riparian countries of shared watercourses.

Keywords: international water law principles; transboundary water resources management; water conventions, IWRM, Juba and Shabbelle Basins, cooperation

Introduction

This paper analyses the concept of Integrated Water Resources Management (IWRM) at international conferences and addresses the prospects of IWRM in resolving the current water crisis resources with a focus on the Juba and Shabelle Basins in the Horn of Africa and to analyse the resulting transboundary water management issues. This study identifies the constraints and opportunities for cooperation and regional development through integrated water development and management of the Juba and Shabble basin.

Integrated water resources management

Since 1977, international water professionals in alliance with all concerned stakeholders persuaded IWRM to promote a holistic water management practices worldwide (Biswas, 2004).

In 2002, at the Johannesburg World Summit on Sustainable Development (WSSD, 2002), The Technical Advisory Committee of the Global Water Partnership defined Integrated Water Resources Management (IWRM) "as a process, which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems," and emphasized that water should be managed in a basin-

wide context, under the principles of good governance and public participation.

The overall aim of integrated water development and management is to satisfy the freshwater needs of all countries for their sustainable development.

Water resources management is an art to supply the required water volume with acceptable quality at the proper place and in proper time. This is process which includes a few principal components: available water resources, engineering infrastructure, demands, allocation procedure, delivery service and finally – use of water.

Historically, we can go back centuries, if not millennia, to discover forerunners of the present IWRM

Paradigm. In a number of countries, water management has been institutionalized in an advanced and integrated way over centuries. In Valencia, Spain, for example, multistakeholder, participatory water tribunals have operated at least since the tenth Century. Embid (2003) described that Spain was probably the first country to organize water management on the basis of river basins, as it adopted the system of confederations hydrographical in 1926. Over the last several decades, there have been serious attempts to implement IWRM in different global regions.

Mar del Plata (1977), IWRM was the recommended approach to incorporate the multiple competing uses of water resources. Although in the 1980s, water disappeared, for the most part, from the political agenda, the situation changed in the 1990s, thanks to the efforts of a number of conferences and international organizations.

Internationally, 60% of all the water flows in the world's rivers. 145 nations have shared waters with their neighbours (Giordano & Wolf, 2003).

International water events

The most influential water events are listed below:

1. United Nations Conference on Water (Mar del Plata, 1977).
2. International Conference on Water and Environment (Dublin, 1992).
3. UNCED (Rio de Janeiro, 1992).
4. Second World Water Forum and Ministerial Conference (The Hague, 2000).
5. International Conference on Fresh Water (Bonn, 2001).
6. World Summit on Sustainable Development (Johannesburg, 2002) .
7. The Third World Water Forum (Kyoto, 2003).
8. The Fourth World Water Forum (Mexico, 2006).
9. The Fifth World Water Forum (Istanbul, 2009).

International Principles of Water Low

Basic concepts

IWRM in the International Agenda FROM Mar del Plata 1977 to Kyoto 2003

The international agenda, from the UN Conference on Water held in Mar del Plata in 1977 to the Third World Water Forum of Kyoto in 2003 illustrated as follows:

United Nations Conference on Water (Mar del Plata 1977)

In 1977, the UN Conference on Water was held in Mar del Plata, Argentina. Its goals were to assess the status of water resources; to ensure that an adequate supply of quality water was available to meet the planet's socioeconomic needs; to increase water use efficiency; and to promote preparedness, nationally and internationally, to avoid a water crisis of global dimensions before the end of the twentieth century.

International Conference on Water and Environment - Dublin 1992

International Conference on Water and the Environment (ICWE) was held in Dublin, Ireland to serve as the preparatory event, concerning water issues, to the Rio United Nations Conference on Environment and Development (UNCED) Conference, based on the following four guiding principles (ICWE, 1992):

- **Principle one** recognized freshwater as a finite, vulnerable, and essential resource, and suggested that water should be managed in an integrated manner.
- **Principle two** suggested a participatory approach, involving users, planners, and policymakers, at all levels of water development and management.
- **Principle three** recognized women's central role in the provision, management, and safeguarding of water
- **Principle four** suggested that water should be considered as an economic good.

Second World Water Forum & Ministerial Conference (The Hague 2000)

On 17-22 March 2000, the Second World Water Forum was held in The Hague, the Netherlands, with more than 5,700 participants from all over the world.

The participants of The Hague forum suggested applying equity criteria, along with appropriate subsidies to the poor, when systematically adopting full-cost water pricing. The Forum acknowledged that food security, ecosystem protection, empowerment of people, risk management from water-related hazards, peaceful boundary and transboundary river basin management, basic water demands, and wise water management are achievable through IWRM. (WWC, 2000)

World Summit on Sustainable Development -Johannesburg 2002

The World Summit on Sustainable Development (WSSD), held in Johannesburg, South Africa, in 2002, should be recognized as a success because it put IWRM at the top of the international agenda. (WSSD,2002)

The Third World Water Forum - Kyoto 2003

Over 24,000 people from around the world attended the third World Water Forum, held in March 2003 in Kyoto, Japan. The key issues were safe, clean water for all, good governance, capacity building, financing, public participation, and various regional topics (TWWF,2003a)

International River Basins

Globally, there are 263 rivers that either cross or demarcate the international political boundaries of two or more nations (Wolf et al, 1999). 63 are in Africa (UNEP, 2010). These shared river basins contain

65% of the continent's area, 75% of the people and 93% of the surface water (UNEP, 2010)

Principles of international water law

Several studies scrutinise the general provisions of the Helsinki Rules and UN Watercourses Convention to explain the development of international water law.

Theories and doctrines of international water law

The theoretical foundation of the principles of international water law related to transboundary water resources management evolves from different theories and doctrines. This section summarises three major ones:

1. Theory of absolute territorial sovereignty
2. Theory of absolute territorial integrity
3. Theory of limited territorial sovereignty

Theory of absolute territorial sovereignty

Every nation can utilise the waters of an international river flowing on its territory, as it likes, regardless of the consequences in other countries and without the duty to consult (Correia and Silva, 1999). According to this theory, the upstream states would be free to divert all the water from a shared watercourse without considering the need for downstream states.

Theory of absolute territorial integrity

This theory is based on the assertion that the lower riparian of an international river has the right to a full flow of water of natural quality and interference with the natural flow by the upstream state require the consent of the downstream riparian

Theory of limited territorial sovereignty

This theory is based on the assertion that every state is free to use shared rivers flowing on its territory as long as such utilisation does not prejudice the rights and interests of the co-riparians. In this case, sovereignty over shared water is relative and qualified.

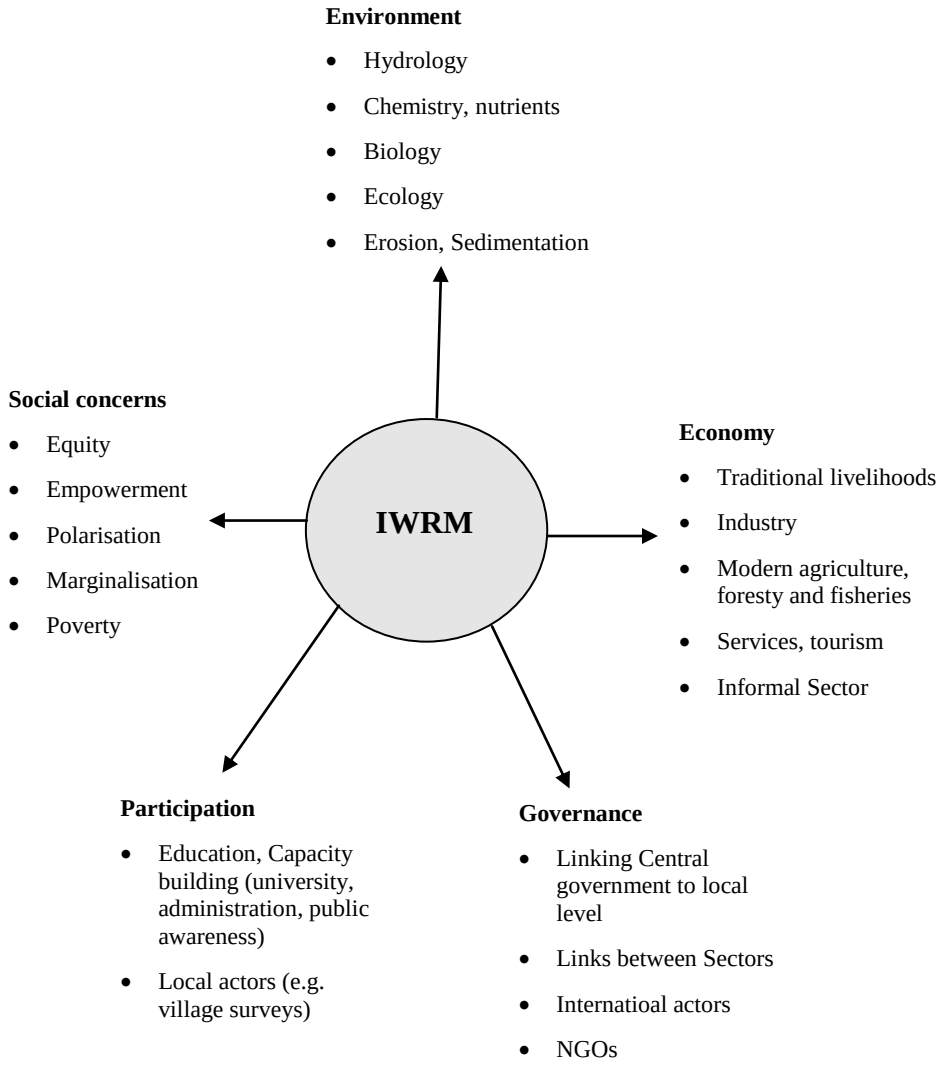


Figure 1. Integrated water resources management should occur under and enhance good governance (Varis et al.,2006)

Accordingly, waters should be used to provide economic well-being to people, without compromising social equity or environmental sustainability. This should happen in a basin wide context, with stakeholder participation and under the pre valence of good governance (Keskinen,2010)

Transboundary river basin management

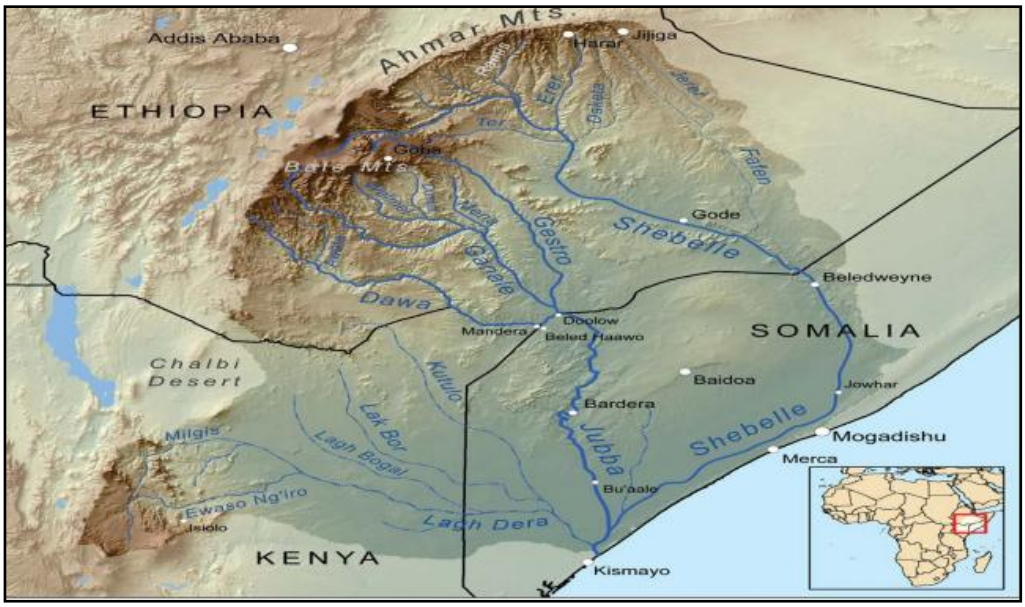
An increasing number of countries are experiencing water stress, yet in most river basins mechanisms and institutions to manage disputes over water resources are either absent or inadequate. The need for integrated, cooperative solutions is particularly urgent in the 263 river basins, which are shared by two or more states, and in which nearly half of the territory and population of the world are located.

Integrated planning for efficient watershed management is hampered by the difficulties of coordinating between riparian states with diverse and often conflicting needs (UNESCO, 2003).

The examples of inter-country conflicts include: Nile basin in Africa, Tigris and Euphrates in the Middle East, Parana Basin in South America and Ganges–Brahmaputra–Meghna basins in Asia (Petrella, 2001)

IGAD Region

The IGAD region covers an area of 5.2 million square Km and has a total population of. 240 million spread in the countries of Djibouti. Eritrea, Ethiopia, Kenya Somalia, South Sudan, Sudan and Uganda



Map-1: international watercourses in the IGAD region

Achieving food security for this huge population puts a tremendous challenge to Somali's water resources. Flooding every year during monsoon and drought during the dry season due to unsustainable abstraction of water in upstream causes socio-economical and environmental disaster for Somalia. Sustainable management of water resources is obligatory for a country like Somalia.

The Basin of Juba and Shabelle Rivers

Somalia has mainly two revers; the Juba river and Shabelle river come from the highlands of Ethiopia and crosses south of the country demonstrated as follows:

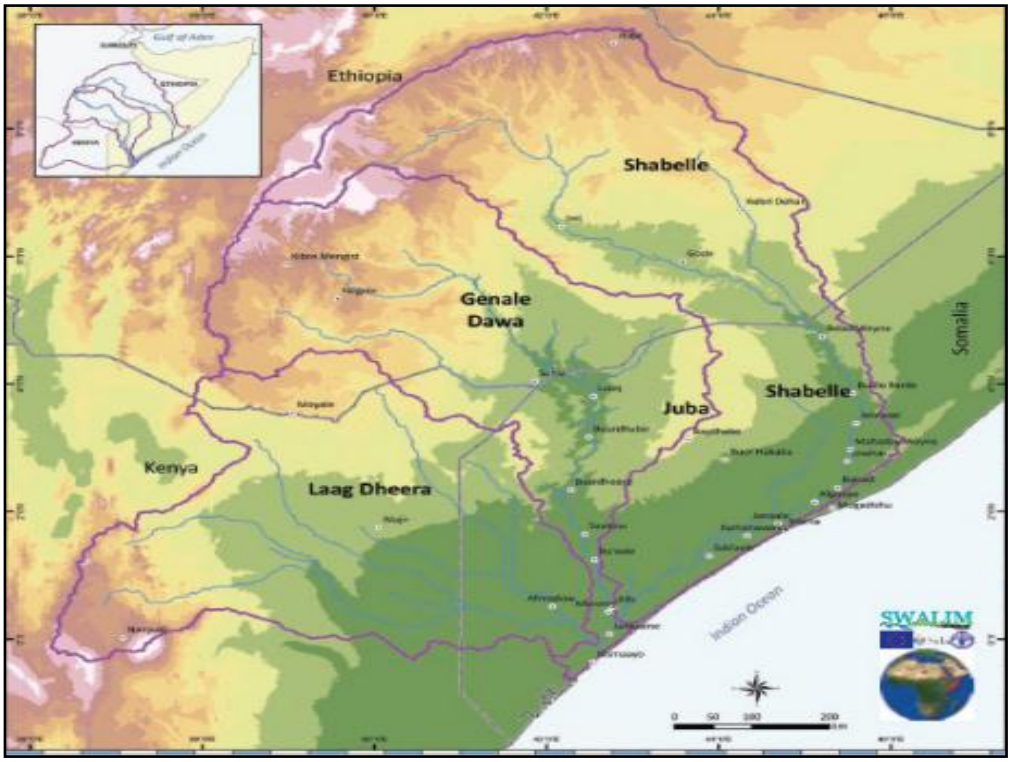


Figure 2. Map of the Juba and Shabelle basins

The Shabelle River Basin

The Sabelle river stems from Bale Mountain in the Ethiopian highlands about 4 230 m above sea level, the total catchment area of the Shabelle river basin is 297 000 km 2 (FAO,2010). Nearly two-thirds (63.5%) of the basin area lies in Ethiopia and one-third in Somalia (FAO,2010) With an average annual rainfall of 425 mm (over 1 500 mm in the mountain areas and 200 mm near the border), mean annual runoff of the river at the town of Gode in Ethiopia is 3 387 Mm3(M.O,2004). Due to its climate conditions, the basin is frequently affected by droughts and floods causing major problems to mainly downstream communities in Somalia.

The Juba River Basin

Like the Shabelle, the Juba River comes from the highlands of Ethiopia, where three big tributaries, the Genale, the Dawa and the Weyb (Gestro) meet to close the Somali frontier to form what is known as the Juba River in Somalia. The Dawa River is part of the frontier between Ethiopia and Kenya. The Dawa tributary also marks the boundary between Ethiopia and Somalia along its final reach. The Juba has a basin area of 452 000 km2 (M.O,2004). The Juba, which enters the Indian Ocean at Kismayo town in southern Somalia, has a total length of 1 808 km, of which 840 km lies in Ethiopia and 1 004 km in Somalia (FAO,2010)

Ethiopian perspective for River Development

There are presently two significant water projects in Ethiopia's upstream fields. In 1988, 153 Melka Wakana hydropower dam with 60 m3/s discharge was commissioned MW(M.O,2004)

141 irrigation schemes (25 big, 76 medium and 40 tiny irrigation projects) with a net irrigation region of 209 310 have been recognized for irrigation growth with water consumption estimated at 2 566 Mm 3 available in Ethiopia, much greater than available at the Somali frontier (2 384 Mm3)

Somalia perspective for River Development

In 1989, Somalia finished a master plan for the development of the Juba Valley in the Juba basin (GTZ, 1990), The suggested dam was 35 km upstream of the Somali town of Baardheere. This project was called “Fanole Project “, unfortunately the project was not completed.

Upstream and Downstream Water Sharing in International River Basin

There are basically two dimensions of the upstream and downstream problem; one has to do with the distinct groups and regions of the same nation, while the other has to do with the same river system between nations. Whatever happens to water and on the land in upper catchments affects the quantity and the quality of the water more downstream (Pallet et al. 1997). As water passes through the countryside, it brings downstream reactions to land use (FAO, 2000). In addition, three main issues for riparian nations are raised by global waterways – sovereignty, territorial integrity, and domestic safety (Elhance, 1999).

Conflict and cooperation: Somalia and Ethiopia

The relations between Ethiopia and Somalia are complex particularly in view of their long history of animosity, mistrust, conflict and border dispute (Elmi, 2013). Ethiopia dominates the river basins in terms of basin area, river runoff as well as geographic position and population. The Ethiopian master plans of the river basins with their large scale irrigation schemes and large dams reveal that the Somalia economy is in vulnerable state.

As Ethiopian water policy now establishes that all water resources are the common property of the people and state of Ethiopia, irrigation water is no longer a private good. With this transformation of irrigation into a common good, no one is held responsible for any mismanagement (Ravento´s Vilalta,2010). Most scenarios for water use and allocation modelling by Ethiopia shows large scale irrigation schemes with significant impacts on existing and planned downstream uses in Somalia (Elmi, 2013). The two countries are in a position negatively affecting

each other's desperately needed development of the two rivers' water resources.

The country has also decided to base all its energy production on hydropower, requiring large dam buildings on Ethiopia's major rivers. These dam developments will adversely impact on downstream uses in Somalia. Since irrigation is a major consumptive user of water, the Ethiopian irrigation plans in the very dry areas in the middle reaches of the river basins will demand a large amount of water. This causes not only a significant reduction of water flow to Somalia but also dries up the entire river flows.

In 1985, Somalia applied for funds from the World Bank for the implementation of the Baardheere dam project (BDP). The Bank informed Somalia of the need to notify Ethiopia and Kenya of the project (Elmi,2013). Ethiopia objected to the project in 1987 claiming that the dam would cause appreciable harm to their interests and they have the potential to impound all the discharges of the Juba River for irrigation and hydropower development

Research Methodology

The research focuses on Juba and Shabble basins. The researcher used a descriptive method where the data have been collected from the relevant of various international, governmental and local organizations resources as well as published articles, books, documents, and report. For the data analysis, the author applied the content analyses on these references, in light of the principle of international water laws: Equitable and reasonable utilization and participation Consultation and negotiation Principles, Obligation not to cause significant harm. Cooperation and

information exchange Principles, Cooperation and information exchange Principles. Peaceful settlement of disputes. These principles are the standardised norm reference of the analysis as shown in the table below:

Table 1: UN watercourses convention

Article	principles	Statement
Article-5	Equitable and reasonable utilization and participation	Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits there from, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.
Article-7	Obligation not to cause significant harm	Watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States.
Article-8	General obligation to cooperate.	Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.
Article-11	Principles of notification, consultation and negotiation	Watercourse States shall exchange information and consult each other and, if necessary, negotiate on the possible effects of planned measures on the condition of an international watercourse.
Article-11	Peaceful settlement of disputes	In the event of a dispute between two or more Parties concerning the interpretation or application of the present Convention, the Parties concerned shall, in the absence of an applicable agreement between them, seek a settlement of the dispute by peaceful means in accordance with the following provision

Findings and discussions

Analysis on Major challenges of water resources management in Shabble and Juba rivers

About 90 percent of the total annual runoff of rivers is originating from sources outside the country's territory (FAO,2010)

The flowing are the challenges of water resource management:

1. Ensuring food security through expanding irrigation and increasing agricultural productivity for the rapidly growing population.
2. Addressing water-related natural vulnerabilities; drought during December to May and flood during monsoon period June to September, Salinity intrusion, and climatic change, loss of navigation and transport and agricultural water due to extraction of water upstream.
3. Addressing the sedimentation and river erosion problems.

To mitigate dry season drought, monsoon floods, ensure adequate ecological flow, mitigate hunger, create jobs, provide secure drinking water for all, ensure year-round irrigation, reduce deforestation, and achieving sustainable development – all are closely interlinked with the water available from its transboundary international rivers.

Equitable and reasonable utilization and participation

Article 5(2) requires the participation and cooperation of watercourse States in the use of watercourses, Equitable, and reasonable development of and protection of the watercourse. It does not necessarily mean an equal share of waters both Ethiopia and Somalia. There are factors and circumstances should be taken into:

- ✓ Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character.
- ✓ Social and economic needs of the watercourse states concerned.
- ✓ Population dependent on the watercourse in each watercourse state.
- ✓ Effects of the use or uses of the watercourses in one watercourse state on other watercourse states.
- ✓ Existing and potential uses of the watercourse.
- ✓ Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect.
- ✓ The availability of alternatives, of comparable value, to a particular planned or existing use. The account in determining equitable and reasonable utilisation. These factors include:

Consultation and negotiation Principles

Any riparian state in a global watercourse is entitled to previous notification, consultation, and negotiation where the suggested use of a watercourse by another riparian may cause severe damage to its rights or interests. International conventions, agreements, and treaties usually accept these values. Most upstream countries often oppose this principle. It is interesting to note that during the negotiation process of the 1997 UN Watercourses Convention, these principles, which are included in Articles 11 to 18, were opposed by only three upstream riparian countries: Ethiopia (Nile basin), Rwanda (Nile basin) and Turkey

(Tigris–Euphrates basin) (Birnie, et al.2002).

The consultation among the countries include Somalia and Ethiopia will create a transparent process as a step forward to decide the benefit water allocations. Therefore, notification of dam constructions in their national territory is important to the riparian states. This mechanism also supports states which are likely to be impacted on proposed projects.

Cooperation and information exchange Principles

Each riparian state of a global watercourse must collaborate and exchange data and information on the state of the watercourse along the watercourse as well as current and future uses scheduled. It is very essential to share hydro-meteorological, physical, and environmental information between riparian nations. It would be worthwhile to make further research to provide guidelines for a data-sharing mechanism that would possibly suit and become workable in the context since the basin nations have never discussed collaboration on the waterways; there are no agreements between their riparian nations on their use.

These principles are recommended by Articles 8 and 9 of the 1997 UN Watercourses Convention makes these an obligation. Ethiopia and Somalia shall exchange easily accessible data and information on watercourse conditions periodically, in specific hydrological, meteorological, hydrogeological, and ecological data on water quality and associated forecasts.

Peaceful settlement of disputes

This principle promotes that all States in an international waterway should seek a settlement of conflicts by peaceful means if the States involved are unable to achieve a negotiated arrangement.

The two river basins cover geographically one-third of the complete land region of each riparian country. The basin regions of Ethiopia and Kenya are these countries ' least advanced regions. The basins, however, occupy the most populated and significant financial regions in Somalia, where powerful future financial developments are required. Because of the absence of safety in the three countries 'river basins, data collection and information are restricted and sometimes impossible to carry out any work. These principles are recommended by Articles 8 and 9 of the 1997 UN Watercourses Convention.

Obligation not to cause significant harm

According to this concept, no state in a foreign drainage basin is allowed to use watercourses in its territory in a manner that would cause significant harm to other basin states or their climate, including harm to human health or protection, to the use of water for beneficial purposes, or to the living organisms of watercourse systems. This principle is incorporated in the 1997 UN Watercourses Convention (Articles 7). Both Ethiopia and Somalia endorse the principles of cooperation, information exchange, consultation, notification, and negotiation. Both countries should prevent any alien or new species that may cause significant harm to the ecosystem and other watercourse states.

Needed river cooperation and Transboundary Basin Management

There are many issues that avoid negotiations and establish collaboration for sharing benefits through common leadership. Integrated and coordinated water resource management of Juba and Shabble Basin provides opportunities for the entire Horn of Africa region's growth. In domestic water policies, internationally accepted principles of Integrated Water Resources Management (IWRM) must be correctly tackled.

Addressing the globally accepted values of IWRM correctly in domestic water policies could lead to the streamlining of distinct policies and IWRM-related legal, institutional, and governance frameworks and thus encourage the application of IWRM values and plans (Siddiqi et al.2004).

Internationally accepted transboundary water resources management principles, e.g., the theory of limited territorial sovereignty; the principle of equitable and reasonable utilization; obligation not to cause significant harm; principles of cooperation, information exchange, notification, consultation and peaceful settlement of disputes could serve as guidelines for the efficient integrated management of global river basins ' water resources. These principles should be included in future bilateral and multilateral treaties between riparian nations in order to decrease conflict and exploit the complete potential of integrated water resource management. Ethiopia and Somalia have no previous contracts on the common use of water resources in these two rivers, which may trigger water use disputes in the future and impact the Horn of Africa's hydro politics (Elmi et al.210). Based on the above discussions, the researcher underlines the main two factors that contribute to and transponder water resource management:

Possible benefits from coordinated development

If correctly managed, the complete quantity of water in the Juba and Shabble basin is sufficient to satisfy the riparian countries ' social, financial, and environmental demands.

Integrated Juba and Shabble river basin management will offer the opportunity to:

- Improve water quality
- Maintain river flow characteristics
- Sustain biodiversity
- Sediment management,
- Salinity control downstream, and
- Increase fisheries and reduce industrial pollution to the river

Coordinated management of the Juba and Shabble basin has enormous potential to enhance the general financial condition of the three riparian nations (Ethiopia, Kenya, Somalia). Hydropower, meeting the agricultural requirements of the growing population of the basin, as well as flood and drought management is the most emerging growth area. Wise management of Juba and Shabble water by upstream large storage dams and reservoirs would promote and guarantee water flow during the dry season, thereby increasing agricultural activity.

Sadoff & Grey (2002) mention that water has played a significant role in a number of recent and current disputes and conflicts around the world, Thus, unbundling the significance of shared waters in the dynamics between riparian nations from other contributing variables in dispute is complex. An integrated step towards water management would decrease such tensions among riparian nations.

Management of transboundary waters is always challenging, both of the third worlds and in the rich industrial nations. Water conflicts in international watercourses around the world create serious political, economic, environmental, and social instability regionally and internationally.

Considering Water as an Economic Good

In many global statements, water is acknowledged as an economic good. Water, however, is a fundamental human need, and it should be everyone's right to access minimum amounts of safe water (20 liters per individual per day). Poverty and poor health are directly related to lack of access to safe drinking water, sanitation and irrigation The implementation of financial principles to water distribution is acceptable and offers a straightforward tool for more effective growth of water facilities

Conclusion

Water access is a fundamental human need and should be a fundamental right. Yet more than one billion individuals in the Horn of Africa region and in the developing world are denied access to clean water (UNDP, 2006). Somalia's water mismanagement has resulted in severe social issues. These issues are caused by environmental, social, and economic reasons. Widespread pollution has led to bad health and enhanced expenses for the poor, along with the declining infrastructure. Ecological Damage to livelihoods connected with loss or damage has been caused by pollution, water shortages, and irrigation. Water conflict and bad global collaboration have resulted in water shortages, floods, and inner tensions. Poverty has resulted from many of these previous issues.

Transboundary management of water must be based on a sound global legal framework. In the case of Juba and Shabble River, it needs the creation of sustainable inter-state legal collaboration based on international water law principles and tools.

Water management in Juba and Shabble Basin shall consider the creation, use, security, distribution, regulation, and control of water in terms of the quality and the quantity. The most important of them are (i) principle of equitable and reasonable utilization of waters, (ii) principle of "no significant harm," and (iii) principle of cooperation. The water of Juba and shabble revers is now seen as a factor that may be used to threaten the security of the region. The issue of water distribution is part of the general political security view. Delays in its solution can put the region under critical circumstances for inter-state collaboration, as water availability impacts financial and political growth. The duty of the States to collaborate is a prerequisite for implementing the equitable, sensible, and harmless management of transboundary water.

Recommendations

The author suggests making sure that water resources evaluation technologies are accessible to both countries (Ethiopia, Somalia) for effective management of water resources. It also proposes the establishment of databases on the availability of all forms of hydrological data at the national level and the assurance of data quality. These two water-related agreements are a significant development regarding the effective application of these principles and thereby promoting water management throughout the Horn of Africa.

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ISSN 2519-9781

Knowledge, Attitude, and Practice towards COVID-19 among the Faculty of Health Sciences Students at Mogadishu University, Somalia

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Abstract

This article is a study analysis on the Juba and Shabbelle Basins, in

Until June 23, 2020, 2,416 cases are registered and 85 deaths, in Somalia, with the majority of these deaths falling between the ages of 60 to 70. The country's authorities have applied necessary measures to prevent massive spread. This study aims to assess Knowledge, attitude, and practice (KAP) towards COVID-19 among Faculty of Health Sciences Students at Mogadishu University.

A descriptive cross-sectional study was carried out in April 11, 2020, two weeks immediately after the closure of Schools & Universities in Mogadishu, Somalia to June 28, 2020. The survey was online using a

KoBo Toolbox form distributed through "WhatsApp" groups. Health Sciences Students at Mogadishu University, who were explained the objectives and purpose of the study, who agreed to participate in the study, were asked to complete the questionnaire by clicking on the link.

A total of 258 participants completed the survey questionnaire. 60.5% of them were 21–23 years old, 70.5% were females; and 31.8% were in academic year four. Most of the respondents reported that COVID-19 is a virus infection (93.8%), COVID-19 is transmitted by close contact with the infected person (80.2%), and the main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia (84.1%). The majority of the respondents agreed that if getting COVID-19, they will accept isolation in health facilities (61.2%), wearing a well-fitting face mask is effective in preventing COVID-19 (83.7%), and COVID-19 will finally be successfully controlled (61.6%). The vast majority of the participants have worn a mask when in contact with people or leaving home (55.8%), frequently washed hands with soap or sanitizer (72.5%), had not visited any crowded place (40.3%), and sneezed between elbows (54.7%).

The knowledge about COVID-19 in the Faculty of Health Sciences Students of Mogadishu University during the outbreak was acceptable, attitudes have been mostly favorable and the practices are mostly adequate, however, it is necessary to implement massive education campaigns, to increase the proportion of knowledge about COVID-19, to stop its spread.

Keywords: Knowledge, Attitude, Practice, COVID-19, Health Sciences, Mogadishu

Background

Coronaviruses are a large group of viruses that are rather common throughout the community. Historically, evidence has shown that the virus is transmitted through birds and mammals, with humans being particularly vulnerable to infection and transmission of the virus (Huynh, Nguyen, Tran, Vo, Vo, & Pham, 2020). Coronavirus disease 2019 (COVID-19) is a global health and societal emergency respiratory disease that is caused by a novel coronavirus and was first detected in December 2019 in Wuhan, China. They are characterized by sudden onset, fever, fatigue dry cough, myalgia, and dyspnea. It is reported that 10-20 % of the patients develop severe cases, which is characterized by acute respiratory distress syndrome, septic shock, difficult-to-tackle metabolic acidosis, and bleeding and coagulation dysfunction (Hussain, Garima, Singh, Ram & Tripti, 2020). Implementing personal hygiene and public health behaviors such as handwashing and social distancing are necessary to curb the spread of coronavirus, but it will be challenging to practice these in many cities and rural areas in developing settings (Dahab, van Zandvoort, Flasche, Warsame, Spiegel, Waldman, & Checchi, 2020). Without sustained bans on large gatherings (including specific cultural and faith practices such as mass prayer gatherings, large weddings and funerals) these may create super-spreading events that accelerate transmission (Wong, Liu, Liu, Zhou, Bi, & Gao, 2015). This situation may be compounded by the spread of COVID-19 misinformation including unsupported treatments or promotion of ineffective preventive behaviors (Vigdor, 2020).

Globally, till 8th April 2020, total cases of infection reach 1,536,652 and the death toll is 89,907 and the trend is going up, however, so far

340,349 persons were recovered from COVID-19. The lungs are the most affected organs in this disease as the virus enters via the enzyme called angiotensin-converting enzyme 2 (ACE2) which is most profuse in the type II alveolar cells of the lungs Bhuiyan, M., Ananna, Chowdhury, Ahmed, & Rahman, 2020). Consequently, on March 11, 2020, the World Health Organization (WHO) declared that COVID-19 is a pandemic disease (Weiss & Murdoch, 2020).

Furthermore, the disease significantly affects everyday life, resulting in a socio-economic crisis (Qualls, Levitt, & Neha, 2017). According to the WHO report, to date, more than 5.5 million cases, and 353,334 confirmed deaths were recorded in the world (WHO, n.d.). Even though the number of cases and deaths in Africa seems low, it may increase alarmingly than that of reports in Europe and America unless appropriate intervention is implemented.

Somalia is among African countries that have been hit by the COVID-19 epidemic. Until June 23, the country has had 2,416 cases of COVID-19 and 85 deaths, with the majority of these deaths falling between the ages of 60 to 70. Many of these patients are not recovering because of a lack of oxygen in the country's health facilities. WHO Somalia purchased three oxygen machines to fill the gap (WHO, n.d.). Several measures have been adopted to control the COVID-19 transmission in Somalia, including closing all schools and universities, observing physical distancing, the prohibition of mass gathering, isolation, and care for infected people and suspected cases. To facilitate the outbreak management of COVID-19 in Somalia, there is an urgent need to understand the public’s awareness of COVID-19 at this critical moment. In this study, I investigated the KAP towards COVID-19 of

Faculty Health Sciences Students at Mogadishu University during the rapid rise period of the COVID-19 outbreak.

Methods & Materials

Study Design & Study Participants.

This study was designed to obtain information regarding the knowledge, the attitude, and the practice towards COVID-19 among Health Sciences Students at Mogadishu University. A descriptive cross-sectional were used to obtain the data from 11 April 2020, two weeks immediately after the lockdown of Universities & Schools in Mogadishu, Somalia to 28 June 2020.

Data Collection.

As we all know, social-distancing is the best way of prevention from COVID-19, therefore, instead of conducting a community-based survey, this study collected the data using the KoBo Toolbox form as an online survey. The link form was posted and circulated using Whatsapp Group by sending the list of study participants to the secretary of the faculty as well as the class monitors. The study used a quantitative method to achieve the study objectives.

A self-designed questionnaire was prepared, which comprised two parts: the first part of the questionnaire covered demographic information of the study participants and the second part contained questions for KAP assessment. The questions were established based on some published literature and the author's experience of KAP. After the preparation of the questionnaire, it was sent to some experts to consult their opinions regarding the validity of the questionnaire followed by a small pilot study

to test its simplicity and difficulty. However, the results of the pilot study were not included in the actual samples used for the study.

Sample Size & Sampling Procedure.

Yamane (1967) formula was used to determine the sample size; n= N ÷ 1 + N (e^2); 723 ÷ 1 + 723 $(0.05)^2$ = 258. Therefore, a total of two-hundred and fifty-eight subjects was selected to give their responses. A simple random- type of probability sampling was used in this study.

Data Analysis.

The collected data was analyzed using SPSS 16 computer software package appropriately; the percentage was used as a statistical test. Data cleaning was performed to check for accuracy, consistencies, missed values, and variables. Any error was identified and corrected. The t-test was examined to determine the variance of participants' responses according to their age, gender, and academic years.

Ethical Considerations.

The study participants were informed about the details of the study objectives for filling the questionnaire and confidentiality at the beginning of the survey, and informed consent was obtained from each participant. It has been disclosed to all the participants that their identity will keep confidential and the results will be used only for research purposes

Results

Demographic Information of the Study Participants.

Frequency and percentage of all the demographic characteristics like age, gender & academic year are represented in Table 1. Out of the 258 participants, 60.5% were 21–23 years old, 70.5% were females; and 31.8% were in academic year four.

Table 1: Demographic Information of the Study Participants.

Variable	Frequency	Percent
Age group (years)		
18 – 20	95	36.8
21 – 23	156	60.5
24+	7	2.7
Gender		
Male	76	29.5
Female	182	70.5
Academic Year		
1st year	44	17.1
2nd year	67	25.9
3rd year	65	25.2
4th year	82	31.8

Knowledge of COVID-19 among Health Sciences Students.

The respondents were asked eight (8) questions to identify the knowledge of COVID-19 among health sciences students (Table 2a & 2b). Most of the respondents reported that COVID-19 is a virus infection (93.8%), COVID-19 is transmitted by close contact with the infected person (80.2%), and the main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia (84.1%).

Table 2a: Knowledge of COVID-19 among Health Sciences Students.

Item	Variable	International health organization e.g., WHO	Government sites and media e.g., MoH-Somalia	Social media e.g., WhatsApp, Facebook	News media e.g., TV, radio, newspaper	Friends, relatives
K1	Source of information on COVID-19	123 (47.7%)	49 (19.0%)	64 (24.8%)	16 (6.2%)	6 (2.3%)

Table 2b: Knowledge of COVID-19 among Health Sciences Students.

Item	Variable	Yes	No	I don't know
K2	COVID-19 is a virus infection	242 (93.8%)	7 (2.7%)	9 (3.5%)
K3	COVID-19 is transmitted by close contact with the infected person	207(80.2%)	259.7	2610.1
K4	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia	217(84.1%)	27 (10.5%)	14 (5.4%)
K5	The person with COVID-19 cannot infect the virus to others when a fever is not present	95 (36.8%)	110 (42.6%)	53 (20.5%)
K6	The isolation period of COVID-19 is 2 weeks	210 (81.4%)	26 (10.1%)	22 (8.5%)
K7	COVID-19 vaccine is available in markets	61 (23.6%)	166 (64.3%)	31 (12.0%)
K8	There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	191 (74.0%)	31 (12.0%)	36 (14.0%)

Attitude of COVID-19 among Health Sciences Students.

The respondents were asked eight questions to identify the attitude of COVID-19 among health sciences students (Table 3). The majority of the respondents agreed that if getting COVID-19, they will accept isolation in health facilities (61.2%), wearing a well-fitting face mask is effective in preventing COVID-19 (83.7%), and COVID-19 will finally be successfully controlled (61.6%).

Table 3: Attitude of COVID-19 among Health Sciences Students.

Item	Variable	Agree	Neutral	Don't agree
A1	Black race is protective toward COVID-19 disease	82 (31.8%)	0 (0.0%)	176 (68.2%)
A2	You think you will probably get COVID-19 illness	120 (46.5%)	0 (0.0%)	138 (53.5%)
A3	If getting COVID-19, you will accept isolation in health facilities	158 (61.2%)	0 (0.0%)	100 (38.8%)
A4	You are worried one of your family members may get a COVID-19 infection	132 (51.2%)	0 (0.0%)	126 (48.8%)
A5	Wearing a well-fitting face mask is effective in preventing COVID-19	216 (83.7%)	0 (0.0%)	42 (16.3%)
A6	Using a hand wash can prevent you from getting COVID-19	221 (85.7%)	0 (0.0%)	37 (14.3%)
A7	Somalia is in a good position to contain COVID-19	101 (39.1%)	0 (0.0%)	157 (60.9%)
A8	COVID-19 will finally be successfully controlled	159 (61.6%)	0 (0.0%)	99 (38.4%)

Practice of COVID-19 among Health Sciences Students.

The respondents were asked eight questions to identify the practice of COVID-19 among health sciences students (Table 4). The vast majority of the participants have worn a mask when in contact with people or leaving home (55.8%), frequently washed hands with soap or sanitizer (72.5%), had not visited any crowded place (40.3%), and sneezed between elbows (54.7%).

Table 4: Practice of COVID-19 among Health Sciences Students.

Item	Variable	Always	Occasional	Never
P1	Recently have gone to any crowded place	54 (20.9%)	100 (38.8%)	104 (40.3%)
P2	Recently have worn a mask when in contact with people or leaving home	144 (55.8%)	65 (25.2%)	49 (19.0%)
P3	Recently have refrained from shaking hands	104 (40.3%)	111 (43.0%)	43 (16.7%)
P4	Recently have maintained social distances	132 (51.2%)	94 (36.4%)	32 (12.4%)
P5	Frequently washed hands with soap or sanitizer	187 (72.5%)	69 (26.7%)	2 (0.8%)
P6	Frequently touched mouth or eyes or nose	87 (33.7%)	87 (33.7%)	84 (32.6%)
P7	Sneezed between elbows	141 (54.7%)	78 (30.2%)	39 (15.1%)
P8	Usually share food or water pot with others	100 (38.8%)	62 (24.0%)	96 (37.2%)

Table 5: t-test Analysis of Students Responses Variance Based on Their Age, Gender and Academic Year towards KAP.

Item	Variable	Age group (years)		Gender		Academic Year	
		T	Sig.	T	Sig.	T	Sig.
Knowledge Scores							
K1	Source of information on COVID-19	-3.189	.002	2.328	.021	.434	.665
K2	COVID-19 is a virus infection	-1.311	.191	-.199	.843	-1.367	.173
K3	COVID-19 is transmitted by close contact with the infected person	-.458	.647	.476	.635	-2.360	.019
K4	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia	-1.075	.284	-1.867	.063	-.839	.402
K5	The person with COVID-19 cannot infect the virus to others when a fever is not present	1.199	.232	.827	.409	-.728	.467
K6	The isolation period of COVID-19 is 2 weeks	-1.708	.089	.888	.376	-1.304	.194
K7	COVID-19 vaccine is available in markets	.597	.551	1.223	.222	-.237	.813
K8	There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	-3.819	.000	1.060	.290	-1.278	.202
Attitude Scores							
A1	Black race is protective toward COVID-19 disease	-.521	.603	.244	.807	1.594	.112
A2	You think you will probably get COVID-19 illness	.968	.334	.371	.711	.511	.610
A3	If getting COVID-19, you will accept isolation in health facilities	.769	.443	-2.012	.045	.829	.408

Item	Variable	Age group (years)		Gender		Academic Year	
		T	Sig.	T	Sig.	T	Sig.
A4	You are worried one of your family members may get a COVID-19 infection	1.500	.135	-.781	.435	.745	.457
A5	Wearing a well-fitting face mask is effective in preventing COVID-19	3.869	.000	-1.441	.151	2.132	.034
A6	Using a hand wash can prevent you from getting COVID-19	-2.966	.003	-.297	.766	-1.041	.299
A7	Somalia is in a good position to contain COVID-19	2.317	.021	.024	.981	-.590	.556
A8	COVID-19 will finally be successfully controlled	-.232	.817	1.256	.211	2.634	.009
Practice Scores							
P1	Recently have gone to any crowded place	-.701	.484	2.58	.001	.771	.441
P2	Recently have worn a mask when in contact with people or leaving home	2.204	.028	-.669	.504	.251	.802
P3	Recently have refrained from shaking hands	-2.300	.022	3.452	.001	-2.269	.024
P4	Recently have maintained social distances	1.901	.059	-.060	.952	2.499	.013
P5	Frequently washed hands with soap or sanitizer	-.862	.390	-1.422	.156	.307	.759
P6	Frequently touched mouth or eyes or nose	-1.440	.151	-.770	.442	1.276	.203
P7	Sneezed between elbows	.067	.946	1.188	.236	.052	.959
P8	Usually share food or water pot with others	.051	.959	-.804	.422	-2.283	.023

Discussion of Findings

Table 5 describes the scores of knowledge, attitude, and practices towards COVID-19 concerning demographic variables such as age,

gender, and academic year. COVID-19 related knowledge was assessed by 8 items. Each question and its options were described in Table 2a & 2b. To further analyze, the age-category of 21–23 was higher for K1 and K8 than the other categories; the females had significantly higher score for K1 than the males; academic year four students had significantly higher score for K3 than other academic years. Other items were found with no statistically significant difference between groups (Table 5)

Items about COVID-19 attitude including 8 single choice questions. Each question and its options were described in Table 3. The age-category of 21–23 was higher for A5, A6 and A7 than the other categories. The females had scored significantly higher for A3 than the males. Higher grade students scored significantly higher for A5 and A8 than freshmen (Table 5). Practice related to COVID-19 was assessed by 8 single-choice questions. Each question and its options were described in Table 4. The age-category of 21–23 was higher for P2 and P3 than the other categories. The females had significantly higher score for P1 and P3 than the males. Students in academic years four had significantly higher score for P3, P4 and P8 than other academic years (Table 5).

It is worth mentioning that sufficient COVID-19 knowledge scores, positive attitude, and adequate practice were found among the students. Demographic factors, especially the association between gender and KAP towards COVID-19 are generally consistent with previous studies on COVID-19 and SARS in 2003 (Zhong, Luo, Li, Zhang, Liu & Li, 2020). The results are in agreement with the study conducted by (Peng, Pei, Zheng, Wang, Zhang, Zheng & Zhu., 2020) who cited that the knowledge scores of the female were slightly higher than that of males, as well as higher scores of females were observed in the attitude and practice as compared with that of males. In addition, the difference in practice scores was significant between different genders. The KAP score for the age-category of 21-23 was higher than the other categories, with

no significant difference among groups. The major limitation of the present study is that the sample sizes are limited to the students of Health Sciences Faculty at Mogadishu University, and hence the results based on the used sample sizes could not be generalized to all the populations of Mogadishu and Somalia as well, although it can certainly help the state and the country to enhance the awareness regarding KAP in the general population. Due to the questionnaire being self-answered by the participants, there is also a high chance of errors or misrepresentation of information. Less demographic variables is also a limitation.

Conclusion & Recommendations

Most Faculty of Health Sciences Students were informed of basic information, possessed positive attitude and proactive practice towards COVID-19, indicating the efficacy of present public health campaign. However, results also revealed that age, gender, and academic year should be taken into consideration when health and education authorities formulate tailored public health training and improve their preventative measures against the epidemic.

Although the results are positive towards KAP, the research has some suggestions for both the government and residents of Mogadishu Somalia as well: Appropriate preventive measures, healthy practices, and instructions must be strictly implemented by the government with the help of concerned agencies and organizations. 19% of the participants still not worn a mask when in contact with people or leaving home, therefore, the importance of these protective items should be emphasized more. Consequently, health promotion activities are vital in improving KAP towards COVID-19, and it is recommended to conduct interventional studies using the results of this study. Considering that the present study assessed only three demographic variables (age, gender & academic year), so it is also recommended that more demographic factors should be included in further studies.

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